Outer Dowsing Offshore Wind

Environmental Statement

Chapter 9 Benthic and Intertidal Ecology

Volume 3 Appendices

Appendix 9.1

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Benthic Ecology OWF Area Results Report (Vol. 1)

UK4855H-824-RR-01

GEOxyz Document Number: UK4855H-824-RR-01

Revision: 1.2

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Document	Name	Position	Date	Signature
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COMPANY PROPRIETARY INFORMATION

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DEFINITIONS AND ABBREVIATIONS

Where abbreviation used in this document are not included in this list, it may be assumed that they are either equipment brand names or company names.

Table 1 Abbreviations Used in this Document

Acronym	Description	Acronym	Description
ANZECC	Australian and New Zealand Environment and Conservative Council	MBT	Monobutyltin
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand	MCZ	Marine Conservation Zone
BAC	Background Assessment Concentration	MCZ	Marine Conservation Zones
BC	Background Concentration	MESH	Mapping European Seabed Habitats
BDC	Biodiversity Committee	MMO	Marine Management Organisation
BGS	British Geological Survey	MNCR	Marine Nature Conservation Review
BSL	Benthic Solutions Limited	MP	Megapixel
cAL 1 and 2	CEFAS Action levels 1 and 2	MPA	Marine Protected Area
CBD	Conservation of Biological Diversity	N/S	No Sample
CCME	Canadian Council of Ministers of the Environment	NMBAQC	National Marine Biological Analytical Quality Control
Cefas	Centre for Environment, Fisheries and Aquaculture.	NMCAQC	National Chemistry Analytical Quality Control
CEMP	Coordinated Environmental Monitoring Programme	NMEAQC	National Marine Ecotoxicological Analytical Quality Control Group
CLUSTER	hierarchical agglomerative clustering	NMMP	UK National Marine Monitoring Programme
CV	coefficient of variation	OCP	Organochlorine pesticides
DBT	Dibutyltin	OGA	Oil and Gas Authority
DDT	Dichlorodiphenyltrichloroethane	OGUK	Oil and Gas United kingdom
EAC	environmental assessment criteria	OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
EBS	Environmental Baseline Survey	OWF	Outer Dowsing Offshore Windfarm
EC	European Commission	PAH	Polycyclic Aromatic Hydrocarbon
ECC	export Cable corridor	PC	Physio-chemistry
ED50	European Datum 1950	PCB	Polychlorinated Biphenyls
EIA	Environmental Impact Assessment	PCBs	polychlorinated biphenyls
EMODnet	European Marine Observation and Data Network	PEL	probable effect Level
EOL	End of Line	PEP	Project Execution Plan
EPA	Environmental Protection Agency	PSD	Particle Size Distribution
ERL	Effects Range Low	SAC	Special Area of Conservation
ERM	Effects Range Median	SACFOR	MNCR cover/density scales
EU	European Union	SAP	Species Action Plan

Acronym	Description	Acronym	Description
EU	European Union	SAPs	Species Action Plans
EUBS	European Union Biodiversity Strategy	SBP	Sub-bottom Profiler
EUNIS	European University Information Systems organisation	SBP	sub-bottom profiler
F1	Fauna grab sample 1	SCI	Site of Community Importance
FOCI	Features of Conservation Interest	SCI	Sites of Community Importance
GC-MS	Gas Chromatography Mass Spectrometry	SD	Standard Deviation
GEOxyz	GEOxyz Offshore UK Limited	SIC	Single Ion Current
GIG	Macquarie's Green Investment Group	SNS	Southern North Sea
GIS	Geographic Information System	SOL	Start of Line
GIS	Geographic Information System	SPA	Special Protection Areas
GT R4 Limited	50/50 joint venture between TotalEnergies and Macquarie's Green Investment Group (GIG)	SQGV	Sediment Quality Guideline value
GW	Gigawatt	SS.SCS.CCS / A5.14 / MC32	Circalittoral Coarse Sediment
HAP	Habitat Action Plan	SS.SCS.ICS / A5.13 / MB3	Infralittoral Coarse Sediment
HAS	Habitat Assessment Survey	SS.SCS.OCS / A5.15 / MD3	Offshore Circalittoral Coarse Sediment
HAS	Habitat Assessment Spreadsheet	SS.SMx.CMx / A5.44 / MC42	Offshore Circalittoral Mixed Sediment
HC	Hydrocarbons	SS.SSa.CFiSa / A5.25 / MC5	Circalittoral Sand
HD	High Definition	SS.SSa.IFiSa / A5.23 / MB5	Infralittoral Sand
HF	High Frequency	SS.SSa.OSa / A5.27 / MD5	Offshore Circalittoral Sand
HG	Hamon Grab Sampler	SSS	Side Scan Sonar
HG	Hamon Grab	TBT	tributyltin
HM	Heavy Metals	TEL	Threshold Effect level
HR	High Resolution (seismic)	TOC	Total Organic Carbon
HSG	Herring Spawning Ground	UHR	Ultra-High Resolution (seismic)
INNS	Invasive Non-native Species	UK	United Kingdom
JNCC	Joint Nature Conservation Committee	UK BAP	United Kingdom Biodiversity Action Plan
LAT	Lowest Astronomical Tide	UKCS	United Kingdom Continental Shelf
LED	Light-emitting Diode	UKOOA	United Kingdom Offshore Operators Association
LOD	Limit of Detection	UTC	Universal Time Coordinated
MAG	Magnetometer	UTM 31	Universal Transverse Mercator – Zone 31
MESH	Mapping European Seabed Habitats	WGS84	World geodetic system 1984
MBES	Multi Beam Echo Sounder		

1 EXECUTIVE SUMMARY

A habitat assessment and environmental baseline survey was carried out by GEOxyz, in association with Benthic Solutions Limited (BSL), for GT R4 Limited within the Outer Dowsing Offshore Windfarm (OWF) site in the southern North Sea. Survey operations were carried out aboard the *Geo Ocean III* between the 3rd and 13th of April 2022. This report details the habitat and environmental survey operations conducted as part of the environmental phase 1 OWF scope.

Environmental sampling at the OWF site involved the acquisition of physico-chemical and macrofauna samples using a Hamon grab for particle size analysis (PSA) and total organic carbon (TOC) and a Shipek grab for contaminant analysis at 80 and 30 stations, respectively, along with underwater footage and still photographs from 30 stations using a MOD4 camera system. Eight >500m epibenthic trawls were also carried out across the OWF site. Sampling and camera locations were pre-selected by GoBe Consultants prior to mobilisation, with modifications to the scope based on infield observations from Benthic Solutions Limited.

The water depth across the OWF survey area was variable with depths ranging between 5m to 47m below LAT. The seabed across the entire OWF survey area undulated due to the presence of sand waves, megaripples, sandbanks and canyons. The seabed sediments were generally dominated by either sands or gravel with a low but variable proportion of fines. Higher proportions of sand were recorded at shallow depths associated with sandbank features. While the proportion of gravel in the form of pebbles and gravel matrixes interspersed with sand was observed in deeper area of the survey extent. Regional comparisons to the survey area indicates a natural distribution of sediments, unimpacted by seabed infrastructure is present within the OWF array. TOC levels were low across the survey area.

The total polycyclic aromatic hydrocarbons (PAHs) were generally low across the survey area with an elevated ∑16PAH and ∑22PAH recorded at one station sampled within a canyon feature. Polychlorinated biphenyls (PCBs), organotins and organochlorine pesticides were recorded at relatively low concentrations, which in conjunction with the low PAHs suggests a natural distribution of aromatic hydrocarbons across the site.

Trace metal concentrations showed no particular spatial pattern with most at background levels. Elevated concentrations above the United Kingdom offshore operators association (UKOOA) thresholds was observed for mercury, nickel, zinc, copper and arsenic; however, all with the exception of arsenic and nickel were below their respective sediment quality guideline value (SQGV) and were deemed to be 'low risk' within the OWF survey area. Arsenic and nickel exceeded their SQGVs at several stations but at levels which would be considered acceptable as the concentrations recorded were below the background levels determined from previous surveys conducted by BSL for different operators close to the OWF survey area.

Benthic macrofaunal species richness and faunal abundance was variable across the survey area and reflected the sand and gravel dominated sediments present, with a total of 4,429 individuals recorded. Review of the macrofauna dataset using multivariate statistics revealed seven significantly different macrofaunal cluster groupings within the survey area, with differences in macrofaunal assemblages attributed to the exclusion of certain taxa and the underlying mapping European seabed habitats (MESH) sediment classifications.

Epibenthic trawl species richness and faunal abundance also reflected the sand and gravel dominated sediments throughout the survey area, with 4,866 individuals recorded across 91 species. Review of the trawl macrofaunal dataset using multivariate statistics revealed the sediment composition and presence/absence of the polychaete, *Sabellaria spinulosa* was the reason for the significantly different epifaunal community present across the survey area. The grab macrofaunal and epifaunal trawl datasets were considered to represent natural background infaunal and epifaunal conditions for this region of the southern North Sea.

The seabed across the OWF survey area corresponded well to the reflectivity in side scan sonar data across the site and was therefore assigned seven level four JNCC/EUNIS habitat types: MB52 'Atlantic infralittoral fine sand' (SS.SSa.IFiSa), MC52 'Atlantic circalittoral fine sand' (SS.SSa.CFiSa), MD52 'Atlantic offshore circalittoral sand' (SS.SSa.OSa), MB32 'Atlantic infralittoral coarse sediment' (SS.SCS.ICS), MC32 'Atlantic circalittoral coarse sediment' (SS.SCS.CCS), MD32 'Atlantic offshore circalittoral coarse sediment' (SS.SCS.OCS) or MC32/MC42'Atlantic circalittoral coarse and mixed sediment'(SS.SCS.CCS/SS.SMx.CMx). A review of the infauna and epifaunal datasets indicated the presence of several level five habitat types but all were considered impoverished examples: MB5231 'Infralittoral mobile clean sand with sparse fauna' (SS.SSa.IfiSa.ImoSa), MB5233 '*N. cirrose* and *Bathyporeia* sp. in infralittoral sand' (SSa.IFiSa.NcirBat), MD5212 '*Owenia fusiformis* and *Amphiura filiformis* in offshore circalittoral sand or muddy sand' (SS.SSa.OSa.OfusAfil), MB3231 'Sparse fauna on a highly mobile sublittoral shingle (cobbles and pebbles)' (SS.SCS.ICS.SSh), MC3211 '*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles' (SS.SCS.CCS.SpiB), MD3312 '*Hesionura elongata* and *Protodorvillea kefersteini* in offshore coarse sand' (SS.SCS.OCS.HeloPkef), MC4214 '*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment' (SS.SMx.CMx.FluHyd) and MC2211 '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (SS.SBR.PoR.SspiMx).

The associated fauna evident from video footage and still photographs revealed the finer sand dominated sediments had an impoverished epifaunal community when compared to visual inspections of the coarse and mixed sediment habitats due to the greater abundance of hard substrate in the form of cobbles and pebbles present across the coarser sediment habitats, which enables the development of complex epifaunal communities. However, Chordata such as sandeels (*Ammodytes* sp.), plaice (*Pleuronectes platessa*), dragonets (*Callionymus lyra*), lesser weever fish (*Echiichthys vipera)* and pogges (*Agonus cataphractus*) were sighted more often in sand dominated habitats.

Camera transects over intermediate areas of circalittoral coarse and mixed sediments showed some evidence of Annex I stony reef. However, only a single transect (OWF_VID_57) was classified as 'Low Reef' due to the increased composition and elevation of cobbles present. Station OWF_57 had epifauna present at sufficient densities to be considered 'possible reef with sand veneer' or 'reef with sand veneer', but lacked the mean reef species count to be confidently assigned as an area of Annex I stony reef. Similarly, the presence of *Sabellaria spinulosa* aggregations could indicate the presence of *S. spinulosa* reef within areas of circalittoral coarse and mixed sediments; however, further review indicated the aggregations were too patchy to be classified as Annex I reef.

The OWF site is situated between five delineated sandbanks ('Additional Bank 93'and 'Additional Bank 97', Additional Bank 96', Additional Bank 94' and Additional Bank 92'); however, these sandbanks do not form part of any designated Special Areas of Conservation (SACs). Numerous sandeels were observed on the video footage across the sand dominated sediments and the majority of the stations were classified as Prime' and 'Suitable' sandeel grounds. Areas of Atlantic circalittoral coarse sediment, Atlantic offshore circalittoral coarse sediment and Atlantic infralittoral coarse sediment were the most optimal for herring spawning grounds, ranging from 'Sub-prime' to 'Prime', indicating a high likelihood of herring spawning.

No live specimens of ocean quahog (*Arctica islandica*) were observed on underwater video footage or retained with grab or epibenthic trawl datasets. Therefore, it is unlikely for the ocean quahog to occur within the OWF survey area. The slipper limpet (*Crepidula fornicata*) was the only non-native species identified within the survey area.

2 INTRODUCTION

2.1 PROJECT OVERVIEW

An environmental baseline survey (EBS) and habitat assessment survey (HAS) was carried out by GEOxyz in association with Benthic Solutions Limited (BSL) for GT R4 Limited within the Outer Dowsing Wind Farm (OWF) development area located in the southern North Sea (SNS) (Figure 1). Survey operations were carried out aboard the *Geo Ocean III* between 3rd and 13th April 2022.

A geophysical survey across the OWF survey area was performed by Enviros Survey and Consultancy using a vessel-mounted multibeam echosounder (MBES), side scan sonar (SSS), sub-bottom profiler (SBP), magnetometry (MAG) and ultra-high resolution (UHR) seismic prior to the commencement of the phase 1 environmental survey. Environmental seabed sampling and video assessments were carried out across the OWF survey area to provide a regional understanding of the different habitats encountered. Data was acquired through sampling of the seabed using a Hamon grab (HG) at 80 stations and a Shipek grab at 30 stations. Seabed video footage was acquired using the BSL MOD4.2 and MOD4.4 camera systems mounted within a BSL freshwater lens drop down frame equipped with a separate strobe, LED lamps and high definition (HD) camera (Appendix C).

This report is focused on the phase 1 habitat investigation and environmental survey operations conducted within the OWF survey area located across 11 UKCS Blocks: 48/11a, 48/11c, 48/12f, 48/12d, 48/12b, 48/12c, 48/17a, 48/12a, 48/13b, 48/13a and 48/8b. The phase 5 environmental survey operations conducted along the export cable corridor (ECC) and funnel area will be reported separately.

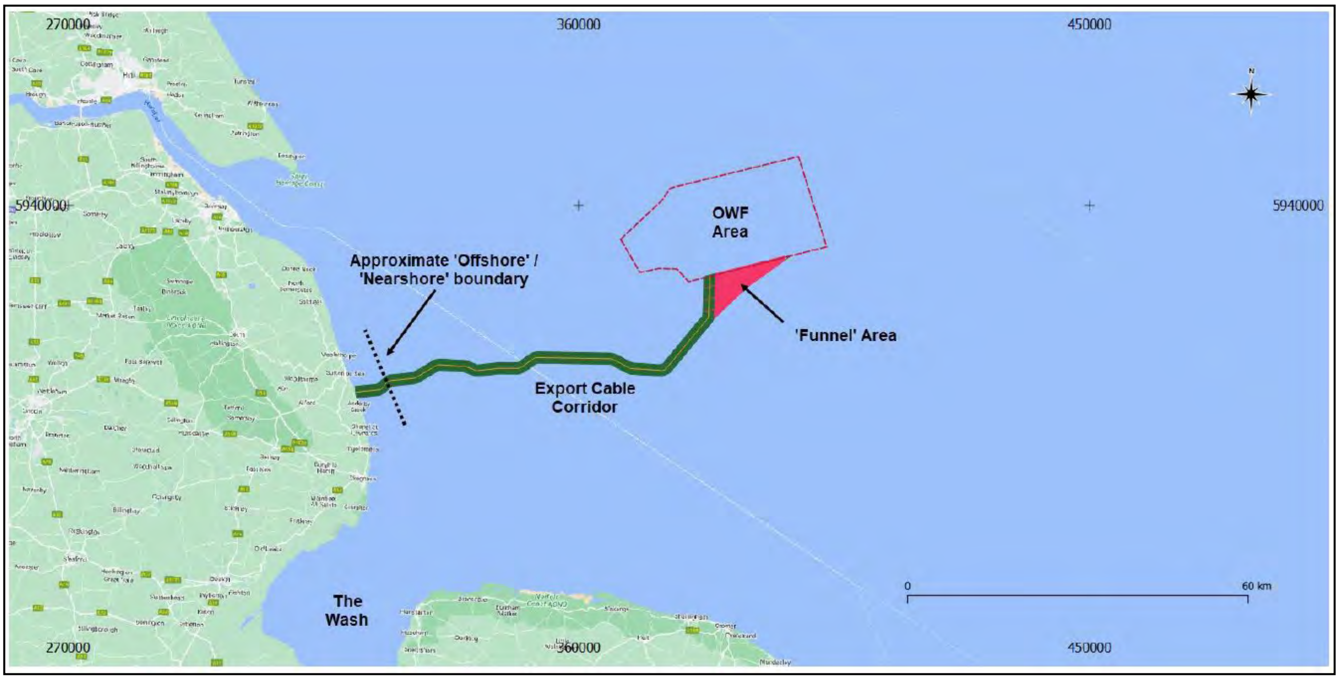


Figure 1 Project Location Overview

2.2 SCOPE OF WORK

The survey included characterisation of the benthos and investigation of the sediment physico-chemistry (PC) to provide an understanding of the baseline conditions to support the environmental impact assessment process in support of the OWF consent application.

The main objectives of the environmental baseline survey and habitat investigation were to:

- Acquire sediment PC and biological characteristics across the survey area to establish a baseline against which will be used to support the EIA baseline characterisation process;
- Provide high-resolution still images and corresponding video at specific stations to ground truth and characterise benthic habitat;
- Identify the occurrence and distribution of any habitats or species of conservation interest, including Annex I habitats, Annex II species and Annex V species of the EC Habitats Directive, species listed under Schedule 5 of the Wildlife and Countryside Act, designated features of the MPA network, species and habitats listed in the OSPAR List of Threatened and/or Declining Species and Habitats, and the UK Post-2010 Biodiversity Framework (formerly the UK Biodiversity Action Plan Priority Habitat descriptions);
- Ground-truth the selected sites for the presence or absence of sensitive habitats, such as stony reefs and biogenic reefs using seabed imagery (stills and video);
- Determine the presence of any invasive non-native species (INNS) in the OWF footprint area;
- Characterise the benthic subtidal environment in the OWF footprint area and assign habitat types to biotope level according to the JNCC/EUNIS habitat classification system.

2.3 REPORTING STRUCTURE

The following reports will be provided by BSL, relating to the habitat assessment and environmental baseline surveys conducted during phase 1 environmental operations across the OWF survey area:

- UK4855H-824-FR-01: Phase 1 Benthic Ecology Survey Field Report
- **UK4855H-824-FR-01: Benthic Ecology OWF Area Results Report (Vol. 1) (This Report)**

The following reports have been provided by GT R4 Limited relating to the geophysical surveys conducted across the OWF survey area:

- ENV21-21042-GTR4-02_Rev.01: Outer Dowsing Offshore Wind Farm Geophysical UHRS And Light Geotechnical Survey, East Anglia, Offshore UK

2.4 GEODETIC PARAMETERS

2.4.1 Horizontal Reference

The horizontal datum will be referenced to the WGS84 Datum, UTM 31N projection. The datum and projection parameters used are provided below in Table 2 and Table 3.

Table 2 Datum Parameters

Coordinate Reference System: World Geodetic System 1984 / UTM Zone 31 North	
Datum	World Geodetic System 1984
Prime Meridian	Greenwich
Ellipsoid/Spheroid	World Geodetic System 1984
Semi Major Axis (a)	6378137.000m
Semi Minor Axis	6356911.946m
Inverse flattening (1/f)	298.25
Projection	UTM Zone 31 North (EPSG Code: 23031)
Coordinate Operation Method	Universal Transverse Mercator
Latitude at Origin	00° 00’ 00” N
Longitude at Origin/Central Meridian	003° 00’ 00” E
False Easting	500000
False Northing	0m
Scale Factor at Central Meridian	0.9996

Table 3 Projection Parameters

Coordinate Transformation	
Coordinate Transformation	ED50 to WGS84 (18)
Transformation Version	UKOOS-CO
Transformation Variant	18
EPSG Code	1311
Source CRS	ED50
Target CRS	WGS84
X-axis translation (m)	+89.5m
Y-axis translation (m)	+93.8m
Z-axis translation (m)	+123.1m
X-axis rotation (arc-second)	0.0”
Y-axis rotation (arc-second)	0.0”
Z-axis rotation (arc-second)	–0.156”
Scale difference (ppm)	+1.2ppm

2.4.2 Vertical Reference

The vertical datum for the project was Lowest Astronomical Tide (LAT). Height data was acquired in relation to the ellipsoid and translated to the project vertical datum (LAT) as defined by the United Kingdom Office Vertical Offshore Reference Frame geoid model at the project location. LAT is 2.45m below Mean Sea Level (MSL) within the survey area.

2.5 BACKGROUND INFORMATION

2.5.1 Background Information on the OWF Survey Area

The offshore wind leasing round 4 in England was launched in 2018 by the Crown Estate with the aim of identifying 7 GW of new offshore wind projects in UK waters. The round 4 tender process concluded in February 2021 with six new offshore wind projects selected in England and Wales. The Outer Dowsing Offshore Wind Farm (OWF) project, a 50/50 joint venture between TotalEnergies and Macquarie's Green Investment Group (GIG), is predicted to be commissioned in 2027 and is estimated to provide 1.5GW of energy annually (GT R4 Limited, 2022).

The OWF survey area, located approximately 60km East of the Humber Estuary, is situated across 11 UKCS Blocks (48/11a, 48/11c, 48/12f, 48/12d, 48/12b, 48/12c, 48/17a, 48/12a, 48/13b, 48/13a and 48/8b) and spans across seven gas fields (Pickerill, Malory, Excalibur, Mordred, Galahad, Barque S and Barque) and five existing gas installations (Pickerill A, Pickerill B, Malory, Galahad and Galahad Tee). Table 4 displays the historical wells found to be within the OWF survey area boundary. Wells located outside of the OWF survey boundary were considered to be outside the potential effect range for contamination from these sources.

Table 4 Historical Well Information

DECC Well Origin Wellbore Name	Well Origin Spud Date	Spud Completion Date	Original Well Intent	Current Status	Water Depth (m)
48/13a-B6	09/09/1991	16/11/1991	Development	Completed (Shut In)	24.4
48/13a-B10	24/05/1994	03/09/1994	Development	Completed (Shut In)	23.2
48/17b- 7Z	05/11/1988	23/01/1989	Exploration	Abandoned Phase 3	19.8
48/17b- 7	19/09/1988	05/11/1988	Exploration	Abandoned Phase 3	19.8
48/17a- 8	08/01/1989	01/03/1989	Exploration	Abandoned Phase 3	21.3
48/13b- 8	20/01/1985	15/04/1985	Appraisal	Abandoned Phase 3	30.2
48/13b- 3	09/03/1982	12/05/1982	Exploration	Abandoned Phase 3	25.3
48/13a-B9	02/08/1992	03/10/1992	Development	Completed (Operating)	23.2
48/13a-B8Z	31/03/1992	23/04/1994	Appraisal	Abandoned Phase 1	23.2
48/13a-B8Y	27/04/1994	25/05/1994	Development	Completed (Operating)	23.2
48/13a-B8	31/01/1992	31/03/1992	Appraisal	Abandoned Phase 1	23.2
48/13a-B7	16/11/1991	11/01/1992	Development	Abandoned Phase 1	24.4
48/13a-B5	29/05/1991	15/08/1991	Development	Completed (Operating)	30.5
48/13a-B4	07/03/1991	27/05/1991	Development	Completed (Operating)	24.4
48/13a-B3	04/11/1990	01/02/1991	Development	Completed (Operating)	24.4
48/13a-B2	30/07/1990	26/10/1990	Development	Completed (Operating)	24.4
48/13a-B11	06/09/1994	01/01/1995	Development	Completed (Operating)	23.2
48/13a-B1	08/01/1990	30/08/1990	Development	Completed (Operating)	24.4
48/13a- 6	31/03/1984	19/09/1984	Appraisal	Abandoned Phase 3	28.0
48/13- 2A	18/04/1971	06/07/1971	Exploration	Abandoned Phase 3	24.4
48/13- 2	12/04/1971	16/04/1971	Exploration	Abandoned Phase 3	24.4
48/12e- SE	Planned	-	Appraisal	-	24.9
48/12e- 11	10/03/2010	09/05/2010	Exploration	Abandoned Phase 3	25.9
48/12d- 9	27/11/1996	01/01/1997	Exploration	Completed (Operating)	21.3

DECC Well Origin Wellbore Name	Well Origin Spud Date	Spud Completion Date	Original Well Intent	Current Status	Water Depth (m)
48/12c- 10Z	19/12/1997	31/01/1998	Appraisal	Abandoned Phase 3	21.3
48/12c- 10	15/11/1997	31/01/1998	Appraisal	Abandoned Phase 3	21.3
48/12b- 6	01/12/1988	20/02/1989	Exploration	Abandoned Phase 3	23.2
48/12b- 5	08/08/1988	01/10/1988	Exploration	Abandoned Phase 3	24.4
48/12b- 4	18/07/1987	21/11/1987	Exploration	Abandoned Phase 2	21.9
48/12b- 3	22/04/1985	17/09/1985	Exploration	Abandoned Phase 3	26.2
48/12a-G3	31/10/1995	06/03/1996	Appraisal	Completed (Shut In)	22.3
48/12a-G2	05/04/1995	31/05/1995	Development	Completed (Shut In)	22.3
48/12a- WC	Planned	-	Exploration	-	18.9
48/12a- 8	29/11/1994	06/02/1995	Appraisal	Abandoned Phase 3	21.3
48/12a- 7Z	12/04/1994	01/07/1994	Appraisal	Completed (Shut In)	22.3
48/12a- 7Y	12/04/1994	23/05/1994	Appraisal	Completed (Shut In)	22.3
48/12a- 7	13/10/1991	16/12/1991	Appraisal	Abandoned Phase 2	22.3
48/12- 2	12/10/1975	12/11/1995	Exploration	Abandoned Phase 3	20.4
48/12- 1	20/05/1967	13/07/1967	Exploration	Abandoned Phase 3	24.7
48/11c- 13	11/07/2007	12/08/2007	Exploration	Abandoned Phase 3	21.3
48/11b-A9	06/02/1999	10/04/1999	Development	Abandoned Phase 3	23.2
48/11b-A8Z	01/06/1994	21/06/1994	Development	Abandoned Phase 3	23.2
48/11b-A8Y	15/08/1994	26/09/1994	Development	Abandoned Phase 3	23.2
48/11b-A8	07/04/1994	04/07/1994	Development	Abandoned Phase 3	23.2
48/11b-A7	10/02/1992	25/05/1992	Development	Abandoned Phase 3	23.2
48/11b-A6Z	27/05/1992	26/06/1992	Development	Abandoned Phase 3	23.2
48/11b-A6	30/12/1991	10/02/1992	Development	Abandoned Phase 3	23.2
48/11b-A5	27/11/1991	28/12/1991	Development	Abandoned Phase 3	23.2
48/11b-A4	11/10/1991	16/10/1991	Development	Abandoned Phase 3	24.4
48/11b-A3Z	25/05/1996	14/07/1996	Development	Abandoned Phase 3	23.2
48/11b-A3Y	14/06/1996	14/07/1996	Development	Abandoned Phase 3	23.2
48/11b-A3	21/08/1991	02/11/1991	Development	Abandoned Phase 3	23.2
48/11b-A2	26/07/1991	19/08/1991	Development	Abandoned Phase 3	23.2
48/11b-A1Z	04/07/1994	02/08/1994	Development	Abandoned Phase 3	23.2
48/11b-A1	28/05/1991	23/07/1991	Development	Abandoned Phase 3	23.2
48/11b- 3	20/04/1977	10/07/1977	Exploration	Abandoned Phase 3	21.6
48/11a-B8	25/02/1994	05/04/1994	Development	Abandoned Phase 3	23.2
48/11a-B7	06/01/1994	14/02/1994	Development	Abandoned Phase 3	23.2
48/11a-B6	11/07/1993	01/09/1993	Development	Abandoned Phase 3	23.2
48/11a-B5	07/04/1993	27/05/1993	Development	Abandoned Phase 3	23.2
48/11a-B4	02/02/1993	05/04/1993	Development	Abandoned Phase 3	23.2
48/11a-B3Z	29/05/1993	11/07/1993	Development	Abandoned Phase 3	23.2
48/11a-B3	26/11/1992	01/02/1993	Development	Abandoned Phase 3	23.2
48/11a-B2	19/09/1992	30/01/1993	Development	Abandoned Phase 3	23.2
48/11a-B1	07/03/1986	13/05/1986	Appraisal	Abandoned Phase 2	21.0
48/11a- 12	22/09/1994	11/11/1994	Exploration	Abandoned Phase 3	32.9
48/11b- 6	16/11/1985	28/12/1985	Appraisal	Abandoned Phase 3	24.1
48/11a- 9	13/05/1987	30/08/1993	Appraisal	Abandoned Phase 3	20.4
48/11b- 8	17/09/1986	15/10/1986	Appraisal	Abandoned Phase 3	21.9
48/11a- 11	27/11/1987	27/01/1988	Appraisal	Abandoned Phase 3	20.4
48/11b- 10	01/09/1987	16/10/1987	Appraisal	Abandoned Phase 3	23.8
48/11b- 4	31/10/1984	28/12/1984	Exploration	Abandoned Phase 3	24.1
48/11- 2	16/07/1969	01/09/1969	Exploration	Abandoned Phase 3	19.5
48/11b- 5	22/02/1985	10/03/1985	Exploration	Abandoned Phase 3	21.6
48/11- 1	25/04/1966	13/08/1966	Exploration	Abandoned Phase 3	27.1

2.5.2 Existing Information Relating to the OWF Survey Area

Existing information considered as part of this assessment includes a geophysical survey result report at the OWF site (Enviros Doc ref: ENV21-21042-GTR4-02_Rev.01). The report provides details of seabed elevation, seabed features, shallow geology and identifies potential hazards present within the survey area utilising MBES, SSS, SBP, MAG and UHR data.

To aid in regional comparisons between the chemical and macrofaunal parameters the current report utilises previous surveys carried out by BSL in 2019 and 2020:

- southern North Sea survey, environmental habitat and baseline survey, (BSL SNS, 2019; BSL SNS 2020a; BSL SNS 2020b)

The three regional BSL surveys showed similar sediment characteristics and water depths along with similar sampling methodology (two macrofauna and one PC per station) to those used during the current OWF survey. The mean, standard deviation (SD) and coefficient of variance (CV) from the previous BSL surveys are provided within their respective tables.

2.5.3 Reference Sources

Sediment quality guidelines for the protection of benthic macrofauna estimate the thresholds of specific compound concentrations in sediments above which can result in adverse effects to sediment-dwelling organisms. The sediment quality guidelines cited in this report in regards to each parameter are tabulated in Table 5 and described in sections a to g below.

Table 5 Sediment Quality Reference Values

SQGVs/Parameters	PSA	TOC	PAH	HM	Organotin	PCB	Organochlorine	Macrofauna
UKOOA 50th 95th Percentiles			X	X				X
OSPAR BC and BAC			X					
OSPAR ERL and ERM			X	X		X	X	
CEFAS Action Levels 1 and 2				X	X	X	X	
CCME TEL and PEL			X	X		X	X	
AZNECC/ARMCANZ SQGV			X	X				

a UKOAA 50th and 95th Percentiles for Background North Sea Sediments

In 2001, the United Kingdom Offshore Operators Association (herein known as UKOOA) published sediment quality guidelines for the UK North Sea (UKOOA, 2001). Using a database of survey data collected between 1975-95, the report sets out 'background' levels for a variety of parameters (e.g. organic carbon, hydrocarbon, and metals content) in sediments over 5km from an existing oil and gas platform. For the current EBS the 50th and 95th percentile levels for uncontaminated background sediments are presented where available, using a combination of levels for the entire North Sea, specific North Sea sectors or specific sediment types, as appropriate to best inform the interpretation.

b OSPAR Background Concentrations and Background Assessment Concentrations

To monitor progress towards 'background conditions' in the marine environment, OSPAR developed a range of background concentrations (BCs) and background assessment concentrations (BACs) for use as reference levels throughout the OSPAR marine area. BCs are concentrations of contaminants derived from analysis of core samples to reflect pre-industrial, pristine, background levels for the OSPAR area (Webster *et al.*, 2009). BACs have been statistically derived from BCs and represent the level above which concentrations can be considered to be significantly higher than the relevant BC, with concentrations said to be near background if they are below their corresponding BAC (OSPAR, 2008). In the current report, reference to BCs and BACs has been made after normalisation of metals and PAHs using the method described in detail in the corresponding results sections and Appendix F.

c OSPAR Effect Range Low and Effect Range Median Levels

In order to assign a level of context for toxicity, an approach used by Long *et al.*, (1995) to characterise contamination in sediments will be used in this report. 'Effect range low' (ERL) levels were defined as concentration of metals at which adverse effects were reported in 10% of the data reviewed, whilst 'effect range median' (ERM) levels were defined as the concentrations at which 50% of studies reported harmful effects. The ERLs and ERMs have been used to evaluate the ecological significance of heavy and trace metal concentrations within the survey area.

d CEFAS Action Levels 1 and 2

The UK is a signatory of both the London Protocol and OSPAR Convention for the protection of the marine environment of the Northeast Atlantic, which addresses the prevention of marine pollution from disposal at sea. The Marine and Coastal Access Act (2009) transposes the requirements of these conventions into English law. The Marine Management Organisation (MMO), in conjunction with the guidelines set out by OSPAR, established two action levels to enable consideration of potential adverse environmental effects from sea disposal activities (MMO, 2015). The two action levels are listed below:

- Below Action Level 1: Contaminants are generally considered to be of no concern and are unlikely to influence the licensing condition.
- Between Action Levels 1 and 2: Contaminants are generally further investigated against background concentrations.
- Above Action Level 2: Contaminants are generally considered unsuitable for disposal at sea.

e CCME Threshold Effect Level and Probable Effect Level

The Canadian sediment quality guidelines were developed by the Canadian Council of Ministers of the Environment as broadly protective tools to protect aquatic life for an indefinite period of exposure to chemicals associated with sediments. The CCME have derived two reference values for aquatic sediments: a threshold effect level (TEL) and a probable effect level (PEL). The TEL and PEL reference values are described below:

- Below TEL: the lowest range of concentrations, within which adverse effects are rarely observed.
- Between TEL and PEL: possible effects range, within which adverse effects are occasionally observed.
- Above PEL: probable effects range, within which adverse biological effects are frequently observed.

f AZNECC and ARMCANZ SQGV and SQGV High

In order to characterise contamination in sediments, when OSPAR normalisation was inappropriate, sediment quality guidelines (SQGs) adopted by the Australian and New Zealand Environment and Conservative Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) will be used in this report (Simpson *et al.*, 2013). The application of SQGs involves a tiered, decision-tree approach. Following this framework, the total concentrations of contaminants are compared to SQG values. For metals, the sediment quality guideline values' (SQGVs) and SQG-High values are largely unchanged and remain based on the effects range low (ERL) and effects range median (ERM) values. For organics, threshold effects level (TEL) and probable effects level (PEL) values are now used. If the contaminant concentrations exceed the SQGVs, further investigations are initiated to determine whether there is indeed an environmental risk associated with the exceedance by assessing the contaminant bioavailability.

g EMODnet Predicted Habitat 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, 2022). The broad-scale seabed habitat map is a predictive delineation of habitats within all European seas to the EUNIS classification system (EMODnet, 2022). 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 in confidently assigning biotopes within a given survey area (Figure 2).

2.5.4 Legislative Background

a UK Post 2010 Biodiversity Framework

The 'UK Post-2010 Biodiversity Framework' was published in July 2012 to succeed the UK BAP 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. All of the 1,150 species, 391 Species Action Plans (SAPs) and 45 Habitat Action Plans (HAPs) included in the UKBAP were incorporated into the framework Key UK BAP 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,
- *Sabellaria spinulosa* Reefs,
- Seamount Communities,
- *Ammodytes marinus* Spawning and Nesting grounds

b 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 own 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 UK Post-2010 Biodiversity Framework, with the “Mud Habitats in Deep Water” listed as “Seapens & Burrowing Megafauna Communities”.

c 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:

- Sub-tidal reefs (e.g. biogenic reefs formed by *Sabellaria spinulosa*, *Modiolus* and rocky reefs formed from iceberg scour or moraine deposits);
- Sandbanks which are slightly covered by sea water all the time;
- 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 UKs 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 UKs 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 1 January 2021 (GOV.UK, 2022).

Main changes to the regulation include:

- The creation of a national site network within the UK territory comprising the protected sites already designated under the Nature Directives, and any further sites designated under these regulations;
- The establishment of management objectives for the national site network (the 'network objectives');
- A duty for appropriate authorities to manage and where necessary adapt the national site network as a whole to achieve the network objectives;
- An amended process for the designation of Special Areas of Conservation (SACs);
- Arrangements for reporting on the implementation of the regulations, given that the UK no longer provides reports to the European Commission;
- Arrangements replacing the European Commission's functions with regard to the imperative reasons of overriding public interest test where a plan or project affects a priority habitat or species, and;
- Arrangements for amending the schedules to the Regulations and the annexes to the Nature Directives that apply to the UK.

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).

d 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.

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 exist for chemical monitoring (NMCAQC) and ecotoxicological monitoring (NMEAQC) (Davies *et al.*, 2001).

2.5.5 Habitat Investigation

a 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 improved classification of deep-sea habitats. The resultant combined JNCC (2015) classification system is analogous with the European Nature Information Service Habitat Classification (EUNIS, 2019), which has compiled habitat information from across Europe into a single database. The two classification systems are both based around 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 interpreted from the side scan sonar (SSS) and bathymetric data acquired during the current survey. Global Mapper V20 GIS software was used to review the SSS mosaic (Geotiff) and multibeam bathymetry data (Geotiff and xyz) and to delineate areas of different seabed habitats. In addition, 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 OWF survey area. As illustrated in Figure 2, the predicted EUNIS habitats in close proximity to the survey area: 'Atlantic Circalittoral Coarse Sediment' (A5.14/MC32), Atlantic Circalittoral Sand' (A5.25/MC52) and 'Atlantic Infralittoral Sand' (A5.23/MB5).

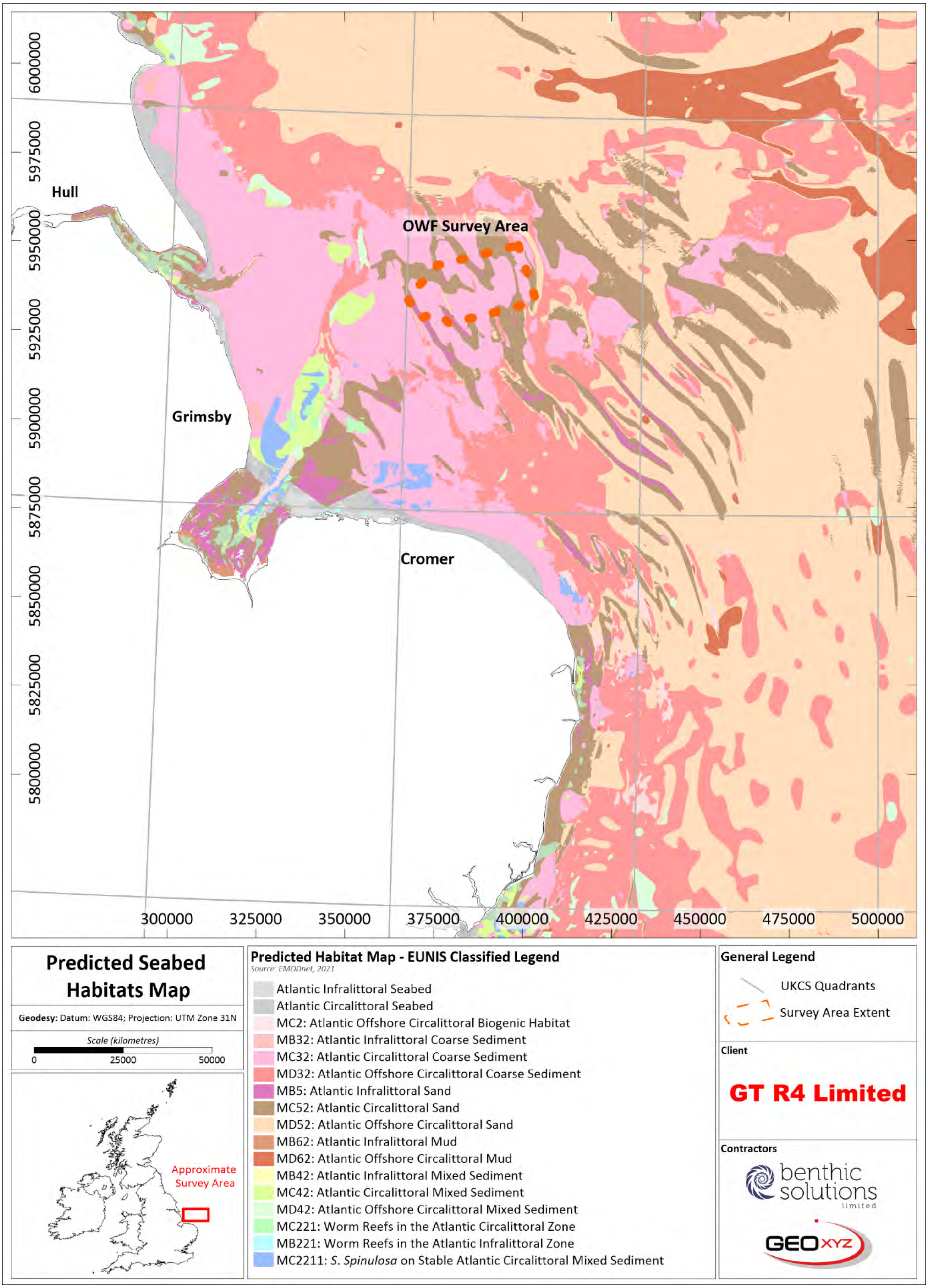


Figure 2 EMODnet Predicted Seabed Habitats Map in Relation to the Survey Area

b Expected Habitat Sensitivities

The OWF survey area is situated within the large Southern North Sea Special Area of Conservation (SAC), which stretches from the central North Sea (north of Dogger Bank) to the Straits of Dover in the south. A mix of habitats which are afforded Annex I protection, such as sandbanks and gravel beds, are present within the SAC but are designated as individual SACs and Marine Conservation Zones (MCZs), of which, the OWF survey area is located over 16km from the closest being Holderness Offshore Marine Conservation Zone (MCZ) (Figure 3). MCZs and SACs found near to the OWF survey area and the primary features for which they were designated are summarised below in Table 6.

Table 6 Key Aspects of Nearby Protected Areas

SAC/ MCZ	Designated Site	Site Area	Closest distance and bearing from the survey area	Key Aspects
SAC	Inner Dowsing, Race Bank and North Ridge	845km^2	17km southeast	Sandbanks bordering channels, linear relict banks, sinusoidal banks with distinctive 'comb-like' subsidiary banks and areas of *Sabellaria spinulosa* biogenic reefs.
	The Wash and North Norfolk Coast	1,072km^2	49km southeast	Sublittoral sandbanks, *Sabellaria spinulosa* biogenic reefs, intertidal mudflats, large shallow inlets and bays, salt meadows, Mediterranean and thermo-Atlantic halophilous scrubs and *Salicornia* and other annuals colonising mud and sand.
	Haisborough, Hammond and Winterton	1,468km^2	57km south	Sandbanks formed via headland associated geological processes and occasional areas of *Sabellaria spinulosa*.
	North Norfolk Sandbanks and Saturn Reef	3,603km^2	5.8km west	Offshore linear ridge and tidal sandbanks with extensive sand waves and areas of *Sabellaria spinulosa* biogenic reefs.
	Dogger Bank	12,331km^2	78km northwest	Sublittoral sandbanks formed by glacial and submergence through sea-level rise.
	Southern North Sea	36,951km^2	Passes through western extent of the survey area	Important area for Annex II harbour porpoise (*Phocoena phocoena*).
	Runswick Bay	68km^2	154km northwest	Protects subtidal coarse and mixed sediments which support the ocean quahog (*Arctica islandica*)

SAC/ MCZ	Designated Site	Site Area	Closest distance and bearing from the survey area	Key Aspects
MCZ	Orford Inshore	72 km²	157km south	Orford Inshore MCZ is dominated by subtidal mixed sediments which act as an important nursery and spawning grounds for many fish species, including dover sole, lemon sole and sandeels.
	Markham's Triangle	200km²	72km east	Protects subtidal mud, sand, coarse and mixed sediments which supports varied faunal assemblages of polychaetes, molluscs, echinoderms and commercially important flatfish such as sole and plaice.
	Holderness Offshore	309km²	16km northwest	North Sea glacial tunnel valleys (inner Silver Pit), and the presence of *Arctica islandica*.
	Holderness Inshore	309km²	50km northwest	Deep water circalittoral rocks supporting sponge aggregations and commercially significant crustaceans (*Cancer pagurus* and *Necora puber*).
	Cromer Shoal Chalk Beds	321km²	50km southwest	Presence of peat and clay exposures and subtidal chalk providing nursery areas for crustaceans, fish and the small spotted catshark.

c Sensitive Habitat and Species Assessment

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

- Ross worm (*S. spinulosa*) reef (EC Habitats Directive Annex I, Habitat FOCI, OSPAR Threatened and/or declining Habitat, UKBAP Priority Habitat);
- Horse mussel (*Modiolus modiolus*) beds (EC Habitats Directive Annex I, Habitat FOCI, OSPAR Threatened and/or declining Habitat, UKBAP Priority Habitat);
- Stony reef (EC Habitats Directive Annex I, UKBAP Priority Habitat);
- Sandbanks which are slightly covered by sea water all the time (EC Habitats Directive Annex I, Habitat FOCI);
- The Ocean Quahog, *Arctica islandica* (Species FOCI, OSPAR Threatened and/or declining species), and;.
- Lesser sandeels (*Ammodytes marinus*) (Species FOCI, UKBAP Priority Species, SPI England and Wales, PMF species Scotland).

The east and west sides of the OWF survey area overlap two designated herring spawning ground (HSG) areas and the OWF survey area is also located within a major sandeel spawning and nursery ground. Four blocks, 48/11c, 48/12f, 48/13a and 48/8b, found within the OWF survey area require a mandatory HSG survey to be undertaken (UK GOV, 2019). As such, there was the potential for sediment suitable for herring and sandeel spawning to occur within the survey area.

d Legislative Species Protection Assessment

The epifauna taxa recorded from review of the underwater video footage and infauna taxa identified by taxonomic analysis were inputted into a database developed by BSL staff which identified any species that are afforded protection under several legislative conventions/directives implemented in the UK, including the UK Post-2010 Biodiversity Framework and the Species of Principal Importance England.

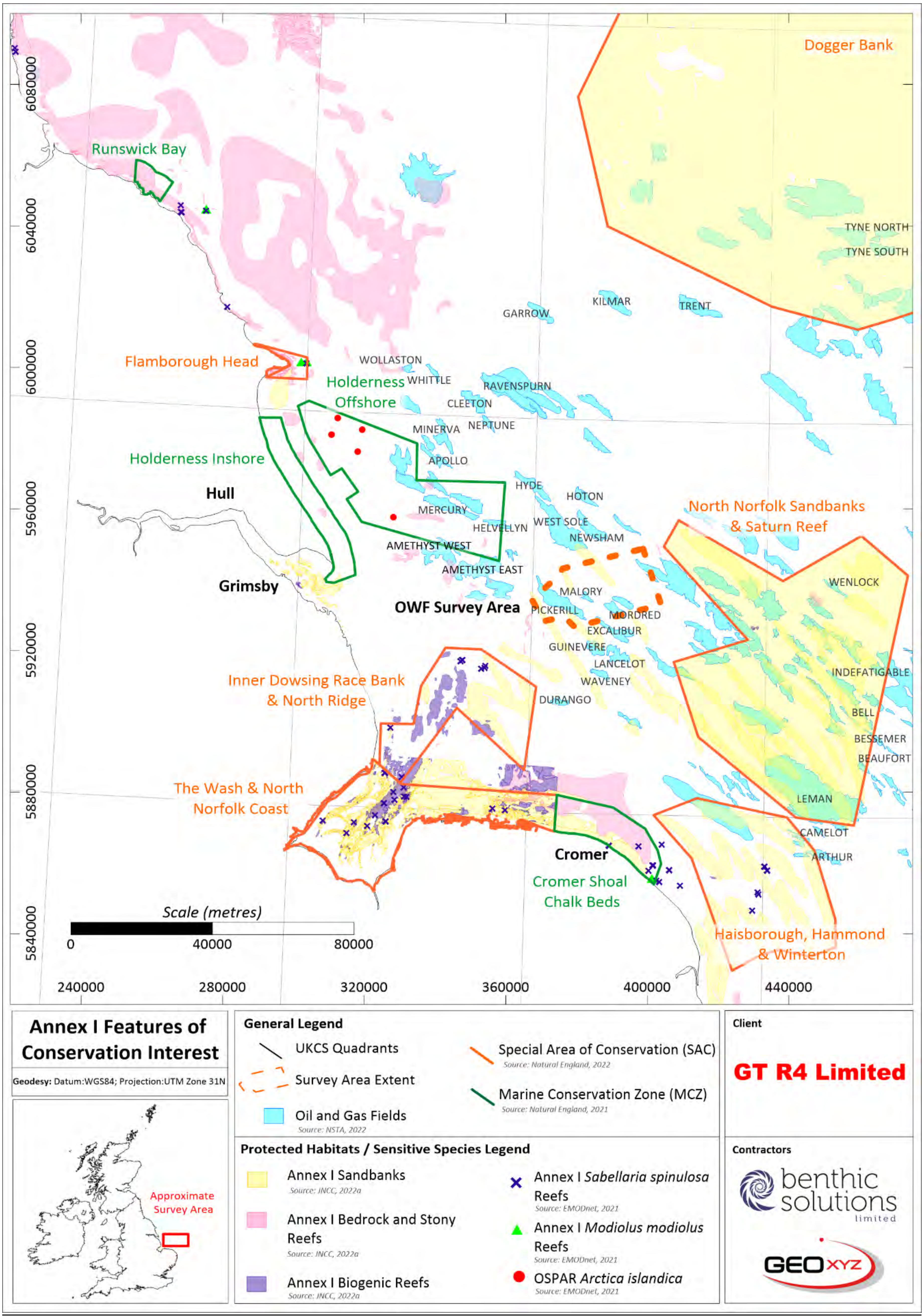


Figure 3 Location of Features of Conservation Interest in Relation to the Survey Area

3 FIELD SURVEY AND ANALYTICAL METHODS

3.1 GEOPHYSICAL DATA

Analogue geophysical data acquired by Enviros Survey and Consultancy Limited prior to survey operations were used for site selection by GoBe Consultants. Site selection using geophysical data can ensure specific locations are selected for the camera transects to investigate any habitats and boundaries across the survey area, with particular attention being paid to the investigation of potential Annex I habitats protected under the EC Habitats Directive.

Additional geophysical lines covering sections of infill to the southeast were completed post environmental survey to ensure comprehensive seabed features and habitat mapping could be acquired.

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

- Bathymetry reduced and processed offshore to provide a digital terrain model (0.25m x 0.25m bin size) where major bathymetric features and minor bathymetric changes could be identified and highlighted. This included the identification of seabed morphology within the survey area (e.g., megaripples, sand waves, canyons and sandbanks), seabed infrastructure and debris (e.g. anthropogenic debris, existing cables and pipelines).
- SSS with data run at both high (600kHz) and low (300kHz) frequencies at a 75m range per channel both acquiring data perpendicular to the towfish. Data was processed using Chesapeake SonarWiz and were digitally rendered onto a seabed mosaic of 0.15m pixel size of the area using the HF 600kHz data for review. Changes in sediment type and hardness, along with features observed through low level relief and discrete objects could be delineated.

3.2 ENVIRONMENTAL GROUND-TRUTHING AND SAMPLING

The environmental sampling strategy was outlined by the client in the project execution plan (Doc Ref UK4855H-824-PEP-01-1.5) and GoBe Consultants selected stations based on the acquired geophysical data prior to the commencement of the survey. All amendments to the environmental data acquisition were agreed prior to sampling in accordance with the JNCC marine monitoring handbook, relevant procedural guidelines and SSS/MBES data review (Bullimore and Hiscock, 2001; Davies *et al.*, 2001; Hitchin *et al.*, 2015; Holt and Sanderson, 2001; Munro, 2001; OGUK, 2019).

Grab sampling was undertaken at a total of 80 stations with seabed video acquisition carried out at 30 stations based on GoBe Consultants intelligent sampling (Table 7, Table 8 and Figure 4). Intelligent sampling covered areas of interest highlighted by the geophysical data such as changes in SSS reflectivity or changes in bathymety to provide an ecological baseline of the OWF survey area, as per the JNCC marine monitoring handbook (Davies *et al.*, 2001). Contaminant analysis was sampled using the Shipek grab sampler while benthic macrofauna and physico-chemical samples were acquired using the min-Hamon grab sampler. Grab stations with the suffix "_A" indicate the station was offset (>25m) from the proposed position due to hard underlying sediments. For example, the Shipek grab deployment at station OWF_62 was offset 25m northeast due to hard sediment and was subsequently given the "_A" suffix. Eight trawl transects were selected across the OWF survey area to characterise the epibenthic species that are commonly under-represented during grab surveys.

All 80 benthic stations underwent the following sampling/sub-sampling:

- 80 x 0.1m^2 macro-invertebrate samples processed over a 1000µm aperture sieve in the field and 1000µm in the lab;
- 80 x 0.1m^2 physico-chemical replicates, subsampled for particle size distribution (PSD) and total organic carbon (TOC) at a single surface depth of 0-2cm.

An additional 30 benthic stations underwent the following sampling/sub-sampling

- 30 x 0.05m^2 Contaminant replicates, subsampled for trace metals (HM), organotins, polyaromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs) and organochlorine pesticides (OCPs).
- 15 x 0.05m^2 80ml eDNA replicates, subsampled from four corners of a surface depth of 0-2cm.

Eight collocated beam trawl transects underwent the following sampling/sub-sampling

- 8 x ~500m trawl replicate, subsampled for macroinvertebrate samples processed over a 5mm mesh in the field and 5mm in the lab.

A full suite of physico-chemical samples were retrieved from each Hamon grab and Shipek contaminant sampling stations across the OWF survey area. However, nine stations did not meet the minimum sample retention (40%) to be processed for macrofaunal analysis, as the hard underlying sediment at these stations restricted sample penetration (Table 7). The under penetration of the Shipek grab resulted in no eDNA samples collected from several of the designated stations. In light of this, it was decided to take eDNA samples from all the remaining Shipek grabs and the corresponding Hamon grabs if the Shipek failed to penetrate the sediment. In total, 24 stations were subsampled for eDNA analysis, which covered a wide spatial area and range of sediment types. The results of the eDNA analysis will be reported separately in the subsequent ECC survey report (UK4855H-824-RR-02).

All eight beam trawl samples were collected with any trawls offset by >50m recorded with a "_A" suffix due to an insufficient sample retention (<5L). The low sample retention and trawl re-deployment occurred at OWF_T2 and OWF_T6. OWF_T8 was dropped from the scope by the client due to the presence of *Sabellaria spinulosa* observed along camera transect OWF_VID_76 and was re-positioned over grab station OWF_79 and subsequently renamed OWF_T9 (Table 9).

Camera transects of approximately 50m in length were collocated with 30 grab locations to acquire video and stills data to facilitate a habitat assessment (Table 8). Survey operations were carried out using a MOD4.2 and 4.4 camera system mounted within a BSL freshwater lens adapted camera sled frame equipped with a separate strobe, LED lamps and HD video. Additional camera and trawl transects were added to the scope (OWF_VID_79A and T9) due to the presence of *Sabellaria spinulosa* at OWF_76 and OWF_T8. The survey field operations are detailed in Appendix C, with the grab sampling logs and deck observations provided in Appendix F, camera transect logs in Appendix G, and trawl sampling logs in Appendix H.

Table 7 Summary of Grab Station Sample Acquisition

Geodetics: WGS84, UTM31N, CM 3°E										
Station	Easting (m)	Northing (m)	Rationale	Depth (m)	PC*	F1*	Contaminant (Primary**)	Contaminant (Spare)**	eDNA SG**	eDNA HG*
OWF_01	368 325	5 933 910	Atop sandbank feature.	12.9	Y	Y	Y	Y	Y	Y
OWF_02	370 677	5 931 587	Example of flat seabed.	21.0	Y	NS	-	-	-	-
OWF_03	370 789	5 928 857	Atop sandbank feature.	12.6	Y	Y	-	-	-	-
OWF_04	371 114	5 934 756	Example of flat seabed.	19.9	Y	Y	-	-	-	-
OWF_05	372 032	5 937 085	Example of flat seabed.	21.1	Y	Y	-	-	-	-
OWF_06	373 189	5 929 297	Area of sand wave features.	20.4	Y	Y	Y	NS	NS	-
OWF_07	373 062	5 931 766	Area of sand wave features.	17.2	Y	Y	-	-	-	-
OWF_08	399 171	5 942 280	Area of sand wave features.	20.7	Y	Y	-	-	-	-
OWF_09	392 180	5 940 380	Area of sand wave features.	21.0	Y	Y	-	-	-	-
OWF_10	374 491	5 934 097	Example of flat seabed.	19.0	Y	Y	Y	Y	Y	Y
OWF_11	374 806	5 932 218	Area of sand wave features.	18.5	Y	Y	Y	Y	Y	Y
OWF_12	375 073	5 939 863	Area of megaripple features.	18.4	Y	Y	Y	Y	Y	Y
OWF_13	375 788	5 937 614	Area of sand wave features.	19.8	Y	Y	-	-	-	-
OWF_14	375 564	5 930 201	Area of sand wave features.	16.0	Y	Y	-	-	-	-
OWF_15	376 342	5 942 246	On the flank of a sandbank feature.	15.4	Y	Y	-	-	-	-
OWF_16	376 475	5 934 626	Example of flat seabed.	20.0	Y	NS	-	-	-	-
OWF_17	376 766	5 939 971	On the flank of a sandbank feature.	14.8	Y	Y	Y	Y	Y	Y
OWF_18	377 425	5 936 529	Area of sand wave features.	22.2	Y	Y	-	-	-	-
OWF_19	377 956	5 933 911	At the base of a tunnel valley.	38.6	Y	Y	Y	Y	Y	-
OWF_20	378 434	5 938 542	On the flank of a sandbank feature.	19.1	Y	Y	-	-	-	-
OWF_21	378 588	5 928 938	Area of sand wave features.	10.2	Y	Y	Y	Y	Y	Y
OWF_22	378 963	5 940 391	Example of flat seabed.	23.2	Y	Y	-	-	-	-
OWF_23	379 012	5 943 303	An area of flat seabed, 5km NNW off the centre point of the cruciform arrangement.	21.5	Y	Y	Y	Y	-	-
OWF_24	379 489	5 932 718	Example of flat seabed.	21.2	Y	Y	-	-	-	-
OWF_25	379 700	5 935 604	Area of megaripple features.	17.8	Y	Y	-	-	-	-
OWF_26	392 596	5 937 978	Example of flat seabed.	19.7	Y	Y	-	-	-	-
OWF_27	381 289	5 938 700	An area of sand waves, 2.5km NNW off the centre point of the cruciform arrangement.	19.8	Y	Y	Y	Y	Y	Y
OWF_28	381 893	5 931 030	Example of flat seabed.	18.5	Y	Y*	-	-	-	-
OWF_29	382 190	5 942 983	Example of flat seabed.	22.6	Y	Y	-	-	-	-
OWF_30	382 215	5 936 874	An area of sand waves, approximately 1.5km NNW off the centre point of the cruciform arrangement.	20.4	Y	Y	Y	Y	Y	Y
OWF_31	382 454	5 928 327	Example of flat seabed.	17.1	Y	Y	-	-	-	-
OWF_32	382 669	5 933 674	An area of flat seabed, 0.5km WSW off the centre point of the cruciform arrangement.	20.5	Y	Y	Y	NS	-	Y
OWF_33	382 666	5 940 287	Example of flat seabed.	21.7	Y	Y	-	-	-	-
OWF_34	383 061	5 931 425	Example of flat seabed.	20.2	Y	Y	Y	NS	Y	Y
OWF_35	383 118	5 935 025	An area of flat seabed, 0.5km NNW off the centre point of the cruciform arrangement.	20.8	Y	NS	Y	NS	-	Y

Geodetics: WGS84, UTM31N, CM 3°E										
Station	Easting (m)	Northing (m)	Rationale	Depth (m)	PC*	F1*	Contaminant (Primary**)	Contaminant (Spare)**	eDNA SG**	eDNA HG*
OWF_36	384 016	5 933 223	An area of flat seabed, 0.5km SSE off the centre point of the cruciform arrangement.	20.1	Y	Y	Y	Y	Y	Y
OWF_37	384 463	5 936 267	Area of sand wave features.	19.4	Y	Y	-	-	-	-
OWF_38	384 543	5 934 491	An area of flat seabed, 0.5km ENE off the centre point of the cruciform arrangement.	20.3	Y	Y*	Y	NS	-	Y
OWF_39	384 808	5 940 130	An example of a tunnel valley feature with a shallow base.	24.9	Y	Y	Y	Y	-	Y
OWF_40	384 835	5 928 514	Area of megaripple features.	15.7	Y	Y	-	-	-	-
OWF_41	384 915	5 931 423	An area of flat seabed, 1.5km SSE off the centre point of the cruciform arrangement.	19.6	Y	Y	Y	NS	NS	Y
OWF_42	384 942	5 943 991	On the flank of a sandbank feature.	18.5	Y	Y	-	-	-	-
OWF_43	384 966	5 938 223	Example of flat seabed.	23.6	Y	Y	-	-	-	-
OWF_44	385 577	5 940 949	Example of flat seabed.	21.3	Y	Y	-	-	-	-
OWF_45	385 841	5 929 678	An area of flat seabed, 2.5km SSE off the centre point of the cruciform arrangement.	20.2	Y	Y	Y	NS	-	Y
OWF_46	386 508	5 928 375	Example of flat seabed.	20.6	Y	Y	Y	Y	Y	Y
OWF_47	386 555	5 935 791	At the base of a tunnel valley.	37.3	Y	Y	Y	Y	Y	Y
OWF_48	387 377	5 939 388	Example of flat seabed.	19.2	Y	Y	-	-	-	-
OWF_49	387 851	5 930 602	Example of flat seabed.	18.9	Y	Y	-	-	-	-
OWF_50	387 946	5 942 699	Example of flat seabed.	18.4	Y	Y*	Y	NS	NS	Y
OWF_51	388 515	5 933 803	Example of flat seabed.	18.5	Y	Y	-	-	-	-
OWF_52	389 066	5 930 894	An example of a tunnel valley feature with a shallow base.	23.1	Y	Y	Y	NS	NS	Y
OWF_53	389 147	5 944 654	Area of sand wave features.	22.7	Y	Y	-	-	-	-
OWF_54	389 704	5 935 683	Example of flat seabed.	19.3	Y	Y	-	-	-	-
OWF_55	390 497	5 939 123	On the flank of a sandbank feature.	14.8	Y	Y	Y	Y	Y	-
OWF_56	390 747	5 941 518	Area of sand wave features.	19.6	Y	Y	-	-	-	-
OWF_57	390 624	5 932 907	Example of flat seabed.	18.6	Y	Y	-	-	-	-
OWF_58	392 721	5 945 816	Area of sand wave features.	23.9	Y	Y	-	-	-	-
OWF_59	393 190	5 942 430	Example of flat seabed.	23.9	Y	Y*	-	-	-	-
OWF_60	393 246	5 931 743	Area of megaripple features.	17.9	Y	Y	-	-	-	-
OWF_61	393 411	5 935 264	Example of flat seabed.	18.4	Y	Y*	-	-	-	-
OWF_62	394 095	5 933 198	Example of flat seabed.	18.7	Y	Y*	Y	NS	-	-
OWF_63	394 360	5 930 657	Area of megaripple features.	17.5	Y	Y	-	-	-	-
OWF_64	394 729	5 945 871	Area of sand wave features.	23.7	Y	Y	-	-	-	-
OWF_65	394 835	5 939 254	Example of flat seabed.	22.0	Y	Y	Y	NS	-	-
OWF_66	395 949	5 947 273	Area of megaripple features.	21.5	Y	Y	-	-	-	-
OWF_67	396 320	5 931 265	Area of megaripple features.	25.5	Y	Y	-	-	-	-
OWF_68	397 374	5 944 018	Area of megaripple features.	21.7	Y	Y	Y	Y	Y	-
OWF_69	397 270	5 941 079	Area of megaripple features.	21.6	Y	Y	-	-	-	-
OWF_70	397 298	5 935 576	Example of flat seabed.	22.1	Y	Y	-	-	-	-
OWF_71	398 094	5 937 269	Area of megaripple features.	21.7	Y	Y	-	-	-	-

Geodetics: WGS84, UTM31N, CM 3°E										
Station	Easting (m)	Northing (m)	Rationale	Depth (m)	PC*	F1*	Contaminant (Primary**)	Contaminant (Spare)**	eDNA SG**	eDNA HG*
OWF_72	398 434	5 947 803	Example of flat seabed.	25.8	Y	Y	Y	Y	-	-
OWF_73	398 488	5 931 847	Area of megaripple features.	17.9	Y	Y	Y	Y	Y	-
OWF_74	399 147	5 945 631	Example of flat seabed.	24.9	Y	Y	-	-	-	-
OWF_75	399 546	5 940 261	Example of flat seabed.	22.8	Y	Y	-	-	-	-
OWF_76	399 997	5 935 262	Example of flat seabed.	22.5	Y	Y	-	-	-	-
OWF_77	400 472	5 933 647	Example of flat seabed.	17.4	Y	Y	-	-	-	-
OWF_78	400 605	5 940 261	Example of flat seabed.	21.4	Y	Y	-	-	-	-
OWF_79	401 370	5 936 295	Example of flat seabed.	21.8	Y	Y	Y	Y	-	-
OWF_80	402 907	5 933 513	Area of megaripple features.	22.8	Y	Y	-	-	-	-

**HG = Hamon grab utilised*
***SG = Shipek grab utilised*
NS = No sampled retained
Y= F1 sample lower than 40%*

Table 8 Summary of Environmental Camera Transect Acquisition

Geodetics: WGS84, UTM31N, CM 3°E					
Transect	Type	Easting (m)	Northing (m)	HD Video footage (mm:ss)	No. Stills
OWF_VID_01	SOL	368 335	5 933 885	00:06:35	23
	EOL	368 315	5 933 938		
OWF_VID_03	SOL	370 795	5 928 832	00:06:15	25
	EOL	370 776	5 928 884		
OWF_VID_11	SOL	374 799	5 932 243	00:05:55	21
	EOL	374 816	5 932 190		
OWF_VID_14	SOL	375 554	5 930 228	00:06:49	21
	EOL	375 574	5 930 168		
OWF_VID_15	SOL	376 355	5 942 221	00:06:22	14
	EOL	376 332	5 942 272		
OWF_VID_17	SOL	376 763	5 939 941	00:06:28	15
	EOL	376 764	5 939 998		
OWF_VID_19	SOL	377 961	5 933 884	00:11:11	30
	EOL	377 948	5 933 938		
OWF_VID_23	SOL	379 022	5 943 291	00:06:33	28
	EOL	379 003	5 943 343		
OWF_VID_25	SOL	379 694	5 935 630	00:10:43	20
	EOL	379 713	5 935 578		
OWF_VID_26	SOL	392 626	5 937 985	00:06:27	17
	EOL	392 570	5 937 965		
OWF_VID_30	SOL	382 206	5 936 900	00:06:17	26
	EOL	382 225	5 936 846		
OWF_VID_31	SOL	382 463	5 928 303	00:06:27	20
	EOL	382 445	5 928 357		
OWF_VID_32	SOL	382 678	5 933 648	00:06:23	10
	EOL	382 657	5 933 701		

Geodetics: WGS84, UTM31N, CM 3°E					
Transect	Type	Easting (m)	Northing (m)	HD Video footage (mm:ss)	No. Stills
OWF_VID_33	SOL	382 671	5 940 262	00:05:27	21
	EOL	382 657	5 940 316		
OWF_VID_37	SOL	384 454	5 936 293	00:11:19	20
	EOL	384 472	5 936 240		
OWF_VID_45	SOL	385 833	5 929 703	00:06:25	21
	EOL	385 851	5 929 650		
OWF_VID_47	SOL	386 567	5 935 764	00:13:55	33
	EOL	386 546	5 935 816		
OWF_VID_50	SOL	387 947	5 942 678	00:09:52	38
	EOL	387 943	5 942 737		
OWF_VID_56	SOL	390 757	5 941 495	00:06:18	16
	EOL	390 736	5 941 547		
OWF_VID_57	SOL	390 615	5 932 931	00:07:00	23
	EOL	390 635	5 932 878		
OWF_VID_58	SOL	392 730	5 945 791	00:06:13	10
	EOL	392 710	5 945 845		
OWF_VID_60	SOL	393 238	5 931 766	00:06:24	18
	EOL	393 258	5 931 715		
OWF_VID_64	SOL	394 723	5 945 896	00:06:21	19
	EOL	394 740	5 945 843		
OWF_VID_65	SOL	394 857	5 939 298	00:06:20	29
	EOL	394 830	5 939 243		
OWF_VID_69	SOL	397 273	5 941 055	00:07:20	19
	EOL	397 272	5 941 115		
OWF_VID_70	SOL	397 305	5 935 552	00:06:26	16
	EOL	397 288	5 935 604		
OWF_VID_73	SOL	398 498	5 931 822	00:06:32	12
	EOL	398 480	5 931 874		
OWF_VID_75	SOL	399 555	5 940 235	00:06:18	24
	EOL	399 537	5 940 288		
OWF_VID_76	SOL	399 987	5 935 225	00:07:54	18
	EOL	400 006	5 935 295		
OWF_VID_79_A	SOL	401 360	5 936 261	00:06:12	30
	EOL	401 340	5 936 313		
OWF_VID_80	SOL	402 895	5 933 540	00:07:00	14
	EOL	402 917	5 933 486		

SOL = Start of line; EOL = End of line

Table 9 Summary of Epibenthic Trawl Acquisition

Geodetics: WGS84, UTM31N, CM 3°E							
Station	Depth Range (m)	SOL		EOL		Length (m)	Duration (hh:mm)
		Easting (m)	Northing (m)	Easting (m)	Northing (m)		
OWF_T1	10 - 11	368 460	5 933 585	368 150	5 934 336	812.59	00:27
OWF_T2_A	16 - 17	376 725	5 940 395	376 705	5 939 724	671.45	00:28
OWF_T3	40 - 43	377 917	5 934 077	378 073	5 933 371	723.33	00:24
OWF_T4	18 - 20	384 544	5 936 017	384 349	5 936 607	621.57	00:27
OWF_T5	20 - 21	387 954	5 942 500	387 930	5 943 008	508.85	00:18
OWF_T6_A	20 - 21	390 589	5 933 290	390 800	5 932 619	702.59	00:26
OWF_T7	21 -22	397 296	5 940 732	397 189	5 941 402	677.67	00:21
OWF_T9	22 - 23	401 256	5 936 524	401 451	5 936 045	517.64	00:20
SOL = Start of line; EOL = End of line							

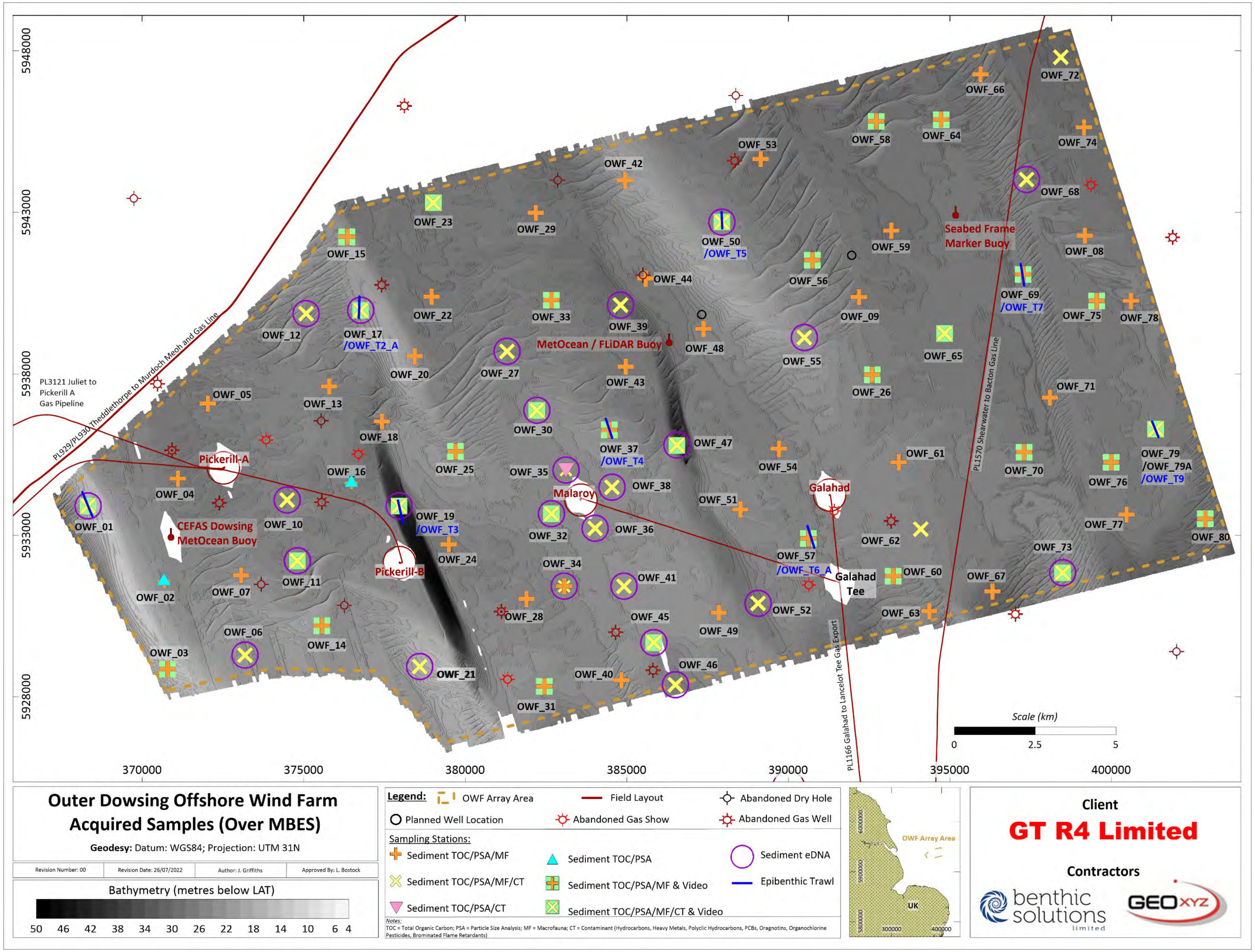


Figure 4 MBES Data and Environmental Sampling Strategy for the OWF Survey Area

3.3 SEDIMENT SAMPLE ANALYSES

The recovered benthic samples were correctly stored prior to demobilisation and transportation of the material to the analytical laboratories. Correct storage involved the freezing of all physico chemical samples on recovery and transportation back to the BSL warehouse to be forwarded to a laboratory, remaining frozen at all times. The material acquired during the survey was analysed at the following laboratories:

- BSL: Particle size Analysis
- BSL: Macro-invertebrate Analysis
- Socotec: Sediment Chemistry

The analytical methods used for the current survey are summarised below in Table 10 with further detail provided in Appendix D.

Table 10 Summary of Analytical Methods

Determinant*	Detection Limits*	Accreditation	Laboratory Technique
Particle Size Distribution	N/A	NMBAQ**	Dry sieving and laser diffraction (Malvern Mastersizer) to whole and half phi intervals, respectively.
Total Organic Carbon	0.02%	ISO 17025 & UKAS/MMO	Documented in-house method with carbonate removal and sulphurous acid/combustion at 1600°C/NDIR, WSLM59.
Trace Metals	Various	ISO 17025, UKAS/MMO	Hydrofluoric/Boric acid extraction followed by ICPMS or ICPOES.
Organotins	$0.001mg.kg^{-1}$	ISO 17025, UKAS/MMO	Documented in-house method using solvent extraction and derivatisation followed by GC-MS analysis.
Polychlorinated Biphenyls (PCBs)	$0.00008µg.kg^{-1}$	ISO 17025, UKAS/MMO	Documented in-house method using solvent extraction and clean up followed by GC-MS-MS analysis.
Organochlorine Pesticides (OCP)	$0.001mg.kg^{-1}$	ISO 17025, UKAS/MMO	Documented in-house method using solvent extraction and clean up followed by GC-MS-MS analysis.
Polycyclic Aromatic Hydrocarbons (PAH)***	$1µg.kg^{-1}$	ISO 17025 & UKAS/MMO for EPA 16 and DTI Parent PAHs	Documented in-house method using DTI specification involving solvent extraction and clean up followed by GC-MS.
Benthic Macrofauna	n/a	NMBAQC**	Biological identification of 1000µm fractions with univariate and multivariate analyses. 1 of 1 replicate processed.

Socotec, the laboratory, who undertook the contaminant, trace metal, PAH and TOC analysis are MMO accredited (https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans)
**Detection limit is the lowest quantity of a substance that can be distinguished from the absence of that substance (a blank value) with a stated confidence level.*
***NMBAQC is not strictly an accreditation but provides external quality assurance for particle size and macrofaunal analysis*
****EPA list of 16 potentially hazardous compounds and six DTI parent and alkylated PAHs*

3.4 DROP DOWN VIDEO HABITAT ASSESSMENT

The habitat assessment was based on the review of high-resolution still images and video data collected across 31 transects. Review of video footage and still photographs was undertaken multiple times, as per JNCC/NMBAQC/MESH guidelines (Coggan *et al.*, 2007;Turner *et al.*, 2016).

An initial review of the video footage was undertaken at high speed (max 3x speed) to assess video quality based on the Centre for Environment, Fisheries and Aquaculture's (CEFAS) processing protocol (Hitchin *et al.*, 2015). The CEFAS processing protocol subdivided video and stills quality into four groups (good, satisfactory, poor and not visible) based on:

- Good = No reduced visibility. Broadscale habitat can be assessed. Classification to JNCC/EUNIS level three and four can be confidently undertaken and level five, based on corresponding epifauna, is possible.
- Satisfactory = Some reduced visibility but seabed area can be assessed and identification of the majority of fauna is unaffected. Classification to JNCC/EUNIS level three and four habitats can be confidently undertaken.
- Poor = Broadscale habitat may be assessed but identification of epifauna may be restricted. Classification to JNCC/EUNIS level three habitats can be confidently undertaken.
- Not visible = broadscale habitat cannot be assessed, preventing assessment of seabed character and identification of epifauna.

BSL used the above guidance and assessed 10-second intervals of video footage to calculate the percentage occurrence of each quality category per habitat section and each individual underwater still (Appendix G). Based on the quality review, the majority of stills and video footage acquired were classified as 'good' quality and enabled the classification of each transect to level four and five JNCC/EUNIS habitats.

The second review of the video was undertaken to identify and log the start and end positions of varying sediment types/characteristics. Sediment types were to be classified using the MESH modified Folk triangle sediment classification (Long, 2006), as this is most appropriate to habitat/biotope mapping. Additional details were added where necessary to capture ecologically relevant variation within a single Folk sediment type for example, descriptions of seabed bedforms, coarse substratum (e.g. pebble, cobble, boulder) and shell/shingle content. Furthermore, as noted in the JNCC Marine Monitoring Handbook (Davies *et al.*, 2001), the lower size limit for a biotope is typically considered to be 5m^2, below which data is not normally distinguished from the surrounding larger biotope. Therefore, sparse or scattered features, such as boulders on sediment plains, were only counted as separate biotopes if their total cumulative area exceeded 5m^2, although their presence was noted. The presence and positioning of any anthropogenic debris was also noted.

The third review of the video was undertaken to identify and assess the presence/absence and abundance of organisms visible on the video footage. The current study assessed the presence/absence, SACFOR scale and counts/percentage cover of visible organisms in accordance with the JNCC/NMBAQC guidelines (Turner *et al.*, 2016). The physical and biological characteristics of each transect were then used to assign level four JNCC and EUNIS habitat classifications, which were mapped via the differences/similarities in SSS/MBES signatures across the video tracks and wider survey area.

The semi-quantitative SACFOR scale can be used to transform abundance data, determined by size class and percentage cover, into seven categories: super-abundant (S), abundant (A), common (C), frequent (F), occasional (O), rare (R) and less than rare (L) (Table 11). The application of the SACFOR scale involved counting the number of individual species within 15 seconds of video footage based on either 5-minute intervals, or sediment changes, depending on which occurred first. The number of individuals per 15-second interval were converted to abundance (m^2) data using a laser scale of 10cm to assess the field of view (Coggan *et al.*, 2007). SACFOR scale abundances were also calculated per individual image, with both stills and video SACFOR scales averaged per transect to calculate the typical abundance and percentage frequency of occurrence in line with the JNCC methodology to habitat assessment (JNCC, 2020).

Video assessment of potential habitats is limited to characterising the epifaunal species present; however, level JNCC/ENUIS five biotopes and a majority of level four JNCC/EUNIS habitats require an infauna assessment. The infaunal assessment, obtained from Hamon Grab samples, was performed (see Section4.7.1) in accordance with the methodology described by Parry (2019) and Jenkins *et al.* (2015). Therefore, the holistic approach of epifauna and infauna assessment grab enabled the assignment of corresponding level five JNCC/EUNIS biotope classifications.

Table 11 SACFOR Abundance Scale

Cover (%)	Crust/ Meadow	Massive/T urf	<1cm	1-3cm	3-15cm	>15cm	Density	
>80%	S		S				>1/0.001m^2 (1x1 cm)	>10,000/m^2
40-79%	A	S	A	S			1-9/0.001m^2	1000-9999/m^2
20-39%	C	A	C	A	S		1-9 / 0.01m^2 (10 x 10 cm)	100-999/m^2
10-19%	F	C	F	C	A	S	1-9 / 0.1m^2	10-99/m^2
5-9%	O	F	O	F	C	A	1-9/m^2	
1-5% or density	R	O	R	O	F	C	1-9 / 10m^2 (3.16 x 3.16m)	
<1% or density	L	R	L	R	O	F	1-9 / 100m^2 (10 x 10m)	
		L		L	R	O	1-9 / 1000m^2 (31.6 x 31.6m)	
					L	R	<1/1000m^2	
						L	<1/10,000m^2	

Key						
S	A	C	F	O	R	L
Super-abundant	Abundant	Common	Frequent	Occasional	Rare	Less than Rare

The SACFOR typical abundance and the percentage frequency of occurrence for each transect based on the video and stills review is provided below in tables Table 12 and Table 13 and indicates that the predominantly coarse sediment stations had a greater abundance of epifaunal species when compared to the stations dominated by sand. The SACFOR analysis also revealed that the stills SACFOR review observed a greater overall occurrence of species when compared to the video review, with 149 and 114 instances of epifauna observed, respectively. This was unsurprising given more stills were taken and analysed than 15 second intervals of video footage. Therefore, stills SACFOR review was more likely to capture the variability in conspicuous epifauna across the OWF survey area due to the increased sampling effort.

Table 12 SACFOR Scale Abundance and Frequency of Occurrence Based on Video Analysis

Taxa	Number of 15 second intervals	Search area (m²)	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		*Actinopterygii*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Haleciidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		Porifera
			(%)	(%)	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	(%)
Abundance (ind/m² ± SD)																																
OWF_VID_01	2	2.36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_03	2	3.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.15 ± 0.71 (F)	0	0	0.93 ± 4.24 (C)	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_11	2	1.96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_14	2	2.84	0	0	0	0.18 ± 0.71 (F)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_15	2	2.93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_17	2	1.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.26 ± 0.71 (C)	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_19	3	1.62	0	0	0	0	0	0	0.21 ± 0.58 (C)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_23	2	2.76	0	0	0	0	0	0	0	0	0.09 ± 0.35 (L)	0	0	0	0	0	0.18 ± 0.71 (C)	0	0	0	0	0	0.36 ± 1.41 (C)	0	0	0	0	0	0	0	0	0
OWF_VID_25	3	1.55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_26	2	2.47	0	0	0	0	0	0	0	0	0	0	0.2 ± 0.71 (C)	0	0	0.81 ± 1.41 (F)	0.61 ± 2.12 (C)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_30	2	2.32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.21 ± 0.71 (C)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	Number of 15 second intervals	Search area (m²)	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Actinopterygii	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Haleciidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		Porifera
			(%)	(%)	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	(%)
OWF_VID_31	2	2.27	0	0.22 ± 0 (L)	0	0	0	0	0.22 ± 0.71 (C)	0	0.22 ± 0 (L)	0.44 ± 1.41 (F)	5.95 ± 4.95 (A)	0	0	0.22 ± 0.71 (F)	0	0	0	0	0	0	0	0	0	0	0	0	0.22 ± 0.71 (F)	0	0	0
OWF_VID_32	2	2.94	0	0	0	0	0	0	0	0	0	0	2.72 ± 5.65 (A)	0	0	0	0.51 ± 2.12 (C)	0	0	0	0	0	0	0	0	0	0	0	0.17 ± 0.71 (F)	0	0	0
OWF_VID_33	2	2.61	0	0.19 ± 0 (L)	0	0	0	0	0	0	0.19 ± 0 (L)	1.53 ± 5.65 (C)	11.7 ± 7.77 (S)	0	0	0.19 ± 0.71 (F)	0	0	0	0	0	0	0	2.3 ± 2.82 (C)	0	0	0.19 ± 0.71 (C)	0	0	0	0	0
OWF_VID_37	3	2.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.11 ± 0.58 (C)	0
OWF_VID_45	2	2.35	0	0.21 ± 0 (L)	0	0	0	0	0	0	0.21 ± 0 (L)	3.62 ± 0.7 (C)	7.24 ± 4.24 (A)	0	0	0	0	0	0	0	0	0	0	0	0.21 ± 0.71 (C)	0	0	0	0	0	0.64 ± 0.71 (C)	0
OWF_VID_47	3	2.35	0	0	0	0	0	0	0	0	0	0	0.42 ± 1.73 (C)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.14 ± 0.58 (F)	0	0
OWF_VID_50	7	2.01	0	0	0	0	0	0	0	0	1.6 ± 4.63 (R)	3.05 ± 6.03 (C)	4.69 ± 2.63 (A)	0	0.28 ± 0.79 (C)	0	0	0	0	0	0	0.21 ± 0.79 (F)	0.78 ± 2.81 (C)	0.28 ± 0.79 (F)	0	0	0	0	0.28 ± 1.13 (F)	0.07 ± 0.37 (O)	0.07 ± 0.37 (F)	0
OWF_VID_56	2	2.43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_57	2	1.7	0.15 ± 0.35 (L)	0	0	0	0.29 ± 0.71 (C)	0	0	0	1.32 ± 2.47 (R)	9.39 ± 17 (C)	7.63 ± 5.65 (A)	1.46 ± 3.53 (C)	0	0	0	0	0	0	0	2.93 ± 7.07 (C)	5.57 ± 13.4 (A)	0.59 ± 1.41 (F)	0	0.59 ± 1.41 (F)	0	0	4.98 ± 9.19 (C)	0	0	0
OWF_VID_58	2	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.19 ± 0.71 (F)	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_60	3	1.98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_64	2	2.75	0	0	0	0	0	0	0	0	0	0.36 ± 1.41 (F)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	Number of 15 second intervals	Search area (m²)	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Actinopterygii	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Haleciidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		Porifera
			(%)	(%)	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	(%)
OWF_VID_65	4	2.66	0	0	0	0	0	0	0	0	0.19 ± 0 (L)	3.47 ± 10.4 (C)	1.13 ± 3.83 (A)	0	0.19 ± 1 (C)	0.94 ± 3.78 (F)	2.53 ± 9.21 (A)	0	0	0	0	0	0.56 ± 3 (C)	0.09 ± 0.5 (O)	0	0	0	0	0.56 ± 1.29 (F)	0.47 ± 1.05 (F)	0.09 ± 0.5 (F)	0.09 ± 0.5 (L)
OWF_VID_69	2	2.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_70	2	2.41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_73	2	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.43 ± 1.41 (F)	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_75	2	1.97	0	0.13 ± 0.35 (L)	0	0	0	0	0	0	0	0	0.25 ± 0.7 (C)	0	0	0	0	0	0	0	0	0	0	0.76 ± 2.12 (F)	0	0	0	0	0	0	0	0
OWF_VID_76	4	3.1	0.32 ± 1.15 (L)	0.16 ± 0 (L)	0	0.08 ± 0.5 (O)	0	0.08 ± 0.50 (O)	0	0.32 ± 2 (F)	0	1.05 ± 3.4 (C)	0.16 ± 0.57 (C)	0.08 ± 0.5 (O)	0.08 ± 0.5 (F)	0.89 ± 4.19 (F)	0.56 ± 2.36 (C)	0	0	0	0	0.8 ± 2.64 (F)	0.64 ± 2.31 (C)	0.48 ± 2.38 (F)	0.72 ± 4.5 (C)	0	0	0.16 ± 0.57 (F)	0.8 ± 1.29 (F)	0.4 ± 0.96 (F)	0	0
OWF_VID_79A	2	2.3	0	0.11 ± 0.35 (L)	0	0	0	0	0	0	0.11 ± 0.35 (L)	1.3 ± 4.24 (C)	3.69 ± 12 (A)	0	0	2.17 ± 7.07 (C)	0.43 ± 1.41 (C)	0	0	0	0	0.43 ± 0 (F)	0.21 ± 0.71 (C)	0.21 ± 0.71 (F)	0	0	0	0	0.65 ± 0.71 (F)	0.22 ± 0.71 (F)	0	0
OWF_VID_80	2	1.87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)*																																
OWF_VID_01																																
OWF_VID_03																		50			50											
OWF_VID_11																																
OWF_VID_14						50																										
OWF_VID_15																																
OWF_VID_17																					50											
OWF_VID_19									33																							
OWF_VID_23											50						50						50									
OWF_VID_25																																
OWF_VID_26													50			100	50															

Taxa	Number of 15 second intervals	Search area (m²)	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		*Actinopterygii*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Haleciidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		Porifera
			(%)	(%)	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	(%)
OWF_VID_30																	50															
OWF_VID_31				100					50		100	50	100			50													50			
OWF_VID_32													100				50												50			
OWF_VID_33				100							100	50	100			50								100			50					
Percentage Frequency of Occurrence (%)*																																
OWF_VID_37																															33	
OWF_VID_45				100							100	100	100												50						100	
OWF_VID_47													33																	33		
OWF_VID_50											100	100	100		43							29	29	43					29	14	14	
OWF_VID_56																																
OWF_VID_57			50				50				100	100	100	50								50	50	50		50			100			
OWF_VID_58																			50													
OWF_VID_60																																
OWF_VID_64												50																				
OWF_VID_65											100	75	50		25	50	75						25	25					75	50	25	25
OWF_VID_69																																
OWF_VID_70																																
OWF_VID_73																				50												
OWF_VID_75				50									50											50								
OWF_VID_76			50	100		25		25		25		75	50	25	25	75	50					75	50	50	25			50	100	75		
OWF_VID_79A				50							50	50	50			50	50					100	50	50					100	50		
OWF_VID_80																																

(S) = Super-abundant, (A) = Abundant, (C) = Common, (F) = Frequent, (O) = Occasional, (R) = Rare and (L) = Less than rare
**To aid clarity 0% frequency of occurrence values have been excluded from the table*

Table 13 SACFOR Scale Abundance and Frequency of Occurrence Based on Stills Analysis

Taxa	Number of stills	Search area (m²)	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida
			(%)	(%)	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	>15cm	3 - 15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	(%)
Abundance (ind/m² ± SD)																			
OWF_VID_01	23	0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_03	25	0.77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_11	21	0.6	0	0	0	0	0	0	0	0	0	0	0.16 ± 0.43 (F)	0	0	0	0	0	0
OWF_VID_14	25	0.63	0	0	0	0	0	0	0	0	0	0	0.06 ± 0.2 (O)	0	0	0	0	0	0
OWF_VID_15	14	0.59	0	0	0	0.12 ± 0.26 (F)	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_17	14	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_19	29	0.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_23	28	0.58	0	0	0	0	0	0	0	0	0	0	0.61 ± 1.19 (F)	0.31 ± 0.94 (C)	0	0	0.61 ± 1.89 (F)	0	0
OWF_VID_25	20	0.62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_26	17	1.11	0	0	0	0	0	0	0	0	0	0	0.11 ± 0.33 (F)	0	0	0	0.16 ± 0.52 (F)	0	0
OWF_VID_30	26	0.63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	Actinopterygii	*Agonus cataphractus*	*Callionymus lyra*	*Echiichthys vipera*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		*Nemertesia* sp.	*Tubularia* sp.	Sertulariidae		Haleciidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	*Ensis* sp.	Porifera
	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	(%)
Abundance (ind/m² ± SD)																							
OWF_VID_01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_03	0.05 ± 0.2 (O)	0	0	0	0	0.05 ± 0.2 (O)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_11	0	0	0	0	0	0	0	0	0	0	0	0.08 ± 0.21 (O)	0.08 ± 0.22 (F)	0	0	0	0	0	0	0	0	0	0
OWF_VID_14	0	0	0	0	0	0	0.06 ± 0.2 (F)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_26	0	0	0	0	0	0	0	0	0	0	0	0	0	0.21 ± 0.56 (F)	0	0	0	0	0	0	0	0	0
OWF_VID_30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	Number of stills	Search area (m²)	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida	*Actinopterygii*	*Agonus cataphractus*	*Callionymus lyra*	*Echiichthys vipera*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		*Nemertesia* sp.	*Tubularia* sp.	Sertulariidae		Haleciidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	*Ensis* sp.	Porifera
			(%)	(%)	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	>15cm	3 - 15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	(%)	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	(%)
OWF_VID_31	20	0.65	0	0.84 ± 0.15 (R)	0	0	0	0	0	0	0	0.84 ± 0.15 (R)	3.22 ± 2.05 (C)	0.38 ± 0.44 (C)	0	0	0	0	0.15 ± 0.31 (R)	0	0	0	0	0	0	0	0	0	0	0	1.84 ± 1.67 (C)	0	0	0	0.08 ± 0.22 (O)	0	0	0	0.08 ± 0.22 (O)	0	0.08 ± 0.22 (O)	0
OWF_VID_32	10	0.69	0	0	0	0	0	0	0	0	0	0	1.31 ± 2.51 (C)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.15 ± 0.31 (F)	0	0	0	0.14 ± 0.32 (F)	0	0	0	0	0	0	0.29 ± 0.63 (R)
OWF_VID_33	21	0.64	0	0.78 ± 0 (R)	0	0	0	0	0	0	0	0.78 ± 0 (R)	11.3 ± 4.85 (A)	0.22 ± 0.35 (C)	0.07 ± 0.22 (O)	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07 ± 0.22 (O)	0	1.78 ± 1.19 (C)	0	0.37 ± 0.54 (F)	0	0.22 ± 0.48 (F)	0.52 ± 0.73 (F)	0	0	0	0	0	0
OWF_VID_37	20	0.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.07 ± 0.22 (O)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_45	21	0.66	0	0.76 ± 0 (R)	0	0	0	0	0	0	0	0.76 ± 0 (R)	8.08 ± 2.08 (C)	0	0.07 ± 0.21 (O)	0	0.07 ± 0.22 (O)	0	0.04 ± 0.11 (L)	0	0	0	0	0	0	0	0	0	0	0	1.08 ± 1.05 (C)	0	0	0	0.14 ± 0.3 (F)	0.14 ± 0.3 (F)	0	0	0	0	0.14 ± 0.3 (F)	0
OWF_VID_47	33	0.6	0	0	0.05 ± 0.17 (O)	0.05 ± 0.17 (O)	0	0	0	0	0	0	0.3 ± 0.58 (F)	0	0	0	0.05 ± 0.17 (O)	0	0	0	0.05 ± 0.17 (O)	0	0	0	0	0	0	0	0	0	0.05 ± 0.17 (O)	0	0	0	0	0.05 ± 0.17 (O)	0.05 ± 0.17 (F)	0.05 ± 0.17 (O)	0	0	0	0
OWF_VID_50	36	0.71	0	0	0	0	0	0	0	0	0	0.98 ± 2.07 (R)	5.95 ± 4.66 (C)	0.23 ± 0.45 (C)	0.19 ± 0.48 (F)	0.04 ± 0.17 (F)	0.08 ± 0.23 (O)	0	0	0	0	0	0	0	0	0	0.74 ± 2.33 (F)	0.35 ± 1.02 (C)	0.05 ± 0.17 (O)	0.04 ± 0.16 (O)	0.74 ± 1.52 (F)	0	0	0	0.31 ± 0.42 (F)	0.04 ± 0.17 (O)	0	0	0	0	0	0
OWF_VID_56	19	0.63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_57	23	0.63	0.21 ± 0.46 (R)	0.03 ± 0.1 (L)	0	0	0	0.07 ± 0.21 (F)	0	0	0.07 ± 0.21 (O)	0.45 ± 0.47 (R)	16.5 ± 8.58 (A)	0.28 ± 0.83 (C)	0.62 ± 0.99 (F)	0	0.35 ± 0.73 (F)	0	0.03 ± 0.1 (L)	0	0	0.07 ± 0.21 (O)	0.07 ± 0.21 (O)	0	0	0	1.11 ± 1.52 (C)	0.69 ± 1.19 (C)	0.07 ± 0.21 (O)	0	5.82 ± 3.18 (C)	0	0.48 ± 1.02 (F)	0	3.6 ± 2.49 (C)	0.21 ± 0.34 (F)	0	0	0	0	0	0.52 ± 0.86 (R)
OWF_VID_58	11	0.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_60	18	0.63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_64	19	0.64	0	0	0	0	0	0	0	0	0	0	0	0	0.08 ± 0.23 (O)	0	0	0	0	0	0	0	0	0.16 ± 0.31 (F)	0	0	0	0	0	0	0	0	0	0	0	0.16 ± 0.45 (F)	0	0	0	0	0	0

Taxa	Number of stills	Search area (m²)	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida	*Actinopterygii*	*Agonus cataphractus*	*Callionymus lyra*	*Echiichthys vipera*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		*Nemertesia* sp.	*Tubularia* sp.	Sertulariidae		Haleciidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	*Ensis* sp.	Porifera
			(%)	(%)	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	>15cm	3 - 15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	(%)	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	(%)
OWF_VID_65	29	0.71	0	0	0	0	0	0	0	0	0	0.17 ± 0.25 (R)	1.03 ± 2.23 (C)	0	0.19 ± 0.44 (F)	0	2.34 ± 2.07 (C)	0.34 ± 0.57 (C)	0	0	0	0	0	0	0	0	0.98 ± 2.05 (F)	0	0	0	0.19 ± 0.58 (F)	0	0	0.05 ± 0.19 (O)	0.1 ± 0.25 (O)	0.24 ± 0.47 (F)	0	0	0	0	0	0.05 ± 0.19 (L)
OWF_VID_69	19	0.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_70	16	0.65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_73	11	0.59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.15 ± 0.3 (F)	0	0	0.15 ± 0.3 (F)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_75	23	0.73	0	0.18 ± 0.22 (R)	0	0	0	0	0	0	0	0.03 ± 0.1 (L)	0.06 ± 0.21 (O)	0	0	0	0.24 ± 0.65 (F)	0	0	0	0	0	0	0	0	0	0.06 ± 0.21 (O)	0	0	0	0	0	0	0	0.12 ± 0.29 (F)	0	0	0	0	0	0	0
OWF_VID_76	18	0.63	12.6 ± 11.4 (F)	0.31 ± 0.25 (R)	0	0.26 ± 0.38 (F)	0.09 ± 0.23 (O)	0	0.09 ± 0.23 (F)	0.26 ± 0.51 (F)	0	0.04 ± 0.12 (L)	0.53 ± 0.84 (F)	0.09 ± 0.24 (F)	1.15 ± 1.48 (C)	0.09 ± 0.24 (F)	0.71 ± 0.92 (F)	0	0	0	0	0	0	0	0	0	0.71 ± 0.62 (F)	0.17 ± 0.32 (C)	0	0.09 ± 0.23 (O)	2.83 ± 1.98 (C)	0	0	0.71 ± 0.98 (F)	0.53 ± 0.68 (F)	0.71 ± 0.61 (F)	0	0.18 ± 0.32 (F)	0	0.09 ± 0.24 (O)	0.18 ± 0.32 (F)	0
OWF_VID_79A	37	0.64	0.08 ± 0.19 (L)	0.06 ± 0.14 (L)	0.04 ± 0.16 (O)	0	0	0	0	0	0	0.02 ± 0.08 (L)	0.63 ± 1.21 (F)	0	0.13 ± 0.28 (F)	0	1.72 ± 1.31 (C)	0	0	0	0	0.04 ± 0.16 (O)	0	0	0	0	0.46 ± 0.52 (F)	0.34 ± 0.63 (C)	0	0	0.59 ± 0.83 (F)	0	0	0	0.38 ± 0.59 (F)	0.13 ± 0.28 (F)	0	0	0	0	0	0
OWF_VID_80	14	0.60																																								
Percentage Frequency of Occurrence (%)*																																										
OWF_VID_01																																										
OWF_VID_03																				4																						
OWF_VID_11													5																		5	5										
OWF_VID_14													4													4																
OWF_VID_15							7																																			
OWF_VID_17																																										
OWF_VID_19																																										
OWF_VID_23													14	4			4																									
OWF_VID_25																																										
OWF_VID_26													12				12																18									
OWF_VID_30																																										
OWF_VID_31				100								100	75	25					10												55				5				5		5	

Taxa	Number of stills	Search area (m^2)	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida	*Actinopterygii*	*Agonus cataphractus*	*Callionymus lyra*	*Echiichthys vipera*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		*Nemertesia* sp.	*Tubularia* sp.	Sertulariidae		Haleciidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	*Ensis* sp.	Porifera
			(%)	(%)	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	>15cm	3 - 15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	(%)	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	(%)
OWF_VID_32													20																		10				10							10
OWF_VID_33				100								100	90	14	5														5		62		19		10	19						
OWF_VID_37																									5																	
OWF_VID_45				100								100	100		5		5		5												43				10	10					10	
OWF_VID_47					3	3							9				3				3										3					3	3	3				
OWF_VID_50												17	72	14	8	3	6										17	11	3	3	14				22	3						
OWF_VID_56																																										
Percentage Frequency of Occurrence (%)*																																										
OWF_VID_57			9	4				4			4	39	83	4	17		9		4			4	4				35	17	4		74		9		78	13						22
OWF_VID_58																																										
OWF_VID_60																																										
OWF_VID_64															5									11												5						
OWF_VID_65						3		3				21	17		10		52	17									14				7			3	7	14						3
OWF_VID_69																																										
OWF_VID_70																																										
OWF_VID_73																						9			9																	
OWF_VID_75				26								4	4				9										4								9							
OWF_VID_76			72	39		17	6		6	11		6	17	6	33	6	22										39	11		6	61			28	22	39		11		6	11	
OWF_VID_79A			8	8	3							3	14		8		59					3					27	14			22				19	8						
OWF_VID_80																																										

(S) = Super-abundant, (A) = Abundant, (C) = Common, (F) = Frequent, (O) = Occasional, (R) = Rare and (L) = Less than rare
**To aid clarity 0% frequency of occurrence values have been excluded from the table*

4 ENVIRONMENTAL BASELINE SURVEY RESULTS AND DISCUSSION

4.1 BATHYMETRY AND SEABED FEATURES

The following text was adapted from the environmental fieldwork report for the OWF survey area (UK4855H-824-FR-01) and Geophysical Survey Report (ENV21-21042-GTR4-02_Rev.01) to describe the bathymetry across the OWF survey area. Bathymetric data was acquired using a 1x dual head Reson T20R multibeam echo sounder and have been reduced to LAT.

The variable water depth range of 5m to 47m LAT was attributed to the undulating seabed due to the presence of megaripples, sand waves, sandbanks and canyons (Figure 5). The seabed morphology resulted in a maximum seabed slope of 23° which was attributed to the presence of two canyons. Whereas the exclusion of the seabed morphologies resulted in an average seabed slope of 1°. The two present within the survey area aligned south-southeast with a maximum depth of 47m (Figure 5). Megaripples and sand waves were observed ubiquitously across the survey area and were orientated east-northeast to west-southwest with typical amplitudes of 1m and 1m to 8m, respectively and wavelengths of 10m to 25m and 100m to 1,250m, respectively. Sandbanks were present along the northern and southern extents of the survey area and had heights equal or greater than 5m.

Side scan sonar (SSS) data was acquired using a 2x Edgetech 4200 simultaneous, dual frequency (300/600kHz) at a 75m range per channel. The SSS mosaic data was rendered at a 0.15m pixel size and supplemented by swathe bathymetry data gridded to a 0.25m cell size. Based on SSS reflectivity and background reference material, seabed sediments were interpreted to vary between mixed sediment, coarse sediment and sand across the OWF survey area, which were defined as 'GRAVEL', 'Gravelly SAND', 'Sand' and' Sandy CLAY' by Enviros Survey and Consultancy Limited (Figure 5). Megaripples and sand waves present on the bathymetry data were also present on the SSS data due to the steep slopes.

Numerous seabed contacts interpreted as cobbles and boulders were present within the survey area, with approximately 205,000 hard contacts relating to pebbles, cobbles and boulders identified from the SSS. The majority of the survey area was characterised by high and moderate reflectivity areas, indicating areas of variable shell fragments, pebbles, cobbles and boulders across the OWF survey area. These areas were characterised by the geophysical report as 'GRAVEL', 'Gravelly sand' and 'Sandy CLAY' (Figure 5). Whereas the lighter reflective sediments to the east, in between the areas of darker reflective sediments, indicate finer sand dominated sediments, which were characterised as 'Sand' by the geophysical report (Figure 5). The areas of darker striated reflective sediment characterised by the geophysical report as 'sandy CLAY' were less mobile than the surrounding sediments as they were less influenced by sand waves and megaripples (Figure 5). Three shipwrecks, two linear debris (potentially wire), rock dump and 333 magnetometer anomalies were also detected by the analogue data within the OWF survey area. The wire ranged between 124m and 1,144m in length and of the 333 magnetometer anomalies only seven were likely to be attributed to buried metal objects not related to oil and gas infrastructure.

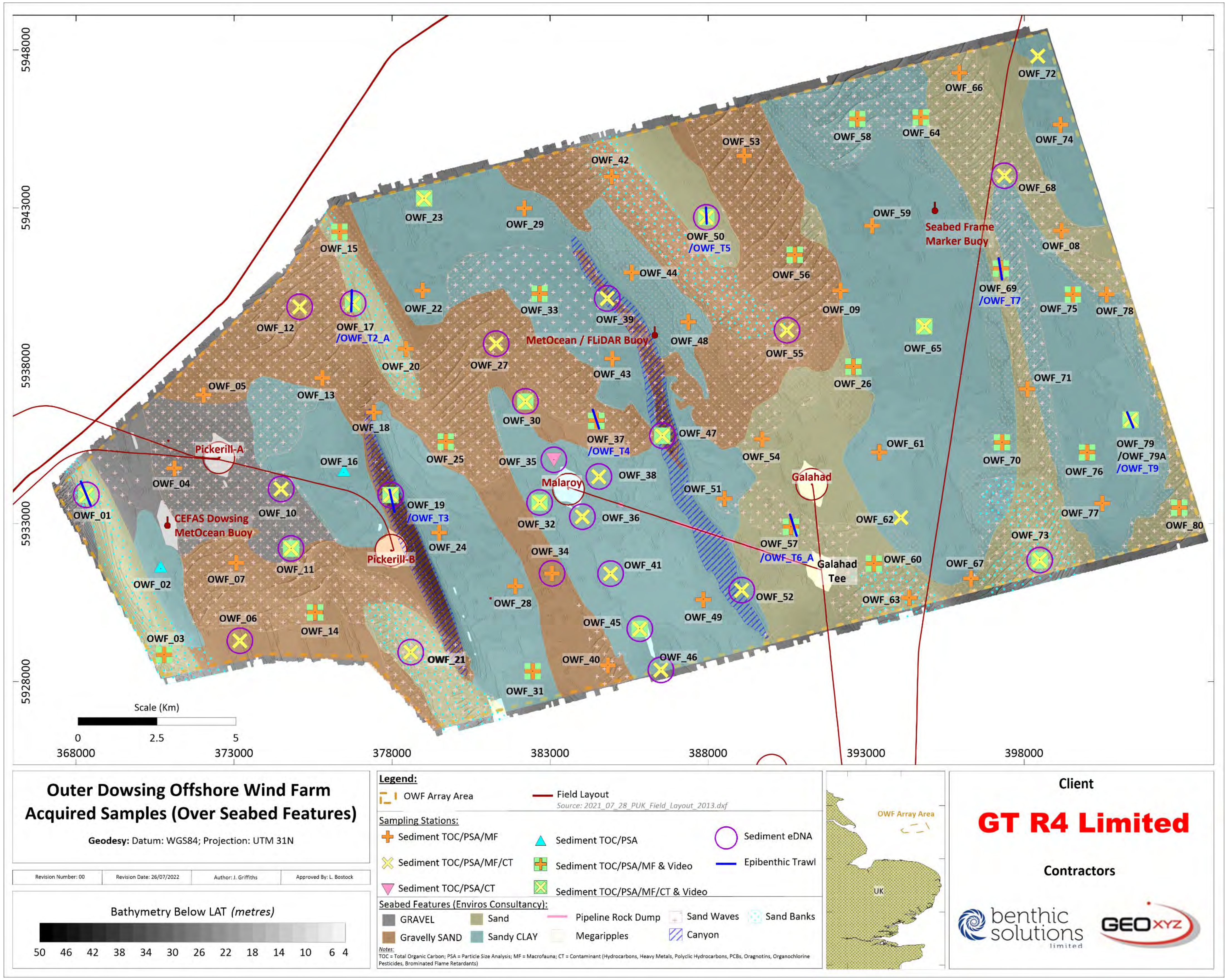


Figure 5 Seabed Features Supplied by Enviros Survey and Consultancy Limited

4.2 SHALLOW GEOLOGY

The following text was adapted from the geophysical survey report (ENV21-21042-GTR4-02_Rev.01) for the OWF survey area, focussing on those layers lying close to the seabed surface which may have influenced surface sediment composition. Interpretation of the shallow geology is based upon sub-bottom profiler (SBP). Lithological descriptions are based on seismic character and regional background information.

The shallow geology across the OWF survey area comprises of mobile bottom current influenced Holocene Sands overlaying the Bolders Bank and Swarte Formations, with an underlying Mesozoic Formation. The Bolders Bank Formation pinches to the surface to the west of the survey area, while the Holocene Sands were thicker and more prominent to the east of the survey area. Bolders Bank Formation is broadly characterised as glacial till comprising gravelly, sandy, silty clay (Wallingford *et al.*, 2002), which is consistent with the observed seabed composition to the west of the survey area. Camera ground truthing also indicated a greater prevalence of sand dominated sediments to the east of the survey area, which was consistent with the thicker layer of Holocene Sands recorded in these areas. The Mesozoic Formation pinches out to the top of the Swarte Formation across the centre and to the west of the survey area. The arcuate sub-linear canyon features that are thought to be a product of subglacial processes penetrated below the Holocene Sands and Bolders Bank Formation and extended into the surface of the Swarte Formation. A more detailed analysis of shallow geology is available in the Geophysical Survey Report (ENV21-21042-GTR4-02_Rev.01).

4.3 PARTICLE SIZE DISTRIBUTIONS

The particle size interpretation of sediments from the environmental baseline survey conducted across the OWF survey area was based on observations made from the acoustic data and seabed photography, and from the analytical results acquired from the surface sediments at 80 stations (Table 14). Material for particle size analysis was recovered from the surface 5cm of the grab samples and was analysed by BSL upon return of the samples to Norfolk, UK. Please refer to Appendix D for the laboratory methods employed. Individual particle size distribution plots are presented in Appendix E.

4.3.1 General Description

The results of particle size analyses indicated a variable sediment type across the OWF survey area where the seabed sediments showed a general sand dominance (mean 70.34%±25.96SD) with a lower proportion of gravel (mean 28.35%±25.23SD) and minimal proportion of fines (mean 1.32%±2.34SD; Table 14 and Figure 6). The variable distribution of fines, sand and gravel across the survey area was represented by the relatively high coefficients of variation (177.5%, 37.0% and 89.0%, respectively), which was expected given the large extent of the survey area but is considered to reflect the ambient seabed sediments of the southern North Sea (Table 14).

Proportions of sand were variable across the OWF survey area ranging between 18.58% at OWF_77 to 99.99% at OWF_01, OWF_03, OWF_15 and OWF_17 (Figure 7). Sand content showed a general spatial pattern with an increased proportion recorded at shallow depths associated with sandbank features, and the geophysical reports 'Sand' areas, which was corroborated by a significant negative Spearman's correlation to water depth ($\varrho(80)=-0.222$, $p<0.05$). However, station OWF_47 sampled within a seabed canyon had a high sand content of 95.50%, demonstrating the general dominance of sand across the survey area.

Similarly to sand, gravel was fairly variable across the survey area ranging from 0.01% at OWF_01, OWF_03, OWF_15 and OWF_17 to 81.08% at OWF_77 (Figure 8). The spatial distribution of gravel demonstrated the inverse relationship to the proportion of sand due to the relatively minimal proportion of fines, and was corroborated by a significant Spearman's correlation between the proportion of gravel and sand ($\varrho(80)=-0.998$, $p<0.001$).

Although, unlike the proportion of sand, no significant correlation was found between the proportion of gravel and the depth (p>0.05). A significant Spearman's correlation between the sorting coefficient and depth (ρ(80)=0.312, p<0.01) indicated the sediments within the deeper areas of the survey, i.e. within the canyons and troughs between the sand waves, were generally more variable than the sediments sampled from sandbank crests. Furthermore, a significant negative Spearman's correlation between the nearest well location and gravel proportion (ρ(80)=-0.225, p<0.05) indicated that the gravel distribution was likely attributed to natural variability across the OWF survey area.

The proportion of fines within the survey area was generally low with the seabed sediment at most stations containing <4% fines while the survey maximum of 14.53% was recorded at station OWF_43 (Figure 9). Slightly higher fines content was observed at deeper stations with the relationship supported by a positive Spearman's correlation between the water depth and fines proportion (ρ(80)=0.295, p<0.01).

The Folk (1954) and Wentworth (1922) classifications for each station are listed in Table 14. The Wentworth classification assigns a single sediment class based on the mean particle size and is appropriate for well-sorted modal sediments, dominated by a narrow range of sediment particle sizes. The Folk classification provides a more representative description for poorly sorted sediments, encompassing a range of particle sizes as it takes into account the relative proportions of mud (<63µm), sand (63µm-2mm) and gravel (>2mm) fractions (Figure 7 to Figure 9). For the purposes of this study, we have used the modified Folk classification produced by the British Geological Survey (Long, 2006).

The samples collected in the survey area represented seven Folk classifications with most (58.8% of the total) assigned to sand dominant classifications such as "Sand", "Slightly Gravelly Sand", "Gravelly Sand" or 'Gravelly Muddy Sand", while the remaining stations (41.3% of the total) were assigned gravel dominant classifications such as "Gravel", "Sandy Gravel" or "Muddy Sandy Gravel" (Table 14). The folk classifications overlapped between the geophysical sediment assigned categories of 'Sand', 'Gravelly SAND', 'GRAVEL' and 'Sandy CLAY', which indicates the variability in surface sediment composition between the different SSS/MBES signatures (Figure 5). The Wentworth classification scale identified six different sediment classifications ranging from "'Fine Sand" to "Pebble". The variable sediment within the samples was reflected in the sorting coefficient (Table 14), with the majority of stations (66.3%) classified as "Very poorly sorted" or "Poorly sorted" and the minority of stations (33.7%) classified as "Moderately sorted", "Moderately well sorted" or "Well sorted" (mean 1.66%±0.86SD).

Previous BSL SNS surveys, close to the OWF survey area, showed slightly different sediment compositions to the current survey (Table 14). The previous SNS surveys had a mean particle size range of 0.68mm to 1.62mm when compared to 1.31mm recorded during the current survey. Similarly to the current OWF survey, differences in mean particle sizes were due to the variable gravel and sand proportions, with the previous SNS surveys recording an overall sand dominance (ranging between 57.51% to 84.07%), with lower gravel proportions of 15.79% to 38.35% in comparison to 70.34% sand and 28.35% gravel recorded during the current survey (Table 14). Similarly, the proportion of fines recorded from the previous studies were minimal and ranged between 0.15% to 4.15% when compared to 1.32% for the current OWF survey (Table 14). Therefore, based on the overlaps in sediment composition between the regional comparisons, the sediment of the OWF survey area likely reflects typical background conditions for this region of the SNS.

Table 14 Summary of Surface Particle Characteristics

Station	Depth (m)	Distance to Nearest Well (km)	Mean Sediment Size		Wentworth Classification	Sorting Coefficient	Sorting Classification	Fines (%)	Sands (%)	Gravel (%)	Modified Folk Scale
			(mm)	(Phi)							
OWF_01	11	3.12	0.31	0.12	Medium Sand	0.45	Well Sorted	0.00	99.99	0.01	Sand
OWF_02	19	2.95	1.56	7.90	Very Coarse Sand	2.68	Very Poorly Sorted	3.21	49.60	47.19	Sandy Gravel
OWF_03	10	3.90	0.30	0.13	Medium Sand	0.49	Well Sorted	0.00	99.99	0.01	Sand
OWF_04	22	0.89	6.37	11.02	Pebble	2.07	Very Poorly Sorted	0.45	23.83	75.72	Sandy Gravel
OWF_05	23	1.67	0.59	3.01	Coarse Sand	1.97	Poorly Sorted	0.00	74.68	25.32	Gravelly Sand
OWF_06	19	2.24	0.58	3.06	Coarse Sand	2.10	Very Poorly Sorted	0.00	73.36	26.64	Gravelly Sand
OWF_07	19	0.68	1.46	3.01	Very Coarse Sand	1.89	Poorly Sorted	0.60	50.95	48.46	Sandy Gravel
OWF_08	21	1.57	0.47	0.27	Medium Sand	0.64	Moderately Well Sorted	0.32	99.27	0.42	Sand
OWF_09	23	5.71	0.97	5.43	Coarse Sand	2.38	Very Poorly Sorted	2.18	56.38	41.44	Sandy Gravel
OWF_10	21	1.07	0.28	0.72	Medium Sand	0.99	Moderately Sorted	0.00	94.74	5.26	Gravelly Sand
OWF_11	20	1.34	0.24	0.10	Fine Sand	0.50	Well Sorted	0.00	99.91	0.09	Sand
OWF_12	20	2.50	0.30	0.79	Medium Sand	0.90	Moderately Sorted	0.00	94.18	5.82	Gravelly Sand
OWF_13	21	1.10	0.76	1.35	Coarse Sand	1.31	Poorly Sorted	0.00	82.67	17.33	Gravelly Sand
OWF_14	18	0.94	1.19	1.91	Very Coarse Sand	1.65	Poorly Sorted	0.00	58.71	41.29	Sandy Gravel
OWF_15	18	1.83	0.25	0.10	Medium Sand	0.45	Well Sorted	0.00	99.99	0.01	Sand
OWF_16	21	0.91	2.13	17.17	Granule	3.08	Very Poorly Sorted	2.42	49.25	48.34	Sandy Gravel
OWF_17	17	1.01	0.27	0.11	Medium Sand	0.44	Well Sorted	0.00	99.99	0.01	Sand
OWF_18	21	1.26	0.80	1.38	Coarse Sand	1.50	Poorly Sorted	0.98	80.09	18.93	Gravelly Sand
OWF_19	40	1.74	1.72	2.87	Very Coarse Sand	1.62	Poorly Sorted	1.06	51.69	47.25	Sandy Gravel
OWF_20	18	2.43	0.24	0.09	Fine Sand	0.45	Well Sorted	0.00	99.95	0.06	Sand
OWF_21	12	2.75	0.98	1.23	Coarse Sand	1.29	Poorly Sorted	0.00	81.85	18.15	Gravelly Sand
OWF_22	23	1.59	0.28	0.41	Medium Sand	0.78	Moderately Sorted	0.00	96.62	3.38	Slightly Gravelly Sand
OWF_23	23	3.01	1.52	4.21	Very Coarse Sand	2.16	Very Poorly Sorted	0.00	51.65	48.35	Sandy Gravel
OWF_24	23	1.61	2.81	8.84	Granule	2.53	Very Poorly Sorted	0.87	34.41	64.72	Sandy Gravel
OWF_25	18	3.01	0.31	0.15	Medium Sand	0.57	Moderately Well Sorted	0.00	99.90	0.10	Sand
OWF_26	21	3.94	1.33	5.09	Very Coarse Sand	2.34	Very Poorly Sorted	0.00	53.59	46.41	Sandy Gravel

Station	Depth (m)	Distance to Nearest Well (km)	Mean Sediment Size		Wentworth Classification	Sorting Coefficient	Sorting Classification	Fines (%)	Sands (%)	Gravel (%)	Modified Folk Scale
			(mm)	(Phi)							
OWF_27	19	4.82	0.86	1.53	Coarse Sand	1.44	Poorly Sorted	1.04	77.39	21.57	Gravelly Sand
OWF_28	21	0.87	0.70	4.43	Coarse Sand	2.81	Very Poorly Sorted	7.14	63.65	29.20	Gravelly Muddy Sand
OWF_29	24	1.21	0.70	5.55	Coarse Sand	2.97	Very Poorly Sorted	8.00	62.78	29.22	Gravelly Muddy Sand
OWF_30	20	5.31	0.93	2.63	Coarse Sand	1.64	Poorly Sorted	0.42	73.25	26.34	Gravelly Sand
OWF_31	19	1.16	1.84	6.39	Very Coarse Sand	2.35	Very Poorly Sorted	0.43	49.95	49.62	Sandy Gravel
OWF_32	20	0.99	2.52	5.95	Granule	2.25	Very Poorly Sorted	0.00	37.35	62.65	Sandy Gravel
OWF_33	23	2.93	0.60	3.75	Coarse Sand	2.60	Very Poorly Sorted	6.16	66.32	27.52	Gravelly Sand
OWF_34	20	2.10	0.65	4.48	Coarse Sand	1.91	Poorly Sorted	0.00	82.32	17.68	Gravelly Sand
OWF_35	20	1.06	0.42	1.46	Medium Sand	1.57	Poorly Sorted	0.96	87.60	11.44	Gravelly Sand
OWF_36	19	0.95	3.58	5.58	Granule	1.96	Poorly Sorted	0.56	22.40	77.03	Sandy Gravel
OWF_37	19	2.37	1.34	1.43	Very Coarse Sand	1.18	Poorly Sorted	0.61	65.62	33.77	Sandy Gravel
OWF_38	19	1.05	1.84	3.94	Very Coarse Sand	2.05	Very Poorly Sorted	1.04	40.32	58.64	Sandy Gravel
OWF_39	27	1.15	0.63	3.21	Coarse Sand	2.00	Poorly Sorted	2.36	73.27	24.37	Gravelly Sand
OWF_40	17	1.49	0.34	0.17	Medium Sand	0.54	Moderately Well Sorted	0.00	99.97	0.03	Sand
OWF_41	18	1.44	3.27	8.58	Granule	2.50	Very Poorly Sorted	2.76	30.55	66.70	Sandy Gravel
OWF_42	16	2.07	0.34	0.19	Medium Sand	0.62	Moderately Well Sorted	0.00	99.45	0.55	Sand
OWF_43	23	2.79	0.64	6.71	Coarse Sand	3.36	Very Poorly Sorted	14.53	58.30	27.17	Gravelly Muddy Sand
OWF_44	23	0.13	2.50	6.88	Granule	2.15	Very Poorly Sorted	0.93	43.01	56.06	Sandy Gravel
OWF_45	19	0.85	1.05	5.61	Very Coarse Sand	2.45	Very Poorly Sorted	2.37	57.09	40.55	Sandy Gravel
OWF_46	22	0.82	3.08	8.91	Granule	2.46	Very Poorly Sorted	0.98	36.50	62.53	Sandy Gravel
OWF_47	37	3.44	0.68	0.63	Coarse Sand	0.88	Moderately Sorted	0.26	95.50	4.24	Slightly Gravelly Sand
OWF_48	21	2.51	0.50	0.59	Coarse Sand	0.91	Moderately Sorted	0.66	95.09	4.26	Slightly Gravelly Sand
OWF_49	18	2.09	3.60	11.75	Granule	2.67	Very Poorly Sorted	3.66	33.58	62.77	Sandy Gravel
OWF_50	21	1.93	3.59	11.14	Granule	2.63	Very Poorly Sorted	0.69	35.95	63.36	Sandy Gravel
OWF_51	20	2.80	3.02	8.31	Granule	2.50	Very Poorly Sorted	1.93	33.89	64.18	Sandy Gravel
OWF_52	22	1.66	2.29	6.85	Granule	2.34	Very Poorly Sorted	1.32	43.94	54.75	Sandy Gravel
OWF_53	25	0.81	0.51	1.59	Coarse Sand	1.45	Poorly Sorted	0.00	85.43	14.57	Gravelly Sand

Station	Depth (m)	Distance to Nearest Well (km)	Mean Sediment Size		Wentworth Classification	Sorting Coefficient	Sorting Classification	Fines (%)	Sands (%)	Gravel (%)	Modified Folk Scale
			(mm)	(Phi)							
OWF_54	22	2.12	0.52	0.44	Coarse Sand	0.74	Moderately Sorted	0.00	97.66	2.34	Slightly Gravelly Sand
OWF_55	17	4.92	0.56	0.51	Coarse Sand	0.78	Moderately Sorted	0.25	96.95	2.80	Slightly Gravelly Sand
OWF_56	19	3.91	0.45	0.24	Medium Sand	0.59	Moderately Well Sorted	0.00	99.92	0.08	Sand
OWF_57	21	1.16	1.98	8.73	Very Coarse Sand	2.64	Very Poorly Sorted	3.88	45.89	50.24	Sandy Gravel
OWF_58	25	4.42	0.58	1.13	Coarse Sand	1.39	Poorly Sorted	1.40	87.63	10.98	Gravelly Sand
OWF_59	25	5.31	3.21	9.77	Granule	2.48	Very Poorly Sorted	0.94	39.89	59.17	Sandy Gravel
OWF_60	20	1.69	0.39	0.20	Medium Sand	0.59	Moderately Well Sorted	0.00	99.97	0.04	Sand
OWF_61	20	1.84	3.99	11.63	Granule	2.67	Very Poorly Sorted	3.22	28.79	68.00	Muddy Sandy Gravel
OWF_62	21	0.94	1.66	7.39	Very Coarse Sand	2.53	Very Poorly Sorted	2.42	52.34	45.24	Sandy Gravel
OWF_63	19	2.67	0.38	0.25	Medium Sand	0.69	Moderately Well Sorted	0.00	97.96	2.04	Slightly Gravelly Sand
OWF_64	24	3.72	0.35	0.28	Medium Sand	0.71	Moderately Well Sorted	0.00	98.52	1.48	Slightly Gravelly Sand
OWF_65	23	6.10	0.68	6.90	Coarse Sand	2.25	Very Poorly Sorted	1.16	79.70	19.15	Gravelly Sand
OWF_66	22	2.38	0.33	0.16	Medium Sand	0.54	Moderately Well Sorted	0.00	99.86	0.14	Sand
OWF_67	27	1.00	0.99	5.60	Coarse Sand	2.18	Very Poorly Sorted	0.57	74.94	24.49	Gravelly Sand
OWF_68	23	2.00	0.32	0.19	Medium Sand	0.63	Moderately Well Sorted	1.38	98.24	0.38	Sand
OWF_69	22	3.47	0.31	0.14	Medium Sand	0.52	Moderately Well Sorted	0.00	99.08	0.92	Sand
OWF_70	23	4.64	0.42	2.26	Medium Sand	1.61	Poorly Sorted	0.00	87.19	12.82	Gravelly Sand
OWF_71	22	6.23	0.27	0.12	Medium Sand	0.49	Well Sorted	0.00	99.84	0.16	Sand
OWF_72	26	3.62	1.01	6.11	Very Coarse Sand	2.53	Very Poorly Sorted	4.53	51.34	44.13	Sandy Gravel
OWF_73	19	1.93	0.32	0.13	Medium Sand	0.48	Well Sorted	0.00	99.96	0.05	Sand
OWF_74	25	1.80	1.91	5.52	Very Coarse Sand	2.30	Very Poorly Sorted	1.00	45.28	53.72	Sandy Gravel
OWF_75	23	3.05	1.96	4.90	Very Coarse Sand	2.32	Very Poorly Sorted	1.10	36.73	62.17	Sandy Gravel
OWF_76	23	5.56	0.83	5.81	Coarse Sand	2.98	Very Poorly Sorted	7.20	53.61	39.20	Muddy Sandy Gravel
OWF_77	22	4.52	7.17	11.37	Pebble	2.07	Very Poorly Sorted	0.35	18.58	81.08	Gravel
OWF_78	22	2.17	0.57	0.70	Coarse Sand	1.08	Poorly Sorted	0.00	94.90	5.10	Gravelly Sand
OWF_79	22	4.90	3.28	13.06	Granule	3.09	Very Poorly Sorted	5.14	34.69	60.17	Muddy Sandy Gravel
OWF_80	23	5.99	0.33	0.18	Medium Sand	0.60	Moderately Well Sorted	0.00	99.63	0.37	Sand

Station	Depth (m)	Distance to Nearest Well (km)	Mean Sediment Size		Wentworth Classification	Sorting Coefficient	Sorting Classification	Fines (%)	Sands (%)	Gravel (%)	Modified Folk Scale
			(mm)	(Phi)							
Mean			**1.31**	**3.90**	**Coarse Sand**	**1.66**	**Very Poorly Sorted**	**1.32**	**70.34**	**28.35**	**Gravelly Sand**
SD			**1.34**	**3.93**	**-**	**0.86**	**-**	**2.34**	**25.96**	**25.23**	**-**
CV (%)			**102.7**	**100.0**	**-**	**52.0**	**-**	**177.5**	**37.0**	**89.0**	**-**
Minimum			**0.24**	**0.09**	**-**	**0.44**	**-**	**0.00**	**18.58**	**0.01**	**-**
Maximum			**7.17**	**17.2**	**-**	**3.36**	**-**	**14.53**	**99.99**	**81.08**	**-**
Regional Examples											
BSL SNS, 2019	**Mean**		**1.02**	**0.08**	**Very Coarse Sand**	**2.64**	**Very Poorly Sorted**	**4.15**	**57.51**	**38.35**	**Sandy Gravel**
	SD		**0.49**	**0.61**	**-**	**0.15**	**-**	**2.51**	**7.49**	**9.18**	**-**
	CV (%)		**47.9**	**695.2**	**-**	**5.6**	**-**	**60.6**	**13.0**	**23.9**	**-**
BSL SNS, 2020a	**Mean**		**1.62**	**-0.31**	**Very Coarse Sand**	**2.20**	**Very Poorly Sorted**	**3.40**	**61.25**	**35.35**	**Sandy Gravel**
	SD		**1.35**	**1.14**	**-**	**0.86**	**-**	**2.65**	**22.67**	**21.68**	
	CV (%)		**83.1**	**-367.1**	**-**	**39.3**	**-**	**78.2**	**37.0**	**61.3**	
BSL SNS, 2020b	**Mean**		**0.68**	**0.63**	**Coarse Sand**	**1.35**	**Poorly Sorted**	**0.15**	**84.07**	**15.79**	**Gravelly Sand**
	SD		**0.23**	**0.55**	**-**	**0.41**	**-**	**0.20**	**10.86**	**10.72**	**-**
	CV (%)		**34.0**	**87.2**	**-**	**30.4**	**-**	**135.9**	**12.9**	**67.9**	**-**

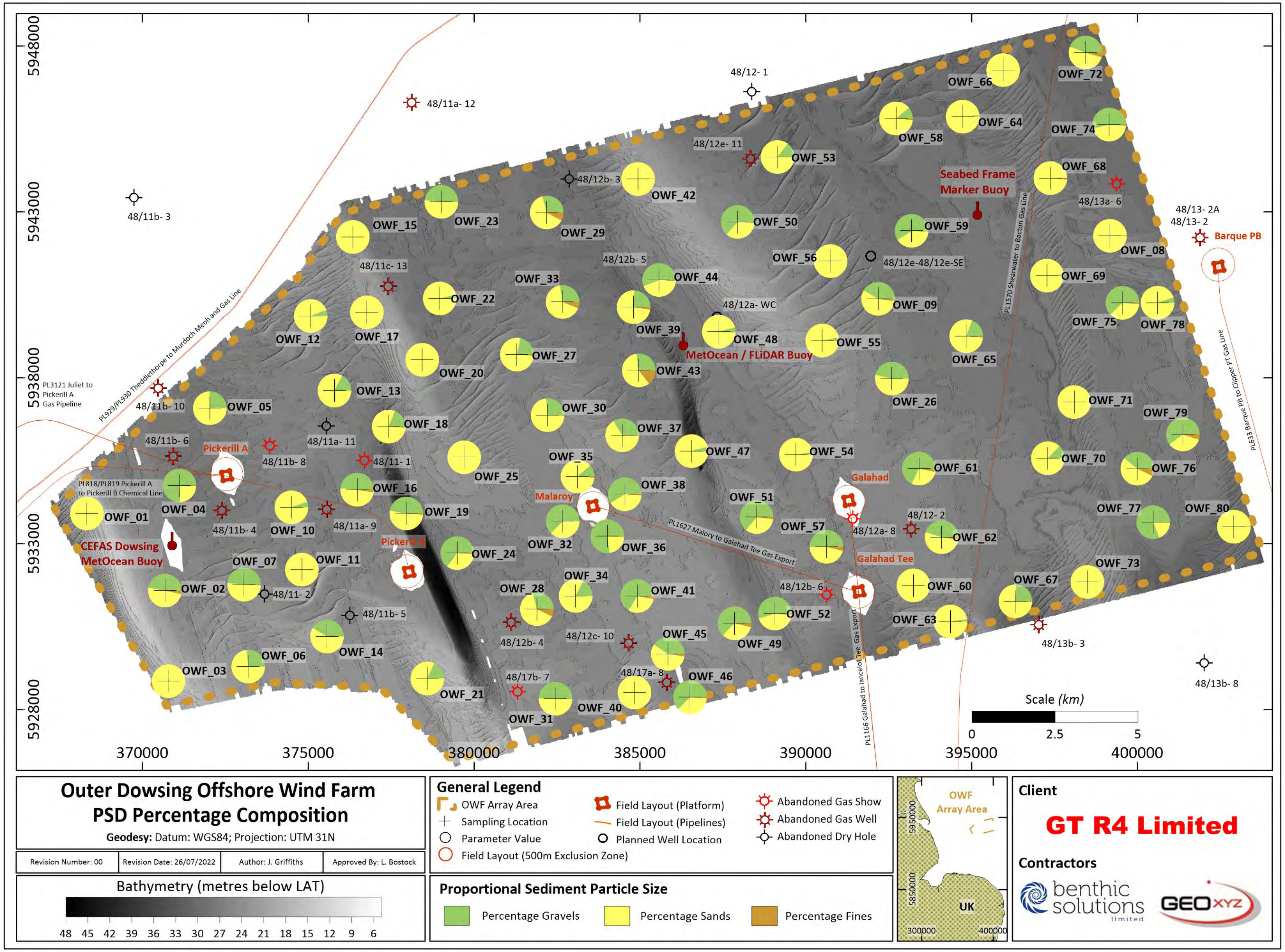


Figure 6 Proportional sediment particle size

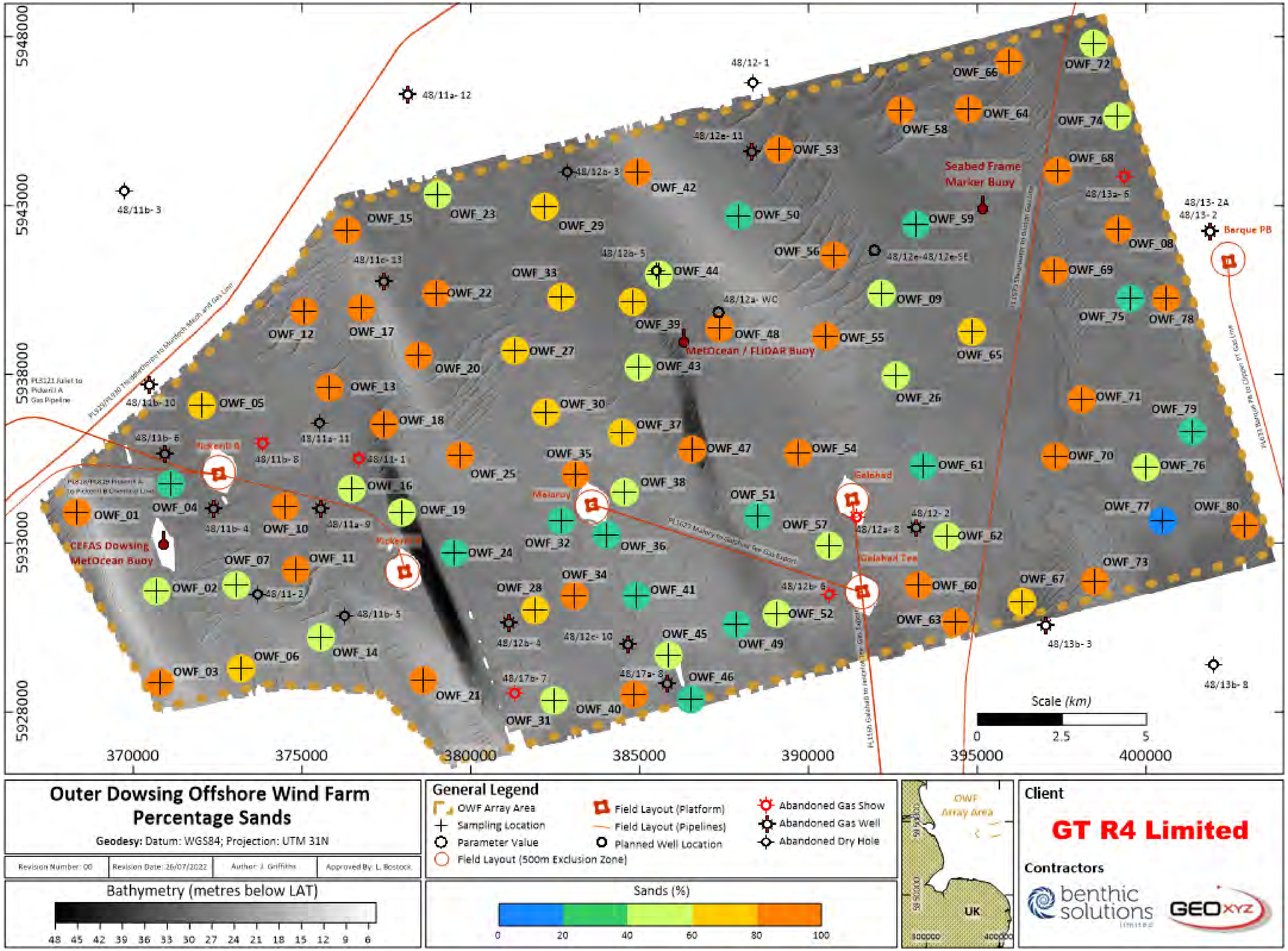


Figure 7 Percentage of sand

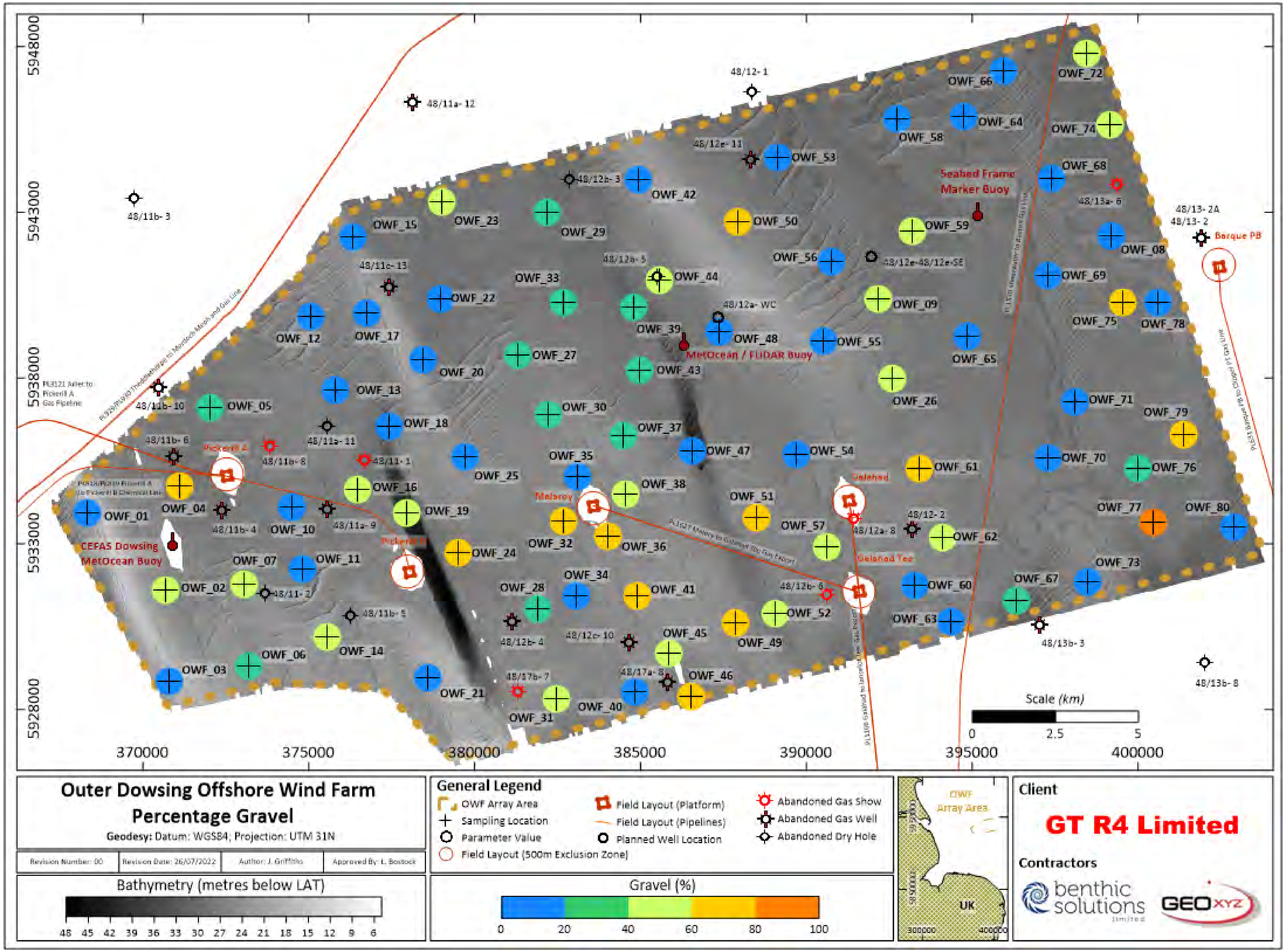


Figure 8 Percentage of gravel

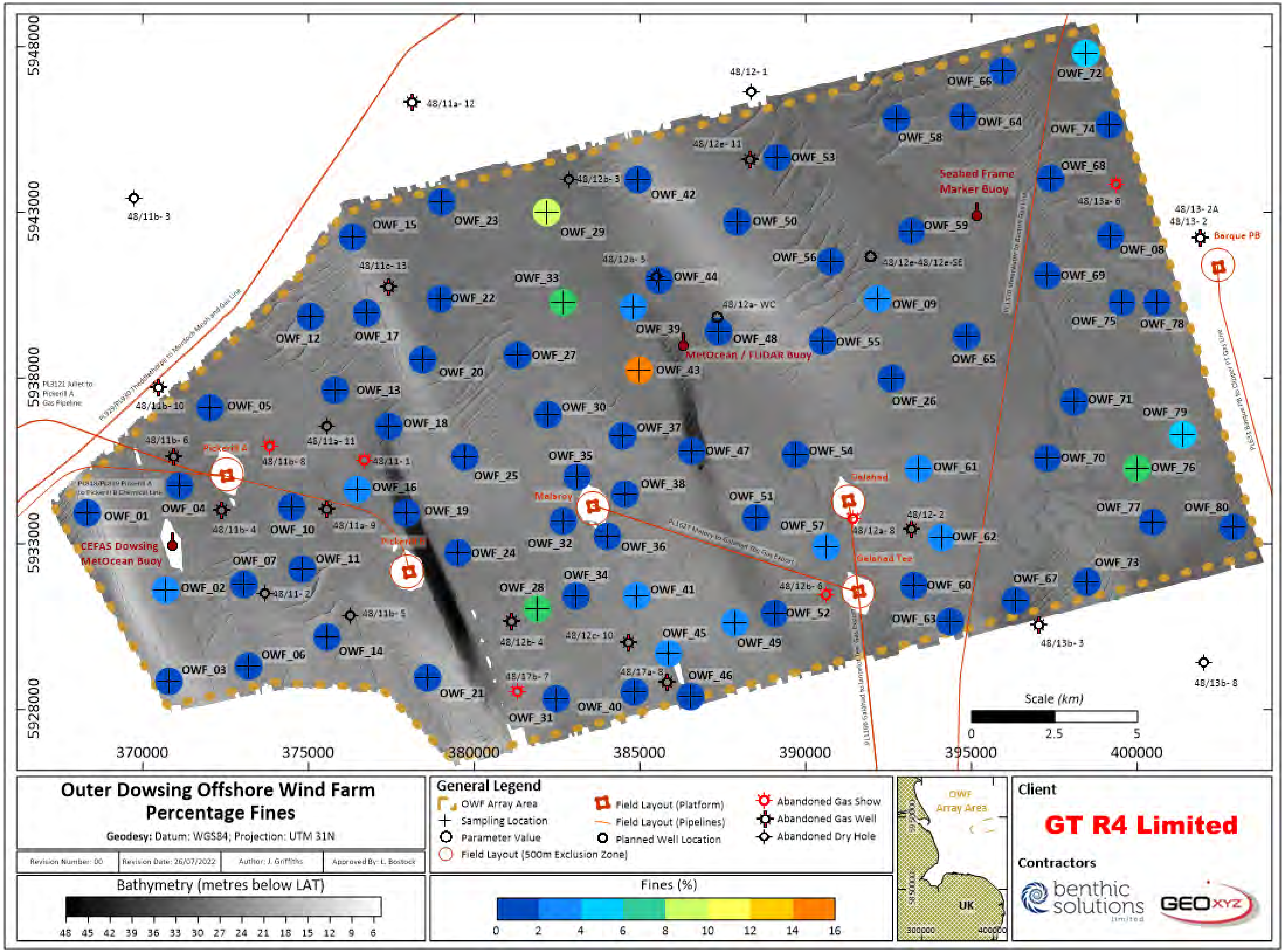


Figure 9 Percentage fines

4.3.2 Multivariate Analyses

The particle size distribution of sediments across the survey area were subjected to further detailed investigation by multivariate analysis using the Plymouth Routines in Multivariate Ecological Research software (PRIMER 7.0.17; Clarke *et al.*, 2014) to elucidate any spatial trends within the data.

A similarity dendrogram was generated by hierarchical agglomerative clustering (CLUSTER) using particle size data (phi) to illustrate similarities/differences between stations using the Euclidean distance dissimilarity measure. The dendrogram produced by cluster analysis is shown in Figure 10, with red lines denoting statistically similar stations and black lines revealing significant differences. Similarity profiling analysis (SIMPROF); indicates the presence of 21 significantly different (p<0.05) clusters; however this was thought to have over-differentiated the dataset. In order to provide a more relevant interpretation to the current survey dataset, a slice was overlain of the SIMPROF clusters at a Euclidean Distance of 34 in order to group the stations at a higher level (Figure 10). The slice splits the dataset into four significantly different (p<0.05) cluster groups, as follows:

- Cluster *'a'*: The differentiation of the first cluster, represented by 33 stations, was not immediately apparent from review of the descriptive statistics as the stations within cluster *'a'* showed comparable sediment characteristics to those stations within the clusters *'b'*, *'c'* and *'d'* (Table 14). However, review of the PSD plots for each station revealed cluster *'a'* had a higher proportion of pebbles (phi -3) and fine silt (phi 7) when compared to the other clusters. The stations within this clusters were predominantly sampled within the 'Sandy CLAY' area.
- Cluster *'b'*: Similarly to cluster *'a'*, the differentiation of the second cluster, represented by 30 stations, was not immediately apparent from review of the descriptive statistics (Table 14). Review of the particle size distribution plots for each station revealed cluster *'b'* had a higher proportion of medium sand (phi 2) when compared to the other clusters. The stations within this cluster were typically sampled within the 'Gravel', 'Gravelly SAND', 'Sand' and 'Sandy CLAY' areas.
- Cluster '*c*:' Similarly to cluster *'b'*, the differentiation of the third cluster, represented by 11 stations, was not immediately apparent from review of the descriptive statistics (Table 14). Review of the PSD plots for each station revealed cluster *'c'* had a higher and more variable proportions of very coarse sand and granules (phi -2 to -1) when compared to the other clusters. The stations within this cluster were predominately sampled within the 'Gravelly SAND' area.
- Cluster *'d'*: Similarly to cluster *'c'*, the differentiation of the fourth cluster, represented by six stations, was not immediately apparent from review of the descriptive statistics (Table 14). Review of the particle size distribution plots for each station revealed cluster *'d'* had a higher proportion of coarse sand (phi 1) when compared to the other clusters. The clusters, similarly, to cluster *'b'*, were sampled within the 'Sand', 'Gravelly SAND' and 'Sandy CLAY' areas.

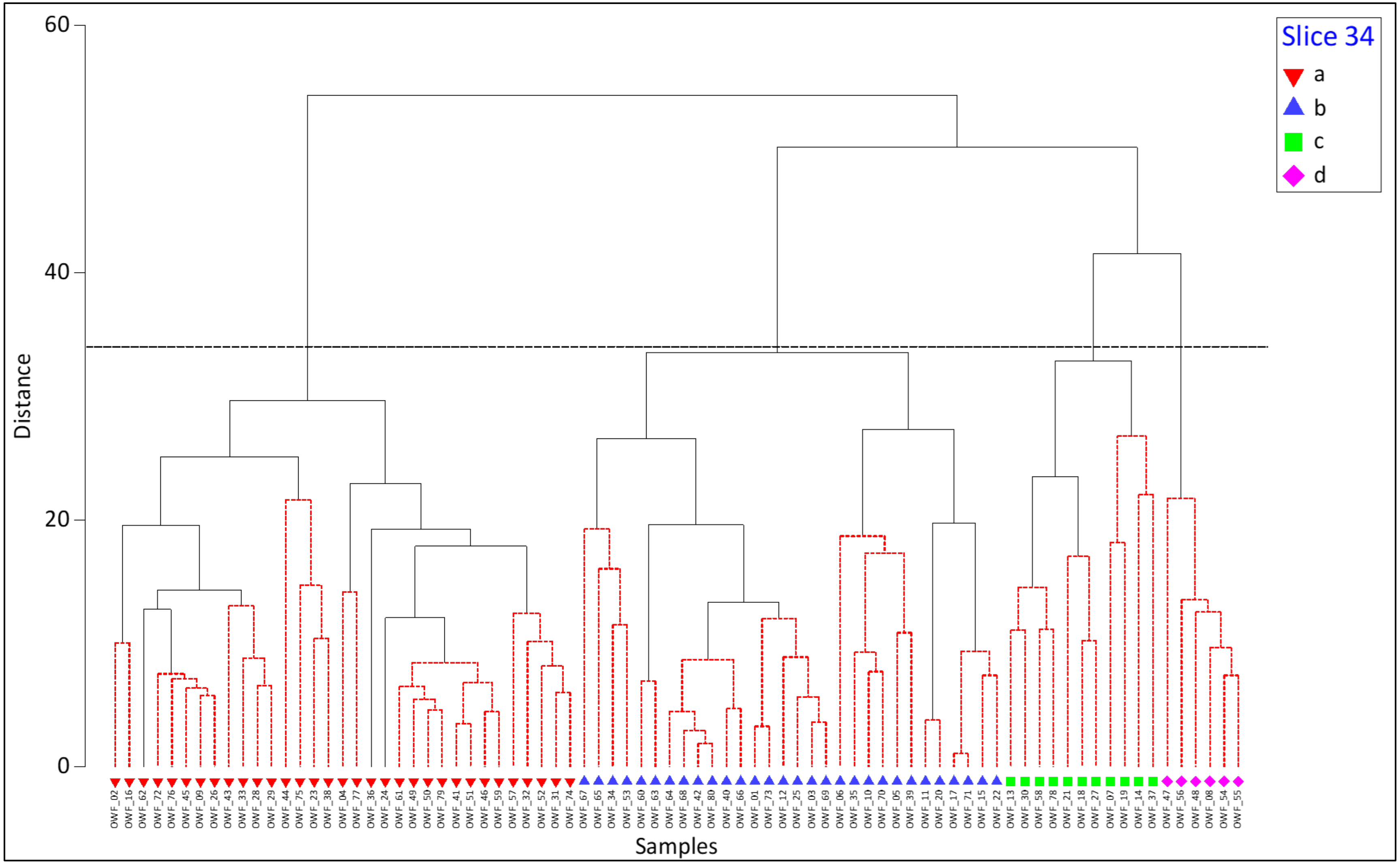


Figure 10 Particle Size Analysis Similarity Dendrogram

A principal component analysis (PCA) was carried out on the proportional whole phi sieve fraction data for each survey station (Figure 11). The resultant PCA plot shows the distribution of each station along axes formed by the two principal components (PC1 and PC2) which together describe the largest proportion of overall variability in the particle size fraction dataset. The direction of change for each sediment phi fraction is shown by eigenvectors which are oriented in three main directions, loosely grouping fractions comprising the three sediment fractions (i.e. fines, sand and gravel). Overall, the plot illustrated the subtle variability in sediment composition driving the differentiation of the clusters. The differentiation was attributed to the variable proportions of the large pebble, coarse sand, medium sand and fine sand fractions within the samples as evidenced by the length of the eigenvectors labelled with phi fraction -3, 1, 2 and 3 (Figure 11). Cluster *'a'* separated from the other three clusters due to the greater influence of the large pebble fraction (phi -3) at these stations. Cluster *'b'* had a higher proportion of medium to fine sand fractions (phi 2 to 3) when compared to cluster '*a*'; however, the spread of cluster *'b'* across the eigenvectors labelled phi -3, 2 and 3 reflected the intra-cluster variation in sediment composition at these stations. Whereas, Clusters *'c'* and *'d'* were principally influenced by the coarse sand to granule fractions, with cluster *'d'* separating due to a higher proportion of the coarse sand fraction (phi 1).

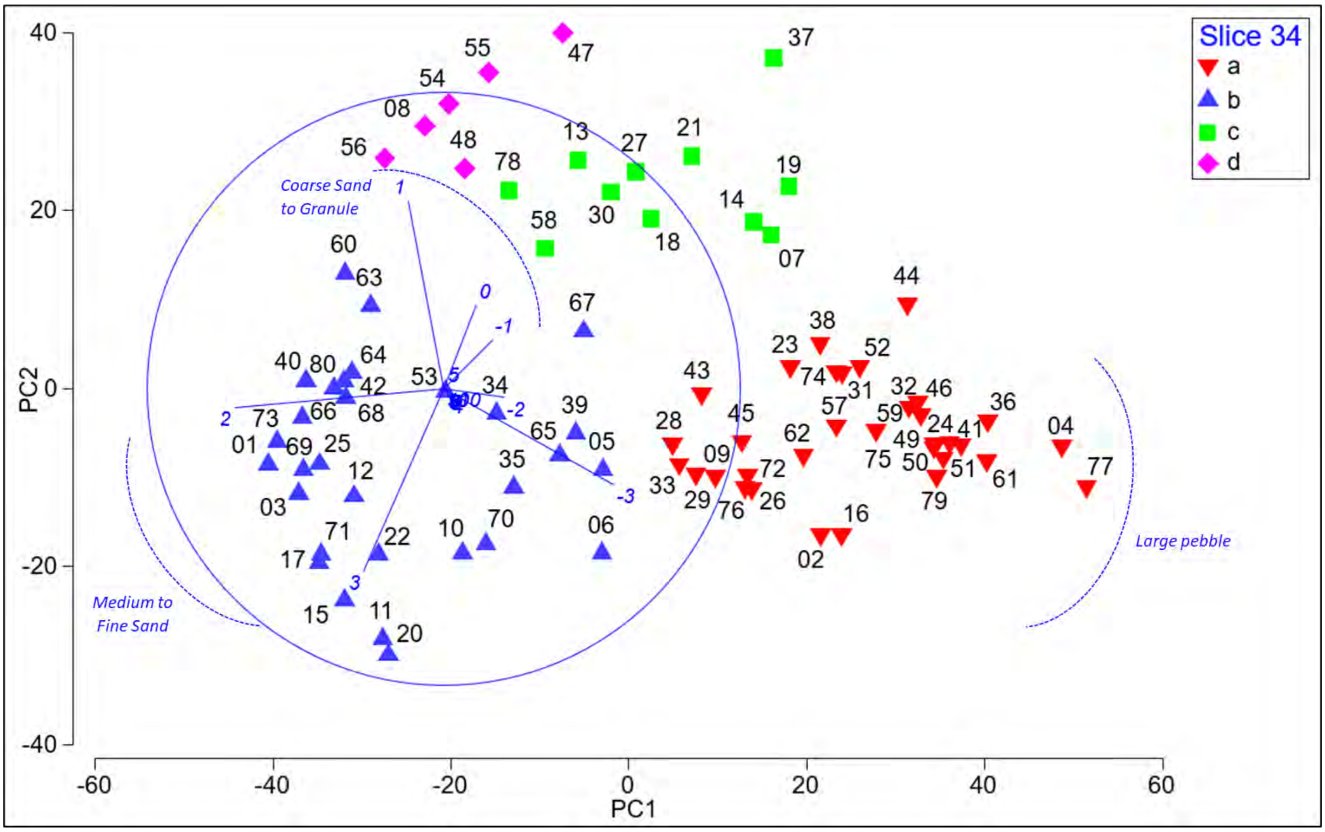


Figure 11 Particle Size Analysis Principal Components Analysis

A comparison of the full particle size distribution dataset using Wentworth (1922) size categories split into the four clusters described above is shown in Figure 12 along with example seabed and grab sample photographs. The plot illustrates the heterogeneity of the seabed sampled, with all four clusters showing variable peaks across the range of phi fractions. Cluster *'a'* had a bimodal distribution with peaks in the pebble (phi -3) and medium to fine sand fractions (phi 2 and 3). Whereas clusters *'b'* and *'d'* showed a general unimodal distribution, peaking in the coarse sand fraction (phi 1) for cluster *'d'* and medium sand fraction (phi 2) for cluster *'b'*. In contrast, the peaks in sediment classes at the stations within cluster *'c'* were more variable across the gravel fractions (phi -2 to 0). The geographical distribution of clusters is displayed over MBES in Figure 13. The areas delineated as 'GRAVEL', Sand', 'Gravelly SAND' and 'Sandy CLAY' generally matched the phi distributions recorded for each cluster grouping but further refinements will be made in Section 4.8, based on the acquired macrofauna, epibenthic trawl and underwater camera data.

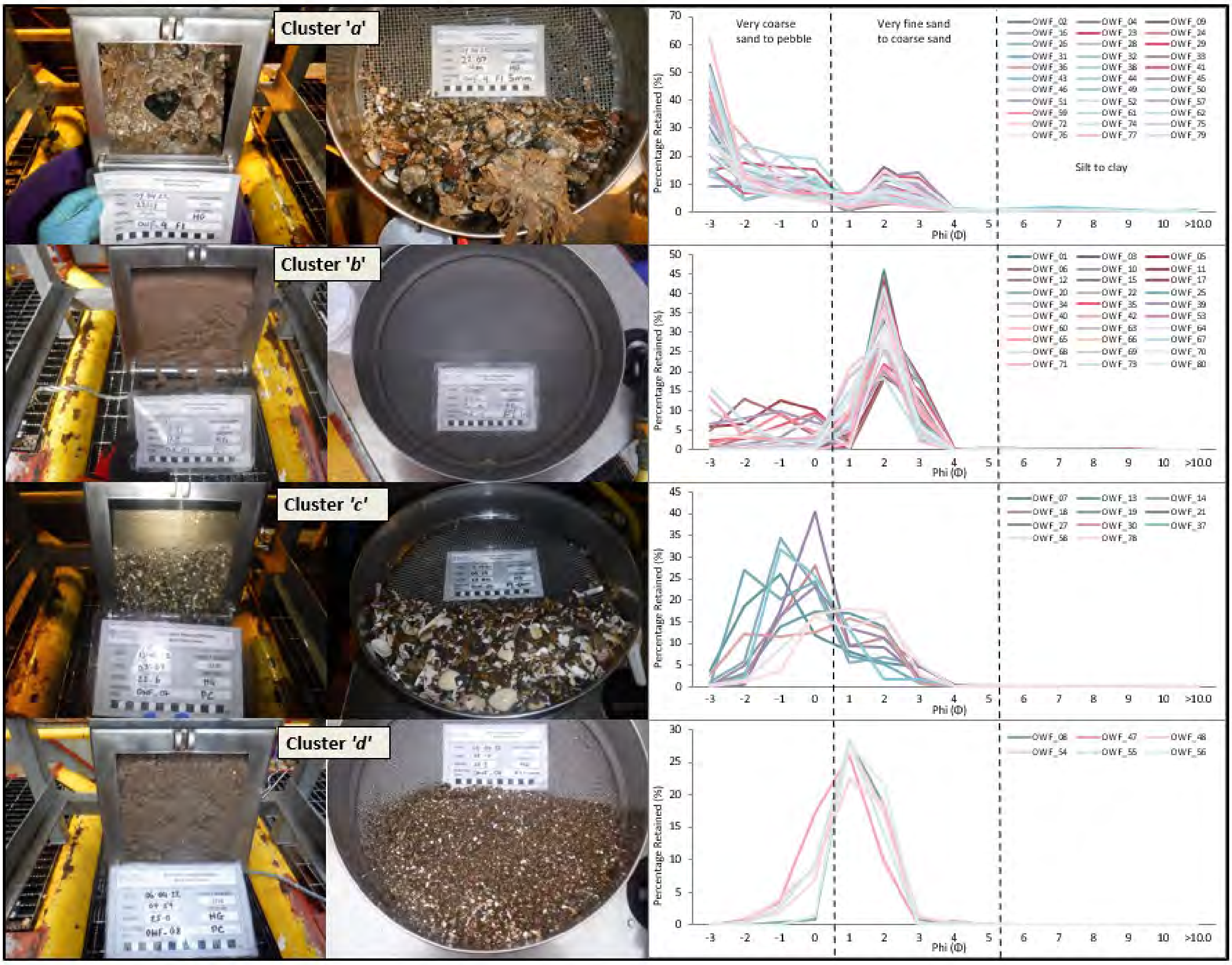


Figure 12 Particle Size Distribution for the Different Clusters *'a'*, *'b'*, *'c'*, 'and *'d'*

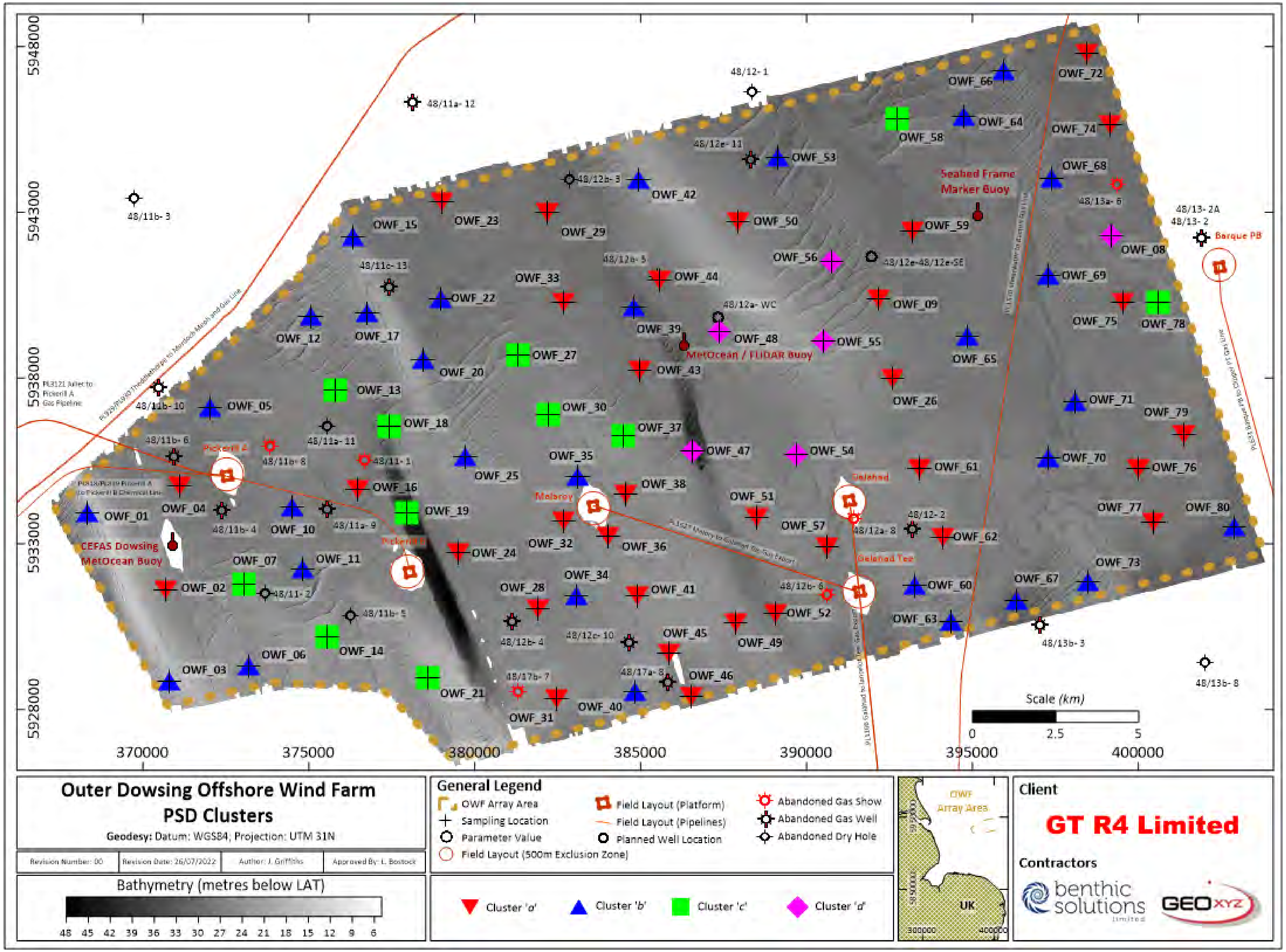


Figure 13 Multivariate PSD Cluster Distribution over MBES

4.4 TOTAL ORGANIC CARBON CONTENT

Sediments were analysed for total organic carbon (TOC) and the results of which are presented in (Table 15), with the spatial variation in TOC illustrated in (Figure 17). TOC represents the proportion of biological material and organic detritus within substrates. The method if less susceptible to the interference sometimes record using crude combustion techniques, such as analysing total organic matter by loss on ignition (LOI).

TOC was low across the OWF survey area and ranged between 0.05% at stations OWF_03, OWF_15, OWF_17, OWF_56 and OWF_80 to 0.65% at station OWF_19 (mean 0.17%±0.11SD), reflecting an organically-deprived environment. Higher TOC generally corresponded to the deeper areas of the site, for example at station OWF_19 (0.65%) which was sampled within the western canyon (Figure 14). In contrast, lower concentrations were typically found at the shallower sand dominated stations, such as stations OWF_01 (0.06%) and OWF_21 (0.14%) which were sampled on the crests of sandbanks. Increases in TOC may also reflect increases in both physical factors (i.e. fines) and common co-varying environmental factors through greater sorption on increased sediment surface areas (Thompson and Lowe, 2004). This general pattern was supported by significant positive Spearman's correlations between TOC and fines proportion ($\rho(80)=0.641$, $p<0.001$), TOC and water depth ($\rho(80)=0.371$, $p<0.001$) and a significant negative correlation between TOC and sand proportion ($\rho(80)=-0.761$, $p<0.001$). However, there was a significant negative Spearman's correlation between distance to the nearest well and TOC ($\rho(80)=-0.301$, $p<0.01$), indicating that both natural and anthropogenic factors were likely to be mediating the distribution of TOC across the OWF survey area.

Terrestrially derived carbon from runoff and fluvial systems, combined with primary production from sources such as phytoplankton blooms, contribute to the TOC levels recorded in sediments. While both allochthonous and autochthonous sources will be present throughout the OWF survey area, the general lack of fine sediment and therefore, reduced surface area for adsorption, meant that overall TOC levels were low. This may in turn affect the richness and abundance of deposit-feeding organisms within the sediment.

Previous BSL surveys carried out close to the OWF survey area had a similar range in TOC of 0.10% to 0.33% when compared to 0.17% for the current OWF survey, indicating that the TOC recorded reflected typical background levels for this region of the SNS. The coefficient of variance (CV) was greater for the current OWF survey (61.1%) when compared to the range of CVs for the previous surveys (15.8% to 33.6%), which was unsurprising given the large area of the OWF site and the variability in sediment composition recorded.

Table 15 Total Organic Carbon Content

Station	Depth (m)	Distance to Nearest Well (Km)	Total Organic Carbon (% M/M)
OWF_01	11	3.12	0.06
OWF_02	19	2.95	0.18
OWF_03	10	3.90	0.05
OWF_04	22	0.89	0.24
OWF_05	23	1.67	0.32
OWF_06	19	2.24	0.29
OWF_07	19	0.68	0.15
OWF_08	21	1.57	0.08
OWF_09	23	5.71	0.17
OWF_10	21	1.07	0.16
OWF_11	20	1.34	0.09
OWF_12	20	2.50	0.06
OWF_13	21	1.10	0.15
OWF_14	18	0.94	0.16
OWF_15	18	1.83	0.05
OWF_16	21	0.91	0.22
OWF_17	17	1.01	0.05
OWF_18	21	1.26	0.13
OWF_19	40	1.74	0.65
OWF_20	18	2.43	0.09
OWF_21	12	2.75	0.14
OWF_22	23	1.59	0.11
OWF_23	23	3.01	0.18
OWF_24	23	1.61	0.31
OWF_25	18	3.01	0.06
OWF_26	21	3.94	0.12
OWF_27	19	4.82	0.13
OWF_28	21	0.87	0.21
OWF_29	24	1.21	0.37
OWF_30	20	5.31	0.15
OWF_31	19	1.16	0.28
OWF_32	20	0.99	0.19
OWF_33	23	2.93	0.25
OWF_34	20	2.10	0.17
OWF_35	20	1.06	0.20
OWF_36	19	0.95	0.25
OWF_37	19	2.37	0.15
OWF_38	19	1.05	0.24
OWF_39	27	1.15	0.43
OWF_40	17	1.49	0.06
OWF_41	18	1.44	0.26
OWF_42	16	2.07	0.11
OWF_43	23	2.79	0.36
OWF_44	23	0.13	0.34
OWF_45	19	0.85	0.19
OWF_46	22	0.82	0.24
OWF_47	37	3.44	0.21
OWF_48	21	2.51	0.10
OWF_49	18	2.09	0.16
OWF_50	21	1.93	0.22
OWF_51	20	2.80	0.25
OWF_52	22	1.66	0.25
OWF_53	25	0.81	0.15
OWF_54	22	2.12	0.12
OWF_55	17	4.92	0.10

Station	Depth (m)	Distance to Nearest Well (Km)	Total Organic Carbon (% M/M)
OWF_56	19	3.91	0.05
OWF_57	21	1.16	0.36
OWF_58	25	4.42	0.15
OWF_59	25	5.31	0.17
OWF_60	20	1.69	0.06
OWF_61	20	1.84	0.17
OWF_62	21	0.94	0.14
OWF_63	19	2.67	0.08
OWF_64	24	3.72	0.07
OWF_65	23	6.10	0.15
OWF_66	22	2.38	0.07
OWF_67	27	1.00	0.15
OWF_68	23	2.00	0.08
OWF_69	22	3.47	0.06
OWF_70	23	4.64	0.15
OWF_71	22	6.23	0.07
OWF_72	26	3.62	0.33
OWF_73	19	1.93	0.05
OWF_74	25	1.80	0.20
OWF_75	23	3.05	0.33
OWF_76	23	5.56	0.28
OWF_77	22	4.52	0.13
OWF_78	22	2.17	0.07
OWF_79	22	4.90	0.14
OWF_80	23	5.99	0.05
Mean			**0.17**
SD			**0.11**
CV (%)			**61.1**
Minimum			**0.05**
Maximum			**0.65**
Regional Examples			
BSL SNS, 2019		**Mean**	**0.20**
		SD	**0.05**
		CV (%)	**26.3**
BSL SNS, 2020a		**Mean**	**0.33**
		SD	**0.11**
		CV (%)	**33.6**
BSL SNS, 2020b		**Mean**	**0.10**
		SD	**0.02**
		CV (%)	**15.8**

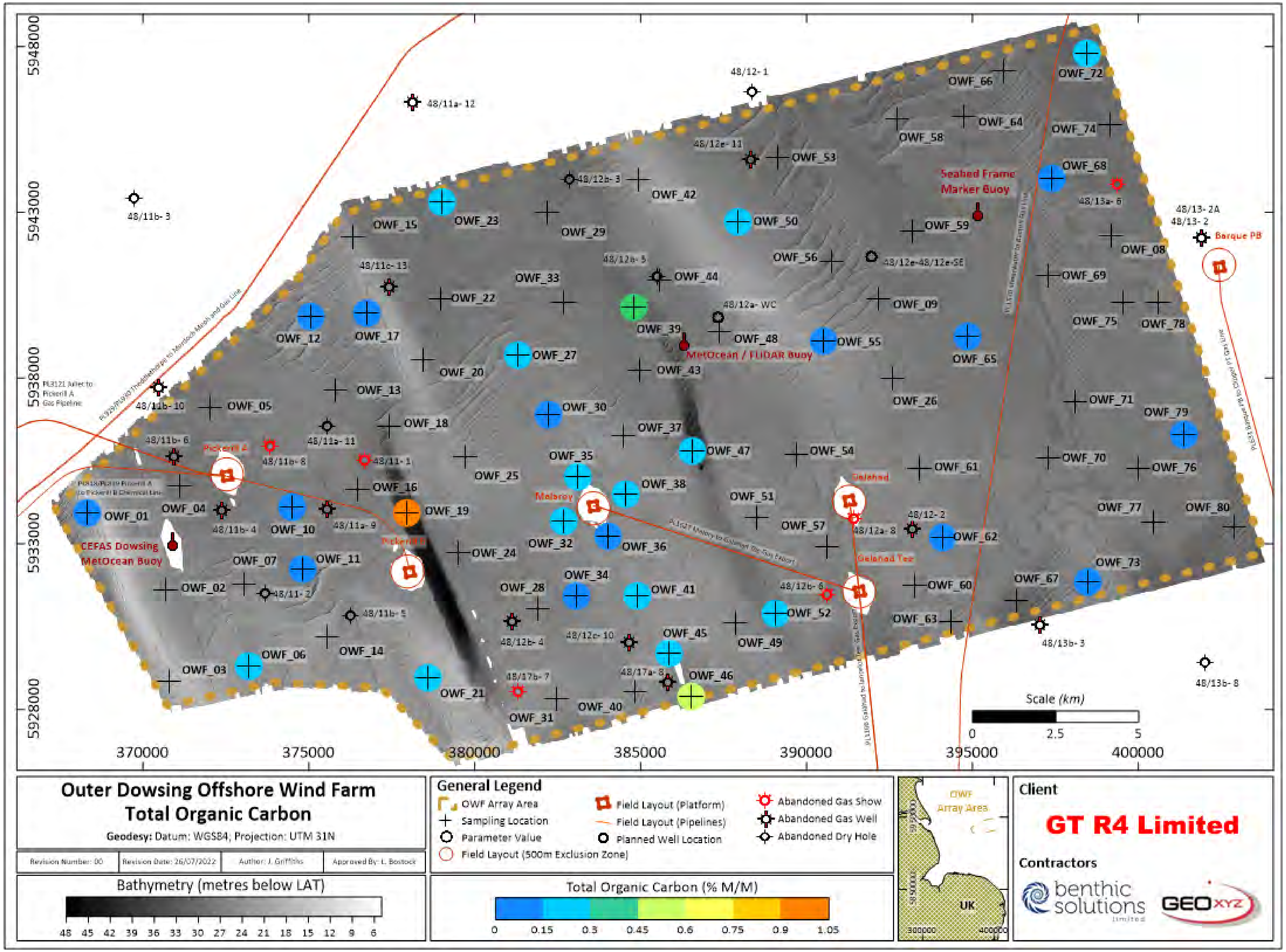


Figure 14 Total Organic Carbon

4.5 SEDIMENT HYDROCARBONS

Results for hydrocarbon analyses are summarised and tabulated as total polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organotins (DBT, TBT and MBT) and organochlorides (Dieldrin and DDT) in Table 16, Table 19, Table 20 and Table 21.

4.5.1 Non-normalised Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAH) were analysed at each station using gas chromatography-mass spectrometry (GC-MS). Results of the single ion current (SIC) analyses are summarised in Table 16.

PAHs and their alkyl derivatives have been recorded in a wide range of marine sediments (Laflamme and Hites, 1978) with the majority of compounds produced from what is thought to be pyrolytic sources. These include the combustion of organic material such as forest fires (Youngblood and Blumer, 1975), the burning of fossil fuels and, in the case of offshore oil fields, flare stacks. The resulting PAHs, rich in the heavier weight 4-6 ring aromatics, are normally transported to the sediments via atmospheric fallout or river runoff. Another PAH source is petroleum hydrocarbon, often associated with localised drilling activities. These are rich in the lighter, more volatile 2 and 3 ring PAHs (naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene and anthracene)

The sum of the EPA's 16 PAH (∑16PAH) concentrations (2-6 compounds) were variable across the OWF survey area ranging from <1µg.kg^{-1} (LOD) at seven stations, OWF_01, OWF_17, OWF_21, OWF_30, OWF_62, OWF_65 and OWF_73, to 677µg.kg^{-1} at station OWF_19 which was above the Cefas action level 1 (cAL1) of 100mg.kg^{-1} and twice the UKOOA 95th percentile threshold value of 366µg.kg^{-1} (Figure 15). The elevated ∑16PAH concentration at station OWF_19 was due to the elevated contribution of each individual PAH; however, only acenaphthylene exceeded its respective TEL (6.71µg.kg^{-1}) and phenanthrene exceeded its respective TEL (86.7µg.kg^{-1}) and ERL (240µg.kg^{-1}) thresholds. The elevated ∑16PAH at station OWF_19 could potentially be attributed to the accelerated natural accumulation of organic material within the canyon feature (see Sections 4.2 and 4.4) as suspended organic compounds can adsorb PAHs and settle out in more sheltered, depositional, environments. This hypothesis was corroborated by a significant positive Spearman's correlation between TOC and ∑16PAH ($\vartheta(80)=0.503$, $p<0.01$). However, station OWF_47 sampled within the eastern canyon, albeit at a shallower water depth (37m) compared to station OWF_19 (40m), had a lower ∑16PAH of 5.49µg.kg^{-1}, indicating that the higher TOC and PAH concentrations at station OWF-19 could be due to chance.

Similarly to ∑16PAH, the sum of 22 PAH (∑22PAH) concentrations (2-6 compounds) were also variable across the OWF survey area ranging from <1µg.kg^{-1} (LOD) at two stations, OWF_01 and OWF_62, to 2,118µg.kg^{-1} at station OWF_19 which was elevated above the CCME TEL threshold (1,684µg.kg^{-1}) due to elevated concentrations of C1-naphthalenes, C2-naphthalenes and C1-phenanthrene (Table 16 and Figure 16). Therefore, ∑22PAH, similarly to ∑16PAH could potentially represent the upper background level of PAHs within the OWF survey area, as accelerated natural accumulation within the canyon feature at OWF_19 could have resulted in the elevated concentrations of the individual PAHs. However, the influence of the canyon features on the natural deposition of PAHs is unknown as the PAH concentrations at station OWF_47 were within the expected ranges for this region of the SNS.

The similar distributions of ∑16PAH and ∑22PAH were corroborated by a significant positive Spearman's correlation between the two parameters ($\vartheta(80)=0.942$, $p<0.001$) and potentially indicates that both ∑16PAH and ∑22PAH can adequately capture variability in PAH distributions across the OWF survey area.

The MMO have considered the use of low (2-3 ring PAHs) and high (4-6 ring PAHs) molecular weight PAHs, in conjunction with ERL and ERM reference values, can provide suitable benchmarks for PAH interpretation (MMO, 2015). Similarly to the ∑16PAH and ∑22PAH distributions, elevated low and high molecular weight PAHs of 321µg.kg^{-1} and 356µg.kg^{-1}, respectively, were recorded at station OWF_19 when compared to the other stations; however, both low and high molecular weight PAHs were below their respective ERL and ERM reference levels, with only the low molecular weight PAHs slightly elevated above its respective TEL (312µg.kg^{-1}) concentration. As previously discussed, the concentrations of low and high molecular weight PAHs could be attributed to the increased deposition of organic matter within the canyon feature a station OWF_19 (low: $\vartheta(80)=0.565$, $p<0.01$; high: $\vartheta(80)=0.545$, $p<0.01$). Therefore, the general lower abundance of low molecular weight PAHs compared to the high molecular weight PAHs could indicate a mixed and petrogenic influenced upper background limit of PAH distribution across the OWF survey area. However, caution must be applied when comparing and interpreting low and high-molecular-weight PAHs as low molecular weight PAHs are more susceptible to microbial degradation (Douglas *et al.*, 1996).

All the maximum PAH concentrations recorded during the current survey were higher than the PAH content observed in previous surveys carried out by BSL in the SNS. However, this was due to the elevated PAH concentrations recorded at just one station, OWF_19. Excluding station OWF_19, the remaining PAH concentrations, apart from naphthalene, C1 naphthalenes, acenaphthene, phenanthrene, anthracene, were within the ranges recorded from the previous BSL SNS surveys. Although five individual PAHs were elevated when compared to the regional comparisons, the ∑16PAH and ∑22PAH levels were within the range recorded during previous SNS surveys (Table 16). Therefore, it is likely that the PAH levels recorded across the OWF survey area likely reflect background levels for this region of the SNS.

Table 16 Summary of Non-normalised PAH Concentrations (µg.kg⁻¹ or ppb)

Station	Depth	Distance to Nearest Well (Km)	Naphthalene	C1 Naphthalenes	C2 Naphthalenes	C3 Naphthalenes	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	C1-phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[e]pyrene	Benzo[a]pyrene	Perylene	Indeno[123,cd]pyrene	Dibenzo[a,h]anthracene	Benzo[ghi]perylene	Total PAHs (Σ16)	Total PAHs (Σ22)	Total 2-3 ring PAH *	Total 4-6 ring PAH *
OWF_01	11	3.12	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
OWF_06	19	2.24	2.25	15.00	16.2	24.60	<1	<1	<1	10.60	16.50	<1	6.74	10.60	4.36	4.67	3.74	1.61	4.83	3.82	1.34	1.77	<1	5.78	55.9	134	12.90	43.10
OWF_10	21	1.07	<1	2.78	2.84	2.64	<1	<1	<1	1.50	1.94	<1	1.06	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.09	3.65	13.90	1.50	2.15
OWF_11	20	1.34	<1	2.39	4.74	6.84	<1	<1	<1	3.41	5.16	<1	1.99	2.17	<1	1.28	1.27	<1	1.41	<1	<1	<1	<1	1.70	11.80	32.40	3.41	8.41
OWF_12	20	2.50	<1	1.67	1.56	1.23	<1	<1	<1	<1	1.05	<1	1.07	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.07	6.58	<1	1.07
OWF_17	17	1.01	<1	<1	4.34	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4.34	<1	<1
OWF_19	40	1.74	14.90	267	372	429	5.13	10.20	12.20	265	327	13.40	60.30	77.20	41.00	41.10	28.80	14.50	37.00	38.00	9.53	12.10	3.27	39.60	677	2,118	321	356
OWF_21	12	2.75	<1	1.37	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.37	<1	<1
OWF_23	23	3.01	1.21	4.49	6.15	11.30	<1	<1	<1	4.10	7.10	<1	2.87	2.98	1.14	1.90	1.78	<1	1.97	1.07	<1	1.02	<1	2.75	20.80	51.80	5.31	15.5
OWF_27	19	4.82	<1	1.45	1.70	4.32	<1	<1	<1	1.93	4.74	<1	1.20	1.23	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4.36	16.60	1.93	2.43
OWF_30	20	5.31	<1	1.27	1.19	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.46	<1	<1
OWF_32	20	0.99	1.18	5.11	12.2	16.00	<1	<1	<1	4.73	6.83	<1	2.01	2.68	<1	1.16	1.17	<1	1.56	<1	1.50	<1	<1	2.50	15.40	58.6	5.91	9.52
OWF_34	20	2.10	<1	1.41	2.08	2.34	<1	<1	<1	1.31	2.17	<1	1.55	1.65	<1	1.21	1.29	<1	1.30	<1	<1	<1	<1	1.34	8.35	17.70	1.31	7.04
OWF_35	20	1.06	<1	3.10	3.68	6.77	<1	<1	<1	3.08	3.86	<1	2.37	2.50	<1	1.46	1.32	<1	1.84	1.07	<1	<1	<1	2.18	14.00	33.20	3.08	10.90
OWF_36	19	0.95	<1	1.06	1.43	2.61	<1	<1	<1	1.58	5.76	2.47	2.55	5.04	2.44	3.10	1.38	<1	2.03	1.89	<1	<1	<1	2.16	22.60	35.50	4.05	18.6
OWF_38	19	1.05	1.16	4.12	3.41	4.96	<1	<1	<1	2.24	3.46	<1	1.54	1.98	<1	1.19	<1	<1	1.17	<1	<1	<1	<1	2.07	10.20	27.30	3.40	6.78
OWF_39	27	1.15	2.28	7.12	19.2	28.8	<1	2.17	1.23	9.47	15.3	<1	7.45	8.42	2.87	4.39	4.33	1.88	5.14	3.04	3.51	2.22	<1	6.77	56.50	136	15.2	41.40
OWF_41	18	1.44	1.28	4.90	4.94	5.96	<1	<1	<1	3.33	4.85	<1	1.84	2.47	<1	1.47	1.49	<1	2.24	1.2	<1	<1	<1	3.48	16.60	39.50	4.61	12.00
OWF_45	19	0.85	<1	2.10	3.22	5.05	<1	<1	<1	2.72	5.89	<1	2.44	3.19	1.48	1.94	2.01	1.09	2.52	1.46	<1	1.13	<1	2.58	20.00	38.80	2.72	17.30
OWF_46	22	0.82	19.80	55.60	38.20	33.50	<1	<1	<1	33.6	33.30	<1	11.00	10.3	5.55	8.65	6.03	2.35	6.95	4.47	1.07	2.24	<1	5.86	110	278	53.4	56.50
OWF_47	37	3.44	<1	1.21	1.66	2.41	<1	<1	<1	1.60	1.93	<1	1.48	1.35	<1	<1	1.06	<1	<1	<1	<1	<1	<1	<1	5.49	12.70	1.60	3.89
OWF_50	21	1.93	1.36	3.35	5.07	7.00	<1	<1	<1	2.98	4.61	<1	2.61	3.23	<1	1.89	1.63	<1	1.86	<1	<1	<1	<1	2.67	16.40	38.30	4.34	12.00
OWF_52	22	1.66	<1	4.18	6.25	7.47	<1	<1	<1	4.63	5.79	<1	2.24	2.45	1.12	1.48	1.48	<1	1.53	<1	<1	<1	<1	1.24	14.60	39.90	4.63	10.00
OWF_55	17	4.92	<1	3.83	4.70	5.59	<1	<1	<1	3.35	4.17	<1	2.56	1.72	1.01	1.32	2.25	<1	1.23	<1	<1	<1	<1	1.15	13.40	32.90	3.35	10.00
OWF_62	21	0.94	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
OWF_65	23	6.10	<1	1.24	2.01	1.96	<1	<1	<1	<1	1.55	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	6.76	<1	<1
OWF_68	23	2.00	1.34	2.99	4.35	5.92	<1	<1	<1	2.66	4.19	<1	2.10	2.51	<1	1.37	<1	<1	1.22	<1	<1	<1	<1	1.95	11.90	30.6	4.00	7.93
OWF_72	26	3.62	<1	<1	1.18	1.15	<1	<1	<1	<1	1.20	<1	1.41	1.15	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.56	6.09	<1	2.56
OWF_73	19	1.93	<1	<1	1.06	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.06	<1	<1
OWF_79	22	4.90	<1	3.04	4.44	7.71	<1	<1	<1	3.54	5.72	<1	2.81	3.58	1.34	1.8	1.98	<1	2.47	1.66	1.35	<1	<1	4.37	21.10	45.80	3.54	17.50
Mean			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
SD			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
CV (%)			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
Minimum			**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**
Maximum			**19.8**	**267**	**372**	**429**	**5.13**	**10.2**	**12.2**	**265**	**327**	**13.4**	**60.3**	**77.2**	**41**	**41.1**	**28.8**	**14.5**	**37**	**38**	**9.53**	**12.1**	**3.27**	**39.6**	**677**	**2,118**	**321**	**356**
Regional Examples																												
BSL SNS, 2019**		**Minimum**	**<1**	**3.08**	**3.18**	**3.40**	**<1**	**<1**	**<1**	**1.79**	**2.54**	**<1**	**1.47**	**1.28**	**<1**	**1.10**	**1.21**	**<1**	**1.10**	**<1**	**<1**	**<1**	**<1**	**1.43**	**8.27**	**21.8**	**1.79**	**6.48**
		Maximum	**6.27**	**30.2**	**32.7**	**39.8**	**<1**	**2.15**	**3.85**	**16.5**	**25.1**	**1.58**	**8.54**	**9.37**	**3.96**	**6.93**	**5.67**	**1.83**	**6.96**	**4.91**	**4.34**	**3.62**	**<1**	**11.4**	**86.6**	**226**	**30.4**	**56.2**
BSL SNS, 2020a**		**Minimum**	**1.42**	**5.41**	**5.02**	**7.13**	**<1**	**<1**	**<1**	**3.59**	**7.10**	**<1**	**3.92**	**4.30**	**1.66**	**2.95**	**2.64**	**1.09**	**3.34**	**1.84**	**<1**	**1.46**	**<1**	**3.79**	**29.5**	**59.0**	**5.00**	**24.5**
		Maximum	**10.2**	**39.6**	**38.3**	**55.7**	**<1**	**1.94**	**2.62**	**28.4**	**40.9**	**2.22**	**17.8**	**20.3**	**6.77**	**13.3**	**10.1**	**4.34**	**13.8**	**7.21**	**3.63**	**5.18**	**1.57**	**15.8**	**148**	**339**	**45.1**	**102**
BSL SNS, 2020b**		**Minimum**	**<1**	**<1**	**1.37**	**1.68**	**<1**	**<1**	**<1**	**1.53**	**1.50**	**<1**	**1.13**	**1.03**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**4.91**	**10.6**	**1.53**	**2.16**
		Maximum	**3.22**	**5.67**	**4.21**	**3.82**	**<1**	**<1**	**<1**	**3.16**	**4.21**	**<1**	**2.23**	**2.41**	**<1**	**1.56**	**1.50**	**<1**	**1.47**	**<1**	**<1**	**<1**	**<1**	**1.76**	**12.7**	**29.2**	**6.38**	**9.23**
Reference Levels																												
TEL (CCME, 2001)			34.6	-	-	-	5.9	6.7	21.2	86.7	-	46.9	113	153	74.8	108	-	-	-	88.8	-	-	6.22	-	-	1,684	312	655
Cefas cAL1 (MMO, 2015)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-
UKOOA 95th Percentile SNS			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	366	-	-	-
OSPAR ERL (OSPAR, 2012)			160	155	150	-	44	16	19	240	170	85	600	665	261	384	-	240	-	430	-	240	63	85	-	4,022	552	1,700
PEL (CCME, 2001)			391	-	-	-	128	88.9	144	544	-	245	1494	1398	693	846	-	-	-	763	-	-	135		-	16,770	1,442	6,676
OSPAR ERM (OSPAR, 2012)			2,100	-	-	-	640	500	540	1,500	-	1,100	5,100	2,600	1,600	2,800	-	-	-	1,600	-	-	260	2,800	-	44,792	3,160	9,600

NC = Not calculated due to incomplete dataset

**Low molecular weight (2-3 ring) PAHs and high molecular weight (4-6 ring) PAHs calculated from the EPA 16 PAHs*

***Minimum and maximum data for regional examples shown instead of means due to 'NC' values*

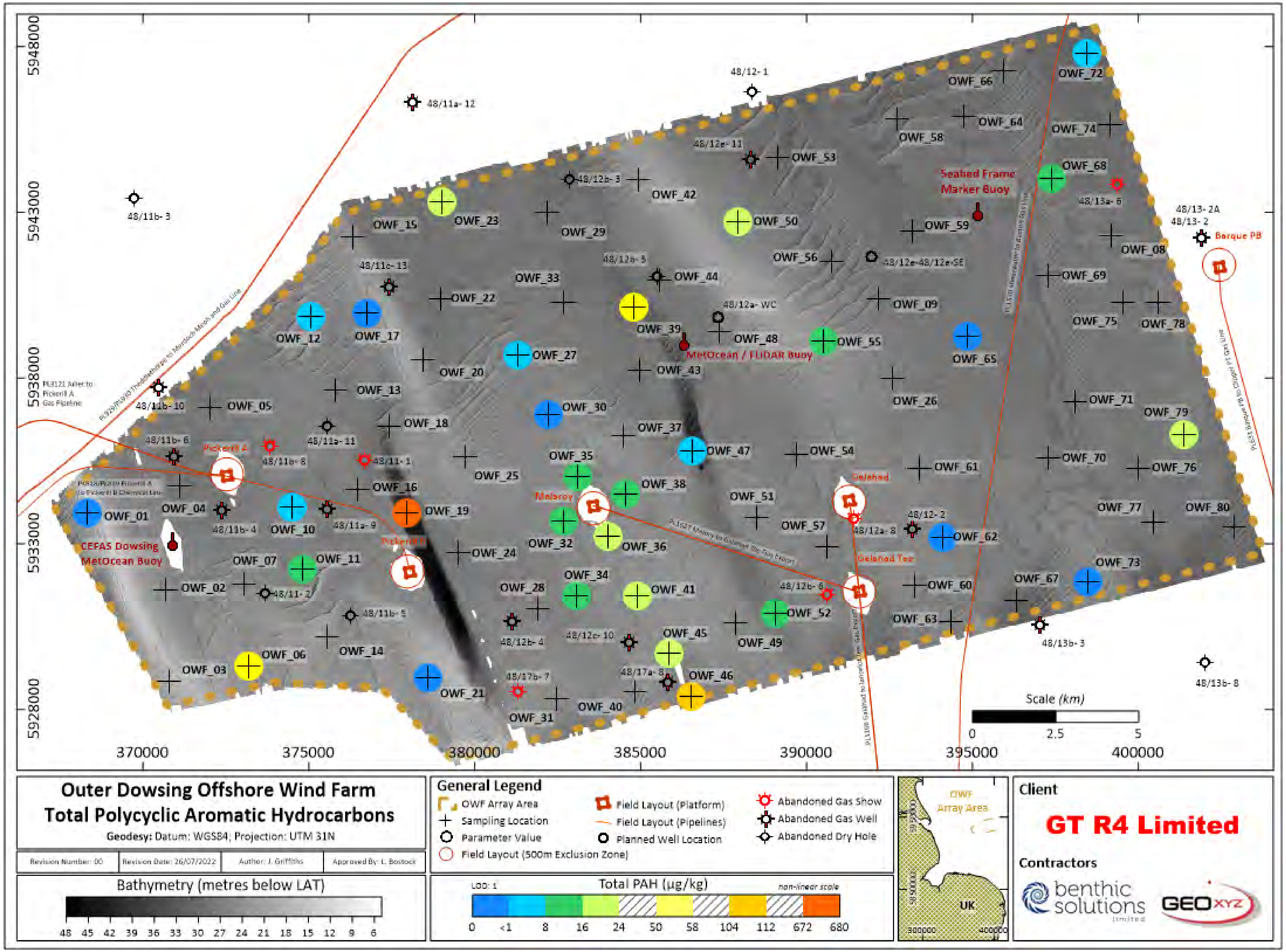


Figure 15 Total Polycyclic Aromatic Hydrocarbons (∑16PAH)

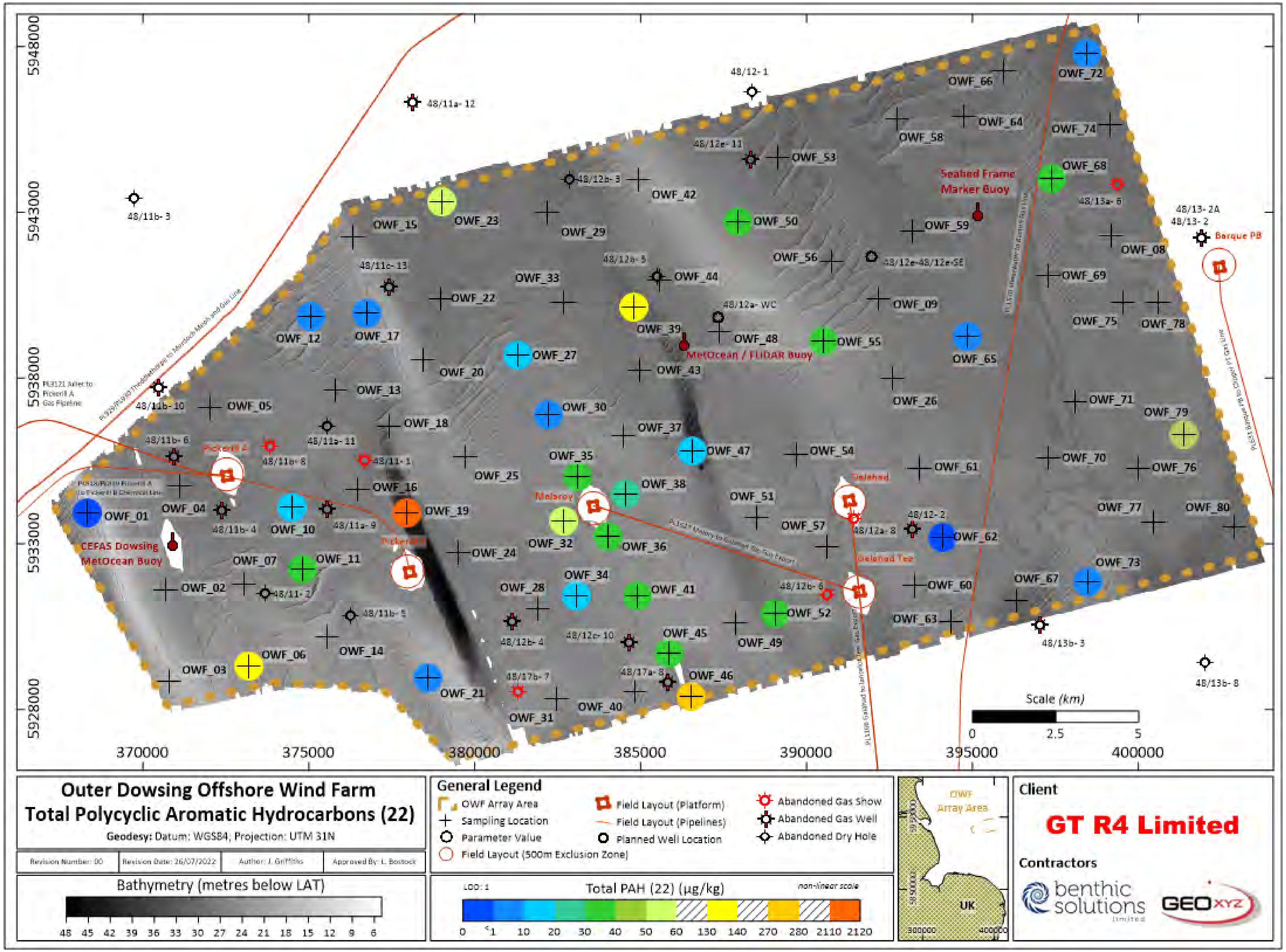


Figure 16 Total Polycyclic Aromatic Hydrocarbons (∑22PAH)

Further information on the source(s) of PAH in the sediment may be obtained from a study of their alkyl homologue distributions (i.e. the degree of methyl, ethyl, substitution of the parent compounds). Pyrolytically derived PAHs are predominantly unalkylated, whereas PAHs derived from petrogenic sources are formed at relatively low temperatures (<150°C) and contain mainly alkylated species. The proportion of 2-6 ring PAH comprising unalkylated parent compounds also reflects whether the source is petrogenic or pyrolytic. However, due to the absence of specific PAHs the alkylated/ unalkylated species could not be calculated and plotted.

An alternative approach to characterising PAH source(s) of PAH in sediments may be obtained from a study of their isomeric ratios (i.e. the same molecular formula but different arrangement of atoms). Two isomeric ratios were used to assess the potential pyrolytic and petrogenic sources of PAHs within the OWF survey area: (1) phenanthrene/anthracene compared with fluoranthene/pyrene and (2) benzo[a]anthracene/ (benzo[a]anthracene + chrysene) compared with fluoranthene/(fluoranthene + pyrene). Isomeric ratios can, to a certain extent, distinguish the pyrolytic and petrogenic sources of PAHs as phenanthrene and fluoranthene are more thermally stable than their anthracene and pyrene isomers (Vane *et al.*, 2014). However, due to the presence of <1 (LOD) concentrations of PAHs the isomeric ratios could not determine the likely source of the PAH across the OWF survey area. Furthermore, the isomeric method alone cannot provide a definitive source due to the degree of uncertainty (Vane *et al.*, 2014).

For further investigation into the possible source(s) of PAH, a principal component analysis (PCA) was performed on the correlation matrix of log-transformed individual 22PAH concentrations. The resultant PCA plot shows the distribution of each station along axes formed by the two principal components (PC1 and PC2) which together describe the largest proportion of overall variability in the PAH concentration dataset. The direction of influence of each individual PAH concentration is shown by the eigenvectors and hence can indicate the potential source(s) of PAH within the OWF survey area. Overall, the PCA plot illustrated a mixed source of (i.e. pyrolytic and petrogenic) PAHs within the survey area, with the differences in PAH concentrations across the stations potentially attributed to variability in natural distribution instead of a dominance of one PAH over another (Figure 17). The mixed source of PAHs was unsurprising given the oil and gas exploration within the OWF survey area and proximity to the Humber Estuary.

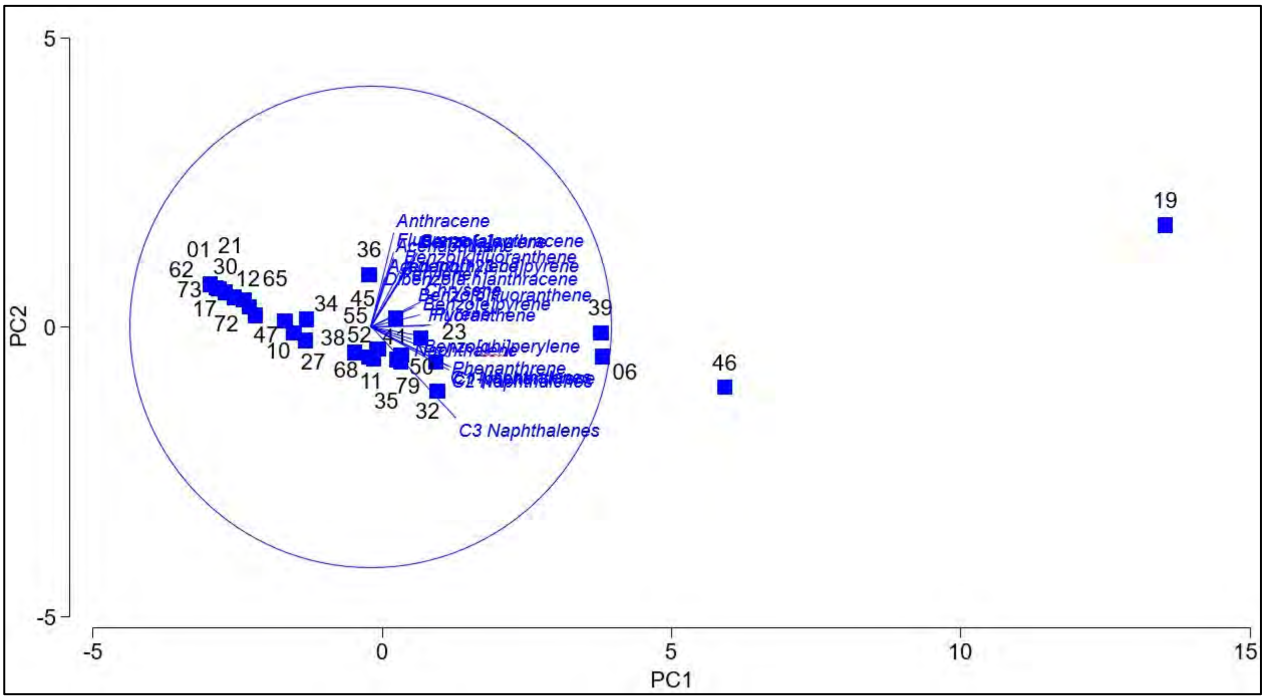


Figure 17 Polycyclic Aromatic Hydrocarbons Principal Component Analysis Source Assignment

4.5.2 Normalised Polycyclic Aromatic Hydrocarbons

a ANZECC and ARMCANZ Sediment Guidelines

Normalised PAH concentrations were calculated to allow comparison to the ANZECC and ARMCANZ SQGVs and OSPAR (2014) background concentrations. The ANZECC and ARMCANZ framework (see Section 2.5.3 and Appendix D) aims to assess contaminated sediment against a set of sediment quality guideline values (SQGV) to establish the level of risk to the biological community, with concentrations below their respective SQGVs indicative of 'low risk' to marine life (Simpson *et al.*, 2013). Whereas, the BCs are concentrations of contaminants derived from analysis of core samples to reflect pre-industrial background levels for the OSPAR area. BACs have been statistically derived from BCs and represent the level above which concentrations can be considered significantly higher than the relevant BC (OSPAR, 2008). Contaminants tend to show a much higher affinity to fine particulate matter (OSPAR, 2009b) due to the increased adsorption capacity of organic matter and clay minerals. In sites where there is variability in grain size between stations, effects due to point sources of contamination will at least partly be obscured by grain size differences.

All PAH concentrations have been normalised to 1% total organic carbon content of the sediment at each station in line with guidance set by the ANZECC and ARMCANZ framework are displayed in Table 17, along with OSPAR BCs and BACs, and OSPAR effect range low (ERL) and effect range median (ERM) thresholds. ERLs are defined as the lowest concentration producing adverse effects in 10% of studies, whilst ERMs are the levels at which harmful effects are expected in 50% of studies.

Normalised PAHs were incalculable at most stations due to concentrations being below the limit of detection (<1µg.kg^{-1}). Of the 22 PAHs analysed during this study, eight PAHs (out of a possible 10 with BCs and BACs) were elevated above their respective BACs at one or more stations, with all eight elevated PAHs recorded at station OWF_19 (Table 17). At station OWF_19, the concentration of phenanthrene (408µg.kg^{-1}) was 12 times greater than its respective BAC of 32µg.kg^{-1} and almost double its respective ERL of 240µg.kg^{-1}. The presence of PAHs significantly elevated above their respective BCs and ERLs is not surprising given the proximity of the survey area to oil and gas exploration activities. However, the ANZECC and ARMCANZ framework state that, while it is recognised the toxicities of individual PAHs differ significantly, it considers individual PAHs unlikely to be dominant when compared to the total PAH concentration. In light of this, the concentration of Σ22PAH was below the SQGV at every station and indicates that the total PAH concentrations observed across the OWF survey area were likely to be 'low risk' with negligible effects to marine life based on the ANZECC and ARMCANZ framework. Therefore, the PAH concentrations and distribution across the OWF survey area are likely to reflect ambient background conditions of diffuse loading for this region of the SNS. However, it should be noted that the current study used Σ22PAH while the ANZECC and ARMCANZ SQGVs were based on Σ18PAH, which could potentially limit the conclusions drawn from direct comparisons.

Table 17 Normalised ANZECC and ARMCANZ Total Polycyclic Aromatic Hydrocarbons (µg.kg-1 or ppb)

Station	Depth	Distance to Nearest Well (Km)	Naphthalene	C1 Naphthalenes	C2 Naphthalenes	C3 Naphthalenes	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	C1-phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[e]pyrene	Benzo[a]pyrene	Perylene	Indeno[123,cd]pyrene	Dibenzo[a,h]anthracene	Benzo[ghi]perylene	Total PAHs (Σ16)	Total PAHs (Σ22)	Total 2-3 ring PAH *	Total 4-6 ring PAH *
OWF_01	11	3.12	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	<1	<1	<1
OWF_06	19	2.24	7.8	51.7	55.9	84.8	NC	NC	NC	36.6	56.9	NC	23.2	36.6	15.0	16.1	12.9	5.6	16.7	13.2	4.6	6.1	NC	19.9	193	456	44.3	149
OWF_10	21	1.07	NC	17.4	17.8	16.5	NC	NC	NC	9.4	12.1	NC	6.63	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	6.8	22.8	86.6	9.38	13.4
OWF_11	20	1.34	NC	26.6	52.7	76.0	NC	NC	NC	37.9	57.3	NC	22.1	24.1	NC	14.2	14.1	NC	15.7	NC	NC	NC	NC	18.9	131	360	37.9	93
OWF_12	20	2.50	NC	27.8	26.0	20.5	NC	NC	NC	NC	17.5	NC	17.8	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	17.8	110	<1	17.8
OWF_17	17	1.01	NC	NC	86.8	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	86.8	<1	<1
OWF_19	40	1.74	22.9	411	572	660	7.9	15.7	18.8	408	503	20.6	92.8	119	63.1	63.2	44.3	22.3	56.9	58.5	14.7	18.6	5.0	60.9	1,041	3,236	494	547
OWF_21	12	2.75	NC	9.8	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	9.79	<1	<1
OWF_23	23	3.01	6.7	24.9	34.2	62.8	NC	NC	NC	22.8	39.4	NC	15.9	16.6	6.3	10.6	10.0	NC	10.9	5.9	NC	5.7	NC	15.3	116	281	29.5	86.2
OWF_27	19	4.82	NC	11.2	13.1	33.2	NC	NC	NC	14.8	36.5	NC	9.2	9.5	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	33.5	127	14.8	18.7
OWF_30	20	5.31	NC	8.8	7.9	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	16.4	<1	<1
OWF_32	20	0.99	6.2	26.9	64.2	84.2	NC	NC	NC	24.9	35.9	NC	10.6	14.1	NC	6.1	6.2	NC	8.2	NC	7.9	NC	NC	13.2	81.2	302	31.1	50.1
OWF_34	20	2.10	NC	8.3	12.2	13.8	NC	NC	NC	7.7	12.8	NC	9.1	9.7	NC	7.1	7.6	NC	7.7	NC	NC	NC	NC	7.9	49.1	104	7.71	41.4
OWF_35	20	1.06	NC	15.5	18.4	33.9	NC	NC	NC	15.4	19.3	NC	11.9	12.5	NC	7.3	6.6	NC	9.2	5.4	NC	NC	NC	10.9	69.9	166	15.4	54.5
OWF_36	19	0.95	NC	4.2	5.7	10.4	NC	NC	NC	6.3	23.0	9.9	10.2	20.2	9.8	12.4	5.5	NC	8.1	7.7	NC	NC	NC	8.6	90.4	142	16.2	74.2
OWF_38	19	1.05	4.83	17.2	14.2	20.7	NC	NC	NC	9.3	14.4	NC	6.4	8.3	NC	5.0	NC	NC	4.9	NC	NC	NC	NC	8.6	42.4	109	14.2	28.3
OWF_39	27	1.15	5.3	16.6	44.7	67.0	NC	5.05	2.86	22.0	35.6	NC	17.3	19.6	6.7	10.2	10.1	4.4	12.0	7.1	8.2	5.12	NC	15.7	131	310	35.2	96.2
OWF_41	18	1.44	4.92	18.8	19.0	22.9	NC	NC	NC	12.8	18.7	NC	7.1	9.5	NC	5.7	5.7	NC	8.6	4.6	NC	NC	NC	13.4	63.7	147	17.7	46.0
OWF_45	19	0.85	NC	11.1	16.9	26.6	NC	NC	NC	14.3	31.0	NC	12.8	16.8	7.8	10.2	10.6	5.74	13.3	7.7	NC	6.0	NC	13.6	105	204	14.3	91.2
OWF_46	22	0.82	82.5	232	159	140	NC	NC	NC	140	139	NC	45.8	42.9	23.1	36.0	25.1	9.8	29.0	18.6	4.5	9.3	NC	24.4	458	1,078	223	235
OWF_47	37	3.44	NC	5.76	7.90	11.5	NC	NC	NC	7.6	9.19	NC	7.1	6.4	NC	NC	5.1	NC	NC	NC	NC	NC	NC	NC	26.1	60.5	7.62	18.5
OWF_50	21	1.93	6.2	15.2	23.0	31.8	NC	NC	NC	13.5	21.0	NC	11.9	14.7	NC	8.6	7.4	NC	8.5	NC	NC	NC	NC	12.1	74.4	168	19.7	54.7
OWF_52	22	1.66	NC	16.7	25.0	29.9	NC	NC	NC	18.5	23.2	NC	9.0	9.8	4.5	5.9	5.9	NC	6.1	NC	NC	NC	NC	5.0	58.6	159	18.5	40.0
OWF_55	17	4.92	NC	38.3	47.0	55.9	NC	NC	NC	33.5	41.7	NC	25.6	17.2	10.1	13.2	22.5	NC	12.3	NC	NC	NC	NC	11.5	134	329	33.5	100
OWF_62	21	0.94	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	<1	<1	<1
OWF_65	23	6.10	NC	8.3	13.4	13.1	NC	NC	NC	NC	10.3	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	45.1	<1	<1
OWF_68	23	2.00	16.8	37.4	54.4	74.0	NC	NC	NC	33.3	52.4	NC	26.3	31.4	NC	17.1	NC	NC	15.3	NC	NC	NC	NC	24.4	149	366	50.0	99.1
OWF_72	26	3.62	NC	NC	3.9	3.5	NC	NC	NC	NC	3.6	NC	4.3	3.5	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	7.8	18.5	<1	7.76
OWF_73	19	1.93	NC	NC	21.2	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	21.2	<1	<1
OWF_79	22	4.90	NC	21.7	31.7	55.1	NC	NC	NC	25.3	40.9	NC	20.1	25.6	9.6	12.9	14.1	NC	17.6	11.9	9.6	NC	NC	31.2	151	327	25.3	125
Mean			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
SD			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
CV (%)			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
Minimum			**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**
Maximum			**82.5**	**411**	**572**	**660**	**7.89**	**15.7**	**18.8**	**408**	**503**	**20.6**	**92.8**	**119**	**63.1**	**63.2**	**44.3**	**22.3**	**56.9**	**58.5**	**14.7**	**18.6**	**5.03**	**60.9**	**1,041**	**3,236**	**494**	**547**
Reference Values																												
BC (OSPAR, 2008)			5	-	-	-	-	-	-	17	-	3	20	13	9	11	-	-	-	15	-	50	-	45	-	-	-	-
BAC (OSPAR, 2008)			8	-	-	-	-	-	-	32	-	5	39	24	16	20	-	-	-	30	-	103	-	80	-	-	-	-
UKOOA 95th Percentile SNS			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	366	-	-	-
OSPAR ERL (OSPAR, 2012)			160	155	150		44	16	19	240	170	85	600	665	261	384	-	240	-	430	-	240	63	85	-	4,022	552	1,700
SQGV (Simpson *et al.*, 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		10,000	-	-
OSPAR ERM (OSPAR, 2012)			2,100				640	500	540	1,500		1,100	5,100	2,600	1,600	2,800	-	-	-	1,600	-	-	260	2,800	-	44,792	3,160	9,600
SQGV High (Simpson *et al.*, 2013)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				50,000	-	-

NC = Not calculated due to incomplete dataset

**Low molecular weight (2-3 ring) PAHs and high molecular weight (4-6 ring) PAHs calculated from the EPA 16 PAHs* *b OSPAR Coordinated Environmental Guidelines*

Normalised PAH concentrations were calculated to allow comparison to OSPAR (2014) background concentrations (BCs) and background assessment concentrations (BACs). BCs are concentrations of contaminants derived from the analysis of core samples to reflect pre-industrial background levels for the OSPAR area. BACs have been statistically derived from BCs and represent the level above which concentrations can be considered significantly higher than the relevant BC (OSPAR, 2008). Contaminants tend to show a much higher affinity to fine particulate matter (OSPAR, 2009b) due to the increased adsorption capacity of organic matter and clay minerals. In sites where there is variability in grain size between stations, effects due to point sources of contamination will at least partly be obscured by grain size differences.

All total PAH concentrations (based on the 11 PAH components outlined in OSPAR, 2014) have been normalised to the 2.5% total organic carbon content of the sediment at each station. Total PAH concentrations normalised to 2.5% TOC content are displayed in Table 18, along with OSPAR BCs and BACs, and OSPAR effect range low (ERL) and effect range median (ERM) thresholds. ERLs are defined as the lowest concentration producing adverse effects in 10% of studies, whilst ERMs are the levels at which harmful effects are expected in 50% of studies.

Normalised PAHs were incalculable at most stations due to concentrations being below the limit of detection (<1µg.kg^{-1}). Similarly to the ANZECC and ARMCANZ normalisation, nine out of 22 PAHs had a concentration elevated above their respective BAC concentrations, with all nine elevated PAHs recorded at station OWF_19 (Table 18). At station OWF_19, phenanthrene (1,019µg.kg^{-1}) was 31 times greater than its respective BAC of 32µg.kg^{-1} and 4. times greater than its respective ERL of 240µg.kg^{-1}, indicating that the OSPAR normalisation was less conservative when compared to the ANZECC and ARMCANZ normalisation. Additionally, station OWF_19 had five PAHs recorded above their respective ERLs (Table 18). Whereas stations OWF_17 and OWF_46 had a single PAH (naphthalene and C2 naphthalene's) above their ERLs of 217µg.kg^{-1} and 206µg.kg^{-1}, respectively. As previously discussed in the ANZECC and ARMCANZ normalisation section, the elevated PAHs significantly above their BCs and ERLs is not surprising given the close proximity of the survey area to gas exploration activities. However, the total concentration of PAHs may provide a more suitable approach to investigating impacts to marine life. Σ22PAH concentration (8,090µg.kg^{-1}) was elevated above its respective ERL of 4,022µg.kg^{-1} but was below the OSPAR ERM of 44,792µg.kg^{-1}. Therefore, the PAH concentrations and distribution across the OWF survey area were likely to reflect background ambient conditions of diffuse PAH loading for this region of the SNS.

In addition, Brils *et al.* (2002) states that weathered sediments are significantly less toxic than freshly-spiked sediments and the toxicity to marine life was attributed to oil constituents rather than the co-occurring PAHs. Therefore, GC traces and TPH analysis could be conducted during environmental baseline surveys to form a more holistic approach when linking historic oil and gas exploration to marine life toxicity and background conditions.

Table 18 Normalised OSPAR Total Polycyclic Aromatic Hydrocarbons (µg.kg^{-1} or ppb)

Station	Depth	Distance to Nearest Well (Km)	Naphthalene	C1 Naphthalenes	C2 Naphthalenes	C3 Naphthalenes	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	C1-phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene (	Benzo[e]pyrene	Benzo[a]pyrene	Perylene	Indeno[123,cd]pyrene	Dibenzo[a,h]anthracene	Benzo[ghi]perylene	Total PAHs (Σ16)	Total PAHs (Σ22)	Total 2-3 ring PAH *	Total 4-6 ring PAH *
OWF_01	11	3.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1
OWF_06	19	2.24	19.4	129.3	139.7	212	-	-	-	91.4	142	-	58.1	91.4	37.6	40.3	32.2	13.9	41.6	32.9	11.6	15.3	-	49.8	482	1,139	111	371
OWF_10	21	1.07	-	43.4	44.4	41.3	-	-	-	23.4	30.3	-	16.6	-	-	-	-	-	-	-	-	-	-	17.0	57.0	216	23.4	33.6
OWF_11	20	1.34	-	66.4	131.7	190	-	-	-	94.7	143	-	55.3	60.3	-	35.6	35.3	-	39.2	-	-	-	-	47.2	328	899	94.7	234
OWF_12	20	2.50	-	69.6	65.0	51.3	-	-	-	-	43.8	-	44.6	-	-	-	-	-	-	-	-	-	-	-	44.6	274.2	<1	44.6
OWF_17	17	1.01	-	-	217.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	217.0	<1	<1
OWF_19	40	1.74	57.3	1,027	1,431	1,650	19.7	39.2	46.9	1,019	1,258	51.5	232	297	158	158	111	55.8	142	146	36.7	46.5	12.6	152.3	2,603	8,090	1,234	1,369
OWF_21	12	2.75	-	24.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	24.5	<1	<1
OWF_23	23	3.01	16.8	62.4	85.4	157	-	-	-	56.9	98.6	-	39.9	41.4	15.8	26.4	24.7	-	27.4	14.9	-	14.2	-	38.2	289	703	73.8	215
OWF_27	19	4.82	-	27.9	32.7	83.1	-	-	-	37.1	91.2	-	23.1	23.7	-	-	-	-	-	-	-	-	-	-	83.8	319	37.1	46.7
OWF_30	20	5.31	-	21.2	19.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	41.0	<1	<1
OWF_32	20	0.99	15.5	67.2	160.5	211	-	-	-	62.2	89.9	-	26.4	35.3	-	15.3	15.4	-	20.5	-	19.7	-	-	32.9	203	756	77.8	125
OWF_34	20	2.10	-	20.7	30.6	34.4	-	-	-	19.3	31.9	-	22.8	24.3	-	17.8	19.0	-	19.1	-	-	-	-	19.7	123	260	19.3	104
OWF_35	20	1.06	-	38.8	46.0	84.6	-	-	-	38.5	48.3	-	29.6	31.3	-	18.3	16.5	-	23.0	13.4	-	-	-	27.3	175	415	38.5	136
OWF_36	19	0.95	-	10.6	14.3	26.1	-	-	-	15.8	57.6	24.7	25.5	50.4	24.4	31.0	13.8	-	20.3	18.9	-	-	-	21.6	226	355	40.5	186
OWF_38	19	1.05	12.1	42.9	35.5	51.7	-	-	-	23.3	36.0	-	16.0	20.6	-	12.4	-	-	12.2	-	-	-	-	21.6	106	272	35.4	70.6
OWF_39	27	1.15	13.3	41.4	111.6	167	-	12.6	7.2	55.1	89.0	-	43.3	49.0	16.7	25.5	25.2	10.9	29.9	17.7	20.4	12.9	-	39.4	329	775	88.1	241
OWF_41	18	1.44	12.3	47.1	47.5	57.3	-	-	-	32.0	46.6	-	17.7	23.8	-	14.1	14.3	-	21.5	11.5	-	-	-	33.5	159	367	44.3	115
OWF_45	19	0.85	-	27.6	42.4	66.4	-	-	-	35.8	77.5	-	32.1	42.0	19.5	25.5	26.4	14.3	33.2	19.2	-	14.9	-	33.9	264	511	35.8	228
OWF_46	22	0.82	206	579	398	349	-	-	-	350	347	-	115	107	57.8	90.1	62.8	24.5	72.4	46.6	11.1	23.3	-	61.0	1,144	2,694	556	588
OWF_47	37	3.44	-	14.4	19.8	28.7	-	-	-	19.0	23.0	-	17.6	16.1	-	-	12.6	-	-	-	-	-	-	-	65.4	151	19.0	46.3
OWF_50	21	1.93	15.5	38.1	57.6	79.5	-	-	-	33.9	52.4	-	29.7	36.7	-	21.5	18.5	-	21.1	-	-	-	-	30.3	186	419	49.3	137
OWF_52	22	1.66	-	41.8	62.5	74.7	-	-	-	46.3	57.9	-	22.4	24.5	11.2	14.8	14.8	-	15.3	-	-	-	-	12.4	146	399	46.3	100
OWF_55	17	4.92	-	95.8	117.5	140	-	-	-	83.8	104	-	64.0	43.0	25.3	33.0	56.3	-	30.8	-	-	-	-	28.8	334	822	83.8	250
OWF_62	21	0.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1
OWF_65	23	6.10	-	20.7	33.5	32.7	-	-	-	-	25.8	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	112.7	<1	<1
OWF_68	23	2.00	41.9	93.4	135.9	185	-	-	-	83.1	131	-	65.6	78.4	-	42.8	-	-	38.1	-	-	-	-	60.9	373	914	125	248
OWF_72	26	3.62	-	-	8.9	8.7	-	-	-	-	9.1	-	10.7	8.7	-	-	-	-	-	-	-	-	-	-	19.4	46.1	<1	19.4
OWF_73	19	1.93	-	-	53.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	53.0	<1	<1
OWF_79	22	4.90	-	54.3	79.3	138	-	-	-	63.2	102	-	50.2	63.9	23.9	32.1	35.4	-	44.1	29.6	24.1	-	-	78.0	376	818	63.2	313
Mean			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
SD			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
CV (%)			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
Minimum			**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**
Maximum			**206**	**1,027**	**1,431**	**1,650**	**19.7**	**39.2**	**46.9**	**1,019**	**1,258**	**51.5**	**232**	**297**	**158**	**158**	**111**	**55.8**	**142**	**146**	**36.7**	**46.5**	**12.6**	**152**	**2,603**	**8,090**	**1,234**	**1,369**
Reference Values																												
BC (OSPAR, 2008)			5	-	-	-	-	-	-	17	-	3	20	13	9	11	-	-	-	15	-	50	-	45	-	-	-	-
BAC (OSPAR, 2008)			8	-	-	-	-	-	-	32	-	5	39	24	16	20	-	-	-	30	-	103	-	80	-	-	-	-
UKOOA 95th Percentile SNS			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	366	-	-	-
OSPAR ERL (OSPAR, 2012)			160	155	150	-	44	16	19	240	170	85	600	665	261	384	-	240	-	430	-	240	63	85	-	4,022	552	1,700
OSPAR ERM (OSPAR, 2012)			2,100	-	-	-	640	500	540	1,500	-	1,100	5,100	2,600	1,600	2,800	-	-	-	1,600	-	-	260	2,800	-	44,792	3,160	9,600

'-' environmentally inadmissible due to the contaminant being below the LOD
NC = Not calculated due to incomplete dataset
**Low molecular weight (2-3 ring) PAHs and high molecular weight (4-6 ring) PAHs calculated from the EPA 16 PAHs*

4.5.3 Sediment Endocrine Disrupters

a Polychlorinated Biphenyls

Samples were analysed for PCBs from 30 stations sampled across the OWF survey area using the Shipek grab sampler. These compounds are considered a major environmental concern due to their high lipophilicity and resistance to metabolic degradation and are used on oil and gas platforms in electrical plants and transformer oils. PCBs are non-ionic (hydrophobic) organic chemicals that have low solubility and as such concentrations in water and sediments are generally low (Cefas, 2001). Of the 25 PCBs analysed only seven (PCB47, PCB101, PCB110, PCB118, PCB138, PCB149 and PCB153) had concentrations above the LoD of <0.08μg.kg^{-1}, ranging between 0.09μg.kg^{-1} to 0.13μg.kg^{-1}, with a peak value of 0.43μg.kg^{-1} recorded for PCB47 at station OWF_50 (Table 19). All individual PCBs were below their respective EAC reference values, where applicable, indicating concentrations of individual PCBs across the survey area were representative of background concentrations. Due to the low concentrations of individual PCBs across the survey area, one station, OWF_01, had a calculable ICES 7 PCB congener of 0.43μg.kg^{-1} and two stations, OWF_01 and OWF_50, had calculable 25 PCB congeners of 0.65μg.kg^{-1} and 0.43μg.kg^{-1}, respectively (Table 19). All PCBs (individual and sum 7 and 25) were below their respective cAL 1, cAL 2, EAC, TEL and PEL thresholds at every station evidencing little to no PCB contamination across the site.

Table 19 Summary of Sediment Polychlorinated Biphenyls Analysis (ug.kg[-1] or ppb)

Station	Depth (m)	Distance to Nearest Well (Km)	PCB 18	PCB 28	PCB 31	PCB 44	PCB 47	PCB 49	PCB 52	PCB 66	PCB 101	PCB 105	PCB 110	PCB 118	PCB 128	PCB 138	PCB 141	PCB 149	PCB 151	PCB 153	PCB 156	PCB 158	PCB 170	PCB 180	PCB 183	PCB 187	PCB 194	Total ICES 7 PCB	Total of 25 Congeners
OWF_01	11	3.12	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.13	<0.08	0.13	0.10	<0.08	0.11	<0.08	0.09	<0.08	0.09	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.43	0.65
OWF_06	19	2.24	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_10	21	1.07	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_11	20	1.34	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_12	20	2.50	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_17	17	1.01	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_19	40	1.74	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_21	12	2.75	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_23	23	3.01	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_27	19	4.82	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_30	20	5.31	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_32	20	0.99	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_34	20	2.10	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_35	20	1.06	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_36	19	0.95	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_38	19	1.05	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_39	27	1.15	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_41	18	1.44	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_45	19	0.85	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_46	22	0.82	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_47	37	3.44	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_50	21	1.93	<0.08	<0.08	<0.08	<0.08	0.43	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.43
OWF_52	22	1.66	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_55	17	4.92	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_62	21	0.94	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_65	23	6.10	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_68	23	2.00	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_72	26	3.62	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_73	19	1.93	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
OWF_79	22	4.90	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Mean			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
SD			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
CV (%)			**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
Minimum			**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**
Maximum			**<0.08**	**<0.08**	**<0.08**	**<0.08**	**0.43**	**<0.08**	**<0.08**	**<0.08**	**0.13**	**<0.08**	**0.13**	**0.10**	**<0.08**	**0.11**	**<0.08**	**0.09**	**<0.08**	**0.09**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**<0.08**	**0.43**	**0.65**
Reference Values																													
Cefas cAL1 (MMO, 2015)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.00	
ERL (OSPAR, 2012)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.50	-
TEL (CCME, 2001)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21.60
EAC (OSPAR, 2012)			-	1.70	-	-	-	-	2.70	-	3	-	-	0.60	-	7.90	-	-	-	40.00	-	-	-	12.00	-	-	-	67.90	
Cefas cAL2 (MMO, 2015)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140.00	
PEL (CCME, 2001)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	189.00

NC = Not calculated due to incomplete dataset

b Organotin

Organotin compounds, principally tributyltin (TBT), have historically been used in marine antifouling products, but their use is now prohibited due to the disruption of the reproductive capabilities of a number of gastropod species (Iguchi *et al.*, 2007). Organotin compounds are relatively persistent and may still be present in offshore cuttings piles from their use in the 1980s. No formal environmental assessment criteria (EAC) thresholds for TBT in sediment have been set through CEMP (OSPAR, 2008), however, limits have been proposed via various OSPAR programmes and meetings, with 0.01µg.kg^{-1} suggested as a provisional EAC for TBT (OSPAR, 2009). No organotin compounds (Dibutyltin, TBT and MBT) were recorded above their respective LoD of <1ug.kg^{-1} (Table 20). The lack of organotin presence across the OWF survey area was unsurprising given the lack of platform infrastructure surrounding the grab locations, as grab samples were taken >500m from any platform infrastructure. However, it is worth noting the LOD of the method used is higher than the EAC thresholds set by OSPAR, including the highest upper EAC level of 0.15µg.kg^{-1} issued in 2004.

Table 20 Summary of Sediment Organotin Analysis (μg.kg^{-1} or ppb)

Station	Depth (m)	Distance to Nearest Well (Km)	Dibutyltin (DBT)	Tributyltin (TBT)	Monobutyltin (MBT)
OWF_01	11	3.12	<1	<1	<1
OWF_06	19	2.24	<1	<1	<1
OWF_10	21	1.07	<1	<1	<1
OWF_11	20	1.34	<1	<1	<1
OWF_12	20	2.50	<1	<1	<1
OWF_17	17	1.01	<1	<1	<1
OWF_19	40	1.74	<1	<1	<1
OWF_21	12	2.75	<1	<1	<1
OWF_23	23	3.01	<1	<1	<1
OWF_27	19	4.82	<1	<1	<1
OWF_30	20	5.31	<1	<1	<1
OWF_32	20	0.99	<1	<1	<1
OWF_34	20	2.10	<1	<1	<1
OWF_35	20	1.06	<1	<1	<1
OWF_36	19	0.95	<1	<1	<1
OWF_38	19	1.05	<1	<1	<1
OWF_39	27	1.15	<1	<1	<1
OWF_41	18	1.44	<1	<1	<1
OWF_45	19	0.85	<1	<1	<1
OWF_46	22	0.82	<1	<1	<1
OWF_47	37	3.44	<1	<1	<1
OWF_50	21	1.93	<1	<1	<1
OWF_52	22	1.66	<1	<1	<1
OWF_55	17	4.92	<1	<1	<1
OWF_62	21	0.94	<1	<1	<1
OWF_65	23	6.10	<1	<1	<1
OWF_68	23	2.00	<1	<1	<1
OWF_72	26	3.62	<1	<1	<1
OWF_73	19	1.93	<1	<1	<1
OWF_79	22	4.90	<1	<1	<1
Mean			**NC**	**NC**	**NC**
SD			**NC**	**NC**	**NC**
CV (%)			**NC**	**NC**	**NC**
Minimum			**<1**	**<1**	**<1**
Maximum			**<1**	**<1**	**<1**
Reference Levels					
Cefas cAL1 (MMO, 2015)			100	100	100
Cefas cAL2 (MMO, 2015)			1000	1000	1000

c Organochlorine Pesticides

Organochlorine pesticides (OCPs) are synthetic pesticides used globally for the control of biological vectors. OCPs are considered persistent organic pollutants due to their high toxicity, degradation resistance, fat solubility and bioaccumulation. Many OCPs are semi-volatile and can be transported over long distances via atmospheric currents in a gaseous state before wet or dry deposition occurs in the oceans. These compounds are transported from the surface waters to the bottom sediments as OCPs are denser than water and can adsorb onto fine particles. Humans and biota can be affected by the toxic effects caused by OCPs, which involve reproductivity damage, endocrine disruption and immune suppression (Girones *et al.*, 2020). Two OCPs were analysed during the current survey, dieldrin and DDT, of which only two stations, OWF_01 and OWF_34, had a DDT concentration recorded above the LoD at 0.2µg.kg^{-1} and 0.1µg.kg^{-1}, respectively (Table 21). The DDT concentrations at stations OWF_01 and OWF_34 were slightly above or at the Cefas action level 1 value of 0.1µg.kg^{-1}, indicating the material at these stations would have to be further investigated before disposal. However, DDT was below the ERL and TEL reference values so it is unlikely the concentrations of DDT would have impacted the macrobenthic community. Furthermore, the UK Cefas action level 1 concentration for DDT were the lowest and strictest for any OSPAR country (MMO, 2015). It is also worth noting the LOD of the method used is equal to the thresholds set by the UK.

Table 21 Summary of Sediment Organochlorine Analysis (µg.kg^{-1} or ppb)

Station	Depth (m)	Distance to Nearest Well (Km)	Dieldrin	DDT*
OWF_01	11	3.12	<0.1	0.2
OWF_06	19	2.24	<0.1	<0.1
OWF_10	21	1.07	<0.1	<0.1
OWF_11	20	1.34	<0.1	<0.1
OWF_12	20	2.50	<0.1	<0.1
OWF_17	17	1.01	<0.1	<0.1
OWF_19	40	1.74	<0.1	<0.1
OWF_21	12	2.75	<0.1	<0.1
OWF_23	23	3.01	<0.1	<0.1
OWF_27	19	4.82	<0.1	<0.1
OWF_30	20	5.31	<0.1	<0.1
OWF_32	20	0.99	<0.1	<0.1
OWF_34	20	2.10	<0.1	0.1
OWF_35	20	1.06	<0.1	<0.1
OWF_36	19	0.95	<0.1	<0.1
OWF_38	19	1.05	<0.1	<0.1
OWF_39	27	1.15	<0.1	<0.1
OWF_41	18	1.44	<0.1	<0.1
OWF_45	19	0.85	<0.1	<0.1
OWF_46	22	0.82	<0.1	<0.1
OWF_47	37	3.44	<0.1	<0.1
OWF_50	21	1.93	<0.1	<0.1
OWF_52	22	1.66	<0.1	<0.1
OWF_55	17	4.92	<0.1	<0.1
OWF_62	21	0.94	<0.1	<0.1
OWF_65	23	6.10	<0.1	<0.1
OWF_68	23	2.00	<0.1	<0.1
OWF_72	26	3.62	<0.1	<0.1
OWF_73	19	1.93	<0.1	<0.1
OWF_79	22	4.90	<0.1	<0.1
Mean			**NC**	**NC**
SD			**NC**	**NC**
CV (%)			**NC**	**NC**
Minimum			**<0.1**	**<0.1**
Maximum			**<0.1**	**0.2**
Reference Levels				
Cefas cAL1 (MMO, 2015)			0.5	0.1
TEL (CCME, 2001)			0.72	1.19
ERL (OSPAR, 2012)			2	1
PEL (CCME, 2001)			4.3	4.77
ERM (OSPAR, 2012)			8	7

** DDT = p,p'-Dichlorodiphenyltrichloroethane*

4.6 TRACE METALS

4.6.1 Non-normalised Trace Metals

Results for trace metals analysis are given in Table 22 and Figure 18 to Figure 21. All of the metals analysed (arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni) and zinc (Zn)), underwent an aqua-regia acid digestion and extraction for partial sediment metals.

The question of bioavailability of metals to marine organisms is a complex one, as sediment granulometry and the interface between water and sediment all affect the bioavailability and subsequent toxicity. Therefore, even if a metal is found in higher concentrations it does not necessarily follow that this will have a detrimental effect on the environment, if present in an insoluble state. Historically, several extraction techniques have been applied to metal analysis, with the most common applying to an HF/perchloric extraction for total metals, and a weaker nitric or aqua regia extraction. The latter techniques have shown close correlation to metal burdens in the tissues of benthic organisms (Luoma and Davies, 1983; Bryan and Langston, 1992). However, the way bioavailability is reflected by the extent to which a particular metal digests is not well understood, and research is ongoing.

Metals occur naturally in the marine environment and are widely distributed in both dissolved and sedimentary forms. Some are essential to marine life while others may be toxic to numerous organisms (Paez Osuna and Ruiz-Fernandez, 1995). Rivers, coastal discharges, and the atmosphere are the principal modes of entry for most metals into the marine environment (Schaule and Patterson, 1983), with anthropogenic inputs occurring primarily as components of industrial and municipal wastes. Historically, several metals are found in elevated concentrations where drilling fluids or produced waters have been discharged by oil and gas installations. These include intentional additives (such as metal based salts and organo-metallic compounds in the fluids) as well as impurities within the drilling mud systems such as clays (e.g. bentonites; a gelling and viscosifying agent) and metal lignosulphates (a viscosity controller; Bordin *et al.*, 1992). Metals most characteristic of offshore contamination of marine sediments from oil and gas exploration are barium (Ba), chromium (Cr), lead (Pb) and zinc (Zn; Neff, 2005), although these may vary greatly dependent upon the constituents in drilling fluids used.

Trace metal contaminants in the marine environment tend to form associations with the non-residual phases of mineral matter, such as iron and manganese oxides and hydroxides, metal sulphides, organics, and carbonates. Metals associated with these non-residual phases are prone to various environmental interactions and transformations (physical, chemical and biological), potentially increasing their biological availability (Tessier *et al.*, 1979). Residual trace metals are defined as those which are part of the silicate matrix of the sediment and that are located mainly in the lattice structures of the component minerals. Non-residual trace metals are not part of the silicate matrix and have been incorporated into the sediment from aqueous solution by processes such as adsorption and organic complexes and may include trace metals originating from sources of pollution. Therefore, in monitoring trace metal contamination of the marine environment, it is important to distinguish these more mobile metals from the residual metals held tightly in the sediment lattice (Chester and Voutsinou, 1981), which are of comparatively little environmental significance.

Metals are generally not harmful to organisms at concentrations normally found in marine sediments and some, like zinc, may be essential for normal metabolism although can become toxic above a critical threshold. In order to assign a level of context for toxicity, an approach used by Long, *et al.* (1995) to characterise contamination in sediments will be used here. These researchers reviewed field and laboratory studies and identified nine metals that were observed to have ecological or biological effects on organisms. They defined 'effect range low' (ERL) values as the lowest concentration of a metal that produced adverse effects in 10% of the data reviewed, whilst 'effect range median' (ERM) values designate the level at which half of the studies reported harmful effects. Consequently, metal concentrations recorded below the ERL and TEL value are not expected to elicit adverse effects, while levels above the ERM and PEL value are likely to be toxic to some marine life.

Of particular relevance to the offshore wind farm industry within close proximity to offshore oil and gas exploration are metals associated with drilling related discharges. Trace metals such as either from impurities or additives can accumulate in marine sediments surrounding oil and gas exploration activities (NRC, 1983; McLeese *et al.*, 1987). Mercury, nickel and zinc were above their respective UKOOA 95th percentile thresholds of 0.05mg.kg^{-1}, 21.5mg.kg^{-1} and 35.8mg.kg^{-1} at minimum of one station, with mercury and nickel above their respective Cefas action level 1s of 0.30mg.kg^{-1} and 20.0mg.kg^{-1} at a minimum of one station (Table 22). Furthermore, copper was elevated above the CCME TEL reference value of 18.7mg.kg^{-1} at station OWF_41 with a concentration of 20.7mg.kg^{-1} recorded (Table 22). The elevated values could indicate a potential residual trace of historical drilling activities within the OWF area as all metals, excluding mercury, had a significant positive relationship to ∑16PAH and could indicate a similar diffuse source of metals (Appendix K; p>0.05). However, a majority of the metals were below their respective UKOOA 95th percentiles and no significant relationship was observed between the nearest well and any metal concentration (Appendix K; p>0.05). Furthermore, all metals, apart from mercury, had a significant negative Spearman's correlation to the proportion of sand along with a significant positive relationship to the proportion of gravel (Appendix K). The lack of correlations to mercury was unsurprising given the majority of stations recording a mercury concentration at or below the LoD of 0.01mg.kg^{-1}.

A series of significant correlations between the metal concentrations and sediment proportions indicate that sediment variability was likely influencing the distribution of metals across the OWF survey area. For example, aluminosilicates present in gravels are associated with several trace metals (Zn, Cr, Ni, Co and Cu) and the erosion of aluminosilicates can lead to the accumulation of trace metals in the overlaying surface sediments (Musafa *et al.*, 1996). In addition, the small scale variability in sediment composition was more likely to be attributed to the variation in metal concentrations, as the elevated concentrations of trace metals, in particular zinc, occurred across multiple geophysical sediment delineations (i.e. Gravelly SAND, SAND Sandy CLAY).

Arsenic was elevated above the NOAA ERL and CCME TEL values of 8.2mg.kg^{-1} and 7.24mg.kg^{-1}, respectively at the majority of stations, excluding stations OWF_01, OWF_10, OWF_11 and OWF_17, with a further four stations, OWF_21, OWF_27, OWF_36 and OWF_46, elevated above the Cefas action level 1 of 20mg.kg^{-1} (Table 22). The elevated arsenic concentrations recorded across the OWF survey area was unsurprising given previous studies that have found comparably high levels of arsenic within the southern North Sea, potentially due to the influence of historic industrial discharge from the Humber Estuary (Whalley *et al.*, 1999). Furthermore, it can be speculated, given the high intensity of drilling activity, that arsenic rich shale has been brought and distributed across the surface sediments of the OWF survey area potentially resulting in elevated surface arsenic concentrations (Whalley *et al.*, 1999). Therefore, the concentrations of arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc are likely to represent the upper limit of natural background levels for this region of the SNS.

The previous SNS surveys carried out by BSL within close proximity to the OWF survey area utilised the same 'aqua-regia' digest on the trace metals analysed enabling a direct comparison between results. All metals analysed (Cr and Zn) were lower or comparable (As, Cd, Cu, Pb, Hg and Ni) in the current OWF survey when compared to the regional SNS surveys (Table 22). For example, the mean arsenic concentration (15.1mg.kg^{-1}) for the current survey was well within the range of the mean concentrations (11.4mg.kg^{-1} to 25.8mg.kg^{-1}) calculated from the previous BSL SNS surveys. Therefore, further indicating the potential for metal concentrations across the OWF survey area to be representative of natural background conditions for this region of the SNS.

Table 22 Total Trace Metal Concentrations (mg.kg^{-1} or ppm)

Station	Depth (m)	Distance from nearest well (m)	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Nickel (Ni)	Zinc (Zn)
OWF_01	11	3.12	6.5	0.08	5.0	6.9	4.9	0.02	4.1	16.1
OWF_06	19	2.24	19.7	0.15	19.1	10.5	6.5	0.03	22.5	40.6
OWF_10	21	1.07	6.5	0.08	4.7	5.6	4.9	0.01	4.1	14.3
OWF_11	20	1.34	5.1	0.04	4.1	4.6	3.6	0.01	3.1	12.7
OWF_12	20	2.50	9.9	0.07	5.4	4.3	3.3	<0.01	5.1	18.8
OWF_17	17	1.01	4.90	0.05	4.0	4.3	2.7	<0.01	2.8	9.6
OWF_19	40	1.74	17.0	0.08	4.0	3.7	10.5	0.01	5.1	20.2
OWF_21	12	2.75	37.3	0.16	13.7	8.4	9.9	0.01	15.9	45.5
OWF_23	23	3.01	19.9	0.19	14.0	8.3	7.9	0.01	15.2	54.1
OWF_27	19	4.82	31.4	0.12	10.3	7.2	7.2	0.05	11.9	33.5
OWF_30	20	5.31	18.7	0.12	8.9	6.9	6.6	0.02	11.1	26.6
OWF_32	20	0.99	15.4	0.14	10.8	9.5	6.0	0.02	12.8	33.0
OWF_34	20	2.10	11.8	0.07	5.4	6.3	4.1	0.01	4.5	15.0
OWF_35	20	1.06	11.1	0.07	7.4	7.3	5.6	0.01	6.7	19.9
OWF_36	19	0.95	24.0	0.17	15.9	9.8	7.1	0.01	18.3	47.4
OWF_38	19	1.05	16.5	0.12	13.4	9.9	6.4	0.02	14.5	34.0
OWF_39	27	1.15	15.1	0.08	10.3	7.2	6.4	<0.01	9.8	24.8
OWF_41	18	1.44	15.5	0.24	17.1	20.7	6.5	0.02	39.4	55.6
OWF_45	19	0.85	14.7	0.16	16.2	9.8	6.7	<0.01	19.	33.0
OWF_46	22	0.82	21.5	0.14	13.1	9.4	5.9	<0.01	14.8	47.4
OWF_47	37	3.44	17.5	0.09	8.9	6.2	6.8	0.01	9.0	27.6
OWF_50	21	1.93	9.0	0.06	6.5	5.7	4.5	0.01	6.0	17.0
OWF_52	22	1.66	19.9	0.11	17.5	12.2	5.8	<0.01	17.7	47.2
OWF_55	17	4.92	18.9	0.09	7.9	6.3	5.0	0.04	7.9	25.6
OWF_62	21	0.94	6.9	0.06	6.7	6.2	3.6	0.01	4.9	14.2
OWF_65	23	6.10	9.4	0.08	6.8	6.7	5.2	0.01	5.7	18.6
OWF_68	23	2.00	12.6	0.05	6.3	6.5	3.9	0.01	6.8	20.6
OWF_72	26	3.62	14.7	0.07	10.4	8.2	6.5	<0.01	11.3	26.6
OWF_73	19	1.93	8.6	<0.04	7.1	5.7	3.3	<0.01	7.50	16.8
OWF_79	22	4.90	14.2	0.13	28.9	12.5	8.4	0.01	28.2	42.9
Mean			**15.1**	**0.11**	**10.3**	**7.89**	**5.86**	**0.02**	**11.5**	**28.6**
SD			**7.38**	**0.05**	**5.69**	**3.29**	**1.87**	**0.01**	**8.2**	**13.4**
CV (%)			**48.7**	**45.3**	**55.1**	**41.7**	**31.9**	**66.8**	**71.2**	**46.9**
Maximum			**37.3**	**0.24**	**28.9**	**20.7**	**10.5**	**0.05**	**39.4**	**55.6**
Minimum			**4.90**	**0.04**	**4.00**	**3.70**	**2.70**	**0.01**	**2.80**	**9.60**
Regional Examples										
BSL SNS, 2019		**Mean**	**11.4**	**0.15**	**10.8**	**8.05**	**5.83**	**0.02**	**9.82**	**33.9**
		SD	**4.62**	**0.07**	**5.23**	**3.18**	**1.56**	**0.00**	**4.72**	**12.5**
		CV (%)	**40.7**	**48.9**	**48.5**	**39.5**	**26.7**	**20.3**	**48.1**	**36.9**
BSL SNS, 2020a		**Mean**	**15.0**	**0.14**	**47.9**	**8.09**	**11.0**	**0.03**	**12.9**	**38.5**
		SD	**3.44**	**0.04**	**7.66**	**2.62**	**2.18**	**0.01**	**4.98**	**16.2**
		CV (%)	**23.0**	**30.2**	**16.0**	**32.4**	**19.9**	**30.2**	**38.7**	**42.0**
BSL SNS, 2020b		**Mean**	**25.8**	**0.10**	**10.6**	**5.76**	**7.58**	**0.02**	**11.1**	**37.6**
		SD	**7.54**	**0.05**	**3.79**	**1.79**	**3.65**	**0.01**	**4.22**	**17.8**
		CV (%)	**29.3**	**45.3**	**35.8**	**31.0**	**48.1**	**47.1**	**38.1**	**47.3**
Reference levels										
UKOOA (2001) 50th Percentile SNS			-	0.03	6.5	2.0	6.0	0.02	4.0	12.2
UKOOA (2001) 95th Percentile SNS			-	0.72	44.8	13.9	21.0	0.05	21.5	35.8
TEL (CCME, 2001)			7.2	0.70	52.3	18.7	30.2	0.13	-	124
Cefas cAL1 (MMO, 2015)			20.0	0.40	40.0	40.0	50.0	0.30	20.0	130
NOAA ERL (Buchman, 2008)			8.2	1.20	81.0	34.0	46.7	0.15	20.9	150
SQGV (Simpson *et al.*, 2013)			20.0	1.50	80.0	65.0	50.0	0.15	21.0	200
PEL (CCME, 2001)			41.6	4.20	160	108	112	0.70	-	271
SQGV High (Simpson *et al.*, 2013)			70.0	10.00	370	270	220	1.00	52.0	410
NOAA ERM (Buchman, 2008)			70.0	9.60	370	270	218	0.71	51.6	410
Cefas cAL2 (MMO, 2015)			50.0	2.00	400	400	500	3.00	200	800

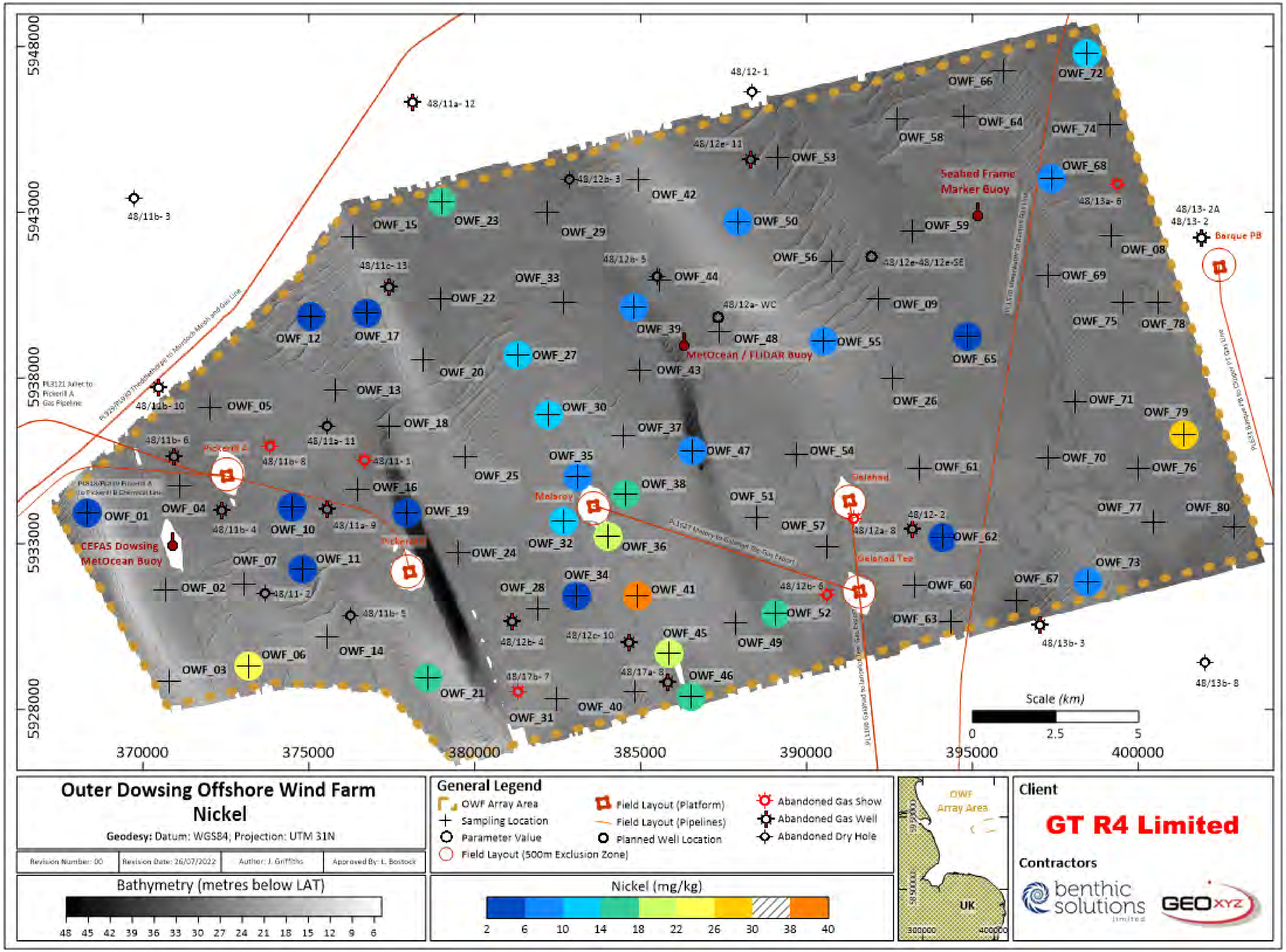


Figure 18 Concentration of Nickel

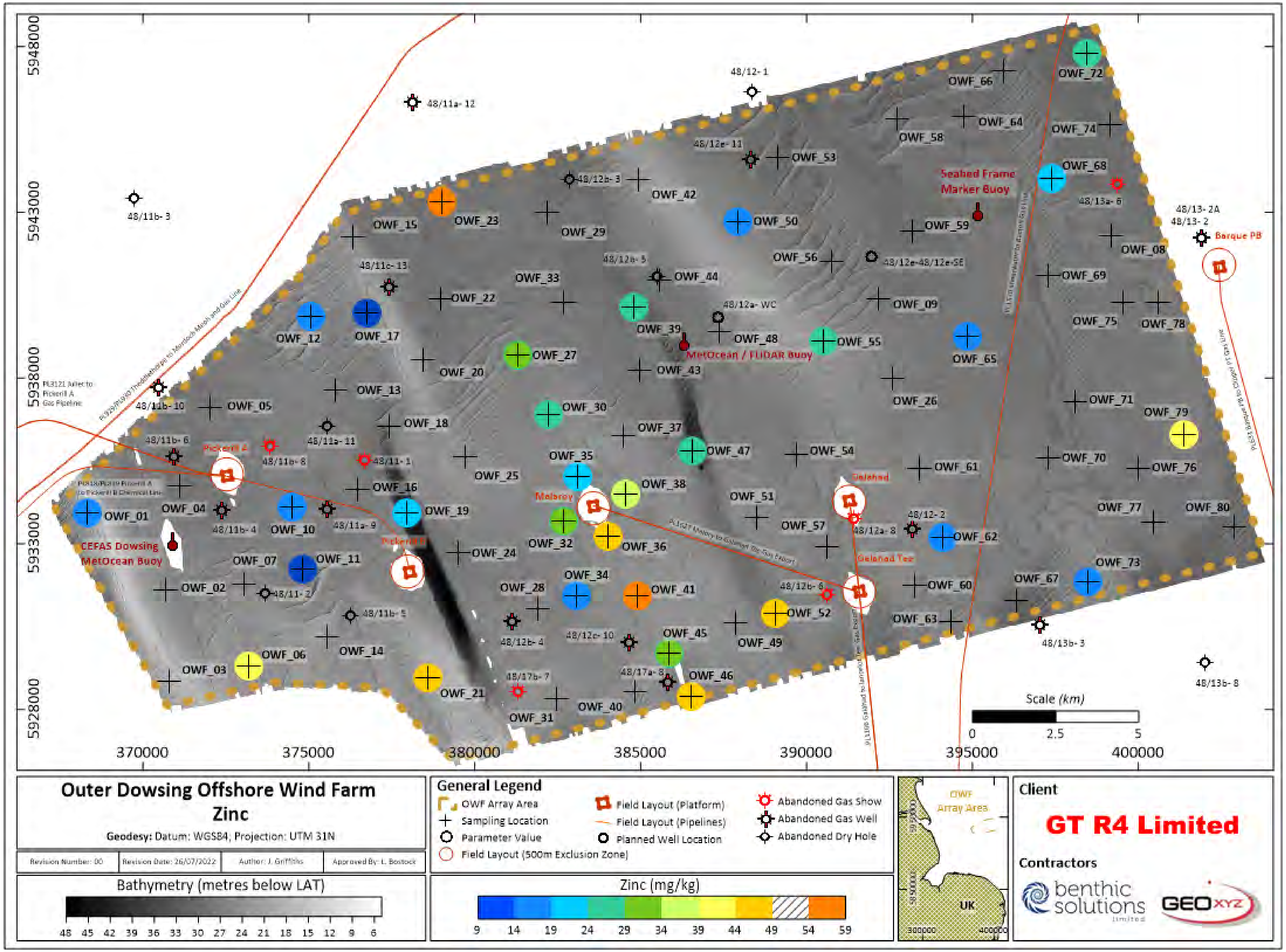


Figure 19 Concentration of Zinc

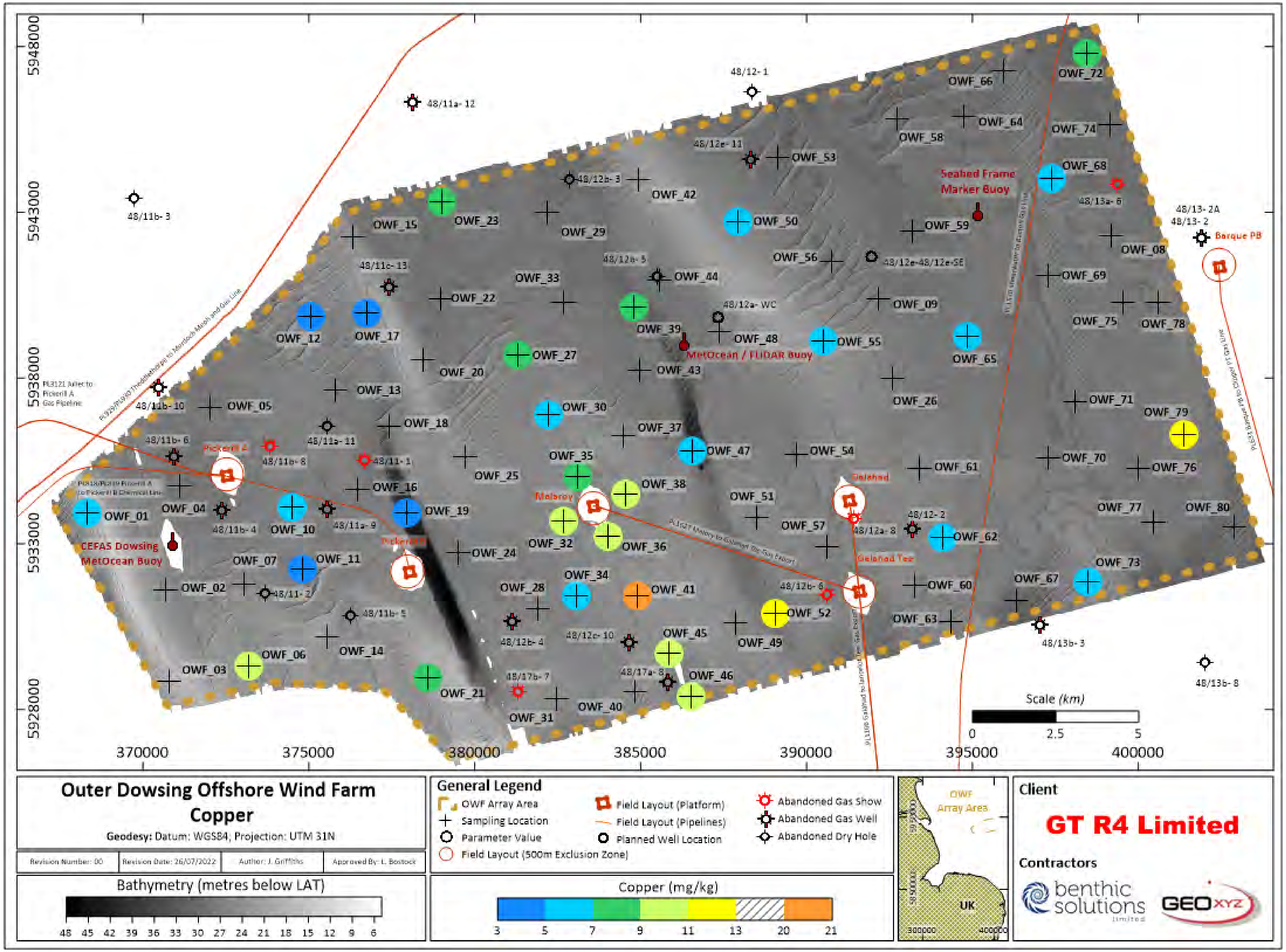


Figure 20 Concentration of Copper

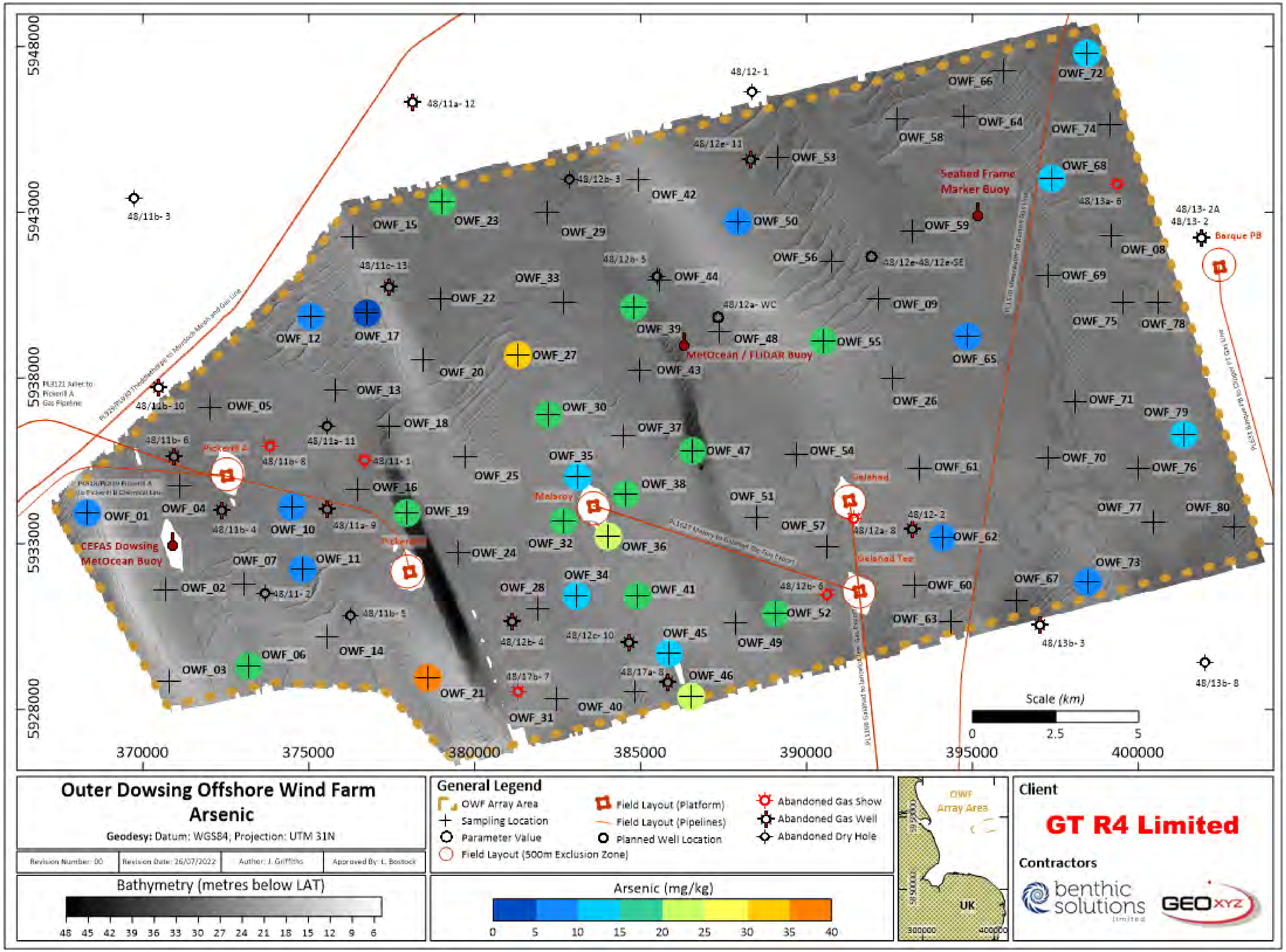


Figure 21 Concentration of Arsenic

4.6.2 Normalised Heavy Metals

a ANZECC and ARMCANZ Sediment Guidelines

As previously stated, the bulk properties of the sediment and the distribution of coarse grained material are closely related to the distribution of heavy metal concentrations across the OWF survey area (Musafa *et al.*, 1996). The ANZECC and ARMCANZ framework (see Section 2.5.3 and Appendix D) aims to assess contaminated sediment against a set of sediment quality guideline values (SQGV) to establish the level of risk to the biological community (Simpson *et al.*, 2013).

The framework dictates that all analysed metals are first assessed against the SQGVs following a total particular metal digestion, with results below their respective SQGVs deemed to constitute 'low risk', indicating the contaminant poses negligible risk of adverse biological effects (Simpson *et al.*, 2013). As shown in Table 22, all metals with the exception of arsenic and nickel were below their respective SQGVs and are deemed to be 'low risk' within the OWF survey area. Arsenic and nickel exceeded their SQGVs of 20mg.kg^{-1} and 21mg.kg^{-1} at four and three stations, respectively but as per the ANZECC and ARMCANZ framework, these levels are acceptable if the concentrations recorded are below the background levels determined from previous surveys close to the OWF survey area. Three previous SNS surveys conducted by BSL close to the OWF survey area had average arsenic concentrations of between 11.3mg.kg^{-1} and 25.8mg.kg^{-1} along with average nickel concentrations of between 9.8mg.kg^{-1} and 12.8mg.kg^{-1}. Therefore, the arsenic and nickel concentrations recorded at the four and three stations within the OWF survey area are likely to reflect the upper limit of background concentrations for this region of the SNS. Furthermore, based on the ANZECC and ARMCANZ framework, the mean concentrations of arsenic and nickel were below their respective SQGVs, indicating that arsenic and nickel across the wider OWF survey area are deemed 'low risk' with 'negligible' effects to wildlife. However, it is worth noting that comparisons to SQGVs were limited due to partial strong acid extraction rather than a total metal extraction, which likely resulted in lower concentrations of extracted metals during the current study. However, it should be noted that Santoro *et al.* (2017) state differences in metal extraction metals can result in a 10% difference, which given the metal concentrations across the OWF survey area would result in concentrations well below their respective SQGV-high thresholds.

b OSPAR Coordinated Environmental Guidelines

Normalisation to a normaliser metal such as aluminium or lithium can be carried out in an attempt to standardise metal concentrations by filtering out the effect that variable clay and aluminosilicates will have on metal concentrations. Normalisation to lithium attempts to standardise metals data by filtering out the effect that variable clay content will have on metal concentrations and is considered a superior cofactor to aluminium for the normalisation of metal data from sediments derived mainly from the glacial erosion of crystalline rocks, such as those found in the southern North Sea. Glacially derived sediments tend to be enriched with T-O-T phyllosilicates which can amplify results if an aluminium normalisation is undertaken (Loring 1990; Herut and Sandler, 2006).

Normalisation for the full range of metals in line with the current Coordinated Environmental Monitoring Programme (CEMP) normalisation procedure, involving the use of pivot values, was not possible due to the absence of lithium analysis (OSPAR, 2008). However, due to the minimal proportion and variation of fines a lithium based normalisation may not have been entirely beneficial across the OWF survey area.

4.7 FAUNAL ANALYSIS

4.7.1 Grab Macrofaunal Analysis

Macrofaunal analysis was carried out on 71 single grab samples obtained from 71 stations across the OWF survey area. Nine stations were excluded from macrofaunal analysis as they were deemed unrepresentative of the macrofaunal community due to low sample retentions of <40% as a result of the underlying hard substrate. The sediments were relatively variable across the survey area with 58.8% of the stations assigned to sand dominant folk classifications such as “Sand”, “Slightly Gravelly Sand”, “Gravelly Sand” or ‘Gravelly Muddy Sand”, while the remaining stations (41.3% of the total) were assigned gravel dominant classifications such as “Gravel”, “Sandy Gravel” or “Muddy Sandy Gravel”. Macrofaunal samples were processed in the field and the lab over a 1mm mesh sieve.

For this assessment epifaunal species have been separated into two categories: solitary epifauna and colonial epifauna. Solitary epifauna includes specimens that, although epifaunal in nature, are recorded in low counts. As such, solitary epifauna are often considered to be less ecologically important components of the marine benthos; for this survey they consisted of solitary Cnidaria, Annelida, Arthropoda and Mollusca individuals. Colonial epifauna are inclusive of encrusting epifauna which are generally recorded in high counts or as presence/absence. For this survey they include colonial Porifera, Cnidaria, Bryozoa and Entoprocta. Within these analyses colonial epifauna have been omitted as they are often not possible to enumerate and therefore only assessed on a presence/absence basis; however, due to the importance of colonial epifauna at stations containing coarse sediments, the richness of this component of the macrobenthos is discussed separately in Section 4.7.1c.

Subsequent macrofaunal taxonomy of all recovered fauna identified a total of 4,429 individuals (infauna and solitary epifauna) from the 71 samples analysed. Faunal data for each sample are listed in Appendix I, whilst univariate analyses are summarised in Table 23. Of the 265 taxa recorded, 37 were colonial epifauna, nine were solitary epifauna and 228 were infaunal. The infaunal taxa consisted of 116 annelid species accounting for 37.7% of the total individuals. The arthropods were represented by 50 species (18.6% of the total individuals), the molluscs by 34 species (22.7% of the total individuals), echinoderms by seven species (1.3% of the total individuals) and the Chordata by four species (0.2% of the total individuals). Solitary epifauna was represented by a single Cnidaria (Actiniaria sp.), four Annelida (*Sabellaria spinulosa*, *Hydroides norvegica*, *Spirobranchus lamarcki* and

Spirobranchus triqueter), three Athropoda (*Balanus balanus*, *Balanus crenatus* and *Verruca stroemia*) and a single Mollusca (*Crepidula fornicata*). All other groups (Cnidaria, Hemichordata, Foraminifera, Phoronida, Platyhelminthes, Nemertea and Nematoda) were represented by 8 species, accounting for 4.8% of the total individuals. Three specimens of the lesser sand eel, *Ammodytes marinus*, were identified at station OWF_42. This species is a priority species under the UK Post 2010 Biodiversity Framework as it is considered an important food source for many commercial fish, seals and seabirds. Furthermore, five specimens of the invasive non-native slipper limpet, *Crepidula fornicata*, were identified at station OWF_05. Slipper limpets can form dense aggregations, which can compete for space and smother native benthic fauna.

The fluctuation in accumulation of taxa with each new sample and hence heterogeneity across the survey area was demonstrated by a species accumulation curve as shown in Figure 22. The species accumulation curve as sampled in this figure demonstrates the variable but incremental increase in recorded species as additional samples were acquired. The stepwise increase in species at sample three (OWF_04) was due to sampling an area of coarse sediment compared to the previously sampled species poor infralittoral fine sand on the crest of a sandbank (OWF_01 and OWF_03). This suggests that the population was diverse with a relatively high species richness being recorded in every new sample. This analysis estimated the maximum species accumulation (Chao-1 curve) for the survey area to be 287 species, compared to the actual 228 infaunal species recorded during the survey. The number of species recorded exceeds the representative portion of the population (i.e. 67% or 191 species) meaning no additional replicates would be required. The current survey discovered 228 infaunal species with over two-thirds (79%) of the population represented. If colonial epifaunal species were considered (37 species), roughly 92% of the interpolated population would have been sampled.

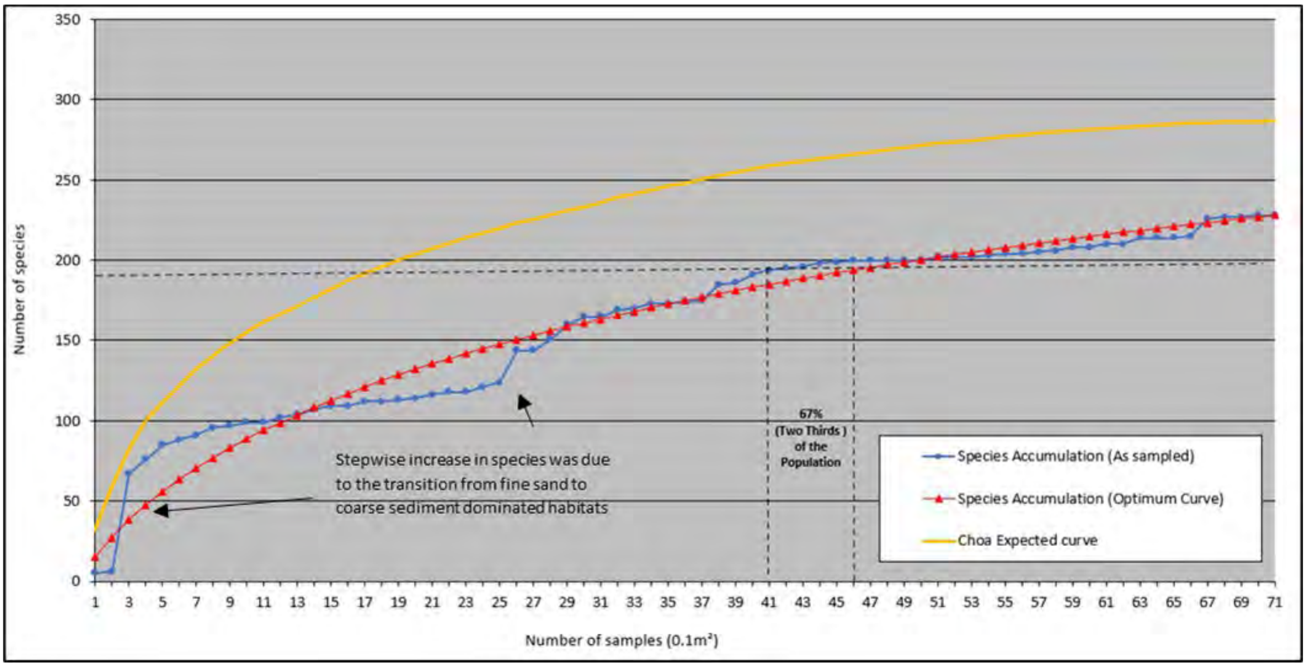


Figure 22 Species Accumulation Curve of OWF Survey Area

With the exception of species that have been intentionally grouped into higher taxonomic levels (e.g. Nematoda, Nemertea, Platyhelminthes etc.), the majority of adult specimens were identified to genus level or lower (~98%). A total of 35 juvenile taxa were recorded during the current survey area, of which Mollusca (12 individuals), Arthropoda (ten individuals) and Annelida (seven individuals) were the most abundant. It was not possible to ascribe these specimens to a particular species at this stage in their lifecycle, and as such have been usually grouped to order level. Juveniles are often excluded from community analyses due to their high mortality prior to reaching maturity and difficulties in distinguishing species of the same genus. Consequently, they tend to induce a recruitment spike at certain times of the year due to rapid settlement and colonisation but are essentially an ephemeral part of the population masking the underlying trends within the mature adults. Similarly to juveniles, eight damaged specimens could not be ascribed to a particular species and could potentially add processing bias to the macrofaunal dataset. These specimens have, therefore, been excluded from univariate and multivariate analyses but have been listed separately in Appendix I.

Nematoda have been included in macrofauna analysis, as they can often serve as indicators of organic enrichment. However, as Nematoda vary in size, the estimates of its abundance may not be entirely accurate, with some likely to have passed through the 1mm sieve during macrofauna sample processing.

a Primary and Univariate Parameters

The primary and univariate parameters for all stations are listed in Table 23 and graphically represented in Figure 23 and Figure 25.

The number of individuals per 0.1m^2 was highly variable across the OWF survey area, ranging between 3 per 0.1m^2 at station OWF_03 to 683 per 0.1m^2 at station OWF_76 (Table 23;Figure 24). The variation is also evidenced by a relatively high coefficient of variation (149.2%;Table 23). The number of species per 0.1m^2 sample was also variable, ranging from 2 species per 0.1m^2 at station OWF_03 to 63 per 0.1m^2 at station OWF_04 (Table 23;Figure 23).

The variation in the number of individuals and species was unsurprising given the variability in sediment composition observed across the OWF survey area, which was corroborated by significant negative Spearman's correlations between the number of species and individuals to the proportion of sand along with a significant positive correlation to the proportion of gravel (Appendix K; p<0.05). The number of individuals and species also positively correlated with several parameters which can be indicators of organic enrichment, TOC, ∑16PAH and ∑22PAH (Appendix K; p<0.05). However, as previously discussed, the TOC along with a majority of the PAH concentrations across the survey area were low and would be unlikely to impact the macrofaunal community, so these parameters are likely to be autocorrelated to other factors such as sediment composition (Appendix K).

The highest number of individuals and second highest number of species recorded at station OWF_76 could be attributed to the presence of *Sabellaria spinulosa*, as *S. spinulosa* aggregations can act as refuges for marine species and hence create localised hotspots of biodiversity (see Section 4.8.2b).

Table 23 displays the UKOOA predicted macrofauna parameters for three environments. Due to the abundance of both sand and gravel in the survey area, both sediment types are provided in the table, as well as the expected values for the general SNS area. When comparing the abundance of individuals and species to UKOOA background levels for the SNS, the current survey had an average lower than expected species abundance (15±12SD species) and a similarly low individual abundance with 62±93SD individuals compared to a predicted 37 species and 334 individuals. Abundances were also lower than those given by UKOOA for gravel and sand substrata. However, only four samples were included in the creation of gravel community predictions, as opposed to >200 for the creation of the sand habitat background macrofauna levels, highlighting the uncertainty in the values provided for gravel communities. Furthermore, as the sand dominated survey area lies within an area of known sandbanks (see Section 4.8.2f), which are characterised by impoverished faunal communities, the numbers observed in the current survey are thought to represent the natural levels for this type of environment.

Margalef's Index, a measure of species richness, was highest at station OWF_04 (11.01) and lowest at station OWF_03 (0.91; Table 23). The denuded community at OWF_03 may relate to the dominance of fine sand sampled from the top of a sand ridge, which are naturally characterised by impoverished faunal communities (JNCC, 2020). In contrast, OWF_04 had a higher species richness due to the inclusion of cobbles and pebbles at this station, which provided additional attachment points for the colonisation and establishment of solitary epifauna contributing to an increased species diversity.

Simpson's Diversity Index was highly variable within the survey area, ranging from a minimum of 0.126 at station OWF_13 to a maximum of 0.970 at station OWF_41, with an average of 0.765±0.197SD indicating a variable but overall fairly diverse macrofaunal community (Table 23 and Figure 25). Pielou's Equitability was similar to the Simpsons Index, with station OWF_13 having the lowest evenness at 0.165, compared to a maximum of 0.967 at station OWF_63 (Table 23). The Shannon-Wiener Diversity index showed a similar pattern, with the lowest diversity of 0.55 recorded at station OWF_13 compared to the highest recorded diversity of 4.85 at station OWF_04. The impoverished macrofaunal community at OWF_13 could be attributed to the firm coarse sand encountered at this station, which could have limited the establishment of burrowing macrofaunal assemblages (Appendix F).

The macrofauna data obtained from three previous BSL surveys carried out in the SNS between 2019 and 2020 revealed similar univariate parameters to the current OWF survey. The previous surveys sampled two macrofaunal replicates per station, while the current survey sampled a single replicate per station. To account for this difference, the two replicates were averaged to enable for comparison between the previous and current OWF survey (Table 23). Species richness and abundance were within the values of the previous surveys with comparable sediment composition, ranging from 8 to 29 species and 22 to 188 individuals per $0.1m^2$. The previous surveys also had species richness and individual abundance below the respective UKOOA values for the SNS, apart from BSL SNS 2020a which was slightly above the UKOOA 50^{th} percentile for individual abundance for gravel. Therefore, the macrofaunal assemblages within the OWF can be considered to reflect the ambient background conditions for this region of the SNS.

Table 23 Univariate Faunal Parameters (0.1m²)

Sample	Distance to Nearest Well (km)	Depth (m)	Number of Species (S)	Number of Individuals (N)	Richness (Margalef)	Evenness (Pielou's Evenness)	Simpsons Diversity (1-Lambda')	Shannon-Wiener Diversity
OWF_01_F1			5	12	1.61	0.767	0.667	1.78
OWF_02_F1	No MF sample acquired (<40% retention)							
OWF_03_F1			2	3	0.91	0.918	0.667	0.92
OWF_04_F1			63	279	11.01	0.811	0.940	4.85
OWF_05_F1			11	138	2.03	0.266	0.231	0.92
OWF_06_F1			15	39	3.82	0.901	0.912	3.52
OWF_07_F1			12	22	3.56	0.935	0.926	3.35
OWF_08_F1			4	10	1.30	0.880	0.733	1.76
OWF_09_F1			14	41	3.50	0.835	0.867	3.18
OWF_10_F1			11	24	3.15	0.839	0.851	2.90
OWF_11_F1			7	10	2.61	0.943	0.911	2.65
OWF_12_F1			6	26	1.53	0.781	0.732	2.02
OWF_13_F1			10	185	1.72	0.165	0.126	0.55
OWF_14_F1			9	14	3.03	0.914	0.901	2.90
OWF_15_F1			10	30	2.65	0.850	0.841	2.82
OWF_16_F1	No MF sample acquired (<40% retention)							
OWF_17_F1			7	32	1.73	0.842	0.782	2.36
OWF_18_F1			5	17	1.41	0.924	0.801	2.15
OWF_19_F1			16	260	2.70	0.287	0.288	1.15
OWF_20_F1			8	40	1.90	0.654	0.601	1.96
OWF_21_F1			6	13	1.95	0.787	0.718	2.04
OWF_22_F1			12	25	3.42	0.895	0.900	3.21
OWF_23_F1			12	149	2.20	0.409	0.507	1.47
OWF_24_F1			15	30	4.12	0.880	0.897	3.44
OWF_25_F1			5	47	1.04	0.299	0.203	0.69
OWF_26_F1			13	25	3.73	0.844	0.860	3.12
OWF_27_F1			11	20	3.34	0.908	0.905	3.14
OWF_28_F1	No MF sample acquired (<40% retention)							
OWF_29_F1			46	185	8.62	0.796	0.910	4.40
OWF_30_F1			11	41	2.69	0.732	0.767	2.53
OWF_31_F1			22	73	4.89	0.731	0.822	3.26
OWF_32_F1			26	82	5.67	0.858	0.918	4.03
OWF_33_F1			30	126	6.00	0.822	0.920	4.03
OWF_34_F1			8	29	2.08	0.832	0.798	2.50
OWF_35_F1	No MF sample acquired (<40% retention)							
OWF_36_F1			26	86	5.61	0.829	0.912	3.90
OWF_37_F1			14	54	3.26	0.833	0.874	3.17
OWF_38_F1	No MF sample acquired (<40% retention)							
OWF_39_F1			36	93	7.72	0.891	0.950	4.61

Sample	Distance to Nearest Well (km)	Depth (m)	Number of Species (S)	Number of Individuals (N)	Richness (Margalef)	Evenness (Pielou's Evenness)	Simpsons Diversity (1-Lambda')	Shannon-Wiener Diversity
OWF_40_F1			4	13	1.17	0.676	0.526	1.35
OWF_41_F1			33	55	7.99	0.939	0.970	4.74
OWF_42_F1			9	23	2.55	0.785	0.763	2.49
OWF_43_F1			48	147	9.42	0.806	0.919	4.50
OWF_44_F1			8	30	2.06	0.729	0.694	2.19
OWF_45_F1			25	71	5.63	0.834	0.913	3.87
OWF_46_F1			21	33	5.72	0.939	0.958	4.12
OWF_47_F1			16	104	3.23	0.453	0.485	1.81
OWF_48_F1			9	26	2.46	0.771	0.760	2.45
OWF_49_F1			14	23	4.15	0.928	0.937	3.53
OWF_50_F1	No MF sample acquired (<40% retention)							
OWF_51_F1			11	30	2.94	0.858	0.864	2.97
OWF_52_F1			16	31	4.37	0.883	0.903	3.53
OWF_53_F1			7	33	1.72	0.760	0.737	2.13
OWF_54_F1			7	22	1.94	0.607	0.541	1.71
OWF_55_F1			8	11	2.92	0.948	0.927	2.85
OWF_56_F1			3	6	1.12	0.921	0.733	1.460
OWF_57_F1			31	62	7.27	0.916	0.960	4.54
OWF_58_F1			13	48	3.10	0.609	0.608	2.25
OWF_59_F1	No MF sample acquired (<40% retention)							
OWF_60_F1			8	15	2.58	0.869	0.838	2.61
OWF_61_F1	No MF samples acquired (<40% retention)							
OWF_62_F1								
OWF_63_F1			6	7	2.57	0.976	0.952	2.52
OWF_64_F1			16	59	3.68	0.693	0.739	2.77
OWF_65_F1			10	23	2.87	0.875	0.870	2.91
OWF_66_F1			6	10	2.17	0.898	0.844	2.32
OWF_67_F1			8	23	2.23	0.732	0.723	2.20
OWF_68_F1			9	29	2.38	0.818	0.820	2.59
OWF_69_F1			7	41	1.62	0.770	0.738	2.16
OWF_70_F1			14	49	3.34	0.773	0.828	2.94
OWF_71_F1			9	93	1.76	0.619	0.633	1.96
OWF_72_F1			21	40	5.42	0.822	0.883	3.61
OWF_73_F1			7	36	1.67	0.504	0.437	1.42
OWF_74_F1			13	37	3.32	0.701	0.725	2.60
OWF_75_F1			13	25	3.73	0.800	0.810	2.96
OWF_76_F1			56	683	8.43	0.576	0.762	3.35
OWF_77_F1			18	30	5.00	0.957	0.961	3.99
OWF_78_F1			6	8	2.40	0.931	0.893	2.41
OWF_79_F1			23	92	4.87	0.689	0.771	3.12

Sample	Distance to Nearest Well (km)	Depth (m)	Number of Species (S)	Number of Individuals (N)	Richness (Margalef)	Evenness (Pielou's Evenness)	Simpsons Diversity (1-Lambda')	Shannon-Wiener Diversity
OWF_80_F1			8	101	1.52	0.282	0.223	0.85
Mean			**15**	**62**	**3.49**	**0.768**	**0.765**	**2.72**
SD			**12**	**93**	**2.15**	**0.184**	**0.197**	**1.02**
CV (%)			**81.6**	**149.2**	**61.6**	**24.0**	**25.8**	**37.6**
Minimum			**2**	**3**	**0.91**	**0.165**	**0.126**	**0.55**
Maximum			**63**	**683**	**11.01**	**0.976**	**0.970**	**4.85**
Regional Comparisons								
BSL SNS, 2019	**Mean**		**18**	**74**	**4.37**	**0.823**	**0.856**	**3.25**
	SD		**12**	**105**	**1.66**	**0.157**	**0.155**	**0.680**
	CV (%)		**66.3**	**141.5**	**38.0**	**19.0**	**18.1**	**20.9**
BSL SNS, 2020a	**Mean**		**29**	**157**	**5.68**	**0.763**	**0.824**	**3.27**
	SD		**22**	**188**	**3.03**	**0.170**	**0.154**	**0.84**
	CV (%)		**75.2**	**119.7**	**53.3**	**22.2**	**18.7**	**25.7**
BSL SNS 2020b	**Mean**		**8**	**22**	**2.37**	**0.817**	**0.768**	**2.26**
	SD		**4**	**16**	**0.88**	**0.128**	**0.118**	**0.66**
	CV (%)		**49.5**	**69.9**	**37.3**	**15.7**	**15.4**	**29.3**
Reference levels								
UKOOA (2001) Background Gravel			34	116	-	0.830	0.910	4.20
UKOOA (2001) Background -Sand			65.	451	-	0.760	0.880	4.44
UKOOA (2001) SNS Mean			37	334	-	0.690	0.810	3.45

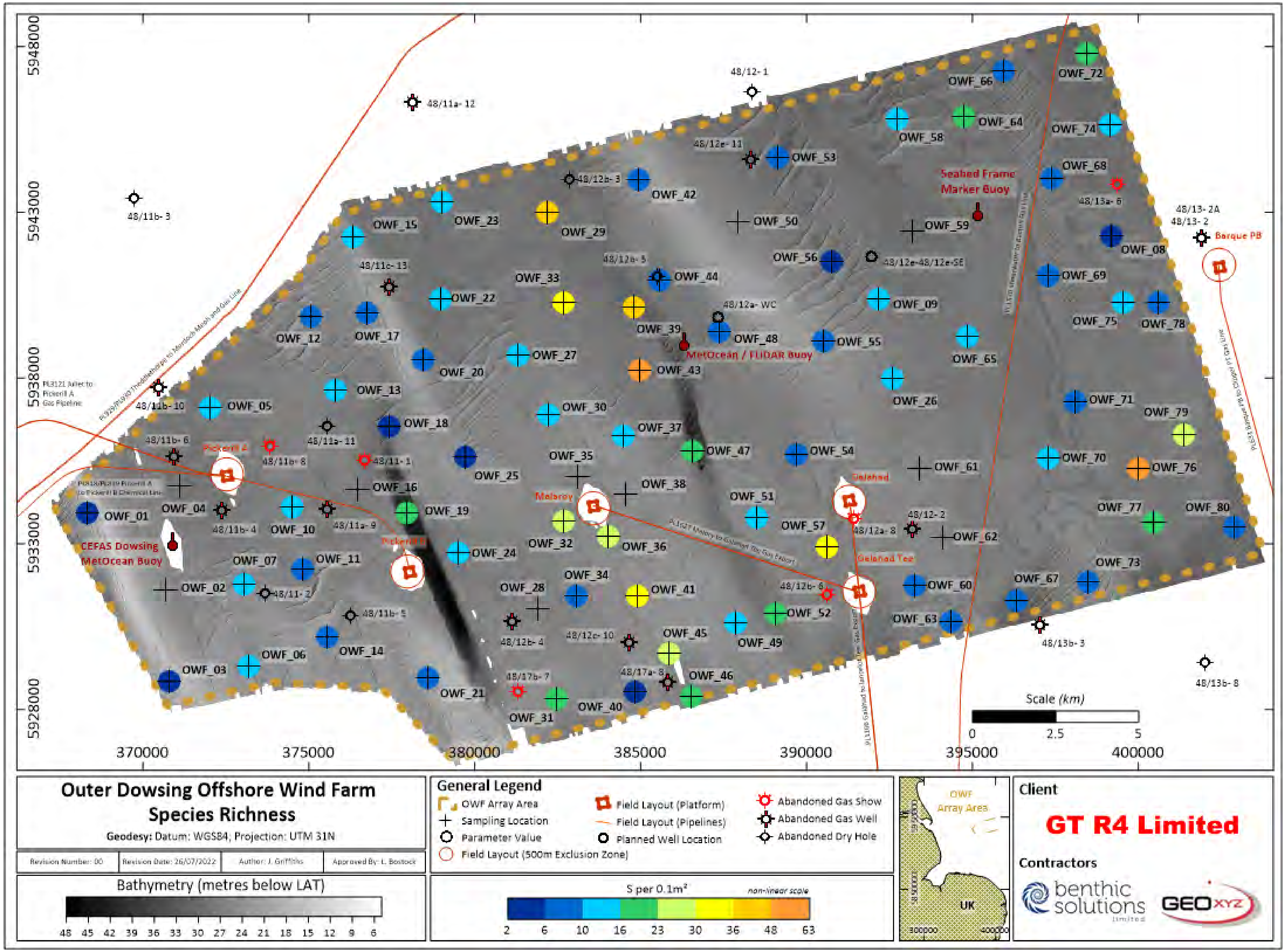


Figure 23 Macrofauna Species Richness (0.1m²)

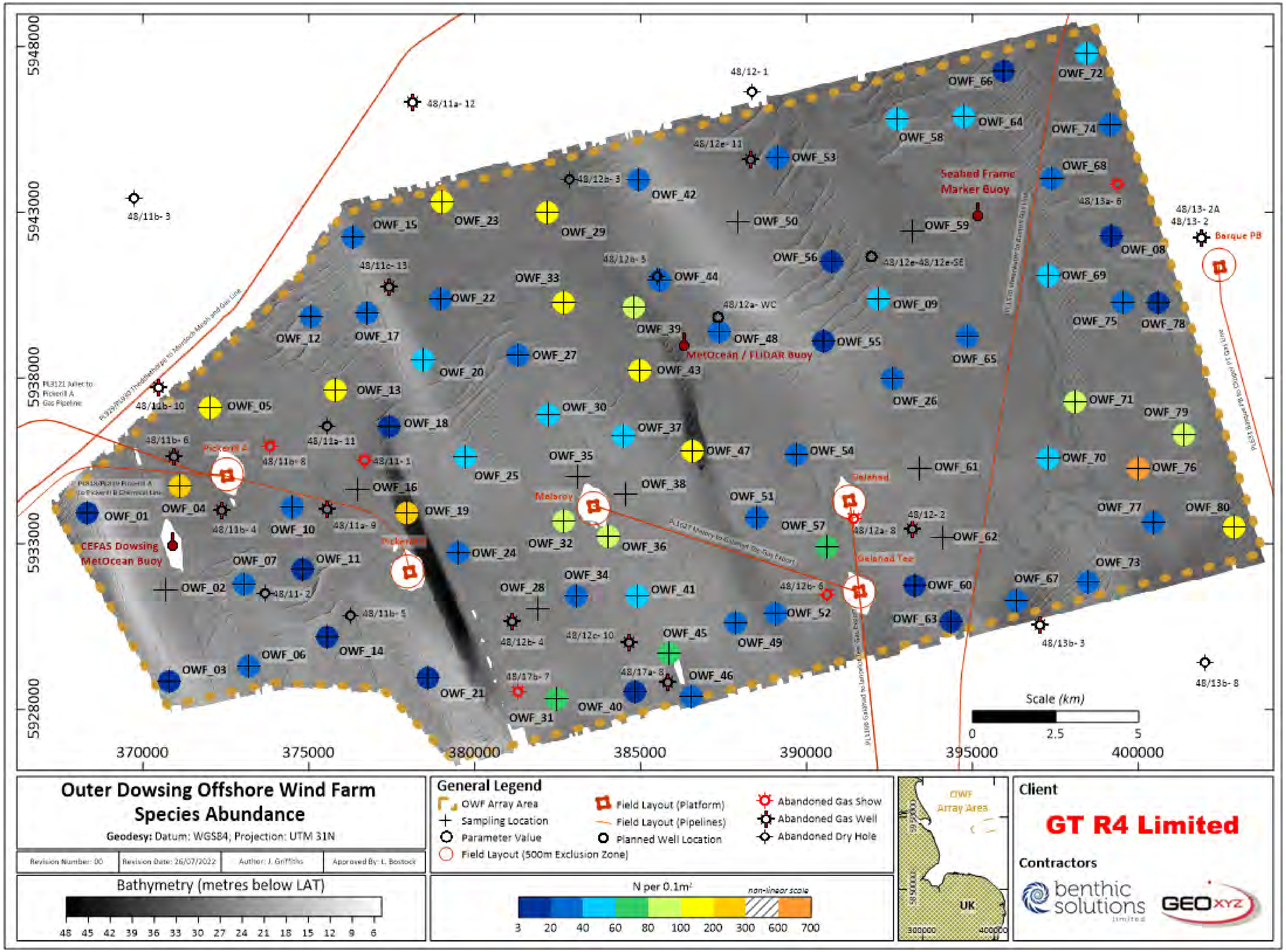


Figure 24 Macrofauna Faunal Abundance (0.1m²)

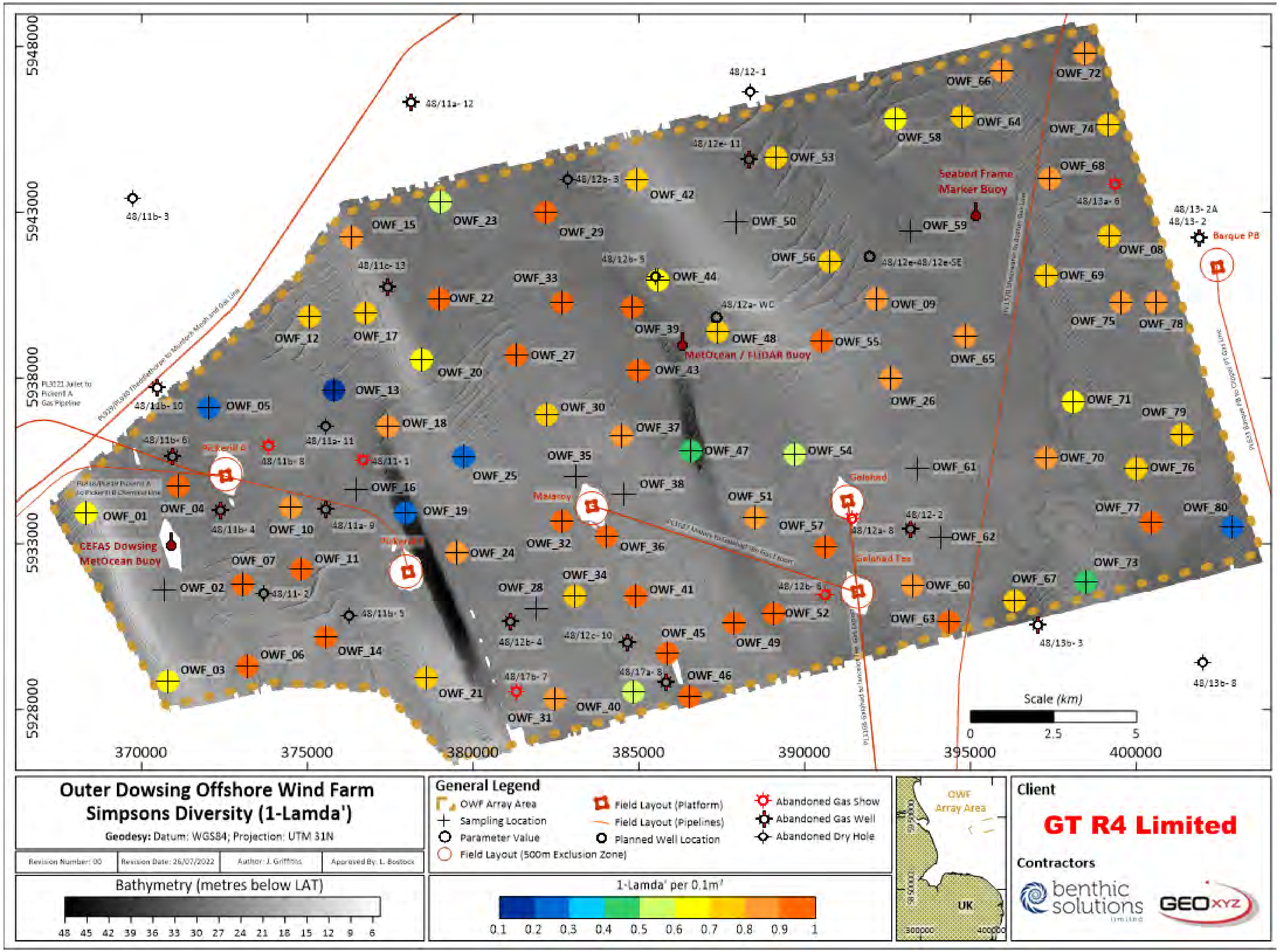


Figure 25 Macrofauna Simpsons Diversity (1-Lambda') per 0.1m²

b Multivariate Analysis

To provide a more thorough examination of the macrofaunal community, multivariate analysis was performed upon the replicate and station data using Plymouth Routines in Multivariate Ecological Research software (PRIMER 7.0.17; Clarke, K.R. *et al.*, 2014) to illustrate data trends. Unlike univariate or derived diversity indices, multivariate analyses preserve the identity of the different species by assigning a similarity or dissimilarity between the samples based on differences in the abundances of constituent species. All data were squared-root transformed prior to analysis to down-weight the influence of any overriding species dominance between sample similarities/dissimilarities.

Hierarchical Agglomerative Clustering – Group Average Method

A similarity dendrogram was created using hierarchical agglomerative clustering (CLUSTER) and is presented for all stations in Figure 26. SIMPROF analysis highlighted the presence of seven significantly different (p<0.05) clusters which were differentiated by black branches and the different structural groups are interpreted below in Table 24. The dendrogram revealed little intra-cluster variability as the stations differentiated at a similar similarity level within each cluster group, indicating that the clusters had a high degree of similar macrofaunal assemblages. Overlaying the MESH sediment classification across the cluster groupings indicated that stations within cluster *'a'* were predominantly comprised of finer sand dominated sediments when compared to stations within clusters *'c'* and *'d'* which were comprised of coarser sediments (Figure 27). Cluster *'g'* was predominately comprised of mixed sediment stations. Stations within clusters *'b'*, *'e'* and *'f'* had similar MESH sediment classifications, which potentially indicates the macrofaunal clusters differentiated based on variability in macrofaunal assemblages rather than the underlying sediment composition (Figure 27). Similarly, station OWF_08 (cluster *'e'*) had a similar habitat classification to the other stations, so potentially separated from the other stations and clusters due to a different macrofaunal assemblage.

Table 24 Summary of SIMPROF Station Groupings

SIMPROF Group	Similarity (%)	Stations	Interpretation
'a'	32.59	01,09,10,11,12 15,17,20,22,25, 26,40,42,53,54, 56,60,63,64,65, 66,67,68,69,70, 71,73,80	The first cluster of stations were primarily comprised of stations with fine sandy sediments with several stations (10, 26, 70, 65,67, 09 and 12) conforming to a coarser sediment habitat classification. The stations within the cluster had relatively low abundances of species and individuals when compared to the other clusters with *Ophelia borealis, Bathyporeia elegans, Nephtys cirrose and Scoloplos armiger* accounting for 93% of the total number of individuals. This cluster could be considered to represent the finer sediment species poor macrofaunal assemblages.
'b'	32.09	03,14,78	The second cluster contained three stations that had relatively low abundances of species and individuals compared to other stations. These stations were dominated by *Ophelia borealis* and *Glycera oxycephala* which together accounted for 100% of the total number of individuals. This cluster can be considered to represent the variable coarse sediment macrofaunal assemblages across the OWF survey area.
'c'	26.71	05,06,07,13,18 19,23,30,44,47, 48,55,58	The third cluster of stations had a relatively low species diversity but a relatively high individual abundance. These stations had the highest abundance of *Goodallia triangularis* and *Ophelia borealis*, accounting for 80% of the total number of individuals. This cluster can be considered to represent the variable coarse sediment macrofaunal assemblages across the OWF survey area.
'd'	21.92	21,24,27,31,32, 34,36,37,41,46, 49,51,52,57,72, 74,75,77	The sixth cluster contained stations primarily comprised of coarse sediments which were characterised by intermediate species and individual abundances, with *Ophelia borealis*, Nematoda and Nemertea accounting for 65% of the total number of individuals. This cluster can be considered to represent the variable coarse sediment macrofaunal assemblages across the OWF survey area.
'e'	*	08	The fifth cluster was comprised of a single station, OWF_08, which had a relatively low species and individual abundance. The species poor station was dominated by an annelid assemblage comprised of *Nephtys cirrose, Pisione remota* and *Tharyx killariensis*. This cluster could be considered to represent the finer sediment species poor macrofaunal assemblages across the OWF survey area.
'f'	*	45	This cluster consisted exclusively of station OWF_45 and had an intermediate species abundance and intermediate individual abundance. The most abundant species at this station were the polychaete, *Sabellaria spinulosa,* amphipod, *Urothoe elegans,* and the horseshoe worm, *Phoronis*. This cluster can be considered to represent the variable coarse sediment macrofaunal assemblages across the OWF survey area.
'g'	27.6	04,29,33,39,43, 76,79	These stations had a high species abundance and number of individuals resulting in a highly diverse community being present with high a Shannon-Wiener diversity index and Margalef's index values recorded. These stations were dominated by *Sabellaria spinulosa* and *Urothoe elegans* which represented 46% of the total number of individuals. This cluster can be considered to represent the variable coarse and mixed sediment macrofaunal assemblages across the OWF survey area.
**Less than two samples in group, unable to perform SIMPER analysis*			

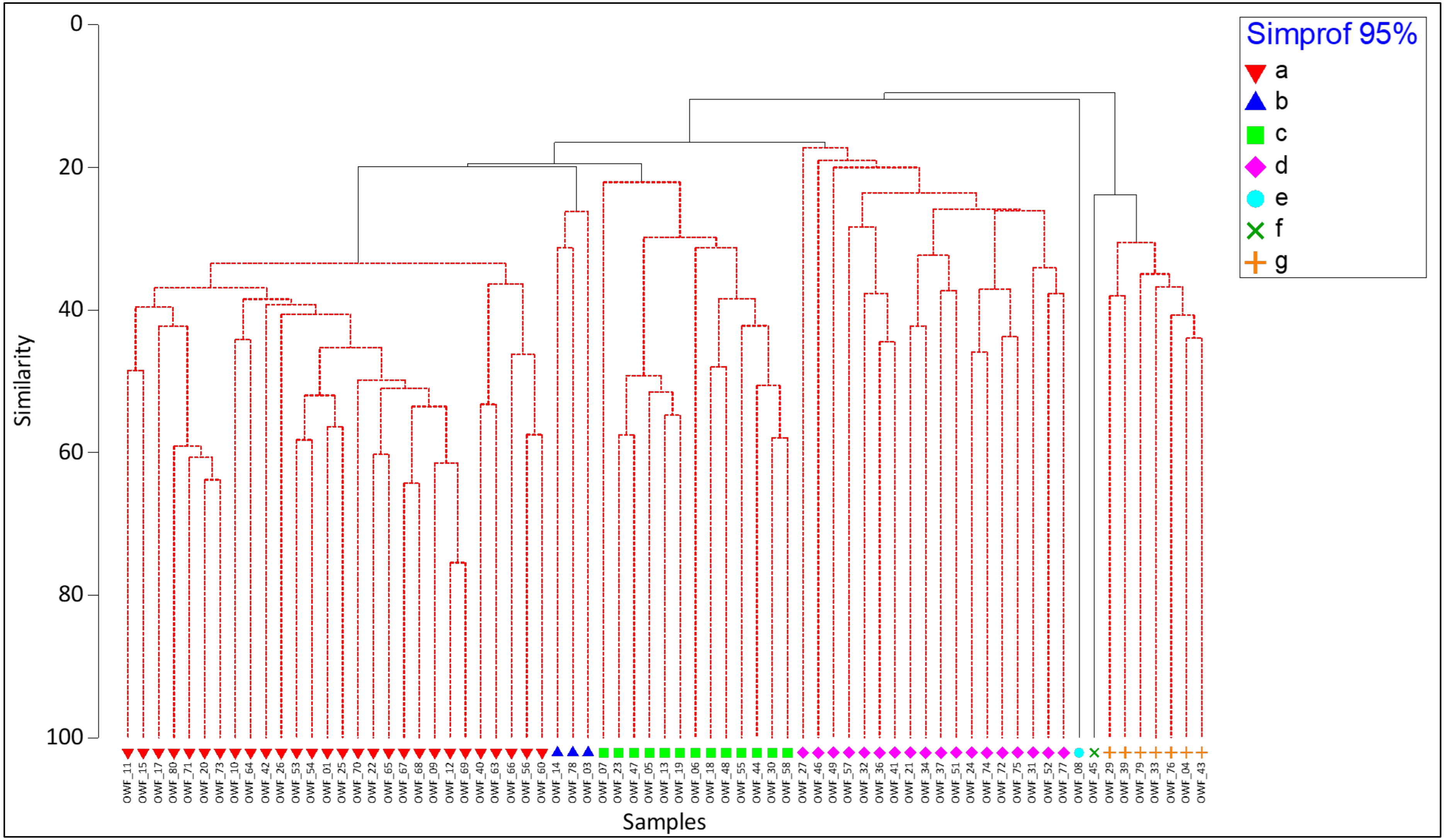


Figure 26 Dendrogram of Macrofaunal Stations (0.1m²)

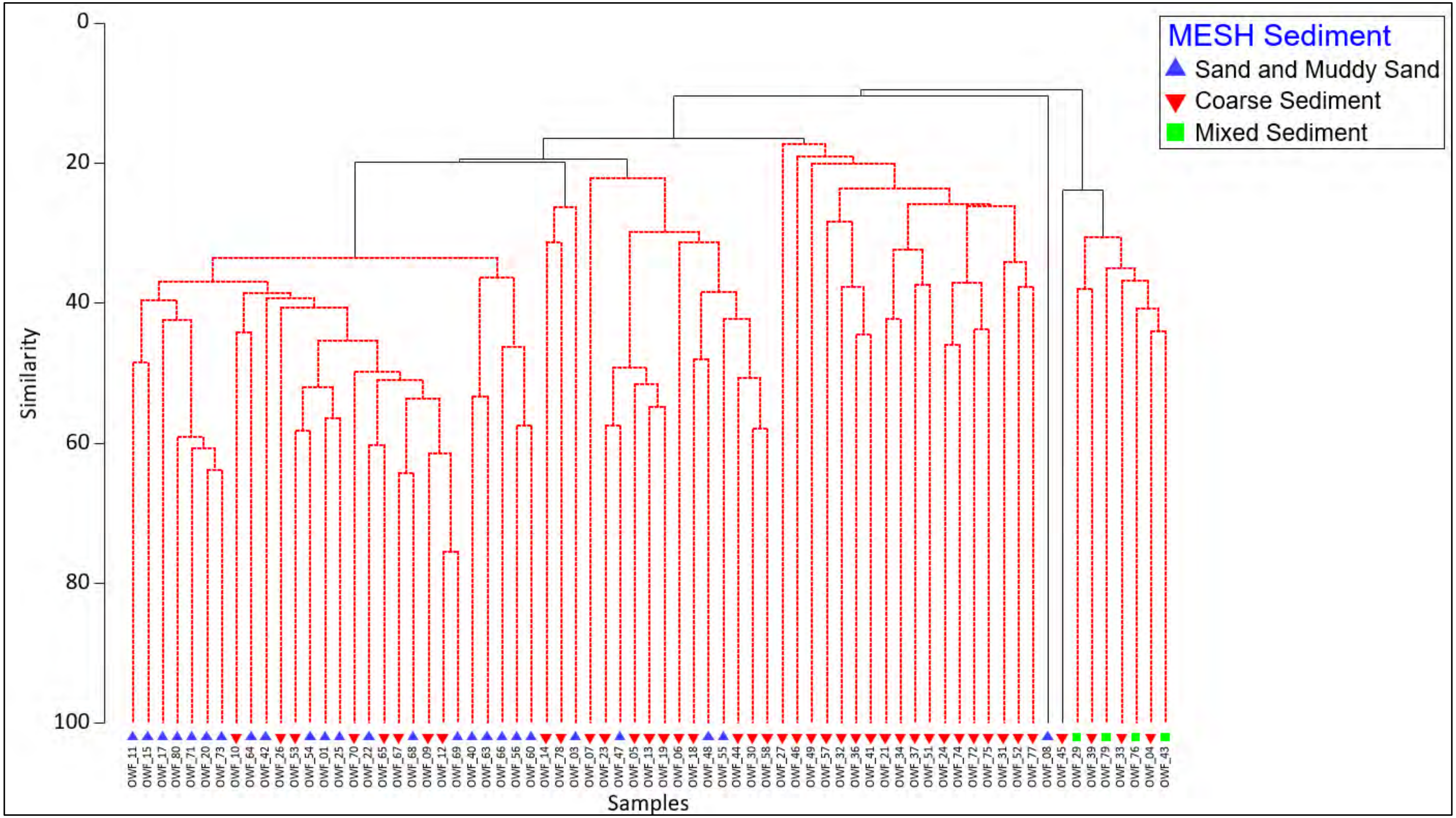


Figure 27 Dendrogram of MESH Sediment Macrofaunal Stations (0.1m²)

Non-metric Multi-dimensional Scaling (nMDS) Ordination

Similarities in the macrofaunal communities recorded across the OWF survey area are presented in Figure 28 as a 2-dimensional non-metric multi-dimensional scaling (nMDS) ordination. The nMDS plot revealed seven different SIMPROF groupings with a moderate stress value of 0.19 (Figure 28). The plotted stations were fairly consistent to the clusters identified in the dendrogram (Figure 26), with cluster *'a'* grouping more tightly together, representing a higher proportion of sand dominated macrofaunal assemblages. Whereas the other clusters were more loosely grouped potentially due to the variability in the coarse and mixed sediment fractions resulting in variable macrofaunal communities.

The nMDS plot, overlain with the MESH sediment classifications, revealed clusters *'g'*, *'d'* and *'c'* macrofaunal assemblages were more likely to be influenced by inter-specific differences in sediment composition. Whereas clusters *'a'*, *'b'*, *'e'* and *'f'* had overlaps in sediment compositions and hence were more likely to be differentiated based on macrofaunal assemblages. The geographical distribution of multivariate clusters is provided in Figure 30 and further corroborates the spatial variability in the macrofaunal communities which were not solely attributed to sediment composition or by extension the geophysical sediment delineations. For example, stations OWF_01 and OWF_03 were sampled on the crest of a sandbank with similar sediments, but different macrofaunal communities and stations OWF_10, sampled in an area of 'GRAVEL', and OWF_71, within an area of 'Sand', had similar macrofaunal communities. The macrofaunal communities present within each cluster grouping will be further explored in the sections discussed below.

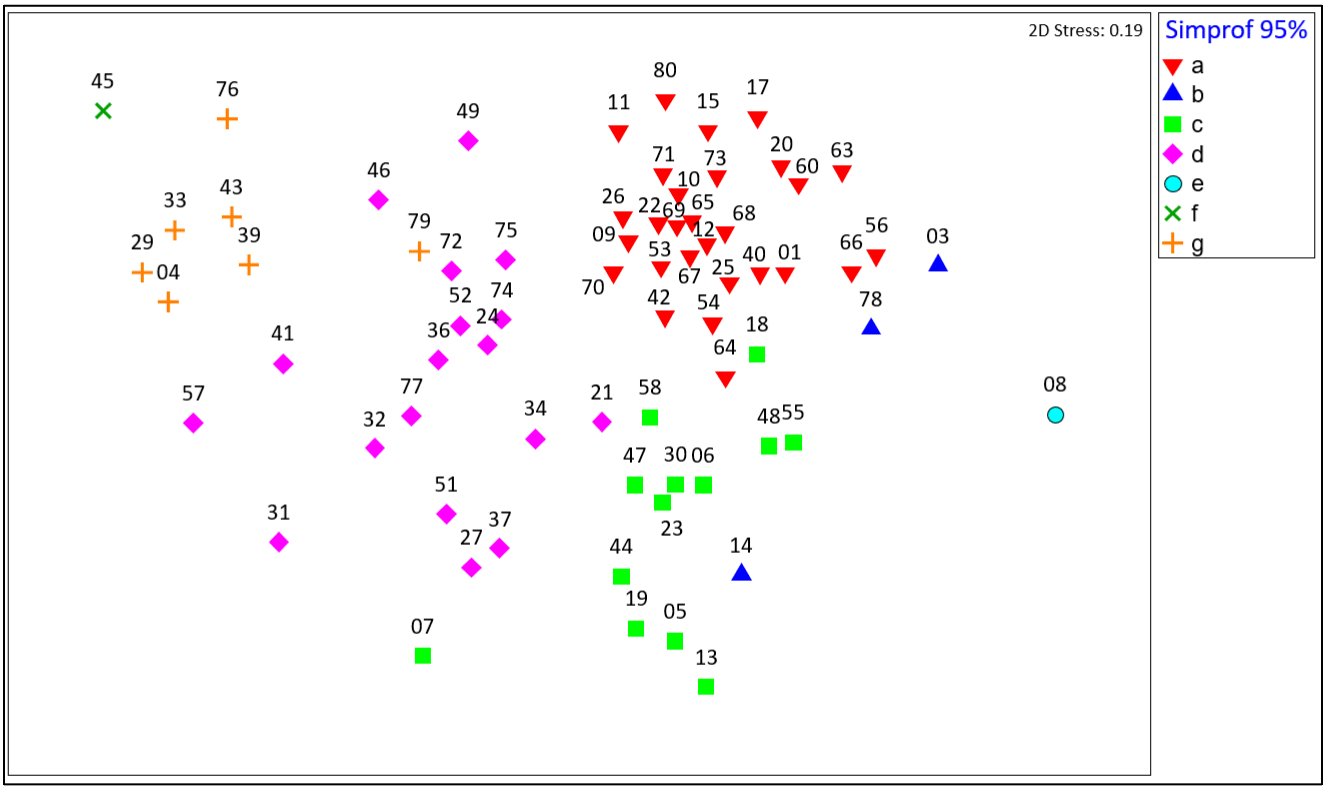


Figure 28 nMDS Ordination Plot of Macrofaunal Stations (0.1m²)

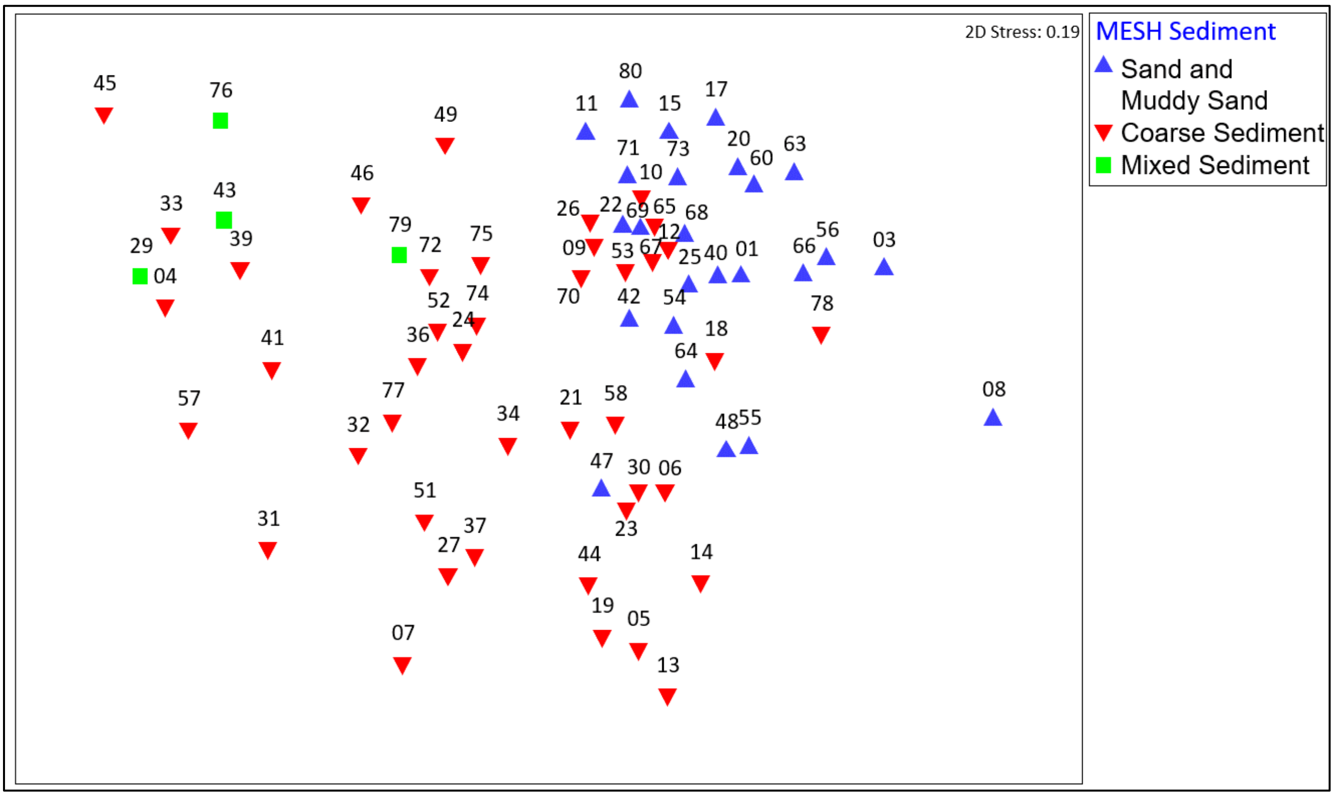


Figure 29 nMDS Ordination Plot of MESH Sediment Macrofaunal Stations (0.1m²)

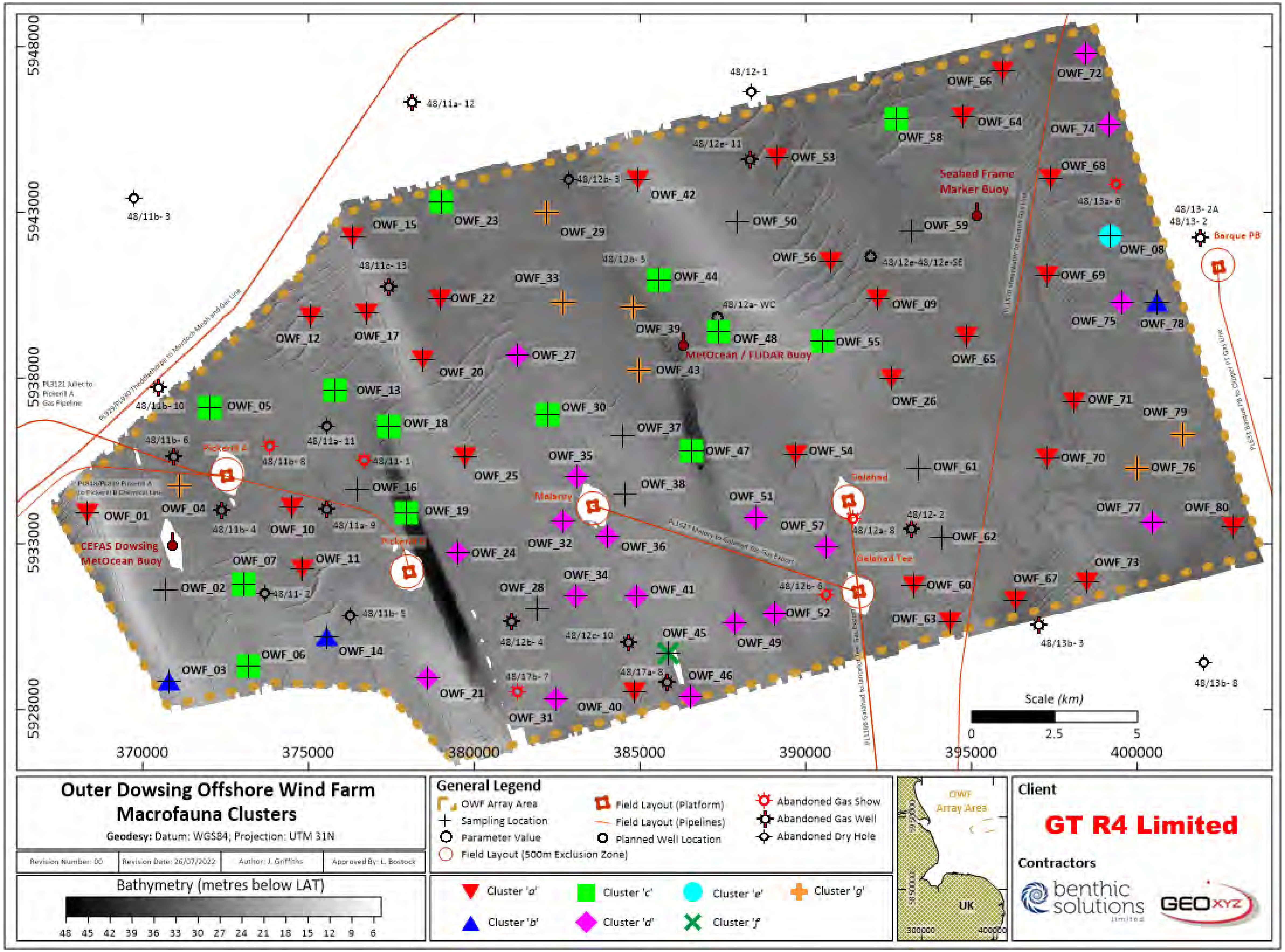


Figure 30 Macrofauna SIMPROF Groupings

Correlation with Environmental Variables

To assess whether the observed differences in community composition were a result of any relationships between the biological community and environmental parameters, such as sediment composition or the concentrations of metals or hydrocarbons, a series of RELATE tests (correlation tests) were performed.

A RELATE test between the macrofaunal and PSA phi fractions and PSA proportions (i.e. sands, fines and gravel) similarity matrices indicated a significant relationship with sample statistics of $\rho=0.345$ $p<0.001$ and $\rho=0.391$ $p<0.001$, respectively. To visualise this relationship a PCA was carried out on the PSA phi data overlain with clusters identified from the macrofauna dataset (Figure 31). The PCA plot highlighted that cluster *'a'* was primarily influenced by the phi fractions 2 and 3, whereas the other six clusters were more influenced by the phi fractions 1 to -3. All the clusters, apart from *'a'* were ordinated on the PCA plot across several eigenvectors indicating greater variability in the sediment compositions at these stations.

The PCA plot further indicates that the influence of the PSA data on the macrofaunal dataset was not the ubiquitous environmental driver of the dissimilarity between all the macrofaunal clusters. For example, coarser sediment stations, OWF_10, OWF_26, OWF_53, OWF_70, OWF_65, OWF_67 and OWF_09, influenced by phi fractions -1 to -3 were grouped within the primarily sand dominated macrofaunal cluster *'a'*, indicating that the dissimilarity in macrofauna within this cluster was more likely to be influencing the differentiation from the other clusters than sediment composition alone.

Similarly, macrofaunal cluster *'b'* had variable phi fractions, with station OWF_03 more influenced by phi fractions 2 and 3 while OWF_78 and OWF_14 were more influenced by phi fractions 1 and -1, indicating that a similarity between macrofauna was driving the clustering of these stations despite the dissimilarity in PSA. Furthermore, cluster *'e'*, station OWF_08, and cluster *'f'*, station OWF_45, had similar PSA phi fractions as the other macrofauna clusters, so the dissimilarity was likely to be driven by differences in macrofaunal community composition.

Additionally, station OWF_72 within the macrofaunal cluster *'g'* had a similar phi fraction distribution to the other stations within the same cluster, but had a closer affinity to macrofaunal cluster *'d'*, indicating subtle macrofaunal differences were driving the pattern observed. However, the overall spatial distribution of clusters of *'g'*, *'d'* and *'c'* across the PCA plot, indicates these clusters were more likely to be influenced by sediment composition as they were all influenced by the coarser phi fractions (phi 1 to -3).

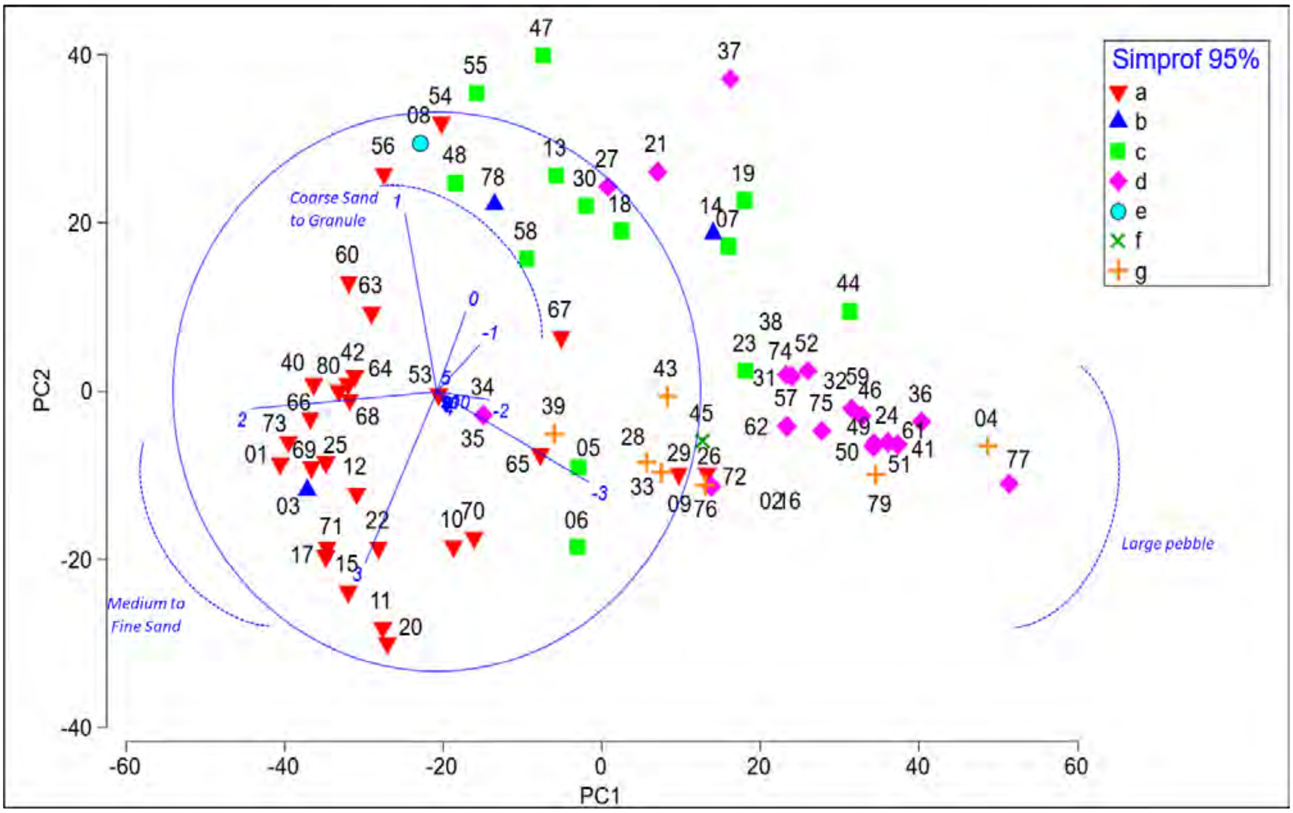


Figure 31 Principal Component Analysis of Phi PSA with Macrofaunal Clusters

Further RELATE tests were carried out between the macrofaunal dataset and separate subsets of PAH, TOC, and trace metal concentrations to further investigate any potential relationships between the benthic macrofauna and physico-chemical characteristics. These found a significant relationship between the macrofauna community data and trace metals (ϱ=0.179 p<0.02), PAHs (ϱ=0.300 p<0.005) and TOC (ϱ=0.428 p<0.001). These correlations could indicate the chemical parameters were influencing the macrofaunal community variation observed within the survey area. However, the fact that PAHs, TOC and metals results showed only minor variation across the OWF survey area, suggests that these chemical parameters are unlikely to be influencing the macrofaunal community differentiation observed. Therefore, it is unlikely that any point source contamination has altered the macrofaunal community present within the OWF survey area. For example, station OWF_19, sampled within a canyon feature, with a hypothesised increased sediment deposition and highest PAH and trace metal concentrations, had a similar macrofauna community to the other stations with cluster *'c'*.

Inter-cluster Variation in Community Composition

To investigate the differing macrofaunal communities described by the identified multivariate clusters, the range in primary and derived univariate diversity indices for stations grouped within each cluster were calculated and are summarised in Table 25.

Stations within cluster *'g'* had some of the highest and the greatest range for numbers of species and individuals across the OWF survey area (23 to 63 species and 92 to 683 individuals), while also representing stations with the highest Margalef's index (max 11.01)and Shannon-Wiener Diversity index (max 4.85). In contrast, cluster *'b'* had the lowest range of number of species and individuals (2 to 9 species and 3 to 14 individuals) but had intermediate richness and diversities. Cluster *'c'* had the widest range of Pielou's Evenness, Simpsons Diversity index and Shannon-Wiener Diversity index but had a relatively low number of species and an intermediate number of individuals. Although each cluster had subtle differences between their respective univariate parameters, overlaps between the clusters was evident and indicates that more in depth review of the macrofaunal dataset is required to adequately describe the differentiation between the macrofaunal clusters.

Table 25 Overview of Univariate Parameters per SIMPROF Cluster

SIMPROF Cluster	Number of species (S)		Number of individuals (N)		Richness (Margalef)		Evenness (Pielou's Evenness)		Simpsons Diversity (1-Lambda')		Shannon Wiener Diversity	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
a	3	16	6	101	1.03	3.72	0.282	0.976	0.203	0.952	0.69	3.21
b	2	9	3	14	0.91	3.03	0.914	0.934	0.667	0.901	0.92	2.90
c	5	16	11	260	1.41	3.82	0.164	0.948	0.125	0.927	0.55	3.52
d	6	33	13	86	1.94	7.98	0.701	0.956	0.717	0.970	2.03	4.74
*e**	-	4	-	10	-	1.30	-	0.880	-	0.733	-	1.76
*f**		25		71		5.63		0.834		0.913		3.87
g	23	63	92	683	4.86	11.01	0.576	0.891	0.761	0.949	3.12	4.85

**Less than two samples in group*

Differences in the macrofaunal communities at a phyla level were explored by plotting the average percentage contribution of major phyla to the overall number of individuals and number of species within each cluster (Figure 32 and Figure 33). The results showed that a majority of clusters were dominated by annelids, which is expected for habitats composed of sand with variable gravel and mud contents. There was a notable difference in the abundances of molluscs, particularly for cluster *'c'* where they accounted for a large proportion of the overall species abundance and clusters *'b'* and *'e'* where molluscs were completely absent. Additionally, echinoderms were completely absent in clusters *'b'*, *'c'*, *'e'* and *'f'*, while solitary epifauna were dominant in clusters *'f'* and *'g'* due to the presence of *Sabellaria spinulosa*. A maximum of eight solitary epifauna taxa were recorded in cluster *'g'*, which was a major contributor to the community due to the 450 *S. spinulosa* individuals present. Discounting solitary epifauna, molluscs and echinoderms appeared to be the least abundant of all phyla, with the exception of cluster *'c'* where molluscs were more abundant than the annelids.

In terms of the contribution of phyla to the numbers of species, the clusters were fairly similar, suggesting that the differing abundances of phyla were more important for the separation of clusters (Figure 33). All clusters were characterised by similar compositions of phyla, with Annelida accounting for the greatest proportion of the overall species richness. Crustacea and Mollusca also represented a large portion of overall species richness and these groups dominated Echinodermata, which was unsurprising given the low abundances of Echinodermata sampled throughout the survey area. The contribution of solitary epifauna to the overall species richness for clusters *'f'* and *'g'* and Mollusca for cluster *'c'* were less dominant than the contributions to the total species abundance, which was attributed to high abundances of the polychaete, *Sabellaria spinulosa,* and the bivalve, *Goodallia triangularis*.

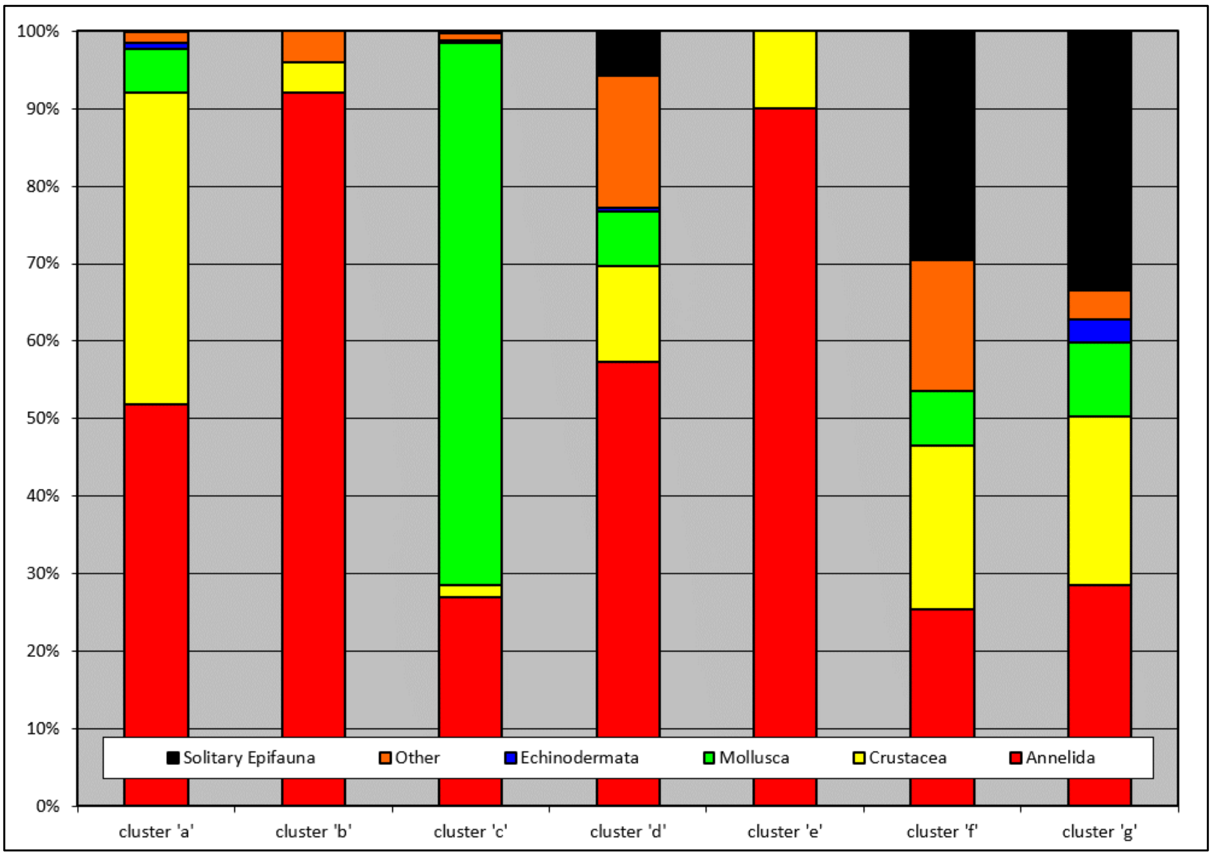


Figure 32 Average Contribution of Each Phyla to Total Faunal Abundance for Each Cluster

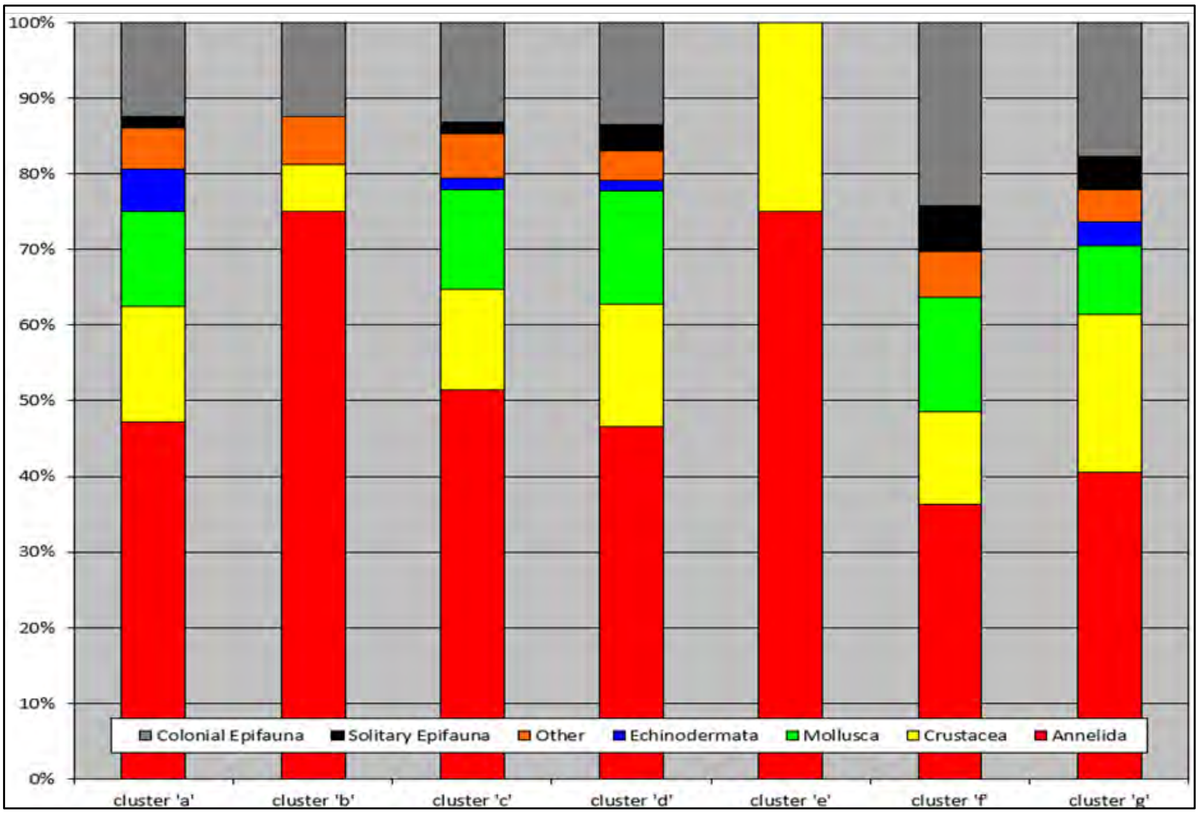


Figure 33 Average Contribution of Each Phyla to Total Number of Species for Each Cluster

Table 26 provides further information on the ecological parameters driving the separation of macrofaunal clusters across the OWF survey area. The contribution of different feeding groups was calculated using the Infaunal Trophic Index, developed by Codling and Ashley (1992). This revealed the dominance of suspension feeders (ITI 1) and surface deposit feeders (ITI 3) across the OWF survey area (Figure 34), with the exception of cluster *'b'* where sub-surface deposit feeders (ITI 4) were the most dominant feeding guild and ITI 1 feeders were the least prominent. All clusters had a representation of all four trophic feeding guilds apart from cluster *'e'*, station OWF_08, which had the highest proportion of surface detritus feeders (ITI 2) feeders due to the absence of competition from ITI 1 feeders such as molluscs. Overall the ITI scores for each cluster reflected a degraded, changed and normal seabed, with the exception of cluster *'g'* which had a predominantly 'normal' seabed due to the wide range of species recorded, which could be attributed to the influence of *Sabellaria spinulosa*. However, high abundances of the bristleworm *Ophelia borealis*, an ITI 3 surface deposit feeder commonly found to inhabit sand dominated sediments, across all clusters reduced the overall ITI score of all the clusters. Once the influence of *O. borealis* was down-weighted the ITI scores increased and represented a greater proportion of 'normal' seabed across the cluster groupings. Therefore, high abundances of sediment influenced and commonly occurring species, in the absence of point source nutrient loading, reveals the potential inadequacy of the ITI method in areas of sandy sediment such as the OWF survey area.

The AZTI Marine Biotic Index (AMBI) is based on the proportion of disturbance-sensitive taxa, which are categorised into five ecological groups, depending on their dominance along a gradient of organic enrichment, and provides insights into the ecological quality status of soft-bottom marine benthic communities (WFD-UKTAG, 2014). The system operates between 0 and 6, with lower numbers corresponding to higher or good ecological status (WFD-UKTAG, 2014). The majority of stations (60.5%) sampled scored between 1 and 2, indicative of "good" ecological status, while 33.8% of stations scored above 2, indicative of "moderate" ecological status and the remaining 5% of stations scored below 5.6%, indicative of "high" ecological status. A "high" ecological status indicates the level of diversity and abundance of invertebrate taxa is within the range normally associated with undisturbed conditions, where species richness and diversity are high and all the disturbance-sensitive taxa associated with undisturbed conditions are present (WFD-UKTAG, 2014). Stations that were deemed to have "good" ecological status have slightly reduced species richness and diversity where most of the sensitive taxa of the type-specific communities are present (WFD-UKTAG, 2014). Whereas a "moderate" ecological status indicates a moderately reduced species richness and diversity where many of the sensitive taxa the type-specific communities are absent (WFD-UKTAG, 2014). The majority of stations with a "high" and "good" AMBI ecological status indicates that the majority of the survey area is considered to be within background levels for species diversity and abundance, with a minority of stations classed as "moderate", indicative of slight pollution disturbance. However, slight pollution disturbance is unsurprising given the proximity of the survey area to historic and current oil and gas extraction activities. The ecological status and hence degree of disturbance from anthropogenic pollution was unlikely to have differentiated the clusters, due to the overlaps in AMBI score between the cluster groups; therefore, it is likely the differentiation can be attributed to differences in community structure not accounted for during the AMBI and ITI analysis.

A comparison of the infaunal versus epifaunal richness within each cluster is provided in Table 26. The OWF survey area macrofaunal community, across all clusters, was dominated by infaunal taxa (all stations had >57.1% infaunal species), with coarse and mixed sediment stations having a greater proportion of epifaunal taxa when compared to the sand dominated stations. Clusters *'a'*, *'b'*, *'c'*, *'d'* and *'e'* had the highest maximum infaunal richness at 100%, but cluster *'d'* also had the lowest at 57.1%. In contrast, clusters *'f'* and *'g'* had the lowest infaunal richness at

69.7% and 84.3%, respectively, indicating infaunal richness was variable within and between cluster groups. The dominance of the infauna was also evidenced by a low infauna/epifauna ratio of 0 for a majority of the clusters.

Table 26 Overview of Faunal Assemblage Parameters per SIMPROF Cluster

SIMPROF Cluster	ITI 1 Contribution (%)		ITI 2 Contribution (%)		ITI 3 Contribution (%)		ITI 4 Contribution (%)		ITI Score		AMBI BC Score		Ecological Status*		Infauna Richness (%)		Epifauna Richness (%)		Infauna / Epifauna Ratio	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
a	0	89.1	0	36.4	0	70.0	3	89.4	5.0	93.1	0	1.91	M	G	62.5	100	0	37.5	0	14.0
b	0	33.3	0	46.1	0	62.5	30.8	66.7	20.8	43.6	1.00	1.68	-	M	75.0	100	0	25.0	0	3.0
c	6.3	94.1	2.0	38.1	1.0	44.4	0	64.6	20.1	96.9	0.78	2.00	M	G	64.7	100	0	35.3	0	12.0
d	5.4	38.4	6.9	41.4	7.7	44.4	8.1	61.5	20.7	57.0	0.80	2.30	M	G	57.1	100	0	42.9	0	8.7
*e***	-	0	-	30	-	70	-	0	-	43.3	-	1.65	-	M	-	100	-	0	-	0
*f***	-	68.6	-	17.14	-	11.43	-	2.8	-	83.8	-	0.80	-	G	-	69.7	-	30.3	-	2.3
g	34.1	60.6	15.9	37.9	17.4	27.8	0.8	14.1	66.3	79.1	0.94	1.50	G	H	72.6	84.3	15.7	27.4	2.6	5.4

** M = Moderate, G = Good and H = High*
*** Clusters e and f contain a single station so only a max value is provided*

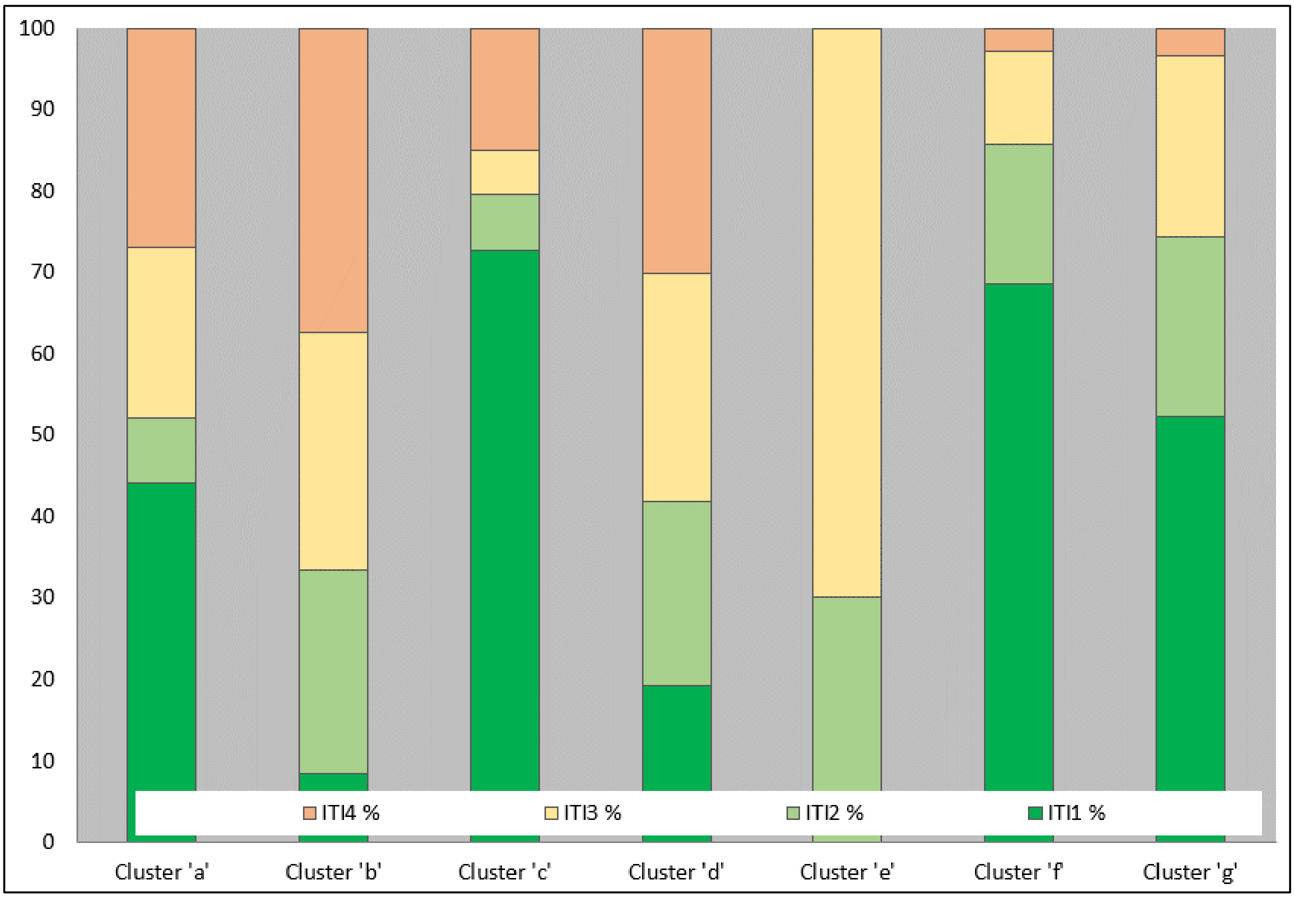


Figure 34 ITI Feeding Groups 1-4 Percentage Contribution per MF Cluster

To determine the species driving the differences between the five SIMPROF clusters identified from the macrofauna data, Table 27 presents the top ten species in each cluster together with their percentage contribution to the overall similarity within the cluster. Whereas Table 28 shows the top five species responsible for differences between clusters.

Table 27 highlights the similarities in the species assemblages represented by clusters *'a'*, *'b'*, *'c'*, *'d'*, *'e'*, *'f'* and *'g'*. All clusters with the exception of cluster *'g'* were characterised by the bristle worm *O. borealis*, with this species being the top characterising species for clusters *'a'*, *'b'* and *'d'* and the second most characterising species for cluster *'c'*. The mollusc, *Goodallia triangularis*, was the top characterising species for cluster *'c'*, this species showed a high average abundance of 56.46 per 0.1m^2 and contributed 54.52% of the population. The absence of *O. borealis* and the presence of seven characterising species that do not occur in any other group differentiated cluster *'g'* from the other six clusters. For example, Cluster *'g'* was characterised by the ross worm *Sabellaria spinulosa* which had the highest abundance of any characterising species over all clusters (64.29 per 0.1m^2), which could potentially be attributed to the mixed sediment within this cluster providing a suitable habitat. Variation is still apparent between the remaining clusters with only one, two or three characterising species being shared between groups including *O. borealis*, *Scoloplos armiger* and *Glycera lapidum*.

Cluster *'d'* showed the least dissimilarity, sharing three of the same top 10 characterising species with other clusters (*O. borealis, Scoloplos armiger* and *Glycera lapidum*). Abundances of the shared species varied for each species between the clusters. Despite being within the top two characterising species for all but one group, the abundance of the annelid *Ophelia borealis* varied among clusters (min 2.67 per 0.1m^2, max 10.38 per 0.1m^2). Interestingly, within cluster *'b' O. borealis* contributed 90.56% of the population, with *Glycera oxycephala* contributing the remaining 9.44%. Within other clusters *O. borealis* only contributed 26.3% to 49.2% of the population. The variation between species abundances and contribution, along with the majority of characterising species differing for each cluster, explains the separation of the five clusters.

Review of the taxa most responsible for differentiating the six clusters (Table 28) included one dominating taxon (*Ophelia borealis*), previously highlighted as characteristic for four out of six clusters, again suggesting that some differentiation was due to variability in the abundance of consistently dominant taxa, which could potentially be attributed to sediment composition as *O. borealis* inhabits clean sands. Table 28 also showed *Sabellaria spinulosa* was the second most responsible taxa for differentiating the six clusters, separating clusters *'f'* and *'g'* from the other clusters.

As previously mentioned, cluster *'g'* separated from the other stations on the dendrogram (Figure 26) and nMDS (Figure 28), indicating variation in the stations macrofauna assemblage. This separation was deemed to be a result of the variable coarse and mixed sediment at these stations. On closer review, the stations forming cluster *'g'* were characterised by the dominance of the ross worm *S. spinulosa and* amphipod *Urothoe elegans*. Therefore, the natural variation in taxa and underlying sediment composition across the OWF survey area are both likely to be influencing the differentiation of the macrofaunal clusters.

Table 27 Top 10 Species Abundances for Clusters ‘a’, ‘b’, ‘c’, ‘d’, ‘e’, ‘f’ and ‘g’

Top 10 Species	Cluster ‘a’			Cluster ‘b’			Cluster ‘c’			Cluster ‘d’			Cluster ‘e’*			Cluster ‘f’*			Cluster ‘g’		
	Species	Av. Abundance	Contribution (%)	Species	Av. Abundance	Contribution (%)	Species	Av. Abundance	Contribution (%)	Species	Av. Abundance	Contribution (%)	Species	Abundance	Contribution (%)	Species	Abundance	Contribution (%)	Species	Av. Abundance	Contribution (%)
1	*Ophelia borealis*	8.46	49.2	*Ophelia borealis*	2.67	90.56	*Goodallia triangularis*	56.46	54.52	*Ophelia borealis*	5.83	36.84	*Nephtys cirrosa*	5	50	*Sabellaria spinulosa*	13	18.30	*Sabellaria spinulosa*	64.29	25.99
2	*Bathyporeia elegans*	10.5	24.62	*Glycera oxycephala*	0.67	9.44	*Ophelia borealis*	10.38	26.3	Nematoda	4.11	17.88	*Pisione remota*	2	20	Phoronis	11	15.49	*Urothoe elegans*	19.43	20.78
3	*Nephtys cirrosa*	1.93	10.63	-	-	-	*Aonides paucibranchiata*	1.31	4.79	Nemertea	2.44	10.37	*Tharyx killariensis*	2	20	*Urothoe elegans*	10	14.08	*Scoloplos armiger*	6.43	5.54
4	*Scoloplos armiger*	2.64	8.86	-	-	-	*Glycera lapidum*	1.54	3.09	*Scoloplos armiger*	1.5	4.65	*Bathyporeia guilliamsoniana*	1	10	*Spirobranchus triqueter*	8	11.26	*Abra alba*	5.57	4.93
5	*Urothoe brevicornis*	0.5	1.01	-	-	-	*Pisione remota*	1.69	2.8	*Mediomastus fragilis*	0.83	3.01				*Golfingia elongata*	3	4.22	*Amphipholis squamata*	5.29	4.1
6	*Spiophanes bombyx*	0.39	1.01	-	-	-	*Nephtys cirrosa*	0.62	2.09	*Polycirrus*	0.78	2.8				*Pholoe baltica*	3	4.22	*Polycirrus*	4.57	3.07
7	-	-	-	-	-	-	*Pseudonotomastus southerni*	0.46	1.36	Eusyllis blomstrandi	2.06	2.62				*Photis longicaudata*	3	4.22	*Kurtiella bidentata*	10.71	3.06
8	-	-	-	-	-	-	*Chaetozone christiei*	0.92	1.17	Aonides paucibranchiata	1.11	2.26				Nephtys longosetosa	2	2.81	Nemertea	3	2.77
9	-	-	-	-	-	-	-	-	-	*Notomastus*	1.22	2.22				*Lanice conchilega*	2	2.81	*Phyllodoce maculata*	6.29	2.71
10	-	-	-	-	-	-	-	-	-	*Glycera lapidum*	0.56	2.01				*Ampharete lindstroemi*	1	1.40	Actiniaria	9.14	2.61

* = Less than two samples within the cluster
Dark blue shading = shared taxa across 4 clusters Light blue shading = sharded taxa across 3 clusters Orange shading = shared taxa across 2 clusters

Table 28 Dissimilarity Percentages (SIMPER) for Macrofauna Dataset

	Cluster a		Cluster b		Cluster c		Cluster d		Cluster e		Cluster f	
Cluster g	**Average dissimilarity 94.37%**		**Average dissimilarity 97.90%**		**Average dissimilarity 96.75%**		**Average dissimilarity 89.22%**		**Average dissimilarity 99.72%**		**Average dissimilarity 77.80%**	
Cluster g	Sabellaria spinulosa	17.61	Sabellaria spinulosa	19.68	Goodallia triangularis	17.02	Sabellaria spinulosa	16.58	Sabellaria spinulosa	19.48	Sabellaria spinulosa	12.17
Cluster g	Urothoe elegans	10.06	Urothoe elegans	11.55	Sabellaria spinulosa	15.21	Urothoe elegans	9.52	Urothoe elegans	11.41	Urothoe elegans	6.02
Cluster g	Bathyporeia elegans	4.59	Scoloplos armiger	3.47	Urothoe elegans	8.55	Pisidia longicornis	3.23	Pisidia longicornis	3.43	Phoronis	4.23
Cluster g	Ophelia borealis	3.94	Pisidia longicornis	3.45	Ophelia borealis	4.11	Ophelia borealis	2.92	Scoloplos armiger	3.43	Pisidia longicornis	2.90
Cluster g	Pisidia longicornis	3.23	Abra alba	2.87	Pisidia longicornis	2.92	Scoloplos armiger	2.55	Nephtys cirrosa	3.09	Spirobranchus triqueter	2.85
Cluster a			**Average dissimilarity 83.26%**		**Average dissimilarity 84.62%**		**Average dissimilarity 84.02%**		**Average dissimilarity 87.77%**		**Average dissimilarity 98.35%**	
Cluster a			Bathyporeia elegans	18.54	Goodallia triangularis	33.02	Bathyporeia elegans	11.16	Ophelia borealis	20.71	Sabellaria spinulosa	13.07
Cluster a			Ophelia borealis	15.91	Ophelia borealis	11.05	Ophelia borealis	9.75	Bathyporeia elegans	17.63	Phoronis	11.09
Cluster a			Scoloplos armiger	6.51	Bathyporeia elegans	9.71	Nematoda	5.37	Nephtys cirrosa	9.91	Urothoe elegans	9.80
Cluster a			Nephtys cirrosa	5.69	Scoloplos armiger	3.14	Scoloplos armiger	4.17	Scoloplos armiger	6.11	Bathyporeia elegans	8.19
Cluster a			Glycera lapidum	3.48	Nephtys cirrosa	2.35	Nemertea	3.24	Tharyx killariensis	5.84	Spirobranchus triqueter	8.06
Cluster b					**Average dissimilarity 87.67%**		**Average dissimilarity 87.73%**		**Average dissimilarity 96.30%**		**Average dissimilarity 100%**	
Cluster b					Goodallia triangularis	39.62	Ophelia borealis	9.94	Nephtys cirrosa	27.17	Sabellaria spinulosa	16.44
Cluster b					Ophelia borealis	12.22	Nematoda	7.59	Ophelia borealis	14.85	Phoronis	13.91
Cluster b					Glycera lapidum	3.62	Nemertea	4.66	Tharyx killariensis	11.61	Urothoe elegans	12.65
Cluster b					Aonides paucibranchiata	2.48	Eusyllis blomstrandi	3.78	Pisione remota	11.61	Spirobranchus triqueter	10.12
Cluster b					Pisione remota	2.38	Glycera lapidum	3.37	Bathyporeia guilliamsoniana	5.80	Golfingia (Golfingia) elongata	3.79
Cluster c							**Average dissimilarity 86.31%**		**Average dissimilarity 92.25%**		**Average dissimilarity 99.20%**	
Cluster c							Goodallia triangularis	30.25	Goodallia triangularis	38.69	Goodallia triangularis	25.16
Cluster c							Ophelia borealis	8.94	Ophelia borealis	15.17	Sabellaria spinulosa	10.06
Cluster c							Nematoda	4.04	Nephtys cirrosa	7.94	Phoronis	8.71
Cluster c							Nemertea	2.37	Tharyx killariensis	3.95	Urothoe elegans	7.87
Cluster c							Pisione remota	2.1	Pisione remota	2.69	Ophelia borealis	7.24
Cluster d									**Average dissimilarity 98.25%**		**Average dissimilarity 93.14%**	
Cluster d									Ophelia borealis	13.02	Sabellaria spinulosa	11.4
Cluster d									Nephtys cirrosa	11.07	Phoronis	9.80
Cluster d									Nematoda	7.24	Urothoe elegans	8.88
Cluster d									Pisione remota	5.28	Spirobranchus triqueter	7.13
Cluster d									Nemertea	4.45	Ophelia borealis	5.32
Cluster e											**Average dissimilarity 100%**	
Cluster e											Sabellaria spinulosa	16.05
Cluster e											Phoronis	13.58
Cluster e											Urothoe elegans	12.35
Cluster e											Spirobranchus triqueter	9.88
Cluster e											Nephtys cirrosa	6.17

c Epifaunal and Other Biological Groups

All macrofaunal replicates obtained within the OWF survey area recorded the presence of colonial epifauna that were not statistically assessed within the infauna data analysis, as they were tabulated on a presence/absence basis. Due to the presence/absence scale to which epifaunal species were identified, for the purpose of this chart and to highlight the epifaunal richness; where epifaunal species were recorded as present this was given the numerical value of "1" to represent the colony. The distribution of epifaunal assemblages across the survey area is represented in Figure 35 and highlights the variation in infaunal and epifaunal richness. Analysis of the infaunal and epifaunal communities indicated that the infauna was dominant, with epifauna making up a very small, but important part of the community. While allowing the data to be presented, the actual abundance of epifaunal species cannot be determined. Infaunal and epifaunal species are listed separately in Appendix I.

Across the stations, 49 taxa were considered to be epifaunal which belonged to the phyla Porifera, Cnidaria, Annelida, Arthropoda, Mollusca, Entoprocta, Bryozoa and Chordata, most of which were Bryozoa. Bryozoa showed the highest number of species and were represented by 22 taxa with *Alcyonidium parasiticum* being the most prevalent recorded at 26% of stations. Cnidaria were represented by 13 taxa with *Sertularia* being the most prevalent at 21% of stations. Annelida was represented by five taxa with the ross worm *S. spinulosa* being the most prevalent appearing at 20% of stations. Arthropoda were represented by four taxa with Cirripedia being the most prevalent appearing at 12.5% of stations. Mollusca was represented by a single taxon, the non-native slipper limpet (*Crepidula fornicata*) which came in the form of five individuals at station OWF_04. Porifera were represented by two taxa including one recording of *Haliclona oculata* at OWF_04 and one recording of an unidentified Porifera at OWF_36. Entoprocta was represented by a single taxon and included two recordings of *Pedicellina* sp. at stations OWF_43 and OWF_47. Chordata were represented by 5 juvenile Ascidiacea individuals recovered from three stations (OWF_23, OWF_43 and OWF_76).

Cluster *'g'* had the highest richness of epifaunal taxa (30 taxa), this is expected due to the high gravel content (23.47% to 75.72%) at all but one station (OWF_48, gravel content 4.26%), the observation of pebbles and/or cobbles at these stations and the presence of *S. spinulosa* which can provide further attachment points. Grab sampling often fails to recover coarse material, especially larger pebbles and cobbles colonised by epifauna; therefore, it is important to not only assess epifauna through physical samples but also to analyse video footage. In this case, occasional patches of pebbles and cobbles were present throughout the survey area within areas previously delineated by the geophysical report as areas of 'Sandy CLAY' and 'Gravelly SAND'.

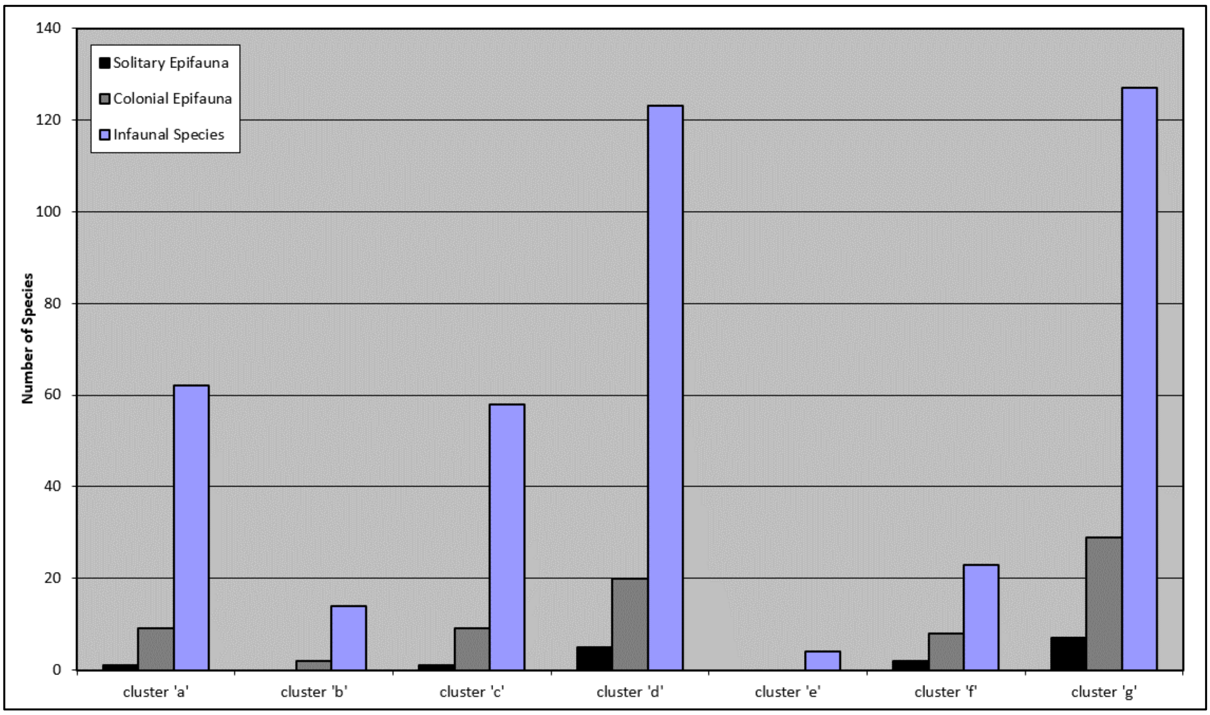


Figure 35 Epifaunal Versus Infaunal Richness

d Biomass

Biomass allows another viewpoint into the community structure of the benthos, providing additional information about changes to potential organic enrichment, pollution and natural variability within a habitat. The biomass (blotted wet weight) of the macrofauna for the OWF survey area is displayed by phylum in Table 29 and by taxa in Appendix I. This includes data for both infauna, epifauna and other biological groups.

The total biomass for the OWF survey area was estimated to be 4,001.21g/m^2, with the majority comprising Mollusca which accounted for 2,186.95g/m^2 (54.66%) of the total biomass. The next major contributor to total biomass was Echinodermata which accounted for 1,044.26g/m^2 (26.10%), however, Echinodermata only accounted for 3.25% of the total number of individuals recorded (Table 29). The high biomass in relation to low abundance could be attributed to the relatively large body sizes of *Asterias rubens* and *Echinocardium cordatum*.

Polychaeta was the next major contributor, accounting for 458.15g/m^2 (11.45%) of total biomass. It is also the most species rich and abundant group, representing 40.91% of the total species and 45.68% of the individuals found in the OWF survey area. Polychaeta were the only group present at all stations in the survey area. Chordata and Cnidaria represented a relatively small proportion of the total biomass, with 151.15g/m^2 (3.78%) and 100.90 g/m^2 (2.52%), respectively. Despite Crustacea contributing to only 1.24% of the total biomass, it represented 20.45% of the macrofaunal species found in the OWF survey area. Similarly, species categorised as ‘other minor phyla’ (Animalia eggs, Porifera, Foraminifera, Nematoda, Nemertea, Platyhelminthes, Phoronida, Bryozoa and Hemichordata) made up 0.25% of the proportional biomass contribution but was relatively species rich (contained 10.39% of the total number of species found). The groups contributing the lowest biomass in the OWF survey area were Arthropoda (0.002g/m^2, 0.08%), Annelida (0.001g/m^2, 0.06%) and Oligochaeta (0.0005g/m^2, 0.02%). The low biomass of Arthropoda, Oligochaeta and Annelida were unsurprising given the subdivisions of these groups (i.e. Polychaeta and Crustacea) so only represent those species that could not be taxonomically ranked any lower.

Table 29 Blotted Wet Weight Biomass (0.0001g) of Major Groups Within the OWF Survey Area

Station	Depth (m)	Distance to Nearest Well (km)	Other minor phyla	Cnidaria	Annelida	Polychaeta	Oligochaeta	Arthropoda	Crustacea	Mollusca	Echinodermata	Chordata	**Total**
OWF_01	11	3.12	-	-	-	0.2759	-	-	0.0027	-	-	-	**0.2786**
OWF_03	10	3.9	-	-	-	0.2430	-	-	-	-	-	-	**0.2430**
OWF_04	22	0.89	0.1328	0.0263	-	5.5308	0.0013	0.0018	2.0415	28.2790	0.0247	-	**36.0382**
OWF_05	23	1.67	0.0007	-	-	0.1710	-	-	-	0.2468	0.0407	-	**0.4592**
OWF_06	19	2.24	-	-	-	0.2108	-	-	0.0047	0.8520	-	-	**1.0675**
OWF_07	19	0.68	0.0025	-	-	1.4947	-	-	-	19.2917	-	-	**20.7889**
OWF_081	21	1.57	0.0001	-	-	0.1573	-	-	0.0074	0.0185	-	-	**0.1833**
OWF_09	23	5.71	0.0037	-	-	0.4216	-	-	0.0285	0.0078	-	-	**0.4616**
OWF_10	21	1.07	-	-	-	0.2016	-	0.0008	0.0117	0.0008	-	-	**0.2149**
OWF_11	20	1.34	0.0025	-	-	0.2471	-	-	0.0038	0.0009	-	-	**0.2543**
OWF_12	20	2.5	-	-	-	0.3608	-	-	0.0177	-	-	-	**0.3785**
OWF_13	21	1.1	-	-	-	0.1011	-	-	0.0453	0.3861	-	-	**0.5325**
OWF_14	18	0.94	0.0001	-	-	0.0580	-	-	-	-	-	-	**0.0581**
OWF_15	18	1.83	-	-	-	0.1548	-	-	0.0367	0.5746	55.5300	-	**56.2961**
OWF_17	17	1.01	-	-	-	0.0909	-	-	0.0565	-	34.9221	-	**35.0695**
OWF_18	21	1.26	-	-	-	0.2569	-	-	0.0006	0.0062	-	-	**0.2637**
OWF_19	40	1.74	-	-	-	0.3838	-	-	0.0038	0.8101	0.0527	-	**1.2504**
OWF_20	18	2.43	-	-	-	0.6714	-	-	0.0668	-	-	-	**0.7382**
OWF_21	12	2.75	0.0001	-	-	0.0650	-	-	-	1.3184	-	-	**1.3835**
OWF_22	23	1.59	-	0.0521	-	0.4024	-	-	0.0175	0.0088	-	-	**0.4808**
OWF_23	23	3.01	0.1045	-	-	0.2902	-	-	0.0030	0.1524	-	-	**0.5501**
OWF_24	23	1.61	0.0051	-	-	0.4112	-	-	0.0232	0.0060	-	-	**0.4455**
OWF_25	18	3.01	-	-	-	0.3236	-	-	0.0017	0.0237	-	-	**0.3490**
OWF_26	21	3.94	-	-	-	0.3771	-	-	0.0012	0.0640	-	-	**0.4423**
OWF_27	19	4.82	0.0001	-	-	0.5933	0.0001	-	0.0013	-	-	-	**0.5948**
OWF_29	24	1.21	0.0641	0.0169	0.0001	1.7650	0.0001	-	0.0472	3.5536	0.0538	-	**5.5008**
OWF_30	20	5.31	-	-	-	0.2674	-	-	-	0.0195	0.0115	-	**0.2984**
OWF_31	19	1.16	0.0065	-	-	0.3349	-	-	-	20.4764	-	-	**20.8178**
OWF_32	20	0.99	0.0198	-	-	0.1870	-	0.0002	0.0111	0.2402	0.0035	-	**0.4618**
OWF_33	23	2.93	0.0056	-	0.0010	0.8225	-	0.0006	0.0910	0.1326	0.0043	-	**1.0576**
OWF_34	20	2.1	0.0167	-	-	0.7175	-	-	0.0021	0.0035	-	-	**0.7398**
OWF_36	19	0.95	0.0017	-	-	0.2606	-	-	0.0334	56.9002	0.0373	-	**57.2332**

Station	Depth (m)	Distance to Nearest Well (km)	Other minor phyla	Cnidaria	Annelida	Polychaeta	Oligochaeta	Arthropoda	Crustacea	Mollusca	Echinodermata	Chordata	**Total**
OWF_37	19	2.37	0.0155	-	-	0.7104	-	-	-	0.0352	-	0.1607	**0.9218**
OWF_39	27	1.15	-	0.3274	-	2.1208	-	0.0005	0.0226	0.0525	0.0493	0.0052	**2.5783**
OWF_40	17	1.49	-	-	-	0.3797	-	-	0.0044	-	-	-	**0.3841**
OWF_41	18	1.44	0.0116	0.0852	-	1.8378	-	0.0001	0.0964	0.3361	0.0041	-	**2.3713**
OWF_42	16	2.07	0.0001	-	-	0.1519	-	-	0.0001	0.0071	-	2.1320	**2.2912**
OWF_43	23	2.79	0.0329	0.0043	-	1.2173	-	0.0022	0.2356	0.5295	0.2121	-	**2.2339**
OWF_44	23	0.13	0.0223	-	-	0.0427	-	-	0.0006	0.0318	-	-	**0.0974**
OWF_45	19	0.85	0.1834	-	0.0021	1.0199	-	-	0.1073	8.6850	-	-	**9.9977**
OWF_46	22	0.82	-	-	0.0027	0.6358	-	-	0.0051	28.7390	0.0008	-	**29.3834**
OWF_47	37	3.44	0.0001	-	-	0.2747	0.0001	-	0.0188	24.4062	-	12.1173	**36.8172**
OWF_48	21	2.51	-	-	-	0.2143	0.0001	-	0.0043	0.0175	-	-	**0.2362**
OWF_49	18	2.09	-	-	-	0.0861	-	-	0.0072	-	-	-	**0.0933**
OWF_51	20	2.8	0.0049	-	-	0.2819	-	-	0.0055	0.6297	0.0011	-	**0.9231**
OWF_52	22	1.66	-	-	-	1.0303	-	-	0.0253	0.0434	-	-	**1.0990**
OWF_53	25	0.81	-	-	-	0.1296	-	-	0.0049	-	-	-	**0.1345**
OWF_54	22	2.12	0.0242	-	-	0.3738	-	-	0.0067	0.0062	0.0001	-	**0.4110**
OWF_55	17	4.92	-	-	-	0.0583	-	-	-	0.0150	-	0.3649	**0.4382**
OWF_56	19	3.91	-	-	-	0.1478	-	-	-	-	-	-	**0.1478**
OWF_57	21	1.16	0.0091	0.3986	-	1.8781	-	0.0001	0.0189	0.0612	-	-	**2.3660**
OWF_58	25	4.42	0.0001	-	-	0.3546	0.0001	-	0.0075	0.0877	-	-	**0.4500**
OWF_60	20	1.69	-	-	-	0.2082	-	-	0.0027	0.4422	11.7803	-	**12.4334**
OWF_63	19	2.67	-	-	-	0.1841	-	-	0.0043	-	-	0.3352	**0.5236**
OWF_64	24	3.72	0.0169	-	-	0.2728	-	-	0.0388	0.7019	0.0296	-	**1.0600**
OWF_65	23	6.1	-	-	-	0.2474	-	-	0.0217	-	-	-	**0.2691**
OWF_66	22	2.38	-	-	-	0.2797	-	-	0.0030	0.1380	-	-	**0.4207**
OWF_67	27	1	0.1989	-	-	0.1937	-	-	0.0067	-	0.0499	-	**0.4492**
OWF_68	23	2	-	-	-	0.4586	-	-	0.0172	-	0.4175	-	**0.8933**
OWF_69	22	3.47	-	-	-	0.5600	-	-	0.0449	0.0016	-	-	**0.6065**
OWF_70	23	4.64	0.0013	-	-	0.5650	-	-	0.0130	0.0796	-	-	**0.6589**
OWF_71	22	6.23	-	-	-	0.9981	-	-	0.1312	-	-	-	**1.1293**
OWF_72	26	3.62	0.0010	-	-	0.7883	-	0.0001	0.0140	3.8637	-	-	**4.6671**
OWF_73	19	1.93	-	-	-	0.2499	-	-	0.0536	-	0.0021	-	**0.3056**
OWF_74	25	1.8	0.0130	-	-	0.3099	-	-	0.0059	-	-	-	**0.3288**
OWF_75	23	3.05	0.0020	-	-	0.1259	-	-	0.0012	15.0120	-	-	**15.1411**

Station	Depth (m)	Distance to Nearest Well (km)	Other minor phyla	Cnidaria	Annelida	Polychaeta	Oligochaeta	Arthropoda	Crustacea	Mollusca	Echinodermata	Chordata	**Total**
OWF_76	23	5.56	0.0516	7.1584	-	7.2552	-	0.0015	1.2484	0.4454	1.1956	-	**17.3561**
OWF_77	22	4.52	0.0161	-	-	0.0798	0.0001	-	0.0182	0.5222	0.0001	-	**0.6365**
OWF_78	22	2.17	0.0096	-	-	0.2429	-	-	0.0022	0.0062	-	-	**0.2609**
OWF_79	22	4.9	0.0136	2.0205	-	1.6094	-	-	0.0396	0.3866	0.0030	-	**4.0727**
OWF_80	23	5.99	-	-	-	0.3912	-	-	0.1716	0.0384	-	-	**0.6012**
Total Biomass (g) by group			**0.9948**	**10.0897**	**0.0059**	**45.8151**	**0.0019**	**0.0079**	**4.9698**	**218.6947**	**104.4262**	**15.1153**	**400.1213**
Proportional Contribution (%)			**0.2486**	**2.5217**	**0.0015**	**11.4503**	**0.0005**	**0.0020**	**1.2421**	**54.6571**	**26.0986**	**3.7777**	**-**
Biomass (g/m^2) by group			**9.9480**	**100.8970**	**0.0590**	**458.1510**	**0.0190**	**0.0790**	**49.6980**	**2,186.9470**	**1,044.2620**	**151.1530**	**4,001.2130**

4.7.2 Epibenthic Trawl Analysis

Beam trawling can capture species that are less likely to be represented by standard grab sampling and can offer supplementary macrofauna data for subsequent habitat characterisation and analysis. The beam trawl sampling undertaken across the survey area revealed a diverse fish and epifaunal assemblage. In total, 108 different species were recovered across the survey area, of which 99 were adults.

For the following epibenthic trawl assessment, the sampling effort was standardised to 500m for each trawl. Species that were recorded in their tens or hundreds are represented in the following analysis by the numerical equivalent of '10' or '100', respectively. This was necessary for small species that were present in extremely high abundances or aggregations, where counting individuals would be unfeasible in the field; For example, barnacle species *Balanus balanus* and *Balanus crenatus*, *Sabellaria spinulosa*, Serpulidae worms and *Pycnogonum littorale*.

Species that could not be enumerated and therefore only assessed on a presence/absence basis have been omitted from abundance analysis. This includes colonial fauna such as Cnidaria and Bryozoa, mixed Hydrozoa and Bryozoa assemblages and species where individuals are difficult to differentiate between, such as Porifera. However, due to the importance of these groups to the epibenthic community, these groups have been investigated in more detail in the Biomass analysis in Section 4.7.2c.

A total of nine juvenile specimens, including eggs, were also excluded from analysis due to their high mortality prior to reaching maturity. Consequently, they tend to induce a recruitment spike at certain times of the year due to rapid settlement and colonisation but are essentially an ephemeral part of the population masking the underlying trends within the mature adults. The planktonic comb jelly *Pleurobrachia pileus* was also excluded from analysis as it is not epibenthic, and likely entered the trawl during deployment and recovery.

Subsequent analysis of the epibenthic trawl samples identified a total of 4,866 individuals across 91 species from the eight trawl samples obtained in the OWF survey area. Faunal data for each sample are listed in Appendix I, whilst univariate analyses are summarised in Table 30 by trawl.

The epibenthic taxa consisted of Arthropods, represented by 23 species (38.8% of the total individuals). Chordata accounted for 23 species (29.7% of the total individuals) of which 91.3% of recorded Chordata were fish. This was followed by Echinoderms with eight species (15.3% of the total individuals), Molluscs with 27 species (10.2% of the total individuals) and seven Annelid species, which accounted for 5.0% of the total individuals. Solitary Cnidaria consisted of Actiniaria, identified down to two groups (Edwardsiidae and Actiniaria) representing 1.0% of the total individuals. Other groups included a single Platyhelminthes (flat worm) specimen, accounting for 0.02% of total individuals.

Five fish species recovered in trawl analysis are UKBAP Priority Species and Species of Principal Importance in England (SPIe) and are species of commercial value; Raitt's sand eel, *Ammodytes marinus*, whiting, *Merlangius merlangus*, ling, *Molva*, plaice, *Pleuronectes platessa* and sole, *Solea solea*. Furthermore, *Ammodytes marinus* is a priority species under the UK Post 2010 Biodiversity Framework as it is considered an important food source for many commercial fish, seals and seabirds (see Section 4.8.2d). Other species of sandeel were also recovered from the OWF survey area, including *Gymnammodytes semisquamatus, Ammodytes tobianus* and *Hyperoplus lanceolatus*. Other species that are commercially valuable that were recovered from trawl stations in the survey area included dab, *Limanda limanda*, lemon sole, *Microstomus kitt*, brown crab, *Cancer pagurus* and the common mussel, *Mytilus edulis*. Fish lengths were recorded on site and are presented in Appendix J.

The reef building ross worm, *S. spinulosa*, was recovered in samples from OWF_T5, OWF_T6_A and OWF_T9 and its presence is discussed further in Section 4.8.2b. Four specimens of the invasive non-native slipper limpet, *Crepidula fornicata*, were identified at stations OWF_T3 and OWF_T5. Slipper limpets can form dense aggregations, which can compete for space and smother native benthic fauna (see Section 4.8.1i).

The consistent accumulation of taxa with each trawl was demonstrated by a species accumulation curve as shown in Figure 36. The minimum curve in this figure demonstrates the incremental increase in recorded species as additional samples were acquired. This suggests that the population was diverse with a relatively high species richness being recorded in every new sample. This analysis estimated the maximum species accumulation (Chao-1 curve) for the survey area to be 131 species, compared to the actual 91 species recorded during the survey. The number of species recorded matches the representative portion of the population (i.e. 67% or 88 species) meaning no additional trawls were required to adequately sample the epibenthic fauna.

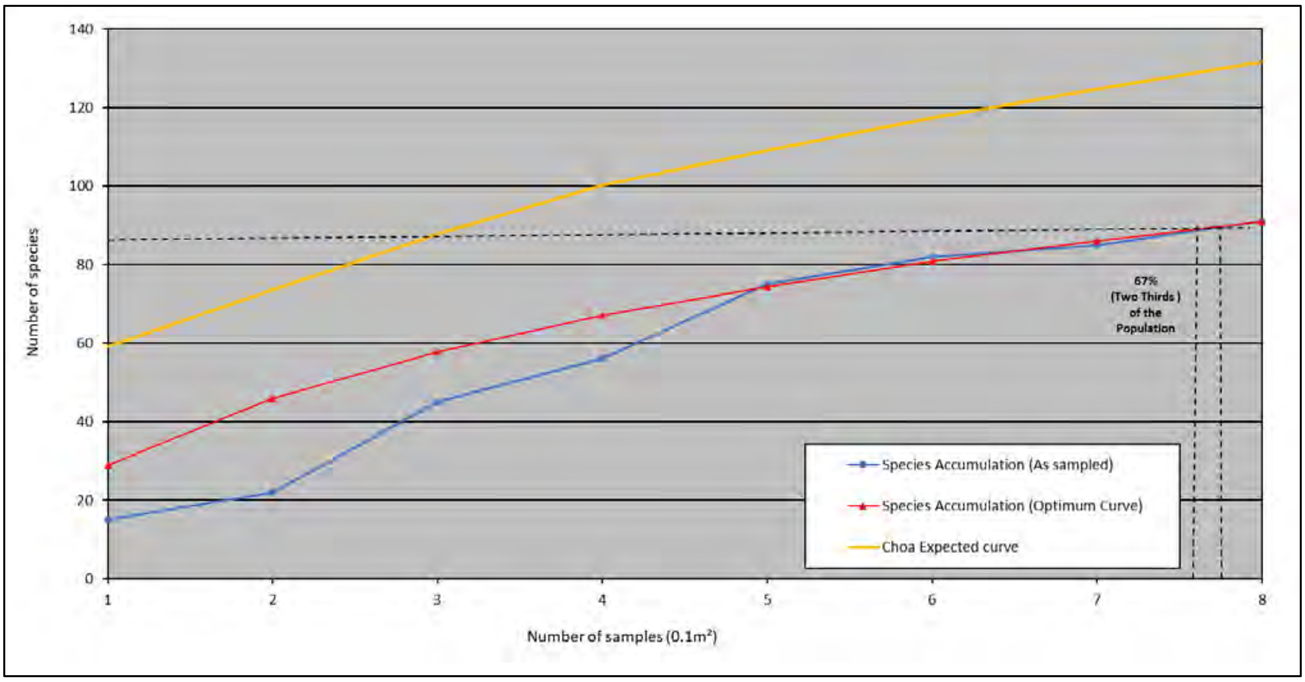


Figure 36 Species Accumulation Curve of OWF Epibenthic Trawls

a Primary and Univariate Parameters

The primary and univariate parameters for all trawls are listed in Table 30. The highest species numbers were identified in areas of mixed sediment made up of between 33.77% to 63.36% gravel (Table 14). For example, a maximum of 46 species were recovered from OWF_T9 (coarse sediment), and a minimum of 15 were recovered from OWF_T1 (sand). The number of individuals per 500m were more variable, evidenced by a relatively high coefficient of variation (54.7%; Table 30) across the OWF survey area, ranging between 171 per 500m at station OWF_T7 to 1,033 per 500m at station OWF_T9 (Table 30). The higher number of individuals and species at OWF_T9 could potentially be attributed to the underlying mixed sediment and the *S. spinulosa* located within the same sediment boundary 'Sandy CLAY' at station OWF_76.

Margalef's Index is a measure of species richness. The maximum Margalef's index was identified at station OWF_T9 (6.48), while the minimum was identified at station OWF_T1 (2.33) (Table 30). Stations with sand proportions of >90% had the lowest species richness, while areas of mixed and coarse sediments, cobbles and pebbles had the highest.

The Simpson's diversity varied from a maximum of 0.900 at station OWF_T3 to a minimum of 0.555 at station OWF_T1, with low overall variability of 15.6% (Table 30). Whereas, the Shannon-Wiener Diversity index was more variable (CV 27.2%), with a maximum recorded at trawl OWF_T3 (3.94) and the minimum at trawl OWF_T1 (1.73). This is due to the difference in the way that the Simpsons and Shannon-Wiener diversity indices are calculated; the Shannon-Wiener diversity index gives more weight to species found in low abundances, while the Simpsons Diversity index gives more weight to abundant species. As such, rare species have less influence over the Simpson's diversity value. For instance, many species were only represented by a few individuals, with only a few highly abundant species (For example, brown shrimp *Crangon crangon*). Therefore, the diversity indices revealed trawls with coarse and mixed sediments had higher diversity than those sand-dominated trawls.

Pielou's Equitability displayed a similar pattern, with coarse and mixed sediment areas having a more evenly represented epibenthic community, with a maximum of 0.756 at OWF_T3 and a minimum of 0.442 at OWF_T1 (Table 30). Therefore, sand dominated sites had a more uneven community due to a small number of representative species when compared to the coarser sediments. Furthermore, the higher diversity found in areas of coarse and mixed sediment can be attributed both to the availability of attachment sites for colonial species, and greater availability and heterogeneity in interstitial space providing refuge sites for a greater range of species.

Table 30 Univariate Faunal Parameters per Epibenthic Trawl (Standardised to 500m)

Station	Depth Range (m)	Distance to Nearest Well (km)	Number of Species (S)	Number of Individuals (N)	Richness (Margalef)	Evenness (Pielou's Evenness)	Shannon-Wiener Diversity	Simpsons Diversity (1-Lambda')
OWF_T1	10 - 11	3.06	15	405	2.33	0.442	1.73	0.555
OWF_T2_A	16 - 17	0.75	16	480	2.43	0.519	2.08	0.668
OWF_T3	40 - 43	1.43	37	342	6.17	0.756	3.94	0.900
OWF_T4	18 - 20	2.17	31	428	4.95	0.661	3.27	0.790
OWF_T5	20 - 21	1.67	39	733	5.76	0.665	3.52	0.862
OWF_T6_A	20 - 21	1.06	35	348	5.81	0.662	3.40	0.849
OWF_T7	21 -22	3.29	18	171	3.31	0.561	2.34	0.687
OWF_T9	22 - 23	4.78	46	1033	6.48	0.648	3.58	0.835
Mean			**30**	**493**	**4.66**	**0.614**	**2.98**	**0.768**
SD			**12**	**269**	**1.71**	**0.100**	**0.81**	**0.120**
CV (%)			**39.9**	**54.7**	**36.7**	**16.2**	**27.2**	**15.6**

b Multivariate Analysis

To provide a more thorough examination of the macrofaunal community, multivariate analysis was performed upon the epibenthic trawl data using PRIMER software (PRIMER 7.0.17; Clarke, K.R. *et al.*, 2014) to illustrate data trends. All data was squared-root transformed prior to analysis to down-weight the influence of any overriding species dominance between sample similarities/dissimilarities.

Hierarchical Agglomerative Clustering – Group Average Method

A similarity dendrogram was created using hierarchical agglomerative clustering (CLUSTER) and is presented for all trawls in Figure 37. SIMPROF analysis highlighted the presence of three significantly different (p<0.05) clusters which were differentiated by black branches and the different structural groups are interpreted below in Table 31. The dendrogram revealed little intra-cluster variability as the stations differentiated at a similar similarity level within each cluster group, indicating that the clusters had a high degree of similar epifaunal assemblages present.

Table 31 Summary of SIMPROF Trawl Groupings (500m)

SIMPROF Group	Similarity (%)	Stations	Interpretation
'a'	57.47%	OWF_T6_A, OWF_T5, OWF_T9	The first cluster of stations were comprised of coarse to mixed sediments between 20m to 23m of depth. These stations were moderately species rich with high diversity values, and were defined by the presence cobbles, pebbles and the reef building worm, *Sabellaria spinulosa*. This cluster can be considered to represent a variable coarse sediment epibenthic assemblage.
'b'	59.81%	OWF_T7, OWF_T1, OWF_T2_A	Stations in this cluster were characterised by well sorted sediments composed of over 99% sand, between 10 to 22m in depth. These stations had the lowest diversity. This cluster could be considered to represent the sand dominated, species poor epibenthic assemblages.
'c'	39.56%	OWF_T3, OWF_T4	These stations were both characterised by coarse sediment with high proportions of sand, gravel and shell gravel. High numbers Mollusca, especially of *Spisula solida* characterised the epibenthic fauna at these stations when compared to other clusters. This cluster can be considered to represent coarse sediment epibenthic assemblages lacking in *Sabellaria spinulosa* across the OWF survey area.

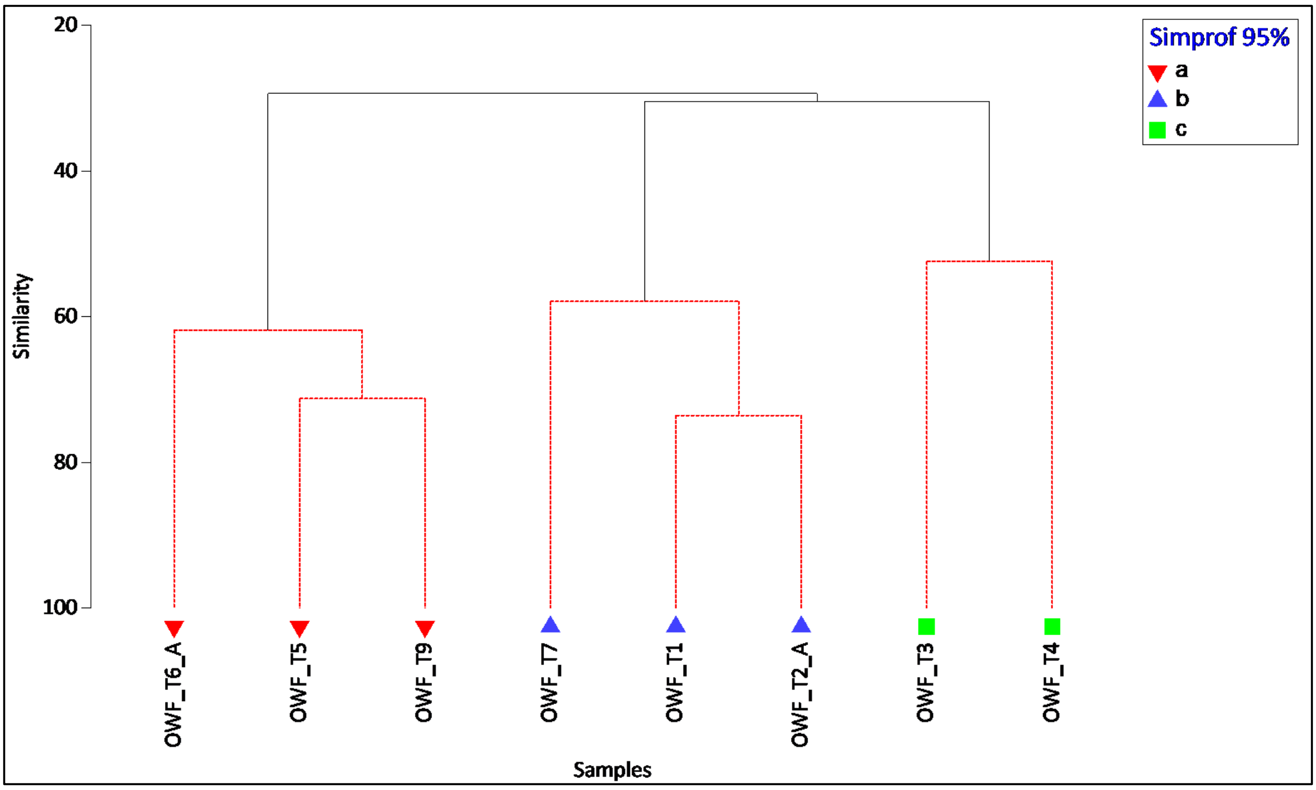


Figure 37 Dendrogram of epibenthic trawls (500m)

Non-metric Multi-dimensional Scaling (nMDS) Ordination

Similarities in the epifaunal communities recorded across the OWF survey area are presented in Figure 38 by trawls, as a 2D nMDS plot. The nMDS plot revealed three different SIMPROF groupings with a low stress value of 0.01 (Figure 38). The low stress value indicates that the complexity of the epibenthic trawl data has been adequately captured by the 2D nMDS. The plotted stations were consistent with the clusters identified in the dendrogram (Figure 37) and further indicate the inter-cluster variability as all stations within each cluster grouped tightly together with no overlap.

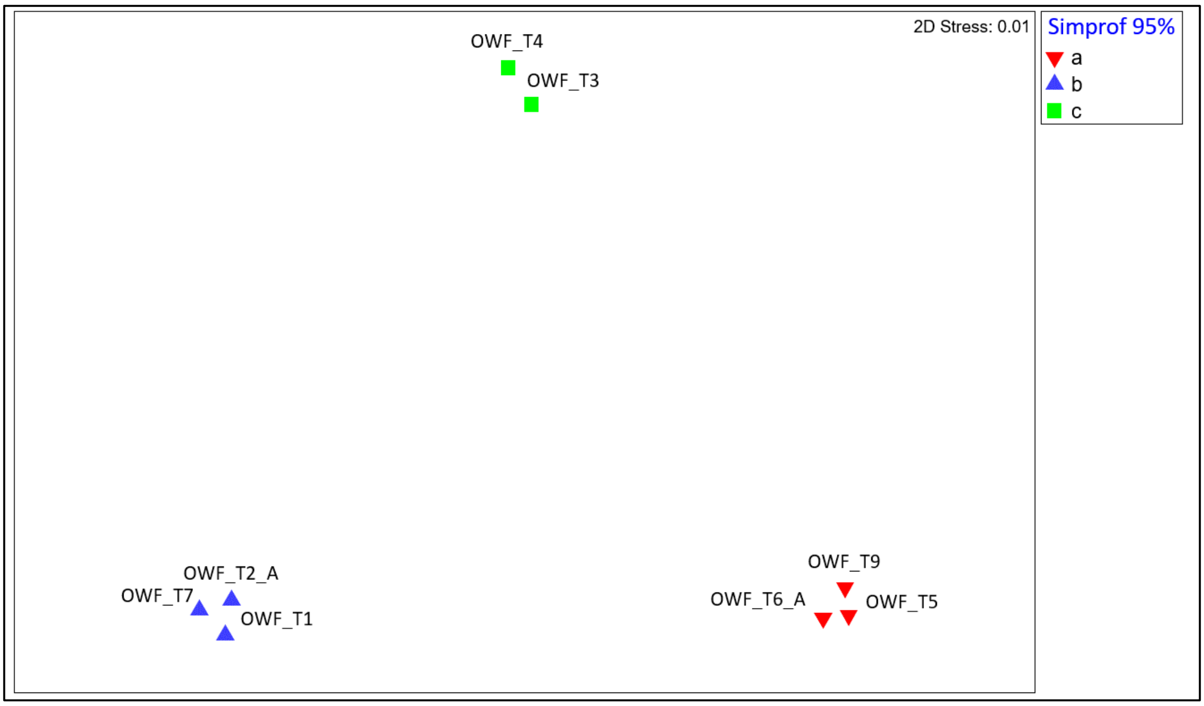


Figure 38 nMDS Ordination Plot of trawls (500m)

Inter-cluster Variation in Community Composition

To investigate the differing macrofaunal communities described by the identified multivariate clusters, the range in univariate diversity indices for the trawl clusters are summarised in Table 32. Stations within cluster *'a'* and *'c'* had the highest overall species richness, diversity and evenness, while cluster *'b'* displayed much lower overall values. Number of individuals displays greater variability and overlap between clusters. This is as a result of a few species in cluster *'b'* being present in very high abundances. Overlaps in diversity indices indicate the subtle difference in epifaunal community structure between the clusters; therefore, further review of the epifaunal dataset is required to describe the differences between each cluster.

Table 32 Overview of Univariate Parameters per SIMPROF Cluster

SIMPROF Cluster	Number of species (S)		Number of individuals (N)		Richness (Margalef)		Evenness (Pielou's Evenness)		Simpsons Diversity (1-Lambda')		Shannon Wiener Diversity	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
a	35	46	348	1,033	5.76	6.48	0.648	0.665	3.397	3.581	0.84	0.86
b	15	18	171	480	2.33	3.31	0.442	0.561	1.728	2.341	0.56	0.69
c	31	37	342	428	4.95	6.17	0.661	0.756	3.274	3.939	0.79	0.90

Differences in the macrofaunal communities at a phyla level was explored by plotting the average percentage contribution of the major phyla to the overall number of individuals and number of species within each station, which have been ordered by cluster for visual clarity, and by cluster (Figure 39 and Figure 40).

There was a notable difference in the abundance of Chordata, particularly for cluster *'b'* where Chordata accounted for a large proportion of the overall species abundance compared to the other clusters. The dominance of Chordata to the overall abundance of phyla for trawls within cluster *'b'* was due to the high abundance of weaver fish (*Echiichthys vipera*), which could be attributed to the higher proportion of sand at these trawl stations. Mollusca were more prevalent within cluster *'c'*, most notably the surf clam, *Spisula solida,* and razor shell, *Ensis magnus*. The greater abundance of Mollusca within cluster *'c'* was potentially attributed to the coarse sediment at these trawl locations when compared to the mixed sediment within cluster *'a'* and the fine sand dominated sediments of cluster *'b'* (Martins *et al.*, 2013). Arthropoda abundance was relatively consistent across the cluster groups, with the brown shrimp (*Crangon crangon)* the most ubiquitous arthropod sampled by the epibenthic trawls. Echinodermata were more significant in cluster *'a'*, notably the predatory common starfish, *Asterias rubens,* when compared to the other clusters. The higher abundance of echinoderms, especially *A. rubens* was likely due to the presence of *S. spinulosa* at these trawl locations, as *A. rubens* predates *S. spinulosa*. Although Cnidaria were the least abundant phyla represented by the epifaunal trawl, a higher abundance occurred within clusters *'a'* and *'c'* due to the greater availability of cobbles and pebbles for sessile epifauna colonisation. Annelida and Platyhelminthes were also underrepresented by the epibenthic trawl dataset. Epifaunal trawls retained epifauna greater or equal to 5cm in length and skimmed across the superficial surface layer of the sediment; therefore, the trawls are likely, by design, to under present infaunal assemblages.

In terms of the contribution of phyla to the numbers of species, the clusters were fairly similar, suggesting that the differing abundances of phyla were more important for the separation of clusters. All clusters were characterised by similar compositions of phyla, with Arthropoda accounting for the greatest proportion of the overall species richness within clusters *'a'*. In contrast, molluscs accounted for the greatest proportion of the overall species within cluster *'c'*. Chordata had the greatest diversity within cluster *'b'*, but the species richness was slightly less dominant than the species abundance due to the high abundance of weaver fish (*E. vipera)* within this cluster grouping. Cnidaria, Platyhelminthes and Annelida had the lowest species richness of any phyla recorded, which was unsurprising given the low abundances and the typical underrepresentation of these phyla within epibenthic trawl datasets.

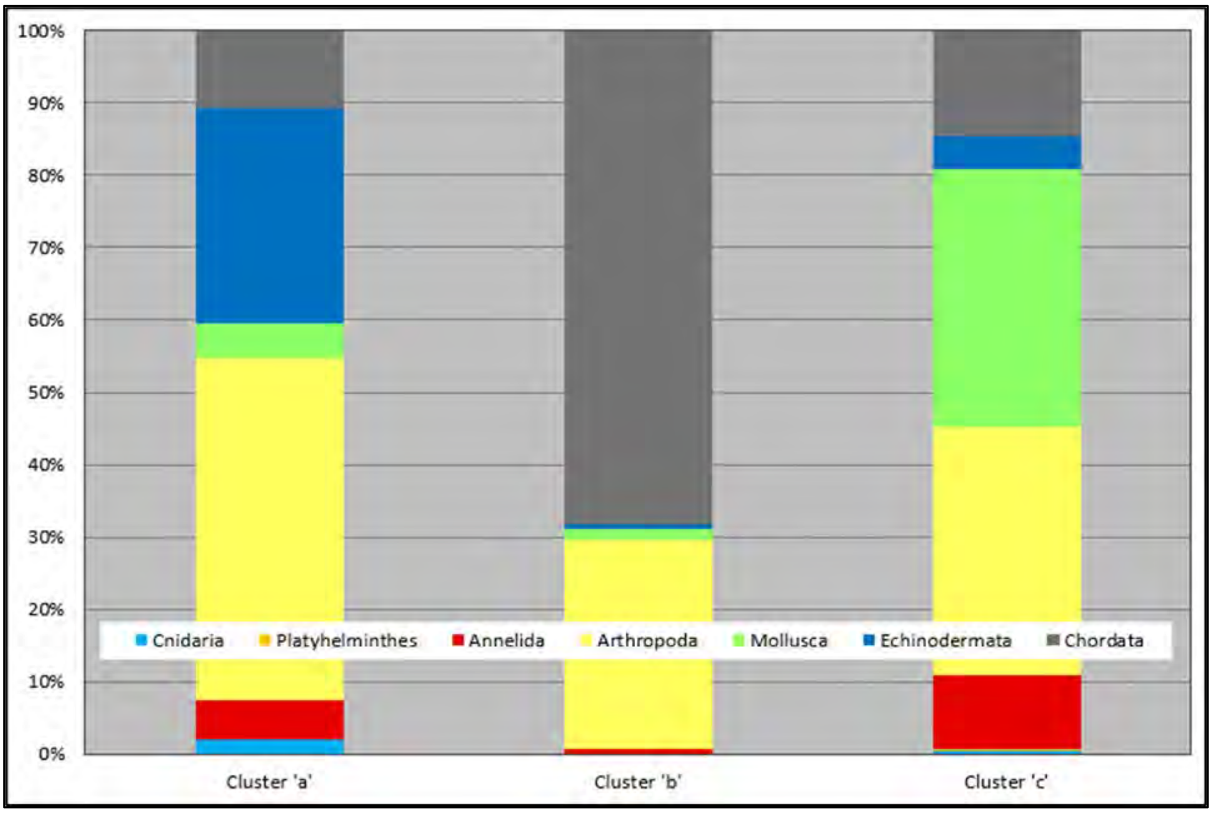


Figure 39 Average Contribution of Each Phyla to Total Epifaunal Abundance for Each Cluster

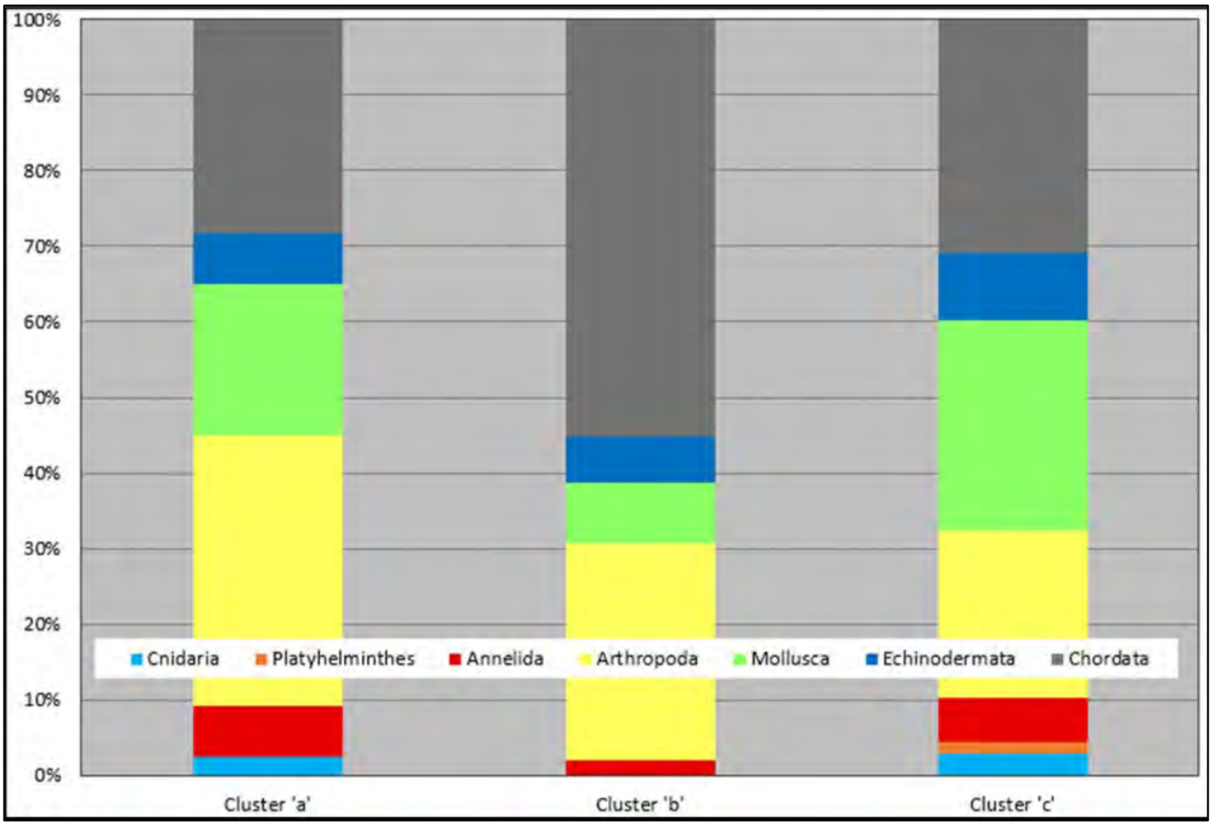


Figure 40 Average Contribution of Each Phyla to Total Number of Species for Each Cluster

To determine the species driving the differences between the three SIMPROF clusters identified from the epifauna data, Table 33 presents the top ten species in each cluster together with their percentage contribution to the overall similarity within the cluster. Whereas Table 34 shows the top five species responsible for differences between clusters.

Table 33 highlights the similarities in the species assemblages represented by clusters *'a'*, *'b'* and *'c'*. All three clusters were characterised by the brown shrimp (*Crangon crangon*) within the top three characterising species and common dab (*Limanda limanda*) within the top five. The similarity between clusters *'a'* and *'b'* were due to the common starfish (*A. rubens*) and the harbour crab (*Liocarcinus depurator*) representing the top characterising species for both clusters. Despite the similarities in epifauna between the clusters, the top characterising species for all three clusters was different. For example, *A. rubens* was the most abundant species within cluster *'a'* (206.80 individuals) when compared to *E. vipera* (187.43 individuals) for cluster *'b'* and *S. solida* (108.99 individuals) for cluster *'c'*.

Further review of the taxa most responsible for differentiating the six clusters (Table 34) included all three dominating taxa (*A. rubens, E. vipera* and *S. solida*), previously highlighted as characteristic for all three clusters, again suggesting that some differentiation was due to variability in the abundance of consistently dominant taxa. The differences in species between the clusters are likely attributed to differences in sediment composition. For example, *E. vipera* are an indicator species of sandbank habitats with high proportions of sand, which coincides with trawls OWF_T7 and OWF_T1 (Kaiser *et al.*, 2004). Whereas clusters *'a'* and *'c'* were differentiated based on the higher abundance of *A. rubens* (206.80 individuals) within cluster *'a'* compared to 15.42 individuals for cluster *'c'*, due to the higher abundance of *S. spinulosa* within cluster *'a'* (38.35 individuals) compared to cluster *'c'* (0 individuals). Therefore, the presence of *S. spinulosa* differentiated the coarser sediment clusters *'a'* and *'c'*, whereas cluster *'b'* was differentiated from the other clusters due to the sampling of sand dominated sandbank habitats.

Table 33 Top 10 Species Abundances for Trawl Clusters *'a'*, *'b'* and *'c'*

Top 10 Species	Cluster *'a'* Species	Av. Abundance	Contribution (%)	Cluster *'b'* Species	Av. Abundance	Contribution (%)	Cluster *'c'* Species	Av. Abundance	Contribution (%)
1	*Asterias rubens*	206.80	27.79	*Echiichthys vipera*	187.43	57.92	*Spisula solida*	108.99	25.87
2	*Pandalus montagui*	129.99	23.88	*Crangon*	95.66	29.52	*Crangon*	45.06	20.59
3	*Crangon*	88.85	18.83	*Limanda*	20.47	3.43	*Asterias rubens*	15.42	8.62
4	*Pandalina brevirostris*	30.26	5.47	*Ammodytes marinus*	18.49	3.19	*Pagurus bernhardus*	14.27	7.39
5	*Limanda*	21.54	3.20	*Sepiola atlantica*	5.14	2.27	*Limanda*	12.20	7.39
6	*Necora puber*	14.94	2.81	-	-	-	*Nephtys caeca*	37.88	5.90
7	*Taurulus bubalis*	14.31	2.74	-	-	-	*Balanus crenatus*	38.58	5.28
8	*Sabellaria spinulosa*	38.35	2.00	-	-	-	*Liocarcinus depurator*	7.65	3.70
9	*Ascidiella aspersa*	14.37	1.66	-	-	-	*Sepiola atlantica*	6.44	3.18
10	*Liocarcinus depurator*	7.26	1.33	-	-	-	*Branchiostoma lanceolatum*	12.73	2.64

Light blue shading = sharded taxa across 3 clusters Orange shading = shared taxa across 2 clusters

Table 34 Dissimilarity Percentages (SIMPER) for Epifaunal Trawl Dataset

	Cluster *a*		Cluster *b*	
Cluster c	Average dissimilarity 79.95%		**Average dissimilarity 79.97%**	
	Asterias rubens	16.06	*Echiichthys vipera*	24.40
	Pandalus montagui	11.44	*Spisula solida*	14.73
	Spisula solida	1.33	*Crangon* sp.	6.49
	Crangon sp.	2.47	*Balanus crenatus*	5.60
	Nephtys caeca	1.11	*Nephtys caeca*	5.09
Cluster a			**Average dissimilarity 79.63%**	
			Echiichthys vipera	18.46
			Asterias rubens	18.17
			Pandalus montagui	12.25
			Crangon crangon	3.76
			Sabellaria spinulosa	3.65

c Biomass

The biomass (blotted wet weight) of the epifaunal trawl data from the OWF survey area is displayed by phylum in Table 35, and by taxa in Appendix I The total biomass for the epibenthic trawls conducted in the OWF survey area was 179,351g/500m. Bryozoa comprised 68,820g/500m, which was the largest proportional biomass of any group (38.37% of total biomass). Surprisingly, Bryozoa comprised of just three species; *Alcyonidium diaphanum*, *Alcyonidium parasiticum* and *Flustra foliacea*. The next major contributor to total biomass was Cnidaria, which accounted for 60,919 (33.80%), made up of the dead man's finger *Alcyonium digitatum*, Edwardsiidae anemones and other Actiniaria.

The group 'Hydrozoa and Bryozoa assemblages' contained mixed Bryozoa and Cnidaria that could not be identified to a lower taxonomic level in the field. This group comprised only 4,504g/500m (2.51% total biomass). Echinodermata followed, accounting for 15,280g/500m (8.52%). Chordata made up 11,361g/500m (6.33%). The majority of this was from bony fish (Actinopterygii), with a small proportion of Ascidiacea and one species of Leptocardii.

Mollusca only made up 1,757g/500m (0.98%) of the total biomass; however, was the most species rich group; 27.10% of the total species found in the OWF survey area were Mollusca. Similarly, Arthropoda contributed to 11,091g/500m (6.18%) of total biomass in the OWF survey area, however, was species rich (25.23% of species) and highly abundant (1,807 individuals). This can be attributed to the relatively small body sizes of most of the Arthropoda species. Porifera (5,647g/500m, 3.15%), Annelida (256g/500m, 0.14%) and 'Other' (Ctenophora & Platyhelminthes) (19g/500m, 0.01%) represented the smallest proportion of the total epibenthic trawl biomass in the OWF survey area.

Table 35 Blotted Wet Weight Biomass (g/500m) of Major Groups Within the OWF Survey Area

Station	Depth (m)	Distance to Nearest Well (km)	Cnidaria	Porifera	Annelida	Arthropoda	Mollusca	Bryozoa	Echinodermata	Chordata	Hydrozoa and Bryozoa assemblages	Other	Total
OWF_T1	10 -11	3.06	0	0	0	142	9	1,772	0	1,188	381	0	**3,492**
OWF_T2_A	16 - 17	0.75	0	0	0	383	19	812	246	1,357	37	4	**2,857**
OWF_T3	40 - 43	1.43	59	45	32	638	98	2,193	597	1,777	145	0	**5,583**
OWF_T4	18 - 20	2.17	4	84	213	438	1,392	24,687	563	752	2,043	12	**30,190**
OWF_T5	20 - 21	1.67	21052	2,270	2	5,111	65	18,458	6608	2,132	255	0	**55,954**
OWF_T6_A	20 - 21	1.06	16,820	968	4	2,098	53	9,893	2250	950	249	0	**33,283**
OWF_T7	21 -22	3.29	74	0	0	234	19	3,254	63	786	89	3	**4,521**
OWF_T9	22 - 23	4.78	22,607	2,280	6	2,047	102	7,752	4953	2,420	1,304	0	**43,470**
Total Biomass (g/500m) by group			**60616**	**5,647**	**256**	**11,091**	**1,757**	**68,820**	**15280**	**11,361**	**4,504**	**19**	**179,351**
Proportional Contribution (%)			**34**	**3**	**0**	**6**	**1**	**38**	**9**	**6**	**3**	**0**	**-**

4.8 ENVIRONMENTAL HABITATS

Video and still photographic ground-truthing from the 31 transects across the OWF survey area confirmed the presence of heterogeneous environment, consisting of sand-dominated habitats with areas of shell debris, pebbles and cobbles, and intermediate habitats of coarse and mixed sediments across the survey area with occasional patches of pebbles and cobbles.

Habitats were identified using a combination of field observations, a detailed review of video footage, still images, infaunal macrofauna and epibenthic trawl datasets in accordance with the guidelines outlined by Parry (2019). SSS data showed areas of high reflectivity sediment across the majority of the survey, with an increased presence to the west of the survey area, indicating an area dominated by coarse sediments with patches of mixed sediments with variable densities of shell debris, cobbles and pebbles. Notable clusters of pebbles and cobbles, colonised by epifauna, were present in the coarse and mixed transitory sediments within the centre of the survey area at stations OWF_23, OWF_31, OWF_32, OWF_45, OWF_50, OWF_57, OWF_65, OWF_76 and OWF_79A. In the eastern extent of the OWF survey area lighter reflective sediment indicated areas of fine sand with variable densities of shell fragments. Two canyons had a similar sediment composition to the surrounding sediments but were classified as deeper variants, while those sediments situated on top of sandbank crests (<15m LAT) were classified as shallower variants to capture the heterogeneity of the OWF survey area.

Based on the ground-truthing data obtained from the OWF survey area a total of seven JNCC/EUNIS habitats were assigned (Table 36). Several habitats were present across all extents of the OWF survey area: “Circalittoral coarse sediment” (SS.SCS.OCS/MD3), “Circalittoral mixed sediment” (SS.SMx.CMx/MC42) and “Circalittoral fine sand” (SS.SSa.CFiSa/MC5). Additionally, the centre of the survey area was characterised by “Infralittoral fine sand” (SS.SSa.IFiSa/MB5) and “Offshore circalittoral sand” (SS.SSa.OSa/MD5). In the west of the survey area patches of “Infralittoral coarse sediment” (SS.SCS.ICS/MB3) and “Circalittoral coarse sediment” (SS.SCS.CCS/MC32) was also present.

It is important to note that habitat classifications will differ from the seabed features identified for the geophysical aspect, as they are required for different purposes and use different sediment classification nomenclature. As such, the current survey re-defined some of the boundaries based on the added information gathered from trawl, video and grab analysis. The ‘Infralittoral fine sand’, ‘Circalittoral fine sand’ and ‘Infralittoral coarse sediment’ habitats generally relate to the geophysical classification of ‘Sand’. Whereas the ‘Offshore circalittoral sand’, ‘Offshore circalittoral coarse sediment’ and ‘Circalittoral coarse sediment’ habitats generally relate to the ‘Gravelly SAND’ and ‘GRAVEL’ classifications. The intermediate habitat classification of ‘Circalittoral coarse and mixed sediment’ generally relate to the ‘Sandy CLAY’ classification (Figure 5).

Table 36 Summarised Habitat Classification

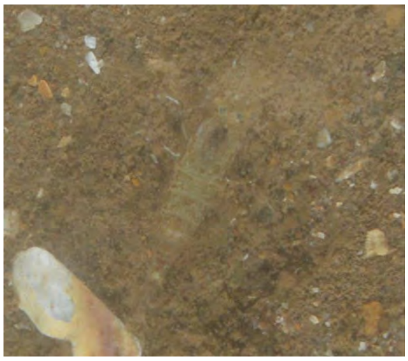
BGS Modified Folk Classification of Particle Size Analysis	JNCC Classification	2012 EUNIS Classification	2019 EUNIS Classification
Slightly gravelly sand	SS.SSa.OSa Offshore circalittoral sand	A5.27 Deep circalittoral sand	MD52 Atlantic offshore circalittoral sand
Sand, Slightly gravelly sand	SS.SSa.CfiSa Circalittoral fine sand	A5.25 Circalittoral fine sand	MC52 Atlantic circalittoral sand
Sand, Slightly gravelly sand	SS.SSa.IfiSa Infralittoral fine sand	A5.23 Infralittoral fine sand	MB52 Atlantic infralittoral sand
Muddy sandy gravel, Gravelly muddy sand,	SS.SMx.CMx Circalittoral mixed sediment	A5.44 Circalittoral mixed sediments	MC42 Atlantic circalittoral mixed sediment
Sandy gravel	SS.SCS.OCS Offshore circalittoral coarse sediment	A5.15 Deep circalittoral coarse sediment	MD32 Atlantic offshore circalittoral coarse sediment
Sandy gravel, gravelly sand, gravel	SS.SCS.CCS Circalittoral coarse sediment	A5.14 Circalittoral coarse sediment	MC32 Atlantic circalittoral coarse sediment
Gravelly sand	SS.SCS.ICS Infralittoral coarse sediment	A5.13 Infralittoral coarse sediment	MB32 Infralittoral coarse sediment

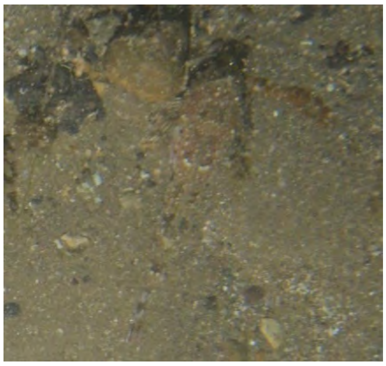
Conspicuous fauna within the OWF survey area showed relatively high diversity and density, with a total of 36 epifaunal species recorded reflecting the broad range of habitats identified. Mobile Arthropoda such as shrimp (Caridea), brown crab (*Cancer pagurus*), spider crab (*Hyas* sp.), velvet swimming crab (*Necora puber*), harbour crab (*Liocarcinus* sp.) and unidentifiable crabs (Bachyura sp.) were generally restricted to areas of coarse and mixed sediment, while hermit crabs (*Pagurus* sp.) were more widespread across a range of sediment types. Other mobile fauna included a limited variety of Echinodermata, including the common starfish (*Asterias rubens*) observed at the majority of sand dominated stations and brittle stars (Opiuroidea sp.) which were associated with finer material. Chordata species were also observed at the more sand dominated stations and came in the form of sandeels *(Ammodytes* sp.*)*, plaice (*Pleuronectes platessa*), flatfish (Pleuronectiformes sp.), dragonet (*Callionymus lyra*), pogge (*Agonus cataphractus*), lesser weaver fish (*Echiichthys vipera*) and unidentified fish (Actinopterygii sp.). Sandeels (*Ammodyte*s sp.) were the most prominently identified Chordata, with higher abundances noticed at sand dominated stations with minimal surface shell fragments. The presence of sandeels warranted further investigation due to the potential for sandeel spawning and nursery ground to occur within the survey area (discussed further in Section 4.8.2d).

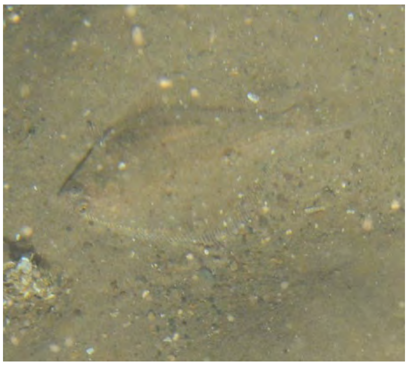
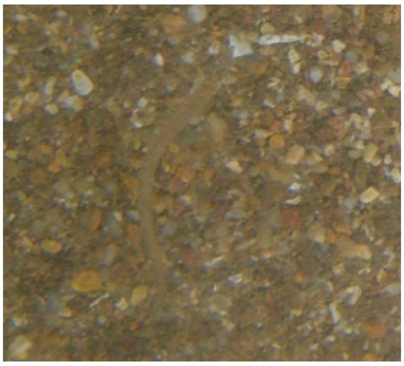
Anthozoa were also present within the survey area, including the dahlia anemone (*Urticina felina*) and dead man's fingers (*Alcyonium digitatum*), with unidentified anemones (Actiniaria sp.) were also observed along multiple transects. Mobile Mollusca were also observed but were limited to the common whelk (*Buccinum undatum*). Other sessile fauna such as razor clams (*Ensis* sp.), barnacles (Cirripedia sp.), Serpulidae, Haleciidae, encrusting sponge (Porifera), antenna hydroid (*Nemertesia* sp.), Sertulariidae, pipe hydroid (*Tubularia* sp.), hornwrack (*Flustra foliacea*), the Bryozoa (*Vesicularia spinosa*), *Cheilostomatida*, sea chervil (*Alcyonidium diaphanum*), sand mason worm (*Lanice conchilega*) and hydrozoan/bryozoan turf were sporadically distributed across the survey area based on hard substrate availability. The invasive non-native slipper limpet (*Crepidula fornicata*) and the Annex 1 habitat forming ross worm (*Sabellaria spinulosa*) were also observed within the OWF survey area and will be further discussed in Sections 4.8i and 4.8.2b.

Habitats comprised of mixed and coarse sediments, more prevalent to the west of the survey area, supported higher diversities and abundance of conspicuous fauna when compared to the sand dominated habitats. The sediment heterogeneity resulted in greater hard surface availability and lead to increased colonisation by a range of epibenthic species. The higher diversity and abundance of epifaunal species was especially apparent at station OWF_76 which had aggregations of ross worm (*S. spinulosa*) and recorded the highest diversity of epifaunal species, with a total of 24 out of 36 species observed. However, Chordata species were more commonly observed across areas of sand dominated sediments as *(Ammodytes* sp.)*,* plaice (*P. platessa*), flatfish (Pleuronectiformes sp.), dragonet (*C. Lyra*), pogge (*A. cataphractus*) and lesser weaver fish (*E. vipera*) appeared to be more reliant on sand burial as a refuge rather than the presence of hard substrates.

Example images of conspicuous fauna within the OWF survey area are presented below in Figure 41, while example seabed images for each transect are provided in Appendix P.

<table>
<tr><th colspan="3">Examples of Conspicuous Fauna</th></tr>
<tr>
<td>
Ross worm
(Sabellaria spinulosa)</td>
<td>
Tube worm
(Serpulidae)</td>
<td>
Shrimp
(Caridea)</td>
</tr>
<tr>
<td>
Hermit crab
(Pagurus sp.)</td>
<td>
Brown crab
(Cancer pagurus)</td>
<td>
Spider crab
(Hyas sp.)</td>
</tr>
</table>

Examples of Conspicuous Fauna		
 Harbour crab (*Liocarcinus* sp.)	 Barnacles (Cirripedia)	 Sea Chervil (*Alcyonidium diaphanum)*
 Hornwrack (*Flustra foliacea*)	 Bryozoa (*Vesicularia spinosa*)	 Bryozoa (Cheilostomatida)
 Pogge (*Agonus cataphractus*)	 Long-spined sea scorpion (*Taurulus bubalis*)	 Common dragonet (*Callionymus lyra*)

Examples of Conspicuous Fauna		
 Flatfish (Pleuronectiformes)	 Sand eel (Ammodytidae sp.*)*	 Dead man's fingers (*Alcyonium digitatum*)
 Hydrozoa (*Nemertesia* sp.)	 Oaten pipe hydroids (*Tubularia* sp.)	 Hydrozoa (Sertulariidae)
 Hydrozoa (Haleciidae)	 Anemone (*Dahlia* sp.)	 Common starfish (*Asterias rubens*)

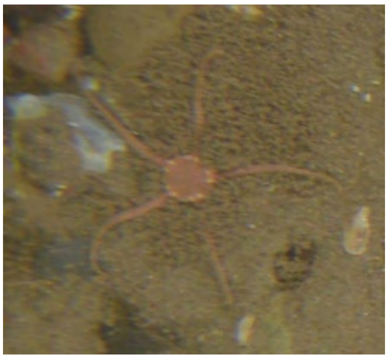
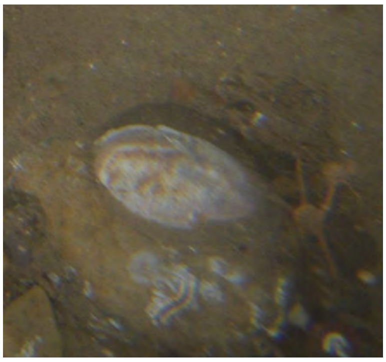
Examples of Conspicuous Fauna		
 Brittle star (Ophiuroidea)	 Slipper limpet (*Crepidula fornicata*)	 Sponge (Porifera)

Figure 41 Species Examples from Seabed Photographs

4.8.1 Habitat Classification

a Infralittoral Fine Sand (SS.SSa.IfiSa / MB52)

Habitats dominated by rippled homogeneous medium to very coarse sands with minimal shell fragments were associated with the crests of sandbanks (<15m LAT) to the east and north of the survey area. Given the elevation, the infralittoral fine sand dominated habitats were influenced by megaripples and sand waves orientated east-northeast to west-southwest. Described by the JNCC as "*clean sands which occur in shallow water, either on the open coast or in tide-swept channels of marine inlets. The habitat typically lacks a significant seaweed component and is characterised by robust fauna, particularly amphipods and robust polychaetes*".

Due to the homogeneous sand with negligible hard substrate, fauna observed on the seabed photographs and video were limited to sporadic sightings of Chordata such as dragonet (*C. lyra*), Lesser weaver fish (*E. vipera)* and unidentified fish (Actinopterygii), with a greater abundance of sandeels (Ammodytidae sp.) observed in relation to the other Chordata species. Other mobile fauna were limited to sporadic observations of hermit crabs (*Pagurus* sp.). The presence of medium to very coarse sand, low abundance and diversity of observed epifauna is consistent with the level four EUNIS habitat classification MB52 describing 'Atlantic infralittoral sand', corresponding with the JNCC classification SS.SSa.IfiSa, 'Infralittoral fine sand', which is within the expected depth range (0 – 20m) for this biotope. The presence of sandeels on the underwater video transects warranted further investigation into this habitat type's suitability for sandeel spawning and nursery grounds (see Section 4.8.2d).

Four level five biotopes exist within the 'Infralittoral fine sand' habitat; but only two had strong similarities to the survey area, these were: SS.SSa.IfiSa.NcirBat '*Nephtys cirrose* and *Bathyporeia* sp. In infralittoral sand' and SS.SSa.IfiSa.ImoSa 'Infralittoral mobile clean sand with sparse fauna'. Due to the generally impoverished fauna observed at stations OWF_01, OWF_03, OWF_42 and OWF_55 the SS.SSa.IfiSa.ImoSa biotope shows the strongest resemblance to the dataset.

The SACFOR scale results based on the video and stills analysis further evidenced the impoverished environment with species observed during video and stills analysis of OWF_01 and OWF_03 limited to Actinopterygii and Ammodytidae fish, with SACFOR scales ranging between 'occasional' and 'frequent' (Table 37 and Figure 40). The limited epifauna is to be expected from 'Infralittoral fine sand', as fauna present in this biotope is robust and often infaunal, giving the sand a 'clean' and impoverished appearance. The SS.SSa.IfiSa.IMoSa habitat, based on the stills and video SACFOR review, was more likely to occur within the infralittoral fine sand areas as the presence of Ammodytidae had a SACFOR abundance and frequency of occurrence of 'frequent' which was in line with the definition established by the JNCC (JNCC, 2020).

The shallow (<15m) sand-dominated habitats were classified and mapped as the overarching 'Infralittoral fine sand' habitat but could be considered to reflect the level 5 'Infralittoral mobile clean sand with sparse fauna' habitat. Example images are given in Figure 42 and the expected extent of the habitat to JNCC level 4 is mapped in Figure 50, while a level 5 map with the SS.SSa.IfiSa.IMoSa habitat applied is displayed in Figure 51.

Table 37 SACFOR Scale from Video Analysis of SS.SSa.IfiSa Habitat

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		*Actinopterygii*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Haleciidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		*Sabellaria spinulosa*	Serpulidae	Porifera
Size Class	(%)	(%)	3 – 15cm	3 – 15cm	>15cm	3 – 15cm	>15cm	3 – 15cm	(%)	3 – 15cm	>15cm	3 – 15cm	>15cm	3 – 15cm	>15cm	*3 – 15cm*	3 – 15cm	3 – 15cm	>15cm	3 – 15cm	>15cm	3 – 15cm	>15cm	3 – 15cm	>15cm	3 – 15cm	3 – 15cm	3 – 15cm	>15cm	(%)	(%)	(%)
SACFOR Scale*																																
OWF_VID_01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)																																
OWF_VID_01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0
**Superabundant = (S), Abundant = (A), Common = (C), Frequent = (F), Occasional = (O), Rare = ® and Less than Rare = (L)*																																

Table 38 SACFOR Scale from Stills Analysis of SS.SSa.IFiSa Habitat

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida	*Actinopterygii*	Agonus cataphractus	Callionymus lyra	Echichthys vipera	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Nemertesia sp.	Tubularia sp.	Sertulariidae		Haleciidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	Ensis sp.	Porifera
Size Class	(%)	(%)–3 -	>15cm	>15cm–3	(%)–3 -	>15cm–3	>15cm–3	>15cm	(%)–3 -	>15cm–3	>15cm–3	>15cm–3	>15cm–3	(%)																										
SACFOR Scale*																																								
OWF_VID_01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	O	0	0	0	0	O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)																																								
OWF_VID_01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Superabundant = (S), Abundant = (A), Common = (C), Frequent = (F), Occasional = (O), Rare = (R) and Less than Rare = (L)*

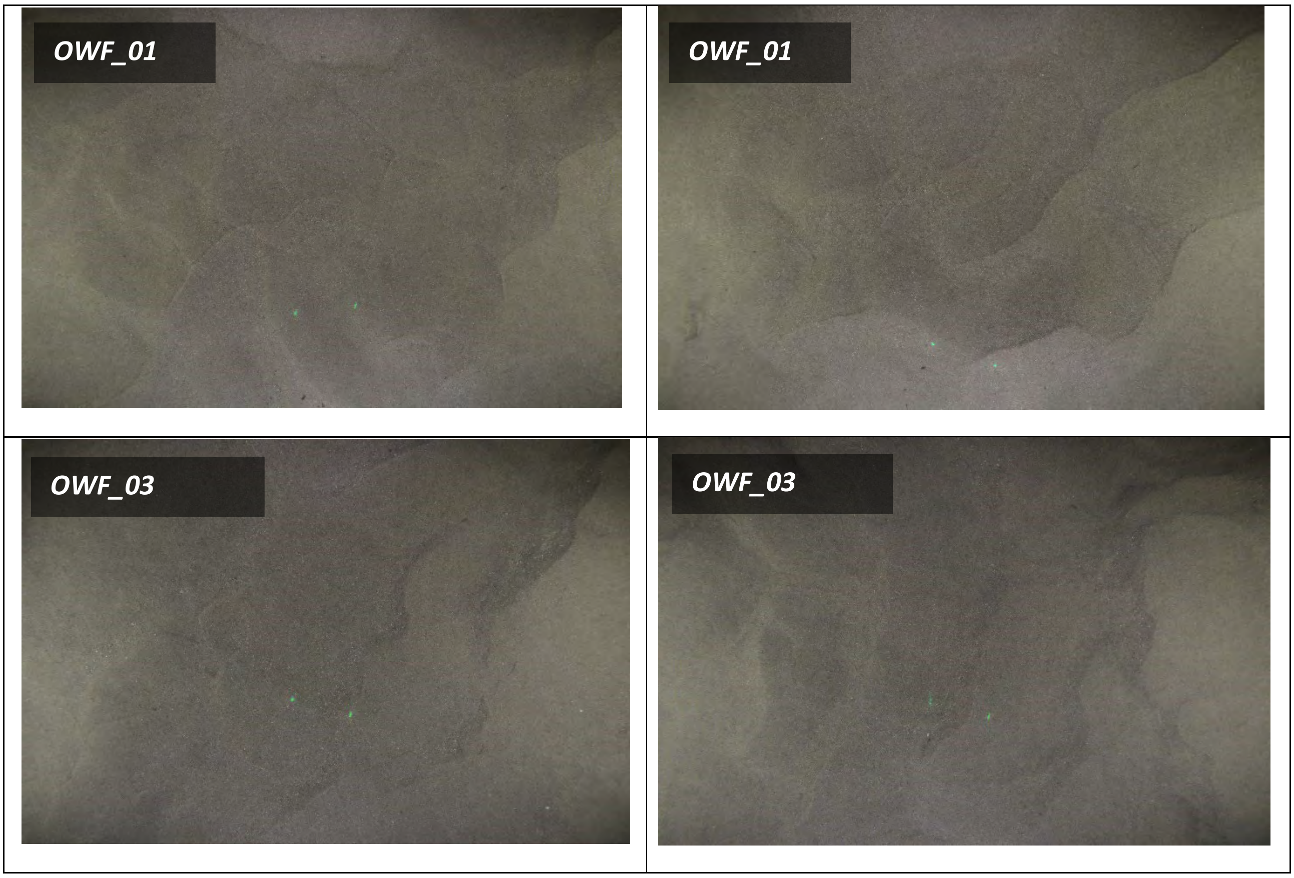


Figure 42 Example Images of Atlantic Infralittoral Sand Habitats

b Circalittoral Fine Sand (SS.SSa.CFiSa / MC52)

Similarly to the infralittoral fine sand habitats, the deeper (>15m) habitats, associated with the flanks of sandbanks and troughs of sand waves to the north and east of the survey area, were dominated by rippled homogeneous fine to coarse sands with minimal shell fragments. Described by the JNCC as "*Clean fine sands with less than 5% silt/clay in deeper water, either on the open coast or in tide-swept channels of marine inlets in depths of over 15-20m. The habitat may also extend offshore and is characterised by a wide range of echinoderms, polychaetes and bivalves. This habitat is generally more stable than shallower, infralittoral sands and consequently supports a more diverse community*".

Due to the homogeneous sand with negligible hard substrate, fauna observed on the seabed photographs and video were limited to sporadic sightings of Chordata such as dragonet (*C. lyra*) and unidentified fish (Actinopterygii), with a greater abundance of sandeels (Ammodytidae sp.) observed in relation to the other Chordata species. Other mobile fauna were limited to sporadic observations of hermit crabs (*Pagurus* sp.), common starfish (*A. rubens*) and unidentified crabs (Brachyura sp.). Sub-surface availability of hard substrate resulted in the colonization of sessile epifauna such as *Vesicularia spinosa*, Sertulariidae and sand mason worms (*L. conchilega*). The presence of fine to coarse sand, moderate abundance and diversity observed epifauna is consistent with the level four EUNIS habitat classification MC52 describing 'Atlantic circalittoral sand', corresponding with the JNCC classification SS.SSa.CFiSa which is within the expected depth range (10 – 50m) for this biotope. Similarly to the infralittoral fine sand, the presence of sandeels on the underwater video transects warranted further investigation into this habitat type's suitability for sandeel spawning and nursery grounds (Section 4.8.2d).

Three level five biotopes exist within the 'Circalittoral fine sand' habitat; however, none of these level five habitats could be confidentially assigned due to the absence of *Echinocyamus pusillus, Abra prismatica, Siphonoecetes* sp. and low abundances of venerid bivalves. The presence of *N. cirrose* and *Bathyporeia* sp. could indicate some level of conformance and hence a deeper variant of the '*N. cirrose* and *Bathyporeia* sp. in infralittoral sand' (SS.SSa.IFiSa.NcirBat / MB5233) habitat. However, the application of this level 5 biotope must be caveated as some characterising species such as *Bathyporeia* were not present at all stations in the SS.SSa.CFiSa habitat.

Similarly, the SACFOR scale based on the stills and video analysis revealed the area to be generally impoverished in regards to conspicuous epibenthic fauna (Table 39 and Table 40). Species observed during video analysis were limited to 'frequent' and 'common' Ammodytidae fish at two stations (OWF_17 and OWF_73). Whereas, the stills analysis revealed 'frequent' abundance of characteristic SS.SSa.CFiSa species such as *Pagurus* sp. However, similar to 'Infralittoral fine sand', fauna present in this biotope is robust and often infaunal, giving the sand a 'clean' impoverished appearance. The limited epifauna was further highlighted by the low frequency of occurrence, ranging between 0% to 9% for species other than Ammodytidae, which had a 50% frequency of occurrence.

A greater number of species were recovered from trawls in areas of 'Circalittoral fine sand' than 'Infralittoral fine sand'. The slightly deeper, more stable nature of the circalittoral provides opportunities for a greater number of species, allowing for greater species diversity. This is evidenced by a higher Shannon-Wiener and Simpson's diversity index at SS.SSa.CFiSa trawl stations when compared to the SS.Sa.IFiSa trawl stations (Section 4.7.2).

Example images are given in Figure 43 and the expected extent of the habitat 'Infralittoral fine sand' (EUNIS: 'Atlantic circalittoral sand', MC52) is mapped in Figure 50. The potential level 5 biotope present (SSa.IFiSa.NcirBat / MB5233) is mapped in Figure 51.

Table 39 SACFOR Scale from Video Analysis of SS.SSa.CFiSa Habitat

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		*Actinopterygii*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Halecidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		*Sabellaria spinulosa*	Serpulidae	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	>15cm	3 - 15cm		>15cm	3 - 15cm	(%)		3 - 15cm		>15cm		3 - 15cm	>15cm	3 - 15cm		>15cm		*3 - 15cm*		3 - 15cm		3 - 15cm	>15cm	3 - 15cm		>15cm	3 - 15cm	>15cm
SACFOR Scale*																																
OWF_VID_15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)																																
OWF_VID_15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Superabundant = (S), Abundant = (A), Common = (C), Frequent = (F), Occasional = (O), Rare = (R) and Less than Rare = (L)*

Table 40 SACFOR Scale From Stills Analysis of SS.SSa.CFiSa Habitat

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida	*Actinopterygii*	Agonus cataphractus	Callionymus lyra	Echichthys vipera	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Nemertesia sp.	Tubularia sp.	Sertulariidae		Haleciidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	Ensis sp.	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	>15cm	3 - 15cm	3 - 15cm	(%)	3 - 15cm		>15cm		3 - 15cm		>15cm	3 - 15cm	>15cm	(%)	3 - 15cm	3 - 15cm	3 - 15cm		3 - 15cm		3 - 15cm	3 - 15cm	>15cm		3 - 15cm	>15cm	3 - 15cm	3 - 15cm		3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm
SACFOR Scale*																																								
OWF_VID_15	0	0	0	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F	0	0	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)																																								
OWF_VID_15	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Superabundant = (S)*, *Abundant = (A)*, *Common = (C)*, *Frequent = (F)*, *Occasional = (O)*, *Rare = (R)* and *Less than Rare = (L)*

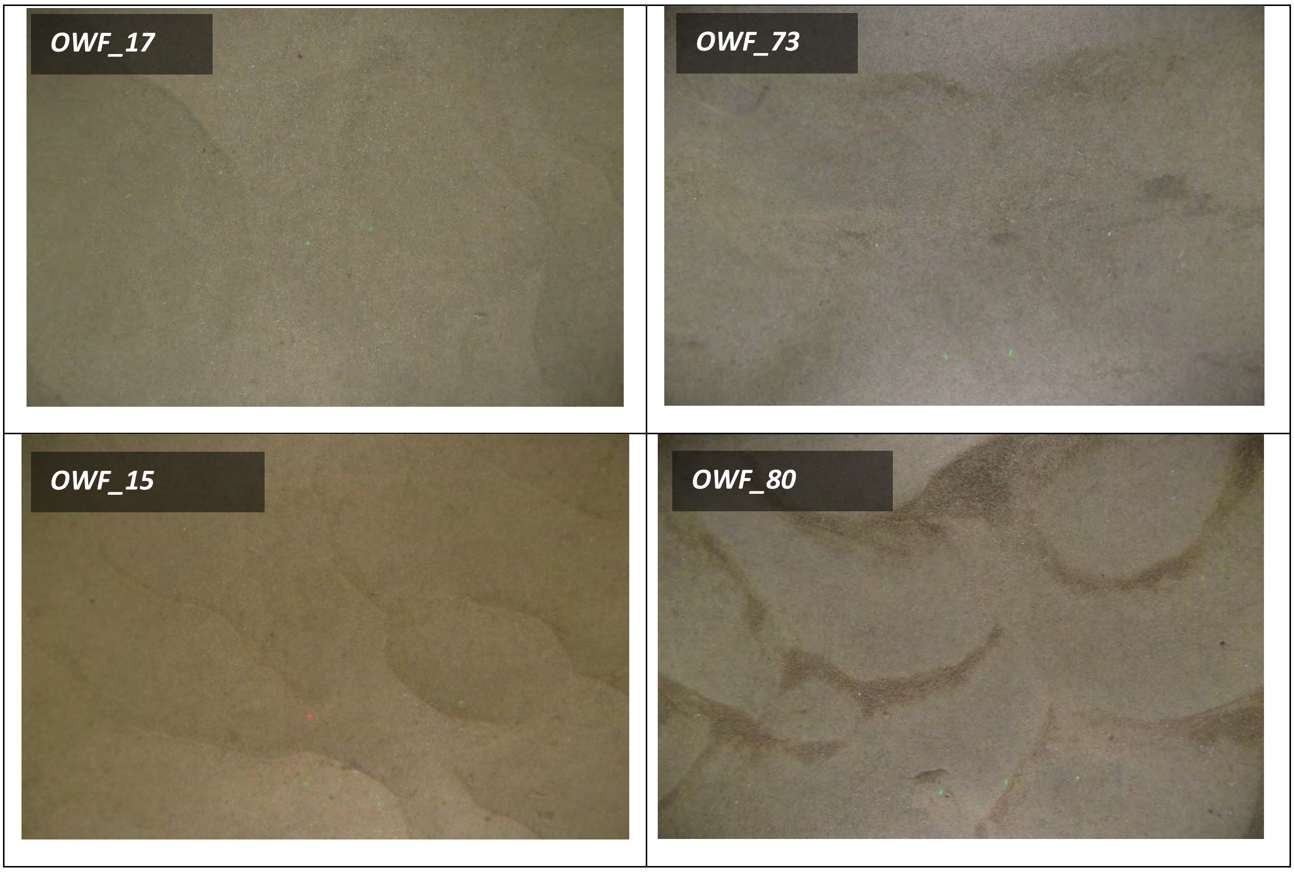


Figure 43 Example Images of Atlantic Circalittoral Sand Habitats

c Offshore Circalittoral Sand (SS.SSa.OSa / MD52)

The deeper (>30m) habitat was limited to the spatial extent of the eastern canyon, which was dominated by rippled heterogeneous coarse sands with variable shell fragments. The sand dominated sediment of the canyon was scoured by bottom currents given the presence of megaripples and sand waves. Described by the JNCC as "*Offshore (deep) circalittoral habitats with fine sands or non-cohesive muddy sands. Very little data is available on these habitats however they are likely to be more stable than their shallower counterparts and characterised by a diverse range of polychaetes, amphipods, bivalves and echinoderms*".

The fauna observed on the seabed photographs and video were similar to those observed for the infralittoral and circalittoral fine sand habitat, with mobile epifauna such as Pogge (*A. cataphractus),* unidentified flatfish (Pleuronectiformes sp.), common starfish (*A. rubens*), shrimp (Caridea sp.), brittle stars (Ophiuroidea sp.) and hermit crabs (*Pagurus* sp.). Sessile epifauna were also observed and included sea chervil (*A. diaphanum*), hornwrack (*F. foliacea*), Sertulariidae and *V. spinosa*. However, unlike the infralittoral and circalittoral habitats, sandeels were absent from this deeper (>30m) sand dominated habitat, potentially indicating a depth preference to the spatial distribution of sandeels across the OWF survey area. The presence of coarse sand and moderate abundance and diversity of observed epifauna is consistent with the level four EUNIS habitat classification MD52 describing 'Atlantic offshore circalittoral sand', corresponding with the JNCC classification SS.SSa.OSa which is within the expected depth range (20-100m) for this biotope.

Two level five biotopes exist within the 'Offshore circalittoral sand' habitat'; however, three of the four characterising taxa (Maldanid polychaetes, *Eudorellopsis deformis* and *Amphiura filiform*) of these biotopes were absent from grab sampling at these stations. A single individual of *Owenia fusiformis* was present at station

OWF_39 in the delineated SS.SSa.OSa habitat type which could indicate a very impoverished version of the JNCC level 5 habitat '*Owenia fusiformis* and *Amphiura filiformis* in offshore circalittoral sand or muddy sand' (SS.SSa.OSa.OfusAfil/MD5212).

The SACFOR scale based on the stills and video analysis confirmed the generally impoverished with species observed during video analysis of station OWF_47 limited to *A. diaphanum* and *A. rubens* (Table 41). The stills analysis captured a greater species diversity, including occasional *Pagurus* sp. and frequent *A. rubens*, in keeping with the expected abundance and occurrence of these species within circalittoral fine sand habitats. Although only one camera transect, OWF_VID_47, characterised this habitat, there was a higher species diversity, which is expected from deeper, more stable biotopes (Table 42). No trawls were carried out at station OWF_47 and hence no trawl data could be compared for the 'Offshore circalittoral sand' habitat.

Example images are given in Figure 44 and the expected extent of the habitat 'Offshore circalittoral sand' (EUNIS: 'Atlantic offshore circalittoral sand', MD52) is mapped Figure 50. The potential level 5 biotope present (SS.SSa.OSa.OfusAfil/MD5212) is mapped in Figure 51.

Table 41 SACFOR Scale from Video Analysis of SS.SSa.Osa Habitat

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		*Actinopterygii*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Haleciidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		*Sabellaria spinulosa*	Serpulidae	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	*3 - 15cm*	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	(%)	(%)	(%)
SACFOR Scale*																																
OWF_VID_47	0	0	0	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0
Percentage Frequency of Occurrence (%)																																
OWF_VID_47	0	0	0	0	0	0	0	0	0	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0	0	0

**Superabundant = (S)*, *Abundant = (A)*, *Common = (C)*, *Frequent = (F)*, *Occasional = (O)*, *Rare = (R)* and *Less than Rare = (L)*

Table 42 SACFOR Scale from Stills Analysis of SS.SSa.Osa Habitat

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida	*Actinopterygii*	Agonus cataphractus	Callionymus lyra	Echiichthys vipera	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Nemertesia sp.	Tubularia sp.	Sertulariidae		Haleciidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	Ensis sp.	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	>15cm	3 - 15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	(%)	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	(%)
SACFOR Scale*																																								
OWF_VID_47	0	0	O	O	0	0	0	0	0	0	F	0	0	0	O	0	0	0	O	0	0	0	0	0	0	0	0	0	O	0	0	0	0	O	F	O	0	0	0	0
Percentage Frequency of Occurrence (%)																																								
OWF_VID_47	0	0	3	3	0	0	0	0	0	0	9	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3	3	0	0	0	0

**Superabundant = (S)*, *Abundant = (A)*, *Common = (C)*, *Frequent = (F)*, *Occasional = (O)*, *Rare = (R)* and *Less than Rare = (L)*

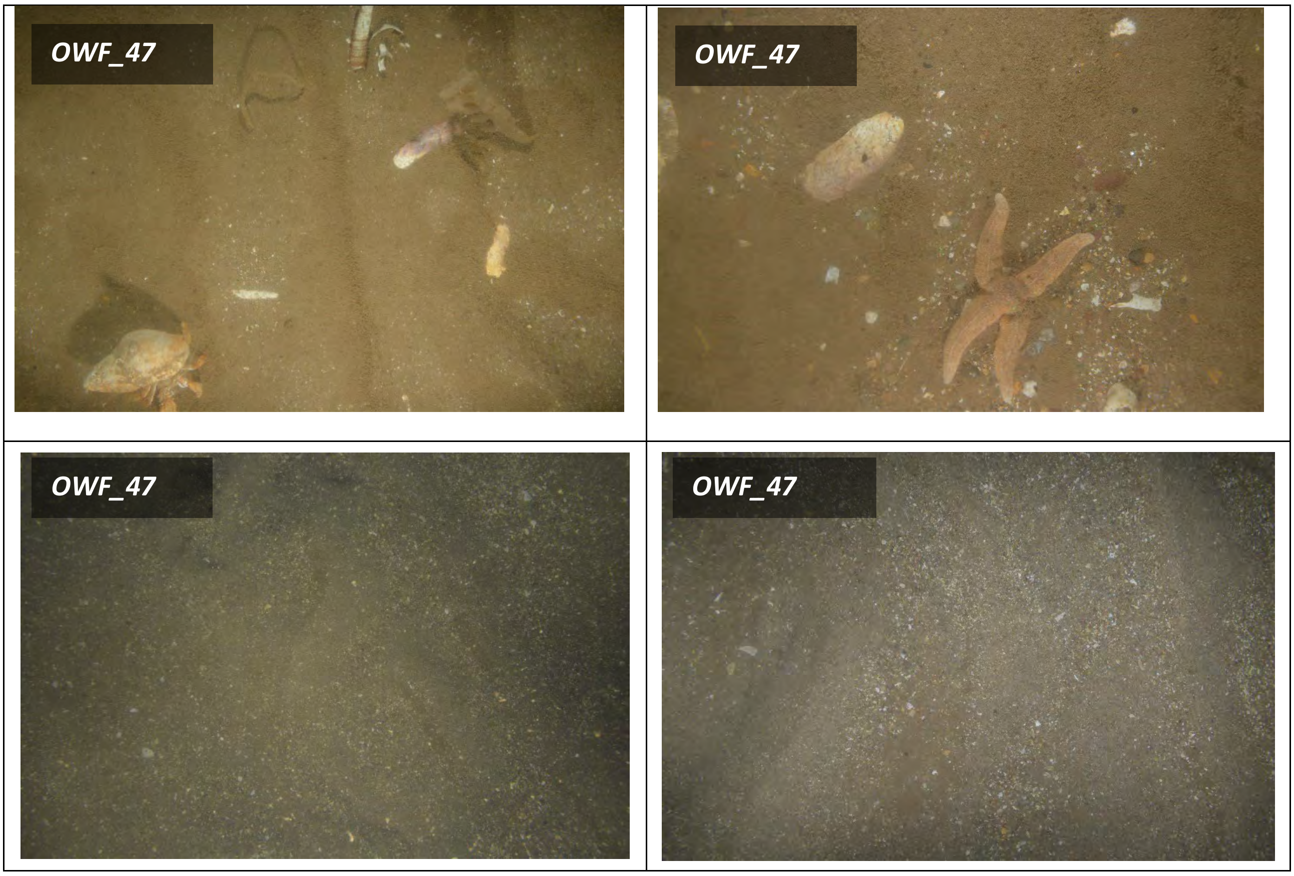


Figure 44 Example Images of Atlantic Offshore Circalittoral Sand Habitats

d Infralittoral Coarse Sediments (SS.SCS.ICS / MB32)

Similarly to the infralittoral fine sand habitats (Section 4.8.1a), habitats dominated by rippled homogeneous coarse sands with minimal shell fragments were associated with the crests of a sandbank (<15m LAT) to the south of the survey area. The infralittoral coarse sediment dominated habitat was influenced by megaripples and sand waves orientated northeast to the west-southwest. Described by the JNCC as "*Moderately exposed habitats with coarse sand, gravelly sand, shingle and gravel in the infralittoral, are subject to disturbance by tidal streams and wave action. Such h*abitats found on the open coast or in tide-swept marine inlets are characterised by a robust fauna of infaunal polychaetes and venerid bivalves".

In the absence of video ground-truthing, the macrofauna grab sample acquired at station OWF_21 indicates a sparse faunal assemblage across this habitat type, with fauna limited to low abundances and diversities of Annelida, Nemertea, Nematoda and Mollusca. The presence of coarse sand and the limited abundance and diversity of infauna is consistent with the level four EUNIS habitat classification MB32 describing 'Atlantic infralittoral coarse sediment', corresponding with the JNCC classification SS.SCS.ICS which is within the expected depth range (10 – 20m) for this biotope. However, only one grab sample was taken from this habitat type, so classification is predominantly based on water depth and sediment composition from PSA and grab photographs.

Seven level five biotopes exist within the 'Infralittoral coarse sediment' habitat; but only two had strong similarities to the survey area, these were: SS.SCS.ICS.SSh 'Sparse fauna on a highly mobile sublittoral shingle (cobbles and pebbles)' and SS.SCS.ICS.Glap '*G. lapidum* in impoverished infralittoral mobile gravel and sand'.

The presence of *G. lapidum* and impoverished fauna recorded supports the assignment of either level five biotope; however, the JNCC state that "*[G. lapidum] is rarely considered a characteristic species and where this is the case it is normally due to the exclusion of other species*". It is possible that 'SS.SCS.ICS.Glap' is not a true biotope, but rather an impoverished, transitional community, which in more settled conditions develops into other more stable communities. The lack of camera data to confirm the presence of *Liocarcinus* sp., *Pagurus* sp. and *U. felina* limit the confident assignment of either level 5 biotopes, however, given the impoverished nature of the sediment the SS.SCS.ICS.SSh could be considered the most likely to be present.

Example grab images are given in Figure 45 and the expected extent of the habitat 'Infralittoral coarse sediment' (EUNIS: 'Atlantic infralittoral coarse sediment, MB32) is mapped Figure 50. Mapping of the possible level 5 biotope SS.SCS.ICS.SSh occurring in the area is displayed in Figure 51.

Figure 45 Example images of Atlantic infralittoral coarse sediment habitats

e *Circalittoral Coarse Sediments (SS.SCS.CCS / MC32)*

Habitats comprised of variable densities of boulders, cobbles, pebbles and shell fragments overlaying sand at water depths greater than 15m were predominantly observed to the east of the survey area. Similarly to the sand dominated habitats, the mobile circalittoral coarse sediment formed megaripples and sand wave bedforms that were orientated northeast to the west-southwest. Relatively smaller patches of shell gravel, pebbles and cobbles were also present in the centre and to the west of the survey area interspersed between the mixed sediment and sand matrices. Described by the JNCC as "*Tide-swept circalittoral coarse sands, gravel and shingle generally in depths of over 15-20 m. This habitat may be found in tidal channels of marine inlets, along exposed coasts and* *offshore. This habitat, as with shallower coarse sediments, may be characterised by robust infaunal polychaetes, mobile crustacea and bivalves".*

Fauna observed on the seabed photographs and video were similar to the assemblages observed in the sand dominated habitats but were of slightly higher diversity and abundance given the greater availability of hard substrate for colonisation. Echinoderms were limited to the common starfish (*A. rubens*). Mobile Arthropoda were also observed and included spider crabs (*Hyas* sp.), unidentifiable crabs (Bachyura sp.) and hermit crabs (*Pagurus* sp.). Mobile Chordata were occasionally observed and included sandeel (*Ammodytes* sp.) and dragonet (*C. lyra*). Sessile organisms were largely limited to the sporadic boulders, cobbles and pebbles found throughout the coarse habitats and included antenna hydroid (*Nemertesia* sp.), Oaten pipe hydroid (*Tubularia* sp.), hydrozoan/bryozoan turf, dead man's fingers (*A. digitatum*), hornwrack (*F. foliacea*), dahlia anemone (*U. felina*), sea chervil (*A. diaphanum*), porifera, barnacles (Cirripedia sp.), Haleciidae, Sertulariidae and *V. spinosa*.

The presence of these species is relatively consistent with the level four EUNIS habitat classification MC32 describing 'Circalittoral coarse sediment', corresponding with the JNCC classification SS.SCS.CCS which is within the expected depth range (10-50m) for this biotope. The observation of sandeels and cobble and pebbles on the underwater video transects warranted further investigation into this habitat type's suitability for sandeel spawning and grounds and the possible presence of Annex I geogenic stony reef habitats (discussed further in Sections 4.8.2d and 4.8.2a).

Five level five biotopes exist within the 'Circalittoral coarse sediment' habitat; but only three had strong similarities to the survey area, these were: SS.SCS.CCS.SpiB '*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles', SS.SCS.CCS.Pkef '*P. kefersteini* and other polychaetes in impoverished circalittoral mixed gravelly sand' and SS.SCS.CCS.MedLumVen '*M. fragilis*, *Lumbrineris* sp. and venerid bivalves in circalittoral coarse sand or gravel'.

The presence of *M. fragilis, G. lapidum, P. kefersteini, S. bombyx, A. squamata*, *S. spinulosa*, Nemertea, *S. triqueter*, *B. crenatus*, bryozoans, *H. falcata*, *Pagurus* sp., and *A. digitatum* could support the assignment of either level five biotope. However, the impoverished species abundances across all the coarse sediment stations could indicate an impoverished occurrence of all three level biotopes.

Similarly, the SACFOR review of the stills and video revealed the presence of 'common' and 'frequent' abundances of *Pagurus* sp. and *Alcyonium digitatum* with frequencies of occurrence ranging between 11% and 29%, respectively, which corresponded with the SS.SCS.CCS.SpiB biotope. Additionally, the epibenthic trawl OWF_T5 retained *A. digitatum and Pagurus bernhardus,* which further corroborates the potential for the SS.SCS.CCS.SpiB biotope to occur within the areas of 'Circalittoral coarse sediment'. However, the SS.SCS.CCS.Pkef and SS.SCS.CCS.MedLumVen could not be determined through video, stills and trawl data review due to the infaunal characterising species, which are not accurately assessed by these survey methods (Table 43 and Table 44). Therefore, cautiously the SS.SCS.CCS.SpiB is considered to be present within areas of 'Circalittoral coarse sediment'.

Example images are given in Figure 46 and the expected extent of the habitat 'Circalittoral coarse sediment' (EUNIS: 'Atlantic circalittoral coarse sediment', MC32) is mapped in Figure 50. The habitat extent to a JNNC level 5 biotope, is mapped in Figure 51, with SS.SCS.CCS.SpiB applied as the most appropriate habitat.

Table 43 SACFOR Scale from Video Analysis of SS.SCS.CCS Habitat

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		*Actinopterygii*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Haleciidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		*Sabellaria spinulosa*	Serpulidae	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	*3 - 15cm*	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	(%)	(%)	(%)
SACFOR Scale*																																
OWF_VID_14	0	0	0	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_50	0	0	0	0	0	0	0	0	R	C	A	0	C	0	0	0	0	0	0	F	C	F	0	0	0	0	F	O	F	0	0	0
OWF_VID_11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_26	0	0	0	0	0	0	0	0	0	0	C	0	0	F	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C	0	0	0
OWF_VID_56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)																																
OWF_VID_14	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_50	0	0	0	0	0	0	0	0	100	100	100	0	43	0	0	0	0	0	0	29	29	43	0	0	0	0	29	14	14	0	0	0
OWF_VID_11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_26	0	0	0	0	0	0	0	0	0	0	50	0	0	100	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0	0
OWF_VID_56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Superabundant = (S), Abundant = (A), Common = (C), Frequent = (F), Occasional = (O), Rare = (R) and Less than Rare = (L)*

Table 44 SACFOR Scale from Stills Analysis of SS.SCS.CCS Habitat

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida	*Actinopterygii*	Agonus cataphractus	Callionymus lyra
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	>15cm	3 - 15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	(%)	3 - 15cm	3 - 15cm	3 - 15cm
SACFOR Scale*																				
OWF_VID_14	0	0	0	0	0	0	0	0	0	0	O	0	0	0	0	0	0	0	0	0
OWF_VID_50	0	0	0	0	0	0	0	0	0	R	C	C	F	F	O	0	0	0	0	0
OWF_VID_11	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0	0	0	0	0
OWF_VID_26	0	0	0	0	0	0	0	0	0	0	F	0	0	0	F	0	0	0	0	0
OWF_VID_30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)																				
OWF_VID_14	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
OWF_VID_50	0	0	0	0	0	0	0	0	0	17	72	14	8	3	6	0	0	0	0	0
OWF_VID_11	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
OWF_VID_26	0	0	0	0	0	0	0	0	0	0	12	0	0	0	12	0	0	0	0	0
OWF_VID_30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa	Echiichthys vipera	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Nemertesia sp.	Tubularia sp.	Sertulariidae		Halecidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	Ensis sp.	Porifera
Size Class	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	(%)
SACFOR Scale*																				
OWF_VID_14	0	0	0	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_50	0	0	0	0	F	C	O	O	F	0	0	0	F	O	0	0	0	0	0	0
OWF_VID_11	0	0	0	0	0	0	0	0	O	F	0	0	0	0	0	0	0	0	0	0
OWF_VID_26	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0	0	0	0	0
OWF_VID_30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_37	0	0	O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)																				
OWF_VID_14	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_50	0	0	0	0	17	11	3	3	14	0	0	0	22	3	0	0	0	0	0	0
OWF_VID_11	0	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0
OWF_VID_26	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0
OWF_VID_30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_37	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: **Superabundant = (S), Abundant = (A), Common = (C), Frequent = (F), Occasional = (O), Rare = (R)* and *Less than Rare = (L)*

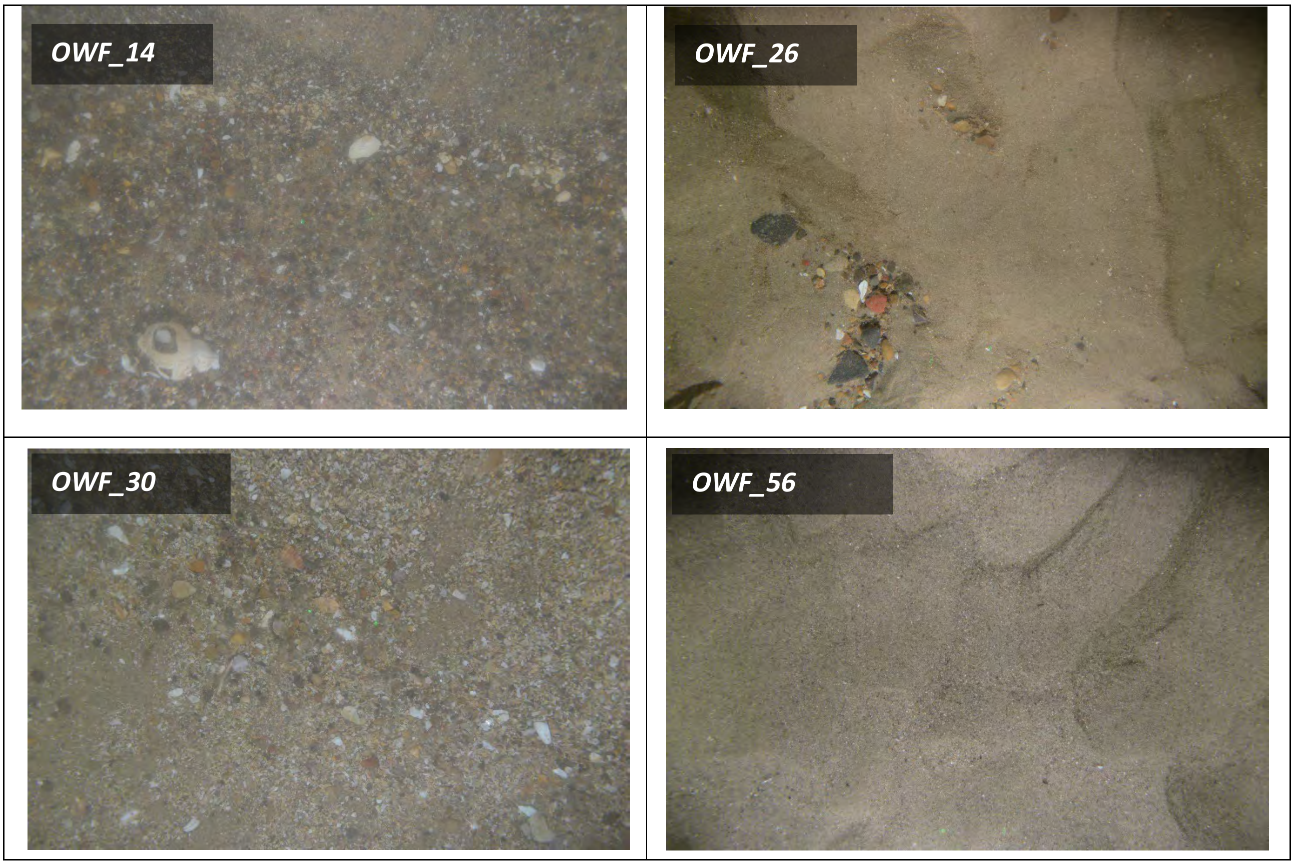


Figure 46 Example Images of Circalittoral Coarse Sediment Habitats

f Offshore Circalittoral Coarse Sediments (SS.SCS.OCS / MD32)

Similarly to the offshore circalittoral sand habitat, the offshore circalittoral coarse sediment was limited to the deeper (>30m) extents of the westernmost canyon feature. The habitat consisted of rippled sand with variable densities of shell fragments, which formed megaripples and sand waves due to the scouring of bottom currents funnelling through the canyon. Described by the JNCC as "*Offshore (deep) circalittoral habitats with coarse sands and gravel or shell. This habitat may cover large areas of the offshore continental shelf although there is relatively little quantitative data available. Such habitats are quite diverse compared to shallower versions of this habitat and are generally characterised by robust infaunal polychaetes and bivalve species*.

Fauna observed on the seabed photographs and video were impoverished when compared to the assemblages observed in the circalittoral coarse sediment habitats due to the reduced availability of hard substrate in the form of cobbles and pebbles. As such, visible fauna were limited to unidentified fish (Actinopterygii), common starfish (*A. rubens*), spider crabs (*Hyas* sp.) and hermit crabs (*Pagurus* sp.). The presence of these species is relatively consistent with the level four EUNIS habitat classification MD32 describing 'Atlantic offshore circalittoral coarse sediment', corresponding with the JNCC classification SS.SCS.OCS which is within the expected depth range (20-100m) for this biotope.

Two level five biotopes exist within the 'Offshore circalittoral coarse sediment' habitat; however, none of the habitats had strong similarities to the survey area due to the impoverished fauna, which could be attributed to only a single grab sample acquired within this habitat classification. The impoverished fauna further limited potential assignment to the level five circalittoral coarse sediment biotopes. Similarly, SACFOR stills and video reviews revealed impoverished epifauna, with only spider crabs (*Hyas* sp.) commonly observed with a percentage frequency of 33% (Figure 48 and Figure 49).

Furthermore, the epibenthic trawl macrofauna data revealed diverse epibenthic assemblages in areas of SS.SCS.OCS, however, the abundance of individuals recovered was low (Section 4.7.2). The nature of the sediments at this location lead to low grab recovery, therefore, trawl data may be more representative of the benthic community at this station. No characteristic infauna or epifauna species indicative of the level five biotopes highlighted above were recovered, therefore, the overarching classification was kept at 'Offshore circalittoral coarse sediment' based on the water depth (20-100m) and the epifauna observed during video analysis. However, for the purpose of classifying and mapping biotopes to JNCC level 5 (Figure 51), eDNA analysis was utilised (See Doc Ref: UK4855H-824-RR-07). In the areas of SS.SCS.OCS, *Hesionura elongata* eDNA was recorded but *Protodorvillea kefersteini* was not, suggesting an impoverished versin of the JNCC level 5 biotope *Hesionura elongata* and *Protodorvillea kefersteini* in offshore coarse sand' (SS.SCS.OCS.HeloPkef) being present.

Example images are given in Figure 47 and the expected extent of the habitat 'Offshore circalittoral coarse sediment' (EUNIS: 'Atlantic offshore circalittoral coarse sediment', MD32) is mapped in Figure 50 with the impoverished level 5 habitat (SS.SCS.OCS.HeloPkef) mapped in Figure 51.

Table 45 SACFOR Scale from Video Analysis of SS.SCS.OCS Habitat

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		*Actinopterygii*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Haleciidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		*Sabellaria spinulosa*	Serpulidae	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	*3 - 15cm*	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	(%)	(%)	(%)
SACFOR Scale*																																
OWF_VID_19	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)																																
OWF_VID_19	0	0	0	0	0	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Superabundant = (S), Abundant = (A), Common = (C), Frequent = (F), Occasional = (O), Rare = (R) and Less than Rare = (L)*

Table 46 SACFOR Scale from Stills Analysis of SS.SCS.OCS Habitat

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida	*Actinopterygii*	Agonus cataphractus	Callionymus lyra	Echichthys vipera	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Nemertesia sp.	Tubularia sp.	Sertulariidae		Haleciidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	Ensis sp.	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	>15cm	3 - 15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	(%)	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	(%)
SACFOR Scale*																																								
OWF_VID_19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)																																								
OWF_VID_19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Superabundant = (S), Abundant = (A), Common = (C), Frequent = (F), Occasional = (O), Rare = (R) and Less than Rare = (L)*

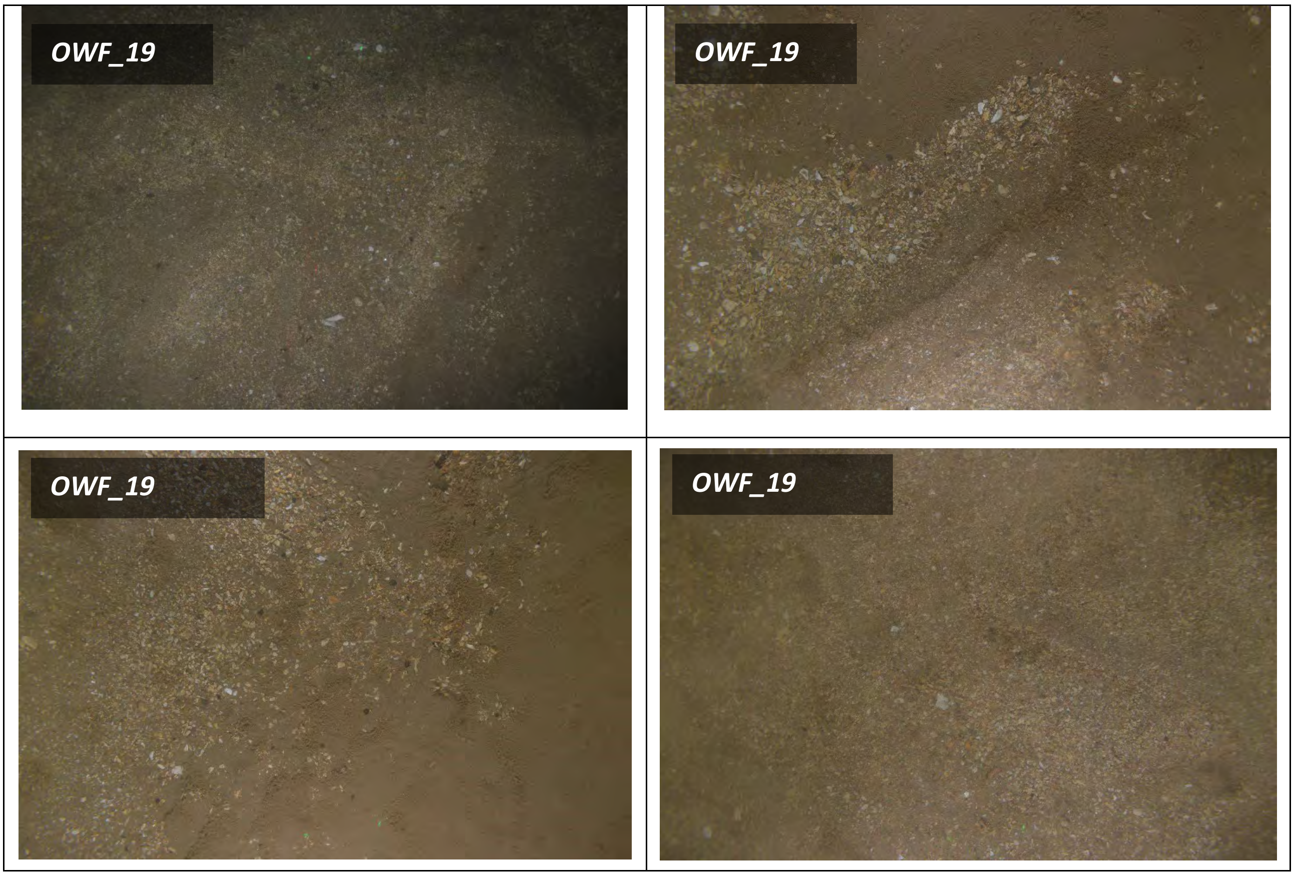


Figure 47 Example Images of Atlantic Offshore Circalittoral Coarse Sediment Habitats

g Circalittoral Mixed Sediments (SS.SMx.CMx / MC42)

This habitat did not occur in isolation and instead formed intermediate habitats within overarching coarse sediments. Intermediate areas of coarse and mixed sediments were ubiquitous to the east, centre and west of the survey area and were less mobile than their purely coarse sediment or sand dominated counterparts, with a general absence of megaripples and sand waves. Similarly to the circalittoral coarse sediments, circalittoral mixed sediments were comprised of variable abundances of cobbles, pebbles and shell gravel overlaying coarse sediments with variable proportions of clay/silt. Circalittoral mixed sediments are described by the JNCC as "*Mixed (heterogeneous) sediment habitats in the circalittoral zone (generally below 15-20 m) including well mixed muddy gravelly sands or very poorly sorted mosaics of shell, cobbles and pebbles embedded in or lying upon the mud, sand or gravel".*

Similarly, to the overarching coarse sediment, fauna observed on the seabed photographs and video included a variety of mobile fauna, including several echinoderms such as common starfish (*A. rubens*) and brittle stars (Ophiuroidea sp.). Mobile Arthropoda were also observed such as hermit crabs (*Pagurus* sp.), brown crab (*C. pagurus*), spider crab (*Hyas* sp.), velvet swimming crab (*N. puber*), harbour crabs (*L. depurator*), and unidentified crabs (Brachyura sp.). Mobile Chordata were occasionally observed including dragonet (*C.* lyra.), plaice (*P. platessa*), flatfish (Pleuronectiformes sp.), lesser weaver fish (*E. vipera*), Pogge (*A. cataphractus*), sandeels (*Ammodytidae* sp.) and unidentified fish (Actinopterygii). Sessile organisms which settled onto the boulders, cobbles and pebbles included antenna hydroid (*Nemertesia* sp.), oaten pipe hydroid (*Tubularia* sp.), hydrozoan/bryozoan turf, unidentified anemones (Actinaria sp.), dead man's fingers (*A. digitatum*), dahlia anemone (*U. felina*), barnacles (Cirripedia sp.), Serpulidae tubes, hornwrack (*F. foliacea*), Porifera, *V. spinosa*, Haleciidae, cheilostomatida, sea chervil (*A. diaphanum*), sertulariidae, sand mason worm (*L. conchilega*), ross worm (*S. spinulosa*) and slipper limpet (*C. fornicata*). The relatively high species diversity of 34 out of a total of 36 epifaunal species observed was unsurprising given the range of sediment types encompassed in the intermediate coarse and mixed sediment habitat, ranging from variable proportions of fines to matrices of cobbles and pebbles overlaying variable densities of shell gravel.

The presence of these faunal assemblages indicates conformance towards the level four EUNIS habitat classification MC42 describing 'Circalittoral mixed sediment', corresponding with the JNCC classification SS.SMx.CMx, which is within the depth range of (15-20m) for this biotope. The abundance of faunal covered boulders, cobbles, pebbles across the OWF survey area and the presence of *S. spinulosa* aggregations warrants further investigation as potential Annex I geogenic stony and biogenic reef habitats (discussed further in Section 4.8.2a).

The intermediate coarse and mixed sediment habitats to the east, centre and west of the survey area showed strong conformity to the level five biotope SS.SMx.CMx.FluHyd '*F. foliacea* and *H. falcata* on tide-swept circalittoral mixed sediment' with 11 characterising species such as hornwrack (*F. foliacea*), hydroids (*H. falcata*; *Nemertesia* sp.), common starfish (*A. rubens*), dahlia anemone (*U. felina*), hermit crab (*Pagurus* sp.), sea chervil (*A. diaphanum*), dead man's fingers (*A. digitatum*), *S. triqueter*, *V. spinosa* and *Balanus crenatus*.

Sabellaria spinulosa aggregations observed forming crusts over pebbles and cobbles at station OWF_76 also indicate areas where *Sabellaria* is present within the 'Circalittoral coarse sediment' and 'Circalittoral mixed sediment' intermediate habitat conform to the level five SS.SBR.PoR.SspiMx '*S. spinulosa* on stable circalittoral mixed sediment'. Station OWF_76 had a presence of 12 out of 17 main characterising species. However, due to the absence of texture differences in the SSS/MBES data, the areas of *S. spinulosa* at OWF_76 and across the wider survey area could not be accurately mapped. Therefore, the spatial extent of the SS.SBR.PoR.SspiMx habitats are not known and were not mapped in Figure 50. Although the only aggregations of *S. spinulosa* were identified at OWF_76, *S. spinulosa* was identified and enumerated at a further 15 stations across the site, with abundances ranging between 1 individual per 0.1m^2 to 42 individuals per 0.1m^2, indicating that the habitat has the potential to develop across the wider survey area on available hard substrates.

SACFOR abundances of characterising species were either in keeping or more abundant than their expected JNCC SACFOR abundances and frequency of occurrence for the aforementioned biotopes, with 'superabundant' to 'occasional' abundances of *F. foliacea*, *Pagurus* sp., *A. diaphanum*, *V. spinosa*, *A. digitatum*, *U. feline* and *A. rubens*, supporting an assignment to the SS.SMx.CMx.FluHyd biotope (Table 47 and Table 48). Additionally, the epibenthic trawls, OWF_T6A and OWF_T9 at stations OWF_57 and OWF_79, respectively, recorded a presence of *A. diaphanum*, *F. foliacea*, *A. rubens*, *P. bernhardus*, *A. digitatum* and Actinaria, which could have contained *U. feline* and further indicate the potential for the biotope to occur within areas of intermediate circalittoral mixed and circalittoral coarse sediments.

The epifauna within the OWF survey area showed a conformity to the SS.SMx.CMx.FluHyd biotope with pockets of the SS.SBR.PoR.SspiMx biotope where *Sabellaria* was present. However, the latter biotope could not be mapped due to a lack of clear differentiation in acoustic facies across the circalittoral mixed and coarse sediment areas.

Example images are given in Figure 48 and the expected extent of the level 4 habitat 'Circalittoral mixed sediment' (EUNIS: 'Atlantic circalittoral mixed sediment', MC42) is mapped in Figure 50 as 'SS.SCS.CCS' with patches of 'SS.SMx.CMx'. In Figure 51, the extent of SS.SMx.CMx.FluHyd is mapped with a note that the SS.SBR.PoR.SspiMx is present exclusively at OWF_76.

Table 47 SACFOR Scale from Video Analysis of SS.SCS.CCS Habitat with SS.SMx.CMx Patches

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		*Actinopterygii*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Haleciidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		*Sabellaria spinulosa*	Serpulidae	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	(%)	(%)	(%)
SACFOR Scale*																																
OWF_VID_23	0	0	0	0	0	0	0	0	L	0	0	0	0	0	C	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_31	0	L	0	0	0	0	C	0	L	F	A	0	0	F	0	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	L	0
OWF_VID_32	0	0	0	0	0	0	0	0	0	0	A	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0
OWF_VID_33	0	L	0	0	0	0	0	0	L	C	S	0	0	F	0	0	0	0	0	0	0	C	0	0	C	0	0	0	0	0	L	0
OWF_VID_45	0	L	0	0	0	0	0	0	L	C	A	0	0	0	0	0	0	0	0	0	0	0	C	0	0	0	0	0	C	0	L	0
OWF_VID_57	L	0	0	0	C	0	0	0	R	C	A	C	0	0	0	0	0	0	0	C	A	F	0	F	0	0	C	0	0	L	0	0
OWF_VID_58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_64	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_65	0	0	0	0	0	0	0	0	L	C	A	0	C	F	A	0	0	0	0	0	C	O	0	0	0	0	F	F	F	0	0	L
OWF_VID_70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_75	0	L	0	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0	0	0	0	L	0
OWF_VID_76	L	L	0	O	0	O	0	F	0	C	C	O	F	F	C	0	0	0	0	F	C	F	C	0	0	F	F	F	0	L	L	0
OWF_VID_79A	0	L	0	0	0	0	0	0	L	C	A	0	0	C	C	0	0	0	0	F	C	F	0	0	0	0	F	F	0	0	L	0
Percentage Frequency of Occurrence (%)																																
OWF_VID_23	0	0	0	0	0	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_31	0	100	0	0	0	0	50	0	100	50	100	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	100	0

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	*Cancer pagurus*	*Hyas* sp.		*Liocarcinus* sp.	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		*Actinopterygii*	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Sertulariidae		Haleciidae		Actinaria sp.	*Urticina felina*	*Asterias rubens*		*Sabellaria spinulosa*	Serpulidae	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	(%)	(%)	(%)
Percentage Frequency of Occurrence (%)																																
OWF_VID_32	0	0	0	0	0	0	0	0	0	0	100	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0
OWF_VID_33	0	100	0	0	0	0	0	0	100	50	100	0	0	50	0	0	0	0	0	0	0	100	0	0	50	0	0	0	0	0	100	0
OWF_VID_45	0	100	0	0	0	0	0	0	100	100	100	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	100	0	100	0
OWF_VID_57	50	0	0	0	50	0	0	0	100	100	100	50	0	0	0	0	0	0	0	50	50	50	0	50	0	0	100	0	0	50	0	0
OWF_VID_58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_64	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_65	0	0	0	0	0	0	0	0	100	75	50	0	25	50	75	0	0	0	0	0	25	25	0	0	0	0	75	50	25	0	0	25
OWF_VID_70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_76	0	50	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	50	0
OWF_VID_79A	0	50	0	0	0	0	0	0	50	50	50	0	0	50	50	0	0	0	0	100	50	50	0	0	0	0	100	50	0	0	50	0

**Superabundant = (S), Abundant = (A), Common = (C), Frequent = (F), Occasional = (O), Rare = (R) and Less than Rare = (L)*

Table 48 SACFOR Scale from Video Analysis of SS.SCS.CCS Habitat with SS.SMx.CMx Patches

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida	*Actinopterygii*	Agonus cataphractus	Callionymus lyra	Echichthys vipera	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Nemertesia sp.	Tubularia sp.	Sertulariidae		Haleciidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	Ensis sp.	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	>15cm	3 - 15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	(%)	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	(%)
SACFOR Scale*																																								
OWF_VID_23	0	0	0	0	0	0	0	0	0	0	F	C	0	0	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_31	0	R	0	0	0	0	0	0	0	R	C	C	0	0	0	0	R	0	0	0	0	0	0	0	0	0	0	0	C	0	0	0	O	0	0	0	O	0	O	0
OWF_VID_32	0	0	0	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	F	0	0	0	0	0	0	R
OWF_VID_33	0	R	0	0	0	0	0	0	0	R	A	C	O	0	0	0	0	0	0	0	0	0	0	0	0	0	O	0	C	0	F	0	F	F	0	0	0	0	0	0
OWF_VID_45	0	R	0	0	0	0	0	0	0	R	C	0	O	0	O	0	L	0	0	0	0	0	0	0	0	0	0	0	C	0	0	0	F	F	0	0	0	0	F	0
OWF_VID_57	R	L	0	0	0	F	0	0	O	R	A	C	F	0	F	0	L	0	0	O	O	0	0	0	C	C	O	0	C	0	F	0	C	F	0	0	0	0	0	R
OWF_VID_58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_64	0	0	0	0	0	0	0	0	0	0	0	0	O	0	0	0	0	0	0	0	0	F	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0	0
OWF_VID_65	0	0	0	0	0	0	0	0	0	R	C	0	F	0	C	C	0	0	0	0	0	0	0	0	F	0	0	0	F	0	0	O	O	F	0	0	0	0	0	L
OWF_VID_70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_75	0	R	0	0	0	0	0	0	0	L	O	0	0	0	F	0	0	0	0	0	0	0	0	0	O	0	0	0	0	0	0	0	F	0	0	0	0	0	0	0
OWF_VID_76	F	R	0	F	O	0	F	F	0	L	F	F	C	F	F	0	0	0	0	0	0	0	0	0	F	C	0	O	C	0	0	F	F	F	0	F	0	O	F	0
OWF_VID_79A	L	L	O	0	0	0	0	0	0	L	F	0	F	0	C	0	0	0	0	O	0	0	0	0	F	C	0	0	F	0	0	0	F	F	0	0	0	0	0	0
Percentage Frequency of Occurrence (%)																																								
OWF_VID_23	0	0	0	0	0	0	0	0	0	0	14	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_31	0	100	0	0	0	0	0	0	0	100	75	25	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	55	0	0	0	5	0	0	0	5	0	5	0
OWF_VID_32	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	10	0	0	0	0	0	0	10

Taxa	*Sabellaria spinulosa*	Serpulidae	Caridea	*Pagurus* sp.	Brachyura sp.	*Cancer pagurus*	*Hyas* sp.	*Liocarcinus* sp.	Necora puber	Cirripedia	*Alcyonidium diaphanum*		*Flustra foliacea*		*Vesicularia spinosa*		Cheilostomatida	*Actinopterygii*	Agonus cataphractus	Callionymus lyra	Echiichthys vipera	Pleuronectiformes	Ammodytidae sp.		*Alcyonium digitatum*		Nemertesia sp.	Tubularia sp.	Sertulariidae		Haleciidae	Actinaria sp.	*Urticina felina*	*Asterias rubens*		Ophiuroidea	*Buccinum undatum*	*Crepidula fornicata*	Ensis sp.	Porifera
Size Class	(%)	(%)	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	>15cm	3 - 15cm	3 - 15cm	(%)	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	(%)	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	>15cm	3 - 15cm	3 - 15cm	3 - 15cm	3 - 15cm	(%)
Percentage Frequency of Occurrence (%)																																								
OWF_VID_33	0	100	0	0	0	0	0	0	0	100	90	14	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	62	0	19	0	10	19	0	0	0	0	0	0
OWF_VID_45	0	100	0	0	0	0	0	0	0	100	100	0	5	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	43	0	0	0	10	10	0	0	0	0	10	0
OWF_VID_57	9	4	0	0	0	4	0	0	4	39	83	4	17	0	9	0	4	0	0	4	4	0	0	0	35	17	4	0	74	0	9	0	78	13	0	0	0	0	0	22
OWF_VID_58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_64	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
OWF_VID_65	0	0	0	3	0	3	0	0	0	21	17	0	10	0	52	17	0	0	0	0	0	0	0	0	14	0	0	0	7	0	0	3	7	14	0	0	0	0	0	3
OWF_VID_70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OWF_VID_75	0	26	0	0	0	0	0	0	0	4	4	0	0	0	9	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0
OWF_VID_76	72	39	0	17	6	0	6	11	0	6	17	6	33	6	22	0	0	0	0	0	0	0	0	0	39	11	0	6	61	0	0	28	22	39	0	11	0	6	11	0
OWF_VID_79A	8	8	3	0	0	0	0	0	0	3	14	0	8	0	59	0	0	0	0	3	0	0	0	0	27	14	0	0	22	0	0	0	19	8	0	0	0	0	0	0

**Superabundant = (S)*, *Abundant = (A)*, *Common = (C)*, *Frequent = (F)*, *Occasional = (O)*, *Rare = (R)* and *Less than Rare = (L)*

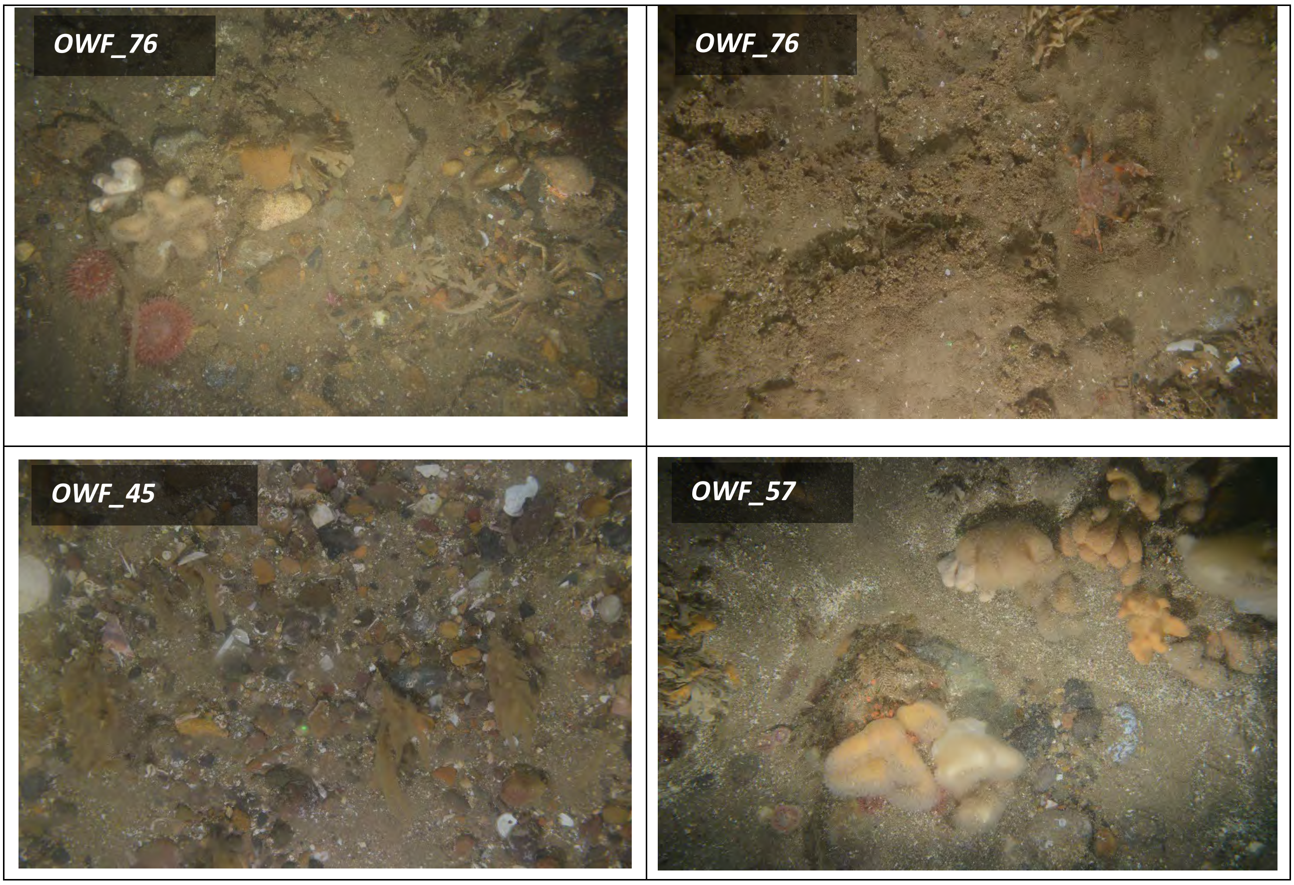


Figure 48 Example Images of Circalittoral Mixed Sediment Habitats

h Anthropogenic habitats (No corresponding JNCC/EUNIS code)

During the environmental sampling operations, very little anthropogenic habitat was identified, with anthropogenic debris identified by the underwater video limited to fishing gear mooring rope at station OWF_31. The geophysical inspection of the OWF survey also revealed a low abundance of anthropogenic debris, with two wire ropes, three suspected shipwrecks, jack-up footprints, 15 suspected UXO and rock dump. The limited anthropogenic debris were unsurprising as the survey was conducted outside of the platforms 500m exclusion zones.

Not all anthropogenically derived debris have deleterious effects on the underlying benthic communities, as the introduction of additional hard substrates into the marine environment can increase epifaunal biodiversity by providing hard attachment in an otherwise homogeneous soft sediment environment (Leewis *et al.*, 2000; Hiscock *et al.*, 2010). Example images of anthropogenic habitat are provided in Figure 49, while the location of rock dump and pipeline infrastructure habitat is mapped in Figure 50.

Figure 49 Example Images of Anthropogenic Debris

i Non-native Invasive Species

Non-native marine species are of particular concern when they become invasive and thus are detrimental to native species. Invasive species have the potential to displace native species, modify habitats, cause the loss of native genotypes, alter community structure, affect ecosystem processes, disrupt the provision of ecosystem services, negatively impact human health and cause substantial economic losses (Cinar *et al.*, 2014).

The macrofauna data revealed five individuals of a single non-native species, slipper limpet (*Crepidula fornicata)*, at station OWF_04, while the underwater video data revealed the presence of *C. fornicata* at station OWF_76. The slipper limpet was unintentionally introduced to the UK with imports of the eastern oyster *Crassostrea virginica* and the Pacific oyster *Crassostrea gigas* in the 1800s (Preston *et al.*, 2020). The depletion of oyster habitat due to overfishing exacerbated the spread and abundance of *C. fornicata* over the years, making this species a well-established invasive species and a major concern across Europe (Blanchard *et al.*, 1997).

C. fornicata has already caused serious ecological and economic impacts across Europe. It has been known to be detrimental to habitat suitability for juvenile fish (Le Pape *et al.*, 2004), as the limpet impacts the survival and shell growth of other commercially important bivalves such as the blue mussel *Mytilus edulis* (Thieltges *et al.*, 2005) and modify habitats by converting predominantly sandy substrata into anoxic mud dominated substrata through the production of mucoidal pseudofaeces (Streftaris *et al.*, 2006). The reduction of suitable substrata means habitats become unsuitable for other species, including oysters that prefer less muddy waters (Barnes *et al.*, 1973). The European oyster (*Ostrea edulis*) is negatively impacted due to the lack of suitable substrate for larval settlement (Blanchard *et al.*, 1997), impeding recruitment and potential restoration efforts on the seabed (Preston *et al.*, 2020). Sea users who find slipper limpets are advised to report to the Marine Biological Association.

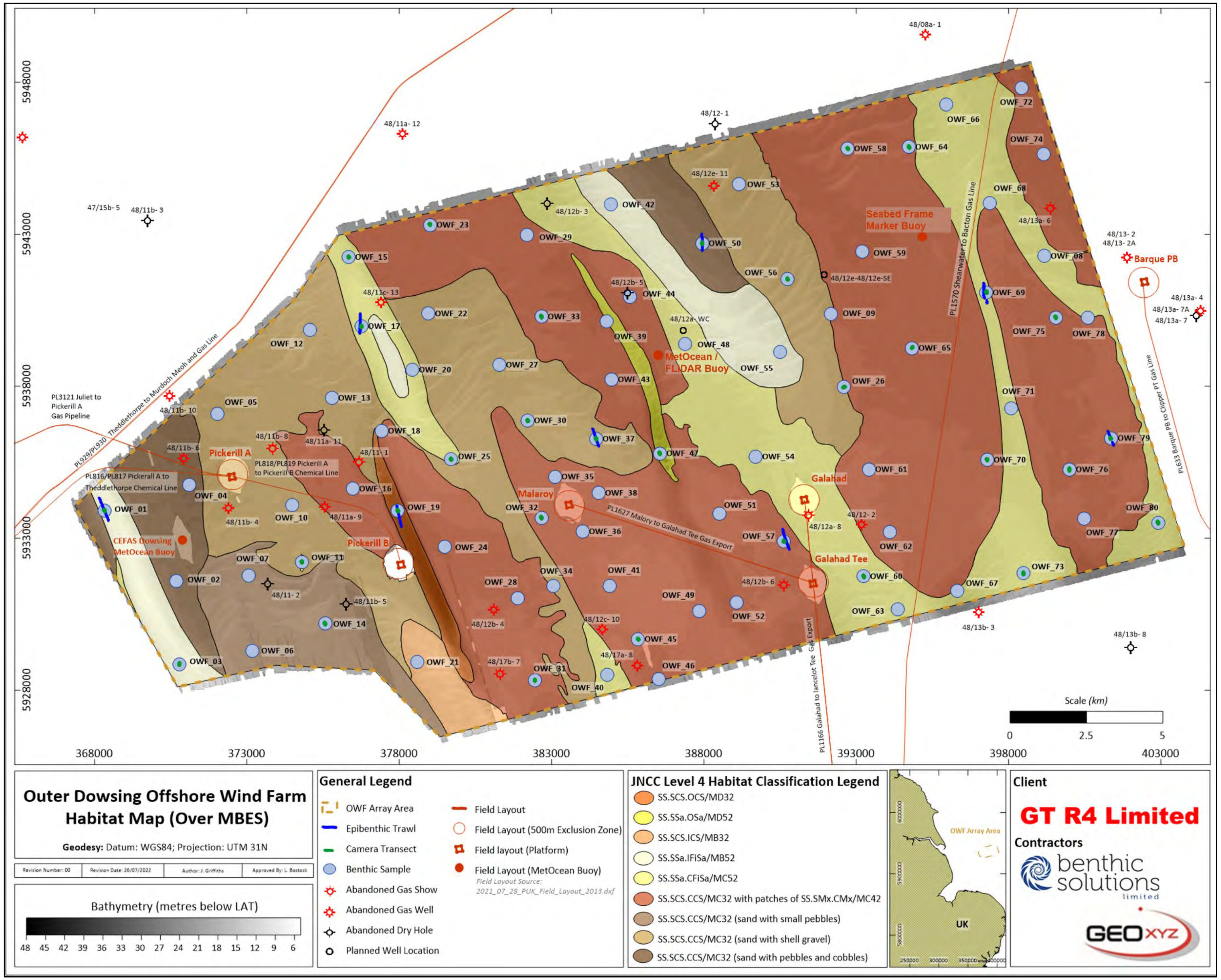


Figure 50 Habitat Distribution (to JNCC Level 4) over MBES Data for the OWF Survey Area

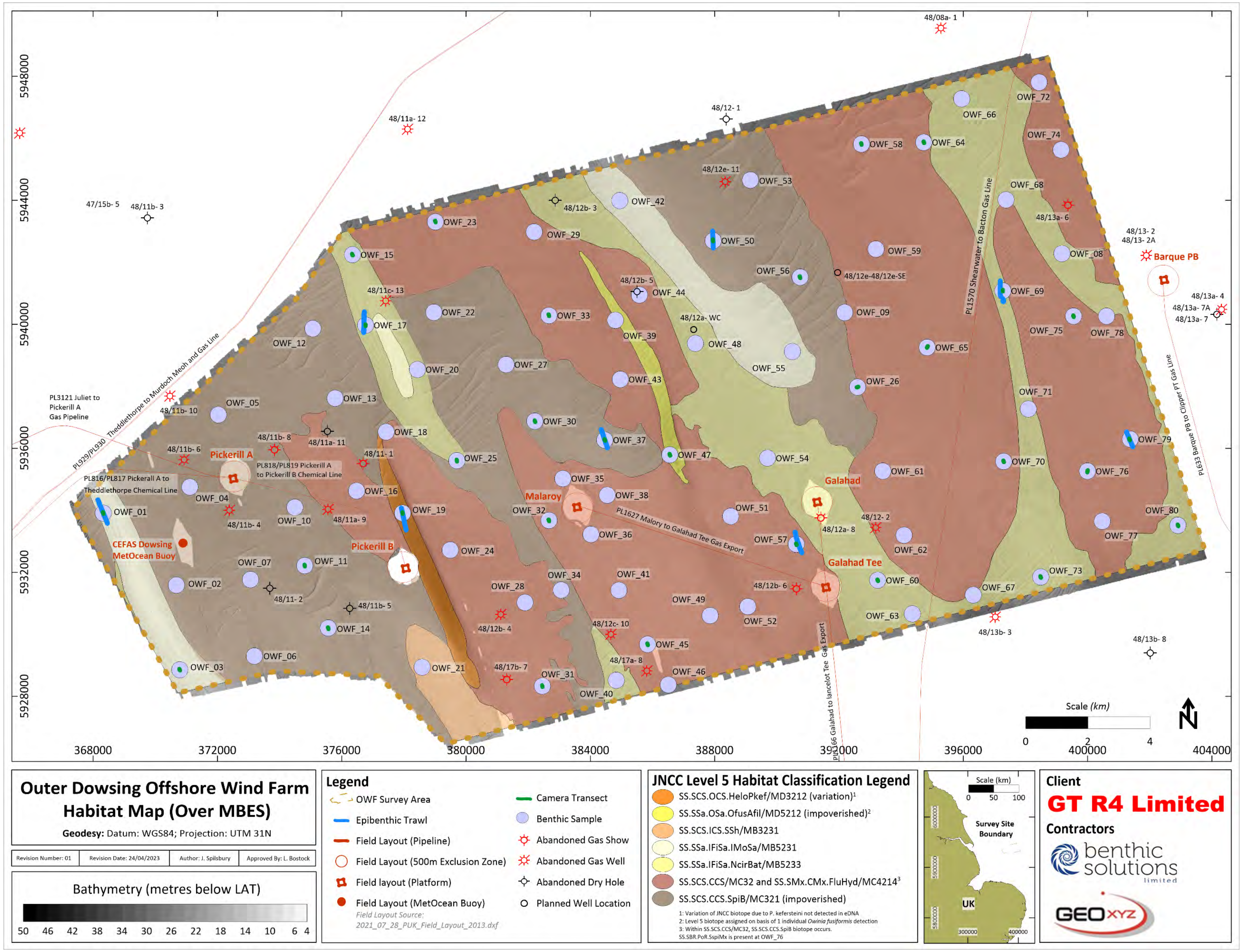


Figure 51 Habitat Distribution (to JNCC Level 5) over MBES Data for the OWF Survey Area

4.8.2 Potential Sensitive Habitats and Species

As previously discussed, there are a number of potentially sensitive habitats and species which are known to occur in the wider region (North Sea), including:

- Stony reefs formed from boulders and cobbles;
- Biogenic reefs formed from *Sabellaria spinulosa*;
- Ocean quahog (*Arctica islandica*);
- Lesser sandeel (*Ammodytes marinus*) spawning and nursery grounds;
- Herring spawning and nursery grounds;
- Sandbanks which are slightly covered by sea water all the time.

These habitats and species are listed by one or more International Conventions, European Directives or UK Legislation (including devolved UK administrations).

a Annex I Stony Reef

Cobbles and rare boulders were recorded along nine transects (OWF_VID_23, OWF_VID_31, OWF_VID_32, OWF_VID_45, OWF_VID_50, OWF_VID_57, OWF_VID_65, OWF_VID_76 and OWF_VID_79A) within the OWF survey area. Matrices of gravelly sand, sandy gravel and muddy sandy gravel with cobbles and boulders were observed across the site, with these areas classed as 'Circalittoral mixed sediment' and 'Circalittoral coarse sediment'. These transects were investigated further to assess whether any areas have the potential to be classified as EC Habitats Directive Annex I stony reef.

The seabed camera ground-truthing data were assessed for potential stony reefs using the criteria proposed by Irving (2009). This breaks down the assessment criteria measures of 'quality' or 'reefiness' as outlined in Table 49. This is based on a minimum cobble size of 64mm being present and indicating relief above the natural seabed where >10% of the matrix are cobble related and a minimum area of around 25m^2 is recorded. The stony reef assessment was based on acquired underwater stills taken every 10 seconds along the camera transect. When this produced underwater stills that were out of focus due to environmental conditions (boat movement, seabed slope, turbidity etc) then additional screengrabs were taken in the office (from the HD video footage) as close to the 10-second interval as possible, but which may have varied by a few seconds to enable a clear enough focus on the screengrab. Each still and screengrab was assessed for changes in density, height and cover of cobbles and boulders. Each section of the transects where cobbles or boulders were detected was then analysed and categorised according to its composition, elevation and extent.

Table 49 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	<64mm	64mm-5m	>5m
Extent (m^2)	<25m^2	>25m^2	>25m^2	>25m^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 25m². This 'composition' characteristic also includes 'patchiness'.*

(b) *Minimum height (64mm) 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' and 'overall reefiness' using a method developed by BSL staff (Table 50 and Table 51). This provided a reef structure value that could then be assessed against extent, where applicable, to provide a measure of overall reefiness, as illustrated in Table 51. As separate thresholds for 'Low', 'Medium' and 'High' stony reef extent were not given in Irving (2009), the overall reefiness is determined by reef structure provided that the extent of the stony reef covers a minimum of 25m^2. Reefiness parameters are colour coded to aid visual assessment of the data.

Table 50 Stony Reef Structure Matrix (after Irving, 2009)

Reef Structure Matrix			Elevation			
			Flat	<64mm	64mm-5m	>5m
			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

Table 51 Overall Stony Reefiness Matrix (Structure vs Extent)

Overall Reefiness Matrix			Reef Structure (incl. Composition and Elevation)			
			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

The stills taken during the survey and additional screengrabs from the video footage analysed for stony reef assessment indicated the intermittent distribution of cobbles and boulders across the camera transects (a complete log of the assessment per still is provided in Appendix N). Out of the 251 images from transects reviewed for stony reef, 151 (60.1%) showed evidence of potential stony reefs due to the presence of cobbles (Table 52). Of the images showing potential stony reef, 127 (84.1%) were classed as 'Not a Reef' and 24 (15.9%) as 'Low Reef' in terms of stony reef composition or percentage cover (Table 52). In terms of elevation, all stills were classed as either 'Low Reef' or 'Medium Reef' as areas of cobbles were either <64mm or >64mm and the rare occurrence of boulders were <5m in height. There were also flat areas of coarse rippled shelly sand between the intermittent aggregations of cobbles across the survey area, mostly appearing to the west and centre of the survey area. When both composition and elevation were taken into account, by examining reef structure, 127 images (84.1%) were classed as 'Not a Reef', 24 (15.9%) as 'Low Reef' and no 'Medium Reef' or 'High Reef' was indicated (Table 52). The low overall reef structure levels are consistent with the review of video footage, with transects within the 'Circalittoral mixed sediment' and 'Circalittoral coarse sediment' characterised by patches of mixed gravelly sand, sand gravel and muddy sandy gravel with varying densities of cobbles and rare boulders (rare = 1–5% occurrence as defined by the SACFOR classification).

Table 52 Summary of Stony Reef Image Analysis

'Reefiness' of Video Screengrabs	No Stony Reef		Not a Reef		Low		Medium		High	
	No.	%	No.	%	No.	%	No.	%	No.	%
Composition (% cover)	151	60.1	127	84.1	24	15.9	0	0	0	0
Elevation			0	0	126	83.4	25	16.6	0	0
Reef Structure			127	84.1	24	15.9	0	0	0	0

The results of the reefiness assessment on the nine transects, with a notable presence of cobbles and boulders, showed evidence of isolated patches of stony reef habitat as per the Irving 2009 criteria. Seven transects were classified as 'Not a Reef' in terms of the composition of cobbles/boulders as the percentage cover was less than 10% (Table 53). Whereas, the remaining two transects had instances of cobble compositions classed as 'Low Reef' (Table 53). All instances of 'Low Reef' reflect the variability in cobble density within the 'Circalittoral coarse sediment' and 'Circalittoral mixed sediment' habitats. No estimation of reef extent could be made for areas which could not be delineated as they lacked any distinct side scan sonar signatures and could not be distinguished from the surrounding non-reef seabed. Therefore, no additional areas across the wider survey area could be mapped as potential 'Low Reef' and the mappable extent of the 'Low Reef' was limited to the reef structure overlain across the camera navigation track (Figure 52). A precautionary approach was applied to areas of 'Low Reef' structure by assuming that these areas covered >25m^2 extent. As per the Irving (2009) guidance, areas of seabed classified as 'Not a Reef', based on reef structure (composition vs elevation), are still 'Not a Reef' regardless of whether the extent was <25m^2 or >25m^2 (Table 53). Therefore, a measure of overall reefiness was determined by combining the reef structure level with a reefiness level based on a conservative assumed extent of >25m^2 for each area of 'Low Reef' structure.

The majority of points of 'Low Reef' structure along the transects were within wider areas of 'Not a Reef' and as such the average of the reef structure for each segment of sediment change was calculated and used with the assumed extent of 25m^2 to calculate a measure of overall reefiness (Figure 52 and Table 53). Areas of potential 'Low Reef', based on an assumed 25m^2 extent, were identified along a single transect (OWF_57). The single point of 'Low Reef' structure identified at OWF_32 was considered unlikely to cover an area of 25m^2 as cobbles were only present for a three second section of video footage.

Areas of 'Not a Reef' were classified as circalittoral coarse or mixed sediments, comprising mosaics of gravel, pebbles, occasional cobbles and variable densities of shell debris, while areas of 'Low Reef' were comprised of similar sediments but cobbles were more frequently observed. The 'Low Reef' identified at station OWF_57 has been classified on a precautionary basis as 'potential low reef' and showed some resemblance to the biotopes ''SS.SMx.CMx.FluHyd - *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment" and "*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles". Although the area of 'Low Reef' had an average elevation of <64mm, the cobbles may still ecologically function as an associated reef community (Table 53; Golding *et al.*, 2020).

Table 53 Summary of Stony Reef Assessment (after Irving, 2009)

Geodetics: WGS84, UTM 31N, CM 3°E								
Station	Easting (m)	Northing (m)	Sediment Type	Stony Reefiness (After Irving 2009)				
				Mean Composition (% Cover of Cobbles/ Boulders)	Mean Elevation (of Cobbles/ Boulders in mm)	Mean Reefiness (Structure)	>25m²	Overall Mean Reefiness (Structure vs Extent)
OWF_VID_23	379 006	5 943 336	Rippled sand with abundant shell fragments and an increased abundance of pebbles and cobbles	2.1	8.5	Not a Reef	>25m²*	Not a Reef
	379 002	5 943 342						
OWF_VID_31	382 462	5 928 305	Mosaic of small pebbles and relic shell fragments	1.1	12.2	Not a Reef	>25m²*	Not a Reef
	382 444	5 928 357						
OWF_VID_32	382 677	5 933 650	Rippled sand with frequent shell fragments, pebbles and occasional cobbles	2	12.5	Not a Reef	>25m²*	Not a Reef
	382 660	5 933 692						
	382 660	5 933 692	Increased abundance of cobbles, pebbles and shell fragments	11	200	Low Reef	<25m²**	Not a Reef
	382 660	5 933 693						
	382 660	5 933 693	Rippled sand with frequent shell fragments, pebbles and occasional cobbles	1	10	Not a Reef	>25m²*	Not a Reef
	382 656	5 933 700						
OWF_VID_45	385 833	5 929 702	Mosaic of small pebbles and relic shell fragments	0.8	5.7	Not a Reef	>25m²*	Not a Reef
	385 850	5 929 650						
OWF_VID_50	387 947	5 942 679	Variable densities of cobbles and pebbles overlaying rippled sand	5.1	30.4	Not a Reef	>25m²*	Not a Reef
	387 943	5 942 737						
OWF_VID_57	390 615	5 932 929	Abundant cobbles and pebbles and a single boulder surrounded by rippled sand with abundant shell fragments	10.7	42.9	Low Reef	>25m²*	Low Reef
	390 625	5 932 902						
	390 625	5 932 902	Increased abundance of cobbles, pebbles and shell fragments	7.6	37	Not a Reef	>25m²*	Not a Reef
	390 635	5 932 878						

Geodetics: WGS84, UTM 31N, CM 3°E								
Station	Easting (m)	Northing (m)	Sediment Type	Stony Reefiness (After Irving 2009)				
				Mean Composition (% Cover of Cobbles/ Boulders)	Mean Elevation (of Cobbles/ Boulders in mm)	Mean Reefiness (Structure)	>25m^2	Overall Mean Reefiness (Structure vs Extent)
OWF_VID_65	394 855	5 939 296	Rippled sand with frequent cobbles, pebbles and shell fragments	1.4	19.3	Not a Reef	>25m^2*	Not a Reef
	394 850	5 939 286						
	394 850	5 939 286	Rippled sand with increased abundance of cobbles and pebbles	7.7	42.5	Not a Reef	>25m^2*	Not a Reef
	394 847	5 939 280						
	394 847	5 939 280	Rippled sand with common cobbles, pebbles and abundant shell fragments	1.6	14.7	Not a Reef	>25m^2*	Not a Reef
	394 830	5 939 242						
OWF_VID_76	399 987	5 935 227	Rippled sand with shell fragments and occasional cobbles and pebbles	2.3	31.3	Not a Reef	>25m^2*	Not a Reef
	399 988	5 935 230						
	399 988	5 935 230	Sand with abundant aggregations of *Sabellaria* overlying frequent cobbles and pebbles	1.8	10	Not a Reef	>25m^2*	Not a Reef
	399 991	5 935 238						
	399 991	5 935 238	Increased abundance of pebbles and cobbles forming a mosaic with frequent aggregations of *Sabellaria*	3.6	31.4	Not a Reef	>25m^2*	Not a Reef
	400 000	5 935 279						
	400 000	5 935 279	Decreased abundance of cobbles and increased abundance of pebbles	0.8	13.6	Not a Reef	>25m^2*	Not a Reef
	400 005	5 935 295						
OWF_VID_79A	401 359	5 936 262	rippled sand with abundant shell fragments and pebbles and occasional cobbles.	2.6	23.4	Not a Reef	>25m^2*	Not a Reef
	401 340	5 936 311						

*>25m^2 was precautionarily applied as the boundary off the feature observed on the camera data could not be distinguished from the SSS/MBES data

**<25m^2 was applied as the sediment change was only observed for a few seconds and is not likely to represent an area >25m^2

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 Annex I stony reef criteria by Irving (i.e. not having the required percentage of cobbles and boulders, as seen along the proposed CA route), but stability allows a diverse and 'reef-like' epifaunal community to develop (Golding *et al.,* 2020). Therefore, the transects where an initial Annex I stony reef assessment was conducted 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 54).

Table 54 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 results of the further stony reef assessment indicated that stations in areas of mixed sediment comprised 'Possible Reef' biotopes due to the potential presence of the level five biotope 'SS.SMx.CMx.FluHyd - *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment'. Characterising species such as hornwrack (*Flustra foliacea),* dead man's fingers *(Alcyonium digitatum),* dahlia anemone *(Urticina felina),* sea chervil *(Alcyonium diaphanum)* hydroids (*Nemertesia* sp.; Haleciidae), tube worms (Serpulidae), barnacles (Cirripedia), hermit crabs (*Pagurus* sp.) and common sea star (*Asterias rubens)* were present. However, the transects occurred within an intermediate area composed of coarse and mixed sediment and the above epifauna could also be indicative of areas classified as 'not a reef' due to the potential presence of the level five biotope SS.SCS.CCS.SpiB '*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles'. Due to the uncertainty in macrofaunal assemblages and sediment boundaries, all stations were grouped to the level four biotope 'SS.SCS.CCS - Circalittoral coarse sediment' as coarse sediment was the dominant sediment type observed across the stills taken. Consequently, the majority of stations were classified as 'Not a Reef biotope' (Table 55).

Transect OWF_57 was a 'Possible Reef biotope' due to the sediment composition of <10% of bedrock, boulder or cobble larger than 64mm and conspicuous reef associated epifauna. This area was considered unstable due to the substrate present (i.e. areas of mixed or coarse sediment which contained no 'reef biotopes'), meaning they could not be classified as Annex I stony reef. However, by reviewing the epifauna they could be considered a 'possible reef with sand veneer' or 'reef with sand veneer' (Golding *et al.,* 2020). Furthermore, the transect supported <5 'reef species', which would indicate that the transect is 'not a reef'– highlighting the need for further refinement of the Golding *et al.* (2020) criteria. Therefore, in the absence of strong justification due to the low composition (10.7%), elevation (43mm), an assumed threshold extent of 25m^2 and threshold biota of a single key reef associated species the OWF_57 transect was deemed not to represent Annex I stony reef along with the other transects carried out throughout the survey area.

Although camera ground-truthed areas within the survey area could not be confidently categorised as Annex I stony reef, a Gaussian Kernel interpolation of 205,000 hard contacts, based on the analysis of 205,000 pebble, cobble and boulder contacts identified from SSS, identified several areas of dense hard substrate aggregations (Figure 53). Although pebbles are not classified as reef forming hard substrate, the 16,000 pebble contacts were included in the dataset to provide a precautionary approach to hard substrate density mapping, as cobbles, pebbles and boulders rarely occur in isolation. Unsurprisingly the higher densities of pebbles, cobbles and boulders were predominantly found within areas delineated as coarse and mixed sediment, with sand dominated habitats showing either a lower density or an absence of hard substrate. The density map confirms the presence of dense aggregations of hard substrate close to station OWF_57, with dense aggregations of hard substrate also identified close to stations OWF_05, OWF_16, OWF_24, OWF_29, OWF_59, OWF_72 and OWF_74 which were not ground-truthed by camera data (Figure 53). Based on the patchy cobble and boulder composition observed throughout the survey area and the limited reef associated species, it is unlikely these areas of dense aggregations of hard substrate will reflect areas of 'Possible Reef'. However, the Gaussian Kernel interpolation method provides a retrospective justification for the OWF sampling strategy by supporting the results of the stony reef assessment and illustrating the key areas of coarse material were adequately sampled for ground-truthing interpretation.

Table 55 Reef Structure Assessment (Golding *et al.*, 2020)

Reef	Stage 1	Stage 2		Stage 3		Reefiness Value
	Reef Biotopes	Mean Key Reef Species Count	Key Reef Species Category	Mean Reef Species Count	Reef Species Category	
OWF_VID_23	Not a Reef Biotope	0	0	0	<5	Not a reef
OWF_VID_31	Not a Reef Biotope	0	0	0	<5	Not a reef
OWF_VID_32	Not a Reef Biotope	0	0	0	<5	Not a reef
OWF_VID_45	Not a Reef Biotope	0	0	0	<5	Not a reef
OWF_VID_50	Not a Reef Biotope	0	0	1	<5	Not a reef
OWF_VID_57	Not a Reef Biotope	1	>1 and <3	2	<5	Possible Reef
OWF_VID_65	Not a Reef Biotope	0	0	0	<5	Not a reef
OWF_VID_76	Not a Reef Biotope	0	0	2	<5	Not a reef
OWF_VID_79A	Not a Reef Biotope	0	0	1	<5	Not a reef

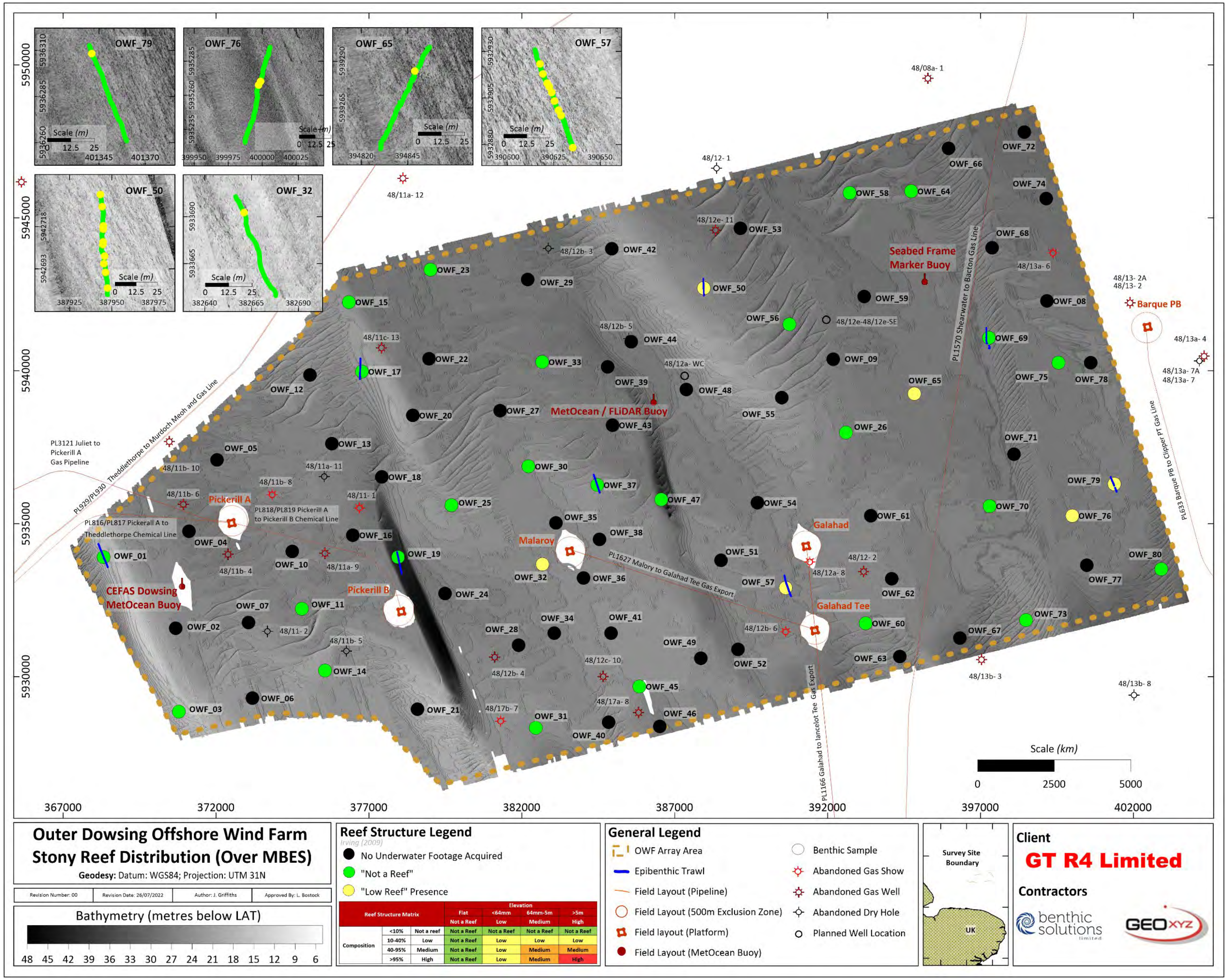


Figure 52 Stony Reef Habitat Assessment for the OWF Survey Area

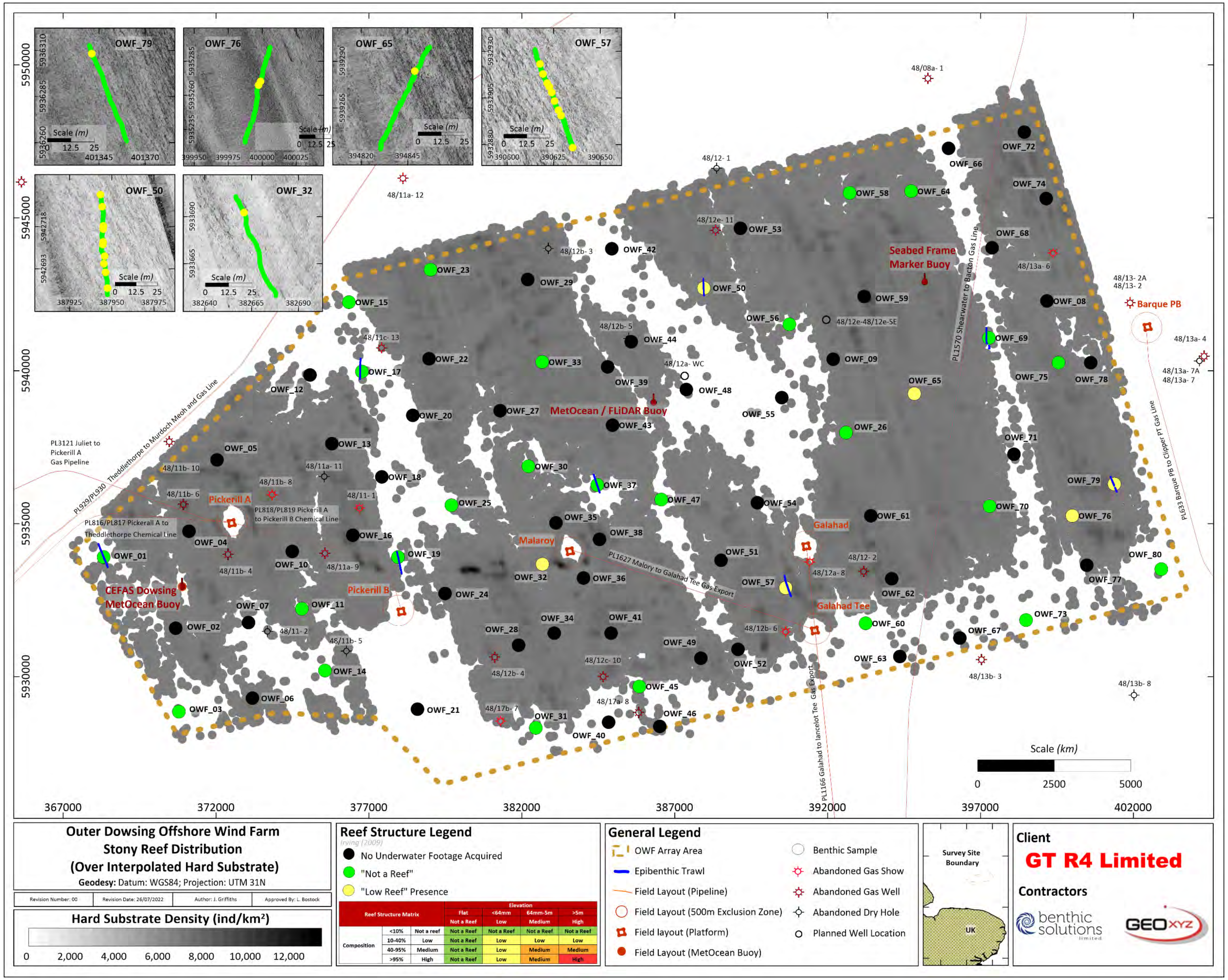


Figure 53 Interpolated Hard Substrate Density Across the OWF Survey Area

b Biogenic Reef Formed by *Sabellaria spinulosa*

Sabellaria spinulosa was present at stations OWF_76 and OWF_79A but was typically limited to encrusting hard substrates such as cobbles and pebbles along the transect. *S. spinulosa* is a tube building polychaete worm and can occur as isolated individuals, small aggregations, thin crust-like veneers, or when in large numbers can form hard reef like structures which can stabilise the surrounding seabed (Gibb *et al.* 2014). As their tubes are built of sand, a high suspended sediment content is essential for the growth of reef like structures and the tidally swept sandy sediments across the survey area could provide adequate habitat conditions.

An assessment of 'reefiness' as described by Gubbay (2007) and presented in Table 56 was performed to describe the habitat, focussing on transects where *S. spinulosa* was recorded during a review of video footage and still photographs (Jenkins *et al.*, 2018). Changes in the coverage and density of *S. spinulosa* tubes were noted during the videos in order to accurately estimate the area covered by *S. spinulosa.* However, this was limited as no texture differences on the SSS/MBES could determine if the changes in density or coverage were part of a larger 'reef' feature or isolated aggregations. A *Sabellaria* assessment was deemed unnecessary for Station OWF_79A due to the fragmented aggregations of *S. spinulosa* present.

Table 56 *Sabellaria* Reefiness Criteria as Outlined by Gubbay (2007)

Measure of 'Reefiness'	Not a Reef	Low	Medium	High
Elevation (average tube height, cm)	<2	2-5	5-10	>10
Area (m^2)	<25	25-10,000	10,000 – 1,000,000	>1,000,000
Patchiness (% Cover)	<10	10-20	20-30	>30

To apply the Gubbay (2007) protocol to the acquired data it was further separated into reef 'structure' and overall 'reefiness' (Table 57 and Table 58). The advantage of this method is that the reef 'structure' value, derived from the patchiness (i.e. percent cover) and tube elevation reefiness, can be assessed against the extent to produce a measure of overall reefiness, as illustrated in Table 57 and Table 58. This method was initially devised by BSL staff and later approved by the JNCC in 2010 (see Jenkins *et al* (2015) for an example application by JNCC and CEFAS).

To avoid potential bias of manual still photographs towards areas of greater environmental interest and to more accurately quantify the reefiness of heterogeneous patches of *S. spinulosa,* screengrabs were taken approximately every 10 seconds along the camera transects (Appendix O). Each screengrab was assessed for *Sabellaria* patchiness and tube elevation, which were then combined to assess reef structure. The average reef structure is then usually assessed for each delineated patch of *S. spinulosa*; however, due to the patchiness in *S. spinulosa* coverage and the absence of texture differences on the SSS/MBES, the transect as a whole was averaged to assess potential 'reefiness' (Table 60).

Table 57 *Sabellaria* Reef Structure Matrix (After Gubbay, 2007)

Reef Structure Matrix			Elevation (cm)			
			<2	2 to 5	5 to 10	>10
			Not a Reef	Low	Medium	High
Patchiness	<10%	Not a Reef	Not a Reef	Not a Reef	Not a Reef	Not a Reef
	10-20%	Low	Not a Reef	Low	Low	Low
	20-30%	Medium	Not a Reef	Low	Medium	Medium
	>30%	High	Not a Reef	Low	Medium	High

Table 58 *Sabellaria* Reef Structure vs Area Matrix (After Gubbay, 2007)

Reef Structure vs Area		Area (m²)			
		<25	25 – 10,000	10,000 – 1,000,000	>1,000,000
		Not a Reef	Low	Medium	High
Reef Structure (incl. Patchiness and Elevation)	Not a Reef	Not a Reef	Not a Reef	Not a Reef	Not a Reef
	Low	Not a Reef	Low	Low	Low
	Medium	Not a Reef	Low	Medium	Medium
	High	Not a Reef	Medium	High	High

The 10 second interval screen grabs and HD video indicated a fairly variable distribution of *S. spinulosa* encrusted over cobbles and pebbles across the OWF_76 transect. For example, out of the 47 images taken along the transect and reviewed for *S. spinulosa* 'reefiness', 32 (68.0%) showed evidence of *S. spinulosa* aggregations. Of the images showing *S. spinulosa*, 19 (59.4%) were classed as 'Not Reef', 5 (15.6%) as 'Low Reef' and 4 (12.5%) as 'Medium Reef' and 'High Reef' in terms of *S. spinulosa* patchiness or percent cover. A similar pattern was evident for tube elevation with 12 (37.5%) classed as 'Not Reef', 8 (25.0%) as 'Low Reef', 11 (34.4%) as 'Medium Reef' and 1 (3.1%) as 'High Reef'. When both patchiness and elevation were taken into account, by examining reef structure, even fewer images showed noteworthy reefiness, with 19 (59.3%) classed as 'Not a Reef', 6 (18.8%) as 'Low Reef', 7 (21.9%) as 'Medium Reef' and no instances of 'High Reef'. This equates to a total of just 13 images (40.6%) showing appreciable reefiness of 'Low Reef' or 'Medium Reef (Table 59). The low overall reef structure levels are consistent with the review of video footage, with many areas seen to be characterised by low coverage of *Sabellaria* encrusting cobbles and pebbles.

Table 59 Summary of *Sabellaria* Reefiness Image Analysis Results (After Gubbay, 2007)

'Reefiness' of Video Screengrabs	No *Sabellaria*		Not a Reef		Low		Medium		High	
	No.	%	No.	%	No.	%	No.	%	No.	%
Patchiness (% Cover)	32	68.0	19	59.4	5	15.6	4	12.5	4	12.5
Elevation (Tube Height, cm)			12	37.5	8	25.0	11	34.4	1	3.1
Reef Structure			19	59.3	6	18.8	7	21.9	0	0

As previously discussed, the lack of unique SSS/MBES features associated with the *S. spinulosa* aggregations made it impossible to delineate the extent of the *Sabellaria* habitat within the OWF survey area. As such, the reef structure matrix of each 10-second still image was overlain across the camera track and indicates the variability in *Sabellaria* coverage and elevation across the OWF_76 transect (Figure 54). The spatial variability in individual 'reefiness', with a maximum coverage of 47% and elevation of 10cm, indicates that '*S. spinulosa* encrusted circalittoral rock' (CR.MCR.CSab.Sspi/MC2213) and '*S. spinulosa* on stable circalittoral mixed sediment' (SS.SBR.PoR.SspiMx./MC2211) habitats could potentially be present within the survey area, with neither potential habitat likely to occur in isolation. A conservative approach revealed an average tube elevation of 2.5cm and percentage cover of 8.2% across the OWF_76 transect, indicating that the *Sabellaria* aggregations were not reef forming, even when an area of >25m^2 was assumed.

Although the *S. spinulosa* aggregations along the OWF_76 transect were not classified as reef forming, a notable difference in the species diversity between aggregations of *S. spinulosa* and cobbles/pebbles were observed, with 23 epifaunal species observed within areas of *Sabellaria*, while only 15 epifaunal species were observed in areas of a cobbles/pebbles along OWF_VID_76. The notable difference in diversity was attributed to *Tubularia* sp. *S. spinulosa*, Ophiuroidea, *Hyas* sp., Haleciidae, *Ensis* sp., Cirripedia, *Crepidula fornicata* and Brachyura sp. The finding of increased biodiversity surrounding fragmented *S. spinulosa* aggregations, such as those observed at station OWF_76, was corroborated by Van der Reijden *et al.*, (2021) that found even patchy biogenic 'reefs' may promote density and local biodiversity of mobile, epibenthic species, due to increased habitat heterogeneity. This indicates that patchy biogenic reefs that occur in dynamic environments may also have high ecological value and that their conservation status should be considered to ensure their protection (Van der Reijden *et al.*, 2021).

Table 60 Conservative Summary of Sabellaria Reef Assessed from Video, Stills and SSS Data

Geodetics: WGS84, UTM 31N, CM 3°E							
Station	Easting (m)	Northing (m)	SSS Signature	*Sabellaria* Reefiness (After Gubbay 2007)			
				Patchiness (% cover)	Elevation (Average tube height in cm)	Area (m^2)	Reef Structure
OWF_VID_76	399 987	5 935 227	No clear SSS feature to delineate boundary	8.2	2.5	>25m^2*	Not a Reef
	400 005	5 935 295					

*>25m^2 was precautionarily applied as the boundary off the feature observed on the camera data could not be distinguished from the SSS/MBES data

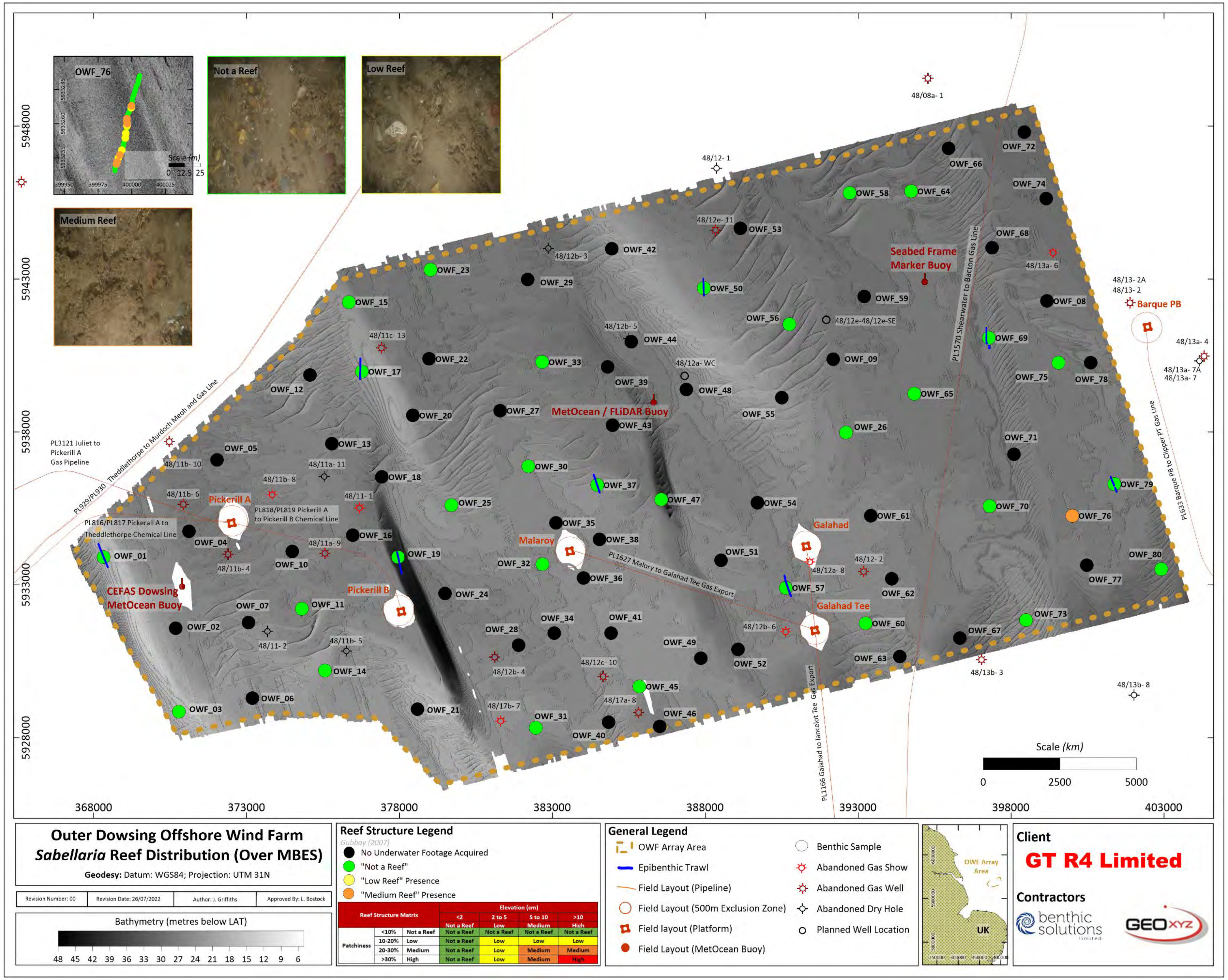


Figure 54 *Sabellaria spinulosa* reef habitat assessment for the OWF survey area

c Ocean Quahog (*Arctica islandica*)

The ocean quahog (*Arctica islandica*) bivalve species are afforded protected status under the OSPAR Commission due to their inclusion in the OSPAR list of threatened and/or declining species in the Greater North Sea area as a priority species (OSPAR, 2008; 2009a). This species is also listed as an MCZ 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 been reduced their populations can take a long time to recover.

No evidence of distinct *A. islandica* siphons or relic shells were observed on any of the video footage or still photographs and no adult or juvenile specimens were recovered in the trawl or grab datasets. Therefore, it is unlikely that *A. islandica* occur within the survey area in any appreciable quantities.

d Sandeel Spawning and Nursery Grounds

Sandeels are small, thin eel-like fish that form large shoals and live most of their life buried in the seabed. They are considered an important component of marine food webs providing food for marine predators such as seabirds, mammals, and other fish (Furness, 1990; 2002). Of the five species of sandeels occurring in the North Sea, the lesser sandeel (*A. marinus*) is the most abundant and comprises over 90% of sandeel fishery catches (Fisheries Management Guidance, 2014). Sandbanks and other sandy areas are known to be important habitats for sandeel, which prefer habitats in water depths between 30m and 70m but are known to occur at depths of 15 m and 120 m (Holland *et al.,* 2005). These small fish burrow into the sediment, sand and use interstitial water to ventilate their gills (Holland *et al.,* 2005). They do not create a permanent opening when burrowed. Fine sediment has the potential to clog their gills and therefore, sandeel have a very specific habitat requirement, resulting in an often highly patchy distribution (Holland *et al.,* 2005; Jensen *et al.,* 2011). Sandeel spawning and nursery grounds have been delineated by Cefas for UK waters; The OWF survey area is located in a low intensity spawning and nursery ground area (Figure 56). Small scale variations in sediment type across the OWF survey area result in a heterogenous mosaic of habitat suitability, ranging from 'Unsuitable' to 'Prime' spawning and nursing grounds for the species (Ellis *et al.,* 2012; Figure 56).

Preferred sandeel habitat is a substrate which contains a high percentage of medium to coarse sand (particle size of 0.25 mm to 2 mm), with a mud content of less than 10% (particles <63 µm) (Wright *et al.,* 1998; Holland *et al.,* 2005). Sediments with a gravel component are also considered to be suitable for sandeel habitat. The inclusion of gravel means that using Folk classifications (Folk, 1954) to assess sandeel habitat can overstate the suitability of the habitat for sandeels. To determine areas of potentially available habitat for sandeel grounds, the PSA results for the grab stations were compared to the parameters specified by Latto *et al.* (2013), as shown in Table 61.

Table 61 Sandeel Ground Assessment Categories Specified by Latto *et al.* (2013)

Folk Categories	Habitat Preference
Sand	Preferred
Gravelly Sand	Preferred
Slightly Gravelly Sand	Preferred
Sandy Gravel	Marginal
Other	Unsuitable

Results from the analysis of PSA and assigned Folk scale data, using the Latto *et al.* (2013) method are outlined in Table 62. Small scale variations in the particle size composition of sediments across the survey area produced highly variable suitability ratings across habitats assigned the same biotope type, with no spatial pattern observed across the survey area or specific biotope preference. 'Preferred' sediments for sandeel grounds were identified at 44 stations across the OWF survey area, with 29 stations considered 'Marginal' for sandeel grounds. The remaining 7 stations were classed as 'Unsuitable' for sandeel habitat. These stations were either too coarse or showed bimodal sediment distributions, containing both very fine and coarse material. As a result, these stations were assigned the Folk classifications of 'Gravel', 'Muddy Sandy Gravel' or 'Gravelly Muddy Sand' (Table 62).

Table 62 Sandeel Ground Assessment Results using Latto *et al.* (2013)

Station	Depth (m)	Modified Folk Scale	Habitat Preference
OWF_01	12.9	Sand	Preferred
OWF_02	21.0	Sandy Gravel	Marginal
OWF_03	12.6	Sand	Preferred
OWF_04	19.9	Sandy Gravel	Marginal
OWF_05	21.1	Gravelly Sand	Preferred
OWF_06	20.4	Gravelly Sand	Preferred
OWF_07	17.2	Sandy Gravel	Marginal
OWF_08	20.7	Sand	Preferred
OWF_09	21.0	Sandy Gravel	Marginal
OWF_10	19	Gravelly Sand	Preferred
OWF_11	18.5	Sand	Preferred
OWF_12	18.4	Gravelly Sand	Preferred
OWF_13	19.8	Gravelly Sand	Preferred
OWF_14	16.0	Sandy Gravel	Marginal
OWF_15	15.4	Sand	Preferred
OWF_16	20.0	Sandy Gravel	Marginal
OWF_17	14.8	Sand	Preferred
OWF_18	22.2	Gravelly Sand	Preferred
OWF_19	38.6	Sandy Gravel	Marginal
OWF_20	19.1	Sand	Preferred
OWF_21	10.2	Gravelly Sand	Preferred
OWF_22	23.2	Slightly Gravelly Sand	Preferred
OWF_23	21.5	Sandy Gravel	Marginal
OWF_24	21.2	Sandy Gravel	Marginal
OWF_25	17.8	Sand	Preferred
OWF_26	19.7	Sandy Gravel	Marginal
OWF_27	19.8	Gravelly Sand	Preferred
OWF_28	18.5	Gravelly Muddy Sand	Unsuitable
OWF_29	22.6	Gravelly Muddy Sand	Unsuitable
OWF_30	20.4	Gravelly Sand	Preferred
OWF_31	17.1	Sandy Gravel	Marginal
OWF_32	20.5	Sandy Gravel	Marginal
OWF_33	21.7	Gravelly Sand	Preferred
OWF_34	20.2	Gravelly Sand	Preferred
OWF_35	20.8	Gravelly Sand	Preferred
OWF_36	20.1	Sandy Gravel	Marginal
OWF_37	19.4	Sandy Gravel	Marginal

Station	Depth (m)	Modified Folk Scale	Habitat Preference
OWF_38	20.3	Sandy Gravel	Marginal
OWF_39	24.9	Gravelly Sand	Preferred
OWF_40	15.7	Sand	Preferred
OWF_41	19.6	Sandy Gravel	Marginal
OWF_42	18.5	Sand	Preferred
OWF_43	23.6	Gravelly Muddy Sand	Unsuitable
OWF_44	21.3	Sandy Gravel	Marginal
OWF_45	20.2	Sandy Gravel	Marginal
OWF_46	20.6	Sandy Gravel	Marginal
OWF_47	37.3	Slightly Gravelly Sand	Preferred
OWF_48	19.2	Slightly Gravelly Sand	Preferred
OWF_49	18.9	Sandy Gravel	Marginal
OWF_50	18.4	Sandy Gravel	Marginal
OWF_51	18.5	Sandy Gravel	Marginal
OWF_52	23.1	Sandy Gravel	Marginal
OWF_53	22.7	Gravelly Sand	Preferred
OWF_54	19.3	Slightly Gravelly Sand	Preferred
OWF_55	14.8	Slightly Gravelly Sand	Preferred
OWF_56	19.6	Sand	Preferred
OWF_57	18.6	Sandy Gravel	Marginal
OWF_58	23.9	Gravelly Sand	Preferred
OWF_59	23.9	Sandy Gravel	Marginal
OWF_60	17.9	Sand	Preferred
OWF_61	18.4	Muddy Sandy Gravel	Unsuitable
OWF_62	18.7	Sandy Gravel	Marginal
OWF_63	17.5	Slightly Gravelly Sand	Preferred
OWF_64	23.7	Slightly Gravelly Sand	Preferred
OWF_65	22	Gravelly Sand	Preferred
OWF_66	21.5	Sand	Preferred
OWF_67	25.5	Gravelly Sand	Preferred
OWF_68	21.7	Sand	Preferred
OWF_69	21.6	Sand	Preferred
OWF_70	22.1	Gravelly Sand	Preferred
OWF_71	21.7	Sand	Preferred
OWF_72	25.8	Sandy Gravel	Marginal
OWF_73	17.9	Sand	Preferred
OWF_74	24.9	Sandy Gravel	Marginal
OWF_75	22.8	Sandy Gravel	Marginal
OWF_76	22.5	Muddy Sandy Gravel	Unsuitable
OWF_77	17.4	Gravel	Unsuitable
OWF_78	21.4	Gravelly Sand	Preferred
OWF_79	21.8	Muddy Sandy Gravel	Unsuitable
OWF_80	22.8	Sand	Preferred

More specific definitions of sandeel preferred grounds using sediment particle size were provided by Greenstreet *et al.* (2010). This method utilises the percentage composition of the sediment by weight, which is split into two distinct fractions; silt and fine sand (particles >0.25mm), and medium to coarse sand (particles 0.25-2.0mm). The coarse >2mm fraction, which can often overstate sandeel habitat suitability, is not considered by this method. The sediment fraction data are then used to assess sandeel sediment preference for each station from Figure 55.

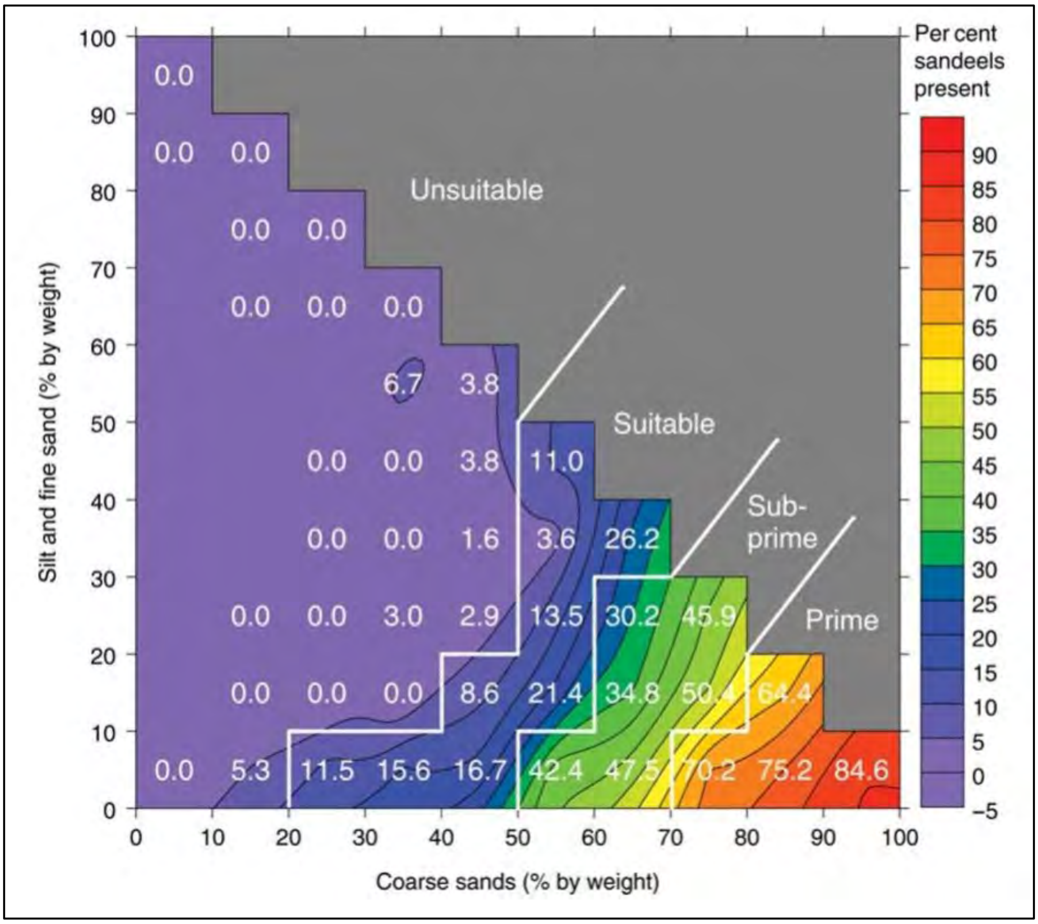


Figure 55 Sandeel Sediment Preference Categories as per Greenstreet *et al.* (2010) (Silt and Fine Sand refer to Particle Sizes >0.25mm, whilst Medium to Coarse Sand refer to Particle Sizes 0.25 to 2.0mm)

The results using the method outlined in Greenstreet *et al.* (2010) indicated less favourable habitat for sandeel grounds across the survey area than the Latto *et al.,* (2013) method. The suitability of some stations was downgraded under the Greenstreet *et al* (2010), while others were upgraded. Overall, the majority of stations (67.5%) have an appropriate sediment type to be utilised by sandeels as spawning and nursery ground.

In total, 21 stations have been classified as 'Prime' sandeel habitat according to Greenstreet *et al*. (2010), of which 17 stations were classed as 'Preferred' habitat under Latto *et al*, 2013 and 4 were considered 'Marginal'. A further 12 stations were classed as 'Sub-Prime' (Greenstreet *et al*., 2010), all of which were previously 'Preferred' or 'Marginal' (Latto *et al*., 2013). 'Suitable' habitat was determined to be present at 21 stations (Greenstreet *et al*., 2010), of which two stations (OWF_61 and OWF_77) that were previously considered 'Unsuitable' under Latto *et al.,* (2013) were classed as suitable sandeel habitat. These stations had a higher proportion of medium and course sands and lower proportion of fines when compared to the other 'Unsuitable' stations. As course sediments over 2mm are not considered in this method, eight stations previously considered 'Preferred' and 13 considered 'Marginal' habitat are classed as 'Unsuitable'. Five stations classed as 'Unsuitable' areas of 'Gravelly Muddy Sand' have remained so, with a total of 26 stations considered 'Unsuitable' for sandeel spawning and nursing (Table 63). Therefore, similarly to the Latto *et al*. (2013) method, the Greenstreet *et al*. (2010) method revealed no overall mapped habitat preference due to the variability in sediment composition within habitat delineations.

Sandeels were also present within the grab macrofauna and epibenthic trawl datasets and the video analysis. They were also observed during video analysis transects. Furthermore, the OWF site falls within sandeels spawning and nursery grounds; however, it should be noted that even optimal habitats may not be occupied by sandeels if populations are below the area's carrying capacity (Holland *et al.,* 2005).

Table 63 Sandeel Ground Assessment Results using Greenstreet *et al.* (2010)

Station	Water Depth (m)	Silt and Fine Sands (% by weight)	Medium to Coarse Sands (% by weight)	Habitat Preference
OWF_01	12.9	24.6	75.4	Sub-Prime
OWF_02	21	70.6	35.5	Unsuitable
OWF_03	12.6	31.4	68.7	Suitable
OWF_04	19.9	59.3	52.8	Unsuitable
OWF_05	21.1	55.0	55.1	Unsuitable
OWF_06	20.4	67.6	36.0	Unsuitable
OWF_07	17.2	32.5	79.5	Unsuitable
OWF_08	20.7	8.0	92.9	Prime
OWF_09	21	49.9	55.7	Suitable
OWF_10	19	56.5	52.1	Unsuitable
OWF_11	18.5	57.5	42.7	Unsuitable
OWF_12	18.4	35.3	65.8	Suitable
OWF_13	19.8	10.5	107.0	Prime
OWF_14	16	36.5	86.8	Prime
OWF_15	15.4	48.3	51.7	Suitable
OWF_16	20	64.0	42.7	Unsuitable
OWF_17	14.8	41.2	58.8	Suitable
OWF_18	22.2	29.1	98.8	Prime
OWF_19	38.6	16.8	107.6	Prime
OWF_20	19.1	59.7	40.4	Unsuitable
OWF_21	10.2	18.7	121.5	Prime
OWF_22	23.2	45.2	57.7	Suitable
OWF_23	21.5	46.9	68.0	Suitable
OWF_24	21.2	54.1	55.8	Unsuitable
OWF_25	17.8	30.8	69.6	Suitable
OWF_26	19.7	53.2	51.7	Unsuitable
OWF_27	19.8	16.3	106.8	Prime
OWF_28	18.5	56.3	49.8	Unsuitable
OWF_29	22.6	63.7	43.9	Unsuitable
OWF_30	20.4	10.8	101.9	Prime
OWF_31	17.1	36.4	75.2	Unsuitable
OWF_32	20.5	42.1	67.4	Suitable
OWF_33	21.7	66.9	42.6	Unsuitable
OWF_34	20.2	28.1	74.6	Sub-Prime

Station	Water Depth (m)	Silt and Fine Sands (% by weight)	Medium to Coarse Sands (% by weight)	Habitat Preference
OWF_35	20.8	52.7	56.8	Unsuitable
OWF_36	20.1	37.6	67.5	Suitable
OWF_37	19.4	10.9	114.7	Prime
OWF_38	20.3	42.0	69.1	Suitable
OWF_39	24.9	44.3	62.7	Suitable
OWF_40	15.7	20.5	79.6	Sub-Prime
OWF_41	19.6	43.0	62.8	Suitable
OWF_42	18.5	24.5	76.2	Sub-Prime
OWF_43	23.6	55.7	53.8	Unsuitable
OWF_44	21.3	32.1	87.3	Prime
OWF_45	20.2	51.5	56.1	Unsuitable
OWF_46	20.6	32.0	72.8	Unsuitable
OWF_47	37.3	3.7	113.4	Prime
OWF_48	19.2	11.1	97.8	Prime
OWF_49	18.9	34.4	70.8	Unsuitable
OWF_50	18.4	37.6	66.5	Suitable
OWF_51	18.5	42.5	63.1	Suitable
OWF_52	23.1	29.5	78.6	Sub-Prime
OWF_53	22.7	28.6	76.1	Sub-Prime
OWF_54	19.3	3.8	102.8	Prime
OWF_55	14.8	4.0	105.2	Prime
OWF_56	19.6	6.1	95.3	Prime
OWF_57	18.6	39.5	66.2	Suitable
OWF_58	23.9	25.2	91.0	Prime
OWF_59	23.9	27.8	79.2	Sub-Prime
OWF_60	17.9	13.9	86.5	Prime
OWF_61	18.4	42.1	62.7	Suitable
OWF_62	18.7	52.0	61.0	Unsuitable
OWF_63	17.5	18.7	82.6	Prime
OWF_64	23.7	23.3	80.4	Prime
OWF_65	22	40.2	63.0	Suitable
OWF_66	21.5	23.7	76.6	Sub-Prime
OWF_67	25.5	19.4	83.1	Prime
OWF_68	21.7	27.1	74.0	Sub-Prime
OWF_69	21.6	28.7	72.4	Sub-Prime
OWF_70	22.1	52.5	53.7	Unsuitable
OWF_71	21.7	40.5	59.5	Suitable
OWF_72	25.8	53.0	50.9	Unsuitable
OWF_73	17.9	23.3	76.8	Sub-Prime
OWF_74	24.9	40.1	68.8	Suitable
OWF_75	22.8	63.2	43.9	Unsuitable
OWF_76	22.5	63.3	40.5	Unsuitable
OWF_77	17.4	39.5	64.8	Suitable
OWF_78	21.4	14.9	101.8	Prime
OWF_79	21.8	51.6	53.2	Unsuitable
OWF_80	22.8	24.3	75.8	Sub-Prime

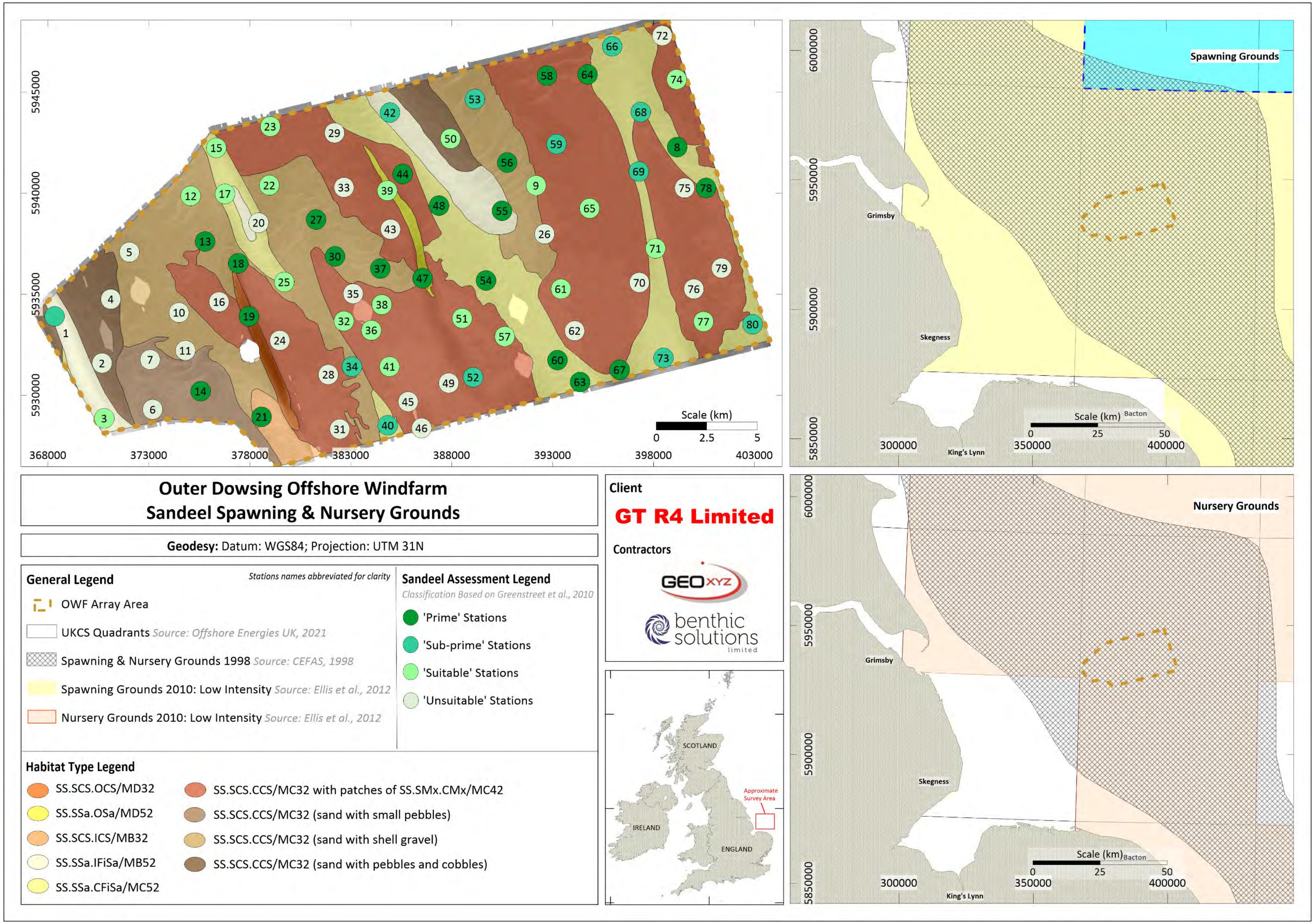


Figure 56 Sandeel Spawning and Nursing Grounds

e Herring Spawning and Nursery Grounds

Herring spawning grounds (HSGs) and nursery grounds have been delineated by Cefas for UK waters. The OWF survey area lies within an area of low intensity nursery ground, adjacent to high intensity nursery ground (Figure 57, Ellis *et al*, 2012). Spawning occurs during August to October and suitable HSGs include sediments that are well oxygenated, allowing their sticky eggs to gestate for around three weeks before they hatch (Rogers & Stocks, 2001). Such sediments are limited to unimodal, unmixed very coarse sands and gravels with a low proportion of fines (Ellis *et al.,* 2012). Overexploitation and poor recruitment led to a decline in the North Sea herring spawning stock in the 1970s, forcing closure of the fishery in 1977. Due to the unique sedimentary requirement for HSGs and the stock's vulnerability to overfishing (Rogers & Stocks, 2001), HSGs may be subject to protection if found. To determine whether any potential habitat for herring spawning exists within the OWF survey area, the PSA results from the grab sampling stations were assigned to the categories specified by Reach *et al.* (2013), as shown in Table 64.

Table 64 Herring Spawning Ground Assessment Categories Specified by Reach *et al.* (2013)

Percent Contribution of Mud & Gravel	Habitat Sediment Preference	Habitat Sediment Classification
<5% mud, >50% gravel	Prime	Preferred
<5% mud, >25% gravel	Sub-prime	Preferred
<5% mud, >10% gravel	Suitable	Marginal
>5% mud <10% gravel	Unsuitable	Unsuitable

Results from particle size distribution of the survey area indicated that 46 stations sampled within the central area of the OWF showed HSG habitat sediment preference ranging from 'Suitable' to 'Prime'. A total of 18 stations showed the highest 'Prime-Preferred' sediment for HSG, indicating a high likelihood of herring spawning at these sample locations (Table 65). Stations within patches of MC32 (Atlantic circalittoral coarse sediment) were the most optimal, ranging from 'Sub-prime' to 'Prime'. Small scale variations in the proportions of mud and gravel across areas of MC32 with patches of MC42 (Atlantic circalittoral coarse sediment with patches of Atlantic circalittoral mixed sediment) created a mosaic of habitats ranging from 'Prime' to 'Unsuitable'. The remaining 34 stations within the survey area were classed as 'Unsuitable' for both habitat sediment preference and classification due to the presence of >5% fines and <10% gravel. Patches of seabed habitat assigned as MB52 (Atlantic infralittoral sand), MD52 (Atlantic offshore circalittoral sand) and MC52 (Atlantic circalittoral sand) were all unsuitable for herring spawning ground (Table 65 and Figure 57).

Table 65 Herring Spawning Ground Assessment Results using Reach *et al.* (2013)

Station	Water Depth	Fines	Sands	Gravel	Modified Folk Scale	Habitat Sediment Preference	Habitat Sediment Classification
OWF_01	12.9	0.0	100.0	0.0	Sand	No Preference	No Preference
OWF_02	21	3.2	49.6	47.2	Sandy Gravel	Sub-prime	Preferred
OWF_03	12.6	0.0	100.0	0.0	Sand	No Preference	No Preference
OWF_04	19.9	0.4	23.8	75.7	Sandy Gravel	Prime	Preferred
OWF_05	21.1	0.0	74.7	25.3	Gravelly Sand	Sub-prime	Preferred
OWF_06	20.4	0.0	73.4	26.6	Gravelly Sand	Sub-prime	Preferred
OWF_07	17.2	0.6	50.9	48.5	Sandy Gravel	Sub-prime	Preferred
OWF_08	20.7	0.3	99.3	0.4	Sand	No Preference	No Preference
OWF_09	21	2.2	56.4	41.4	Sandy Gravel	Sub-prime	Preferred
OWF_10	19	0.0	94.7	5.3	Gravelly Sand	No Preference	No Preference
OWF_11	18.5	0.0	99.9	0.1	Sand	No Preference	No Preference
OWF_12	18.4	0.0	94.2	5.8	Gravelly Sand	No Preference	No Preference
OWF_13	19.8	0.0	82.7	17.3	Gravelly Sand	Suitable	Marginal
OWF_14	16	0.0	58.7	41.3	Sandy Gravel	Sub-prime	Preferred
OWF_15	15.4	0.0	100.0	0.0	Sand	No Preference	No Preference
OWF_16	20	2.4	49.3	48.3	Sandy Gravel	Sub-prime	Preferred
OWF_17	14.8	0.0	100.0	0.0	Sand	No Preference	No Preference
OWF_18	22.2	1.0	80.1	18.9	Gravelly Sand	Suitable	Marginal
OWF_19	38.6	1.1	51.7	47.3	Sandy Gravel	Sub-prime	Preferred
OWF_20	19.1	0.0	99.9	0.1	Sand	No Preference	No Preference
OWF_21	10.2	0.0	81.9	18.1	Gravelly Sand	Suitable	Marginal
OWF_22	23.2	0.0	96.6	3.4	Slightly Gravelly Sand	No Preference	No Preference
OWF_23	21.5	0.0	51.7	48.3	Sandy Gravel	Sub-prime	Preferred
OWF_24	21.2	0.9	34.4	64.7	Sandy Gravel	Prime	Preferred
OWF_25	17.8	0.0	99.9	0.1	Sand	No Preference	No Preference
OWF_26	19.7	0.0	53.6	46.4	Sandy Gravel	Sub-prime	Preferred
OWF_27	19.8	1.0	77.4	21.6	Gravelly Sand	Suitable	Marginal
OWF_28	18.5	7.1	63.7	29.2	Gravelly Muddy Sand	No Preference	No Preference
OWF_29	22.6	8.0	62.8	29.2	Gravelly Muddy Sand	No Preference	No Preference
OWF_30	20.4	0.4	73.2	26.3	Gravelly Sand	Sub-prime	Preferred
OWF_31	17.1	0.4	50.0	49.6	Sandy Gravel	Sub-prime	Preferred
OWF_32	20.5	0.0	37.4	62.7	Sandy Gravel	Prime	Preferred
OWF_33	21.7	6.2	66.3	27.5	Gravelly Sand	No Preference	No Preference
OWF_34	20.2	0.0	82.3	17.7	Gravelly Sand	Suitable	Marginal
OWF_35	20.8	1.0	87.6	11.4	Gravelly Sand	Suitable	Marginal
OWF_36	20.1	0.6	22.4	77.0	Sandy Gravel	Prime	Preferred
OWF_37	19.4	0.6	65.6	33.8	Sandy Gravel	Sub-prime	Preferred
OWF_38	20.3	1.0	40.3	58.6	Sandy Gravel	Prime	Preferred
OWF_39	24.9	2.4	73.3	24.4	Gravelly Sand	Suitable	Marginal
OWF_40	15.7	0.0	100.0	0.0	Sand	No Preference	No Preference
OWF_41	19.6	2.8	30.5	66.7	Sandy Gravel	Prime	Preferred
OWF_42	18.5	0.0	99.5	0.5	Sand	No Preference	No Preference
OWF_43	23.6	14.5	58.3	27.2	Gravelly Muddy Sand	No Preference	No Preference
OWF_44	21.3	0.9	43.0	56.1	Sandy Gravel	Prime	Preferred
OWF_45	20.2	2.4	57.1	40.5	Sandy Gravel	Sub-prime	Preferred

Station	Water Depth	Fines	Sands	Gravel	Modified Folk Scale	Habitat Sediment Preference	Habitat Sediment Classification
OWF_46	20.6	1.0	36.5	62.5	Sandy Gravel	Prime	Preferred
OWF_47	37.3	0.3	95.5	4.2	Slightly Gravelly Sand	No Preference	No Preference
OWF_48	19.2	0.7	95.1	4.3	Slightly Gravelly Sand	No Preference	No Preference
OWF_49	18.9	3.7	33.6	62.8	Sandy Gravel	Prime	Preferred
OWF_50	18.4	0.7	36.0	63.4	Sandy Gravel	Prime	Preferred
OWF_51	18.5	1.9	33.9	64.2	Sandy Gravel	Prime	Preferred
OWF_52	23.1	1.3	43.9	54.7	Sandy Gravel	Prime	Preferred
OWF_53	22.7	0.0	85.4	14.6	Gravelly Sand	Suitable	Marginal
OWF_54	19.3	0.0	97.7	2.3	Slightly Gravelly Sand	No Preference	No Preference
OWF_55	14.8	0.3	96.9	2.8	Slightly Gravelly Sand	No Preference	No Preference
OWF_56	19.6	0.0	99.9	0.1	Sand	No Preference	No Preference
OWF_57	18.6	3.9	45.9	50.2	Sandy Gravel	Prime	Preferred
OWF_58	23.9	1.4	87.6	11.0	Gravelly Sand	Suitable	Marginal
OWF_59	23.9	0.9	39.9	59.2	Sandy Gravel	Prime	Preferred
OWF_60	17.9	0.0	100.0	0.0	Sand	No Preference	No Preference
OWF_61	18.4	3.2	28.8	68.0	Muddy Sandy Gravel	Prime	Preferred
OWF_62	18.7	2.4	52.3	45.2	Sandy Gravel	Sub-prime	Preferred
OWF_63	17.5	0.0	98.0	2.0	Slightly Gravelly Sand	No Preference	No Preference
OWF_64	23.7	0.0	98.5	1.5	Slightly Gravelly Sand	No Preference	No Preference
OWF_65	22	1.2	79.7	19.1	Gravelly Sand	Suitable	Marginal
OWF_66	21.5	0.0	99.9	0.1	Sand	No Preference	No Preference
OWF_67	25.5	0.6	74.9	24.5	Gravelly Sand	Suitable	Marginal
OWF_68	21.7	1.4	98.2	0.4	Sand	No Preference	No Preference
OWF_69	21.6	0.0	99.1	0.9	Sand	No Preference	No Preference
OWF_70	22.1	0.0	87.2	12.8	Gravelly Sand	Suitable	Marginal
OWF_71	21.7	0.0	99.8	0.2	Sand	No Preference	No Preference
OWF_72	25.8	4.5	51.3	44.1	Sandy Gravel	Sub-prime	Preferred
OWF_73	17.9	0.0	100.0	0.0	Sand	No Preference	No Preference
OWF_74	24.9	1.0	45.3	53.7	Sandy Gravel	Prime	Preferred
OWF_75	22.8	1.1	36.7	62.2	Sandy Gravel	Prime	Preferred
OWF_76	22.5	7.2	53.6	39.2	Muddy Sandy Gravel	No Preference	No Preference
OWF_77	17.4	0.3	18.6	81.1	Gravel	Prime	Preferred
OWF_78	21.4	0.0	94.9	5.1	Gravelly Sand	No Preference	No Preference
OWF_79	21.8	5.1	34.7	60.2	Muddy Sandy Gravel	No Preference	No Preference
OWF_80	22.8	0.0	99.6	0.4	Sand	No Preference	No Preference

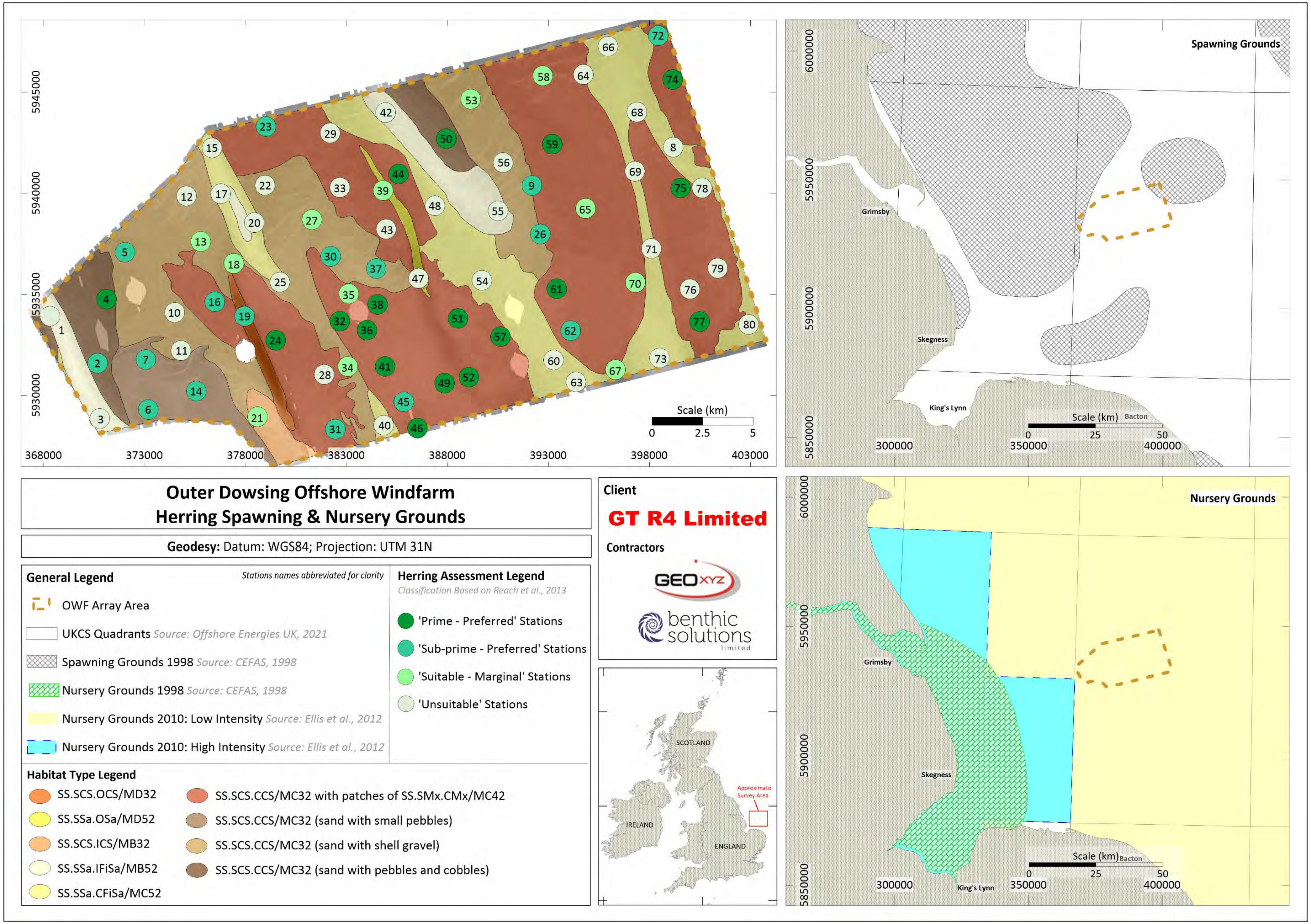


Figure 57 Herring Spawning and Nursing Grounds

f Sandbanks which are Slightly Covered by Seawater all the Time

The Annex I habitat 'sandbanks which are slightly covered by seawater all the time' comprises sandy sediments that typically occur at depths of less than 20m below LAT. The diversity and types of community associated with this habitat are determined primarily by sediment type, together with a variety of other physical, chemical, and hydrographic factors. This habitat type is further split into a range of sub-types, including eelgrass '*Zostera marina*' beds and maerl beds, which are both particularly distinctive and of high conservation value because of the diversity of species they may support and their general scarcity in UK waters.

The OWF site boundary crosses five sandbank areas which have been delineated by the JNCC (2020); 'Additional Bank 93', 'Additional Bank 97', 'Additional Bank 96', 'Additional Bank 94' and Additional Bank 92' (Figure 3). These sandbanks do not form part of any designated Special Areas of Conservation (SAC). The higher proportions of sand dominated sediment across the eastern, northern and southern edges of the survey area, in conjunction with shallow water depths of <15m are consistent with the expected presence of Annex I sandbank habitat within the OWF site.

5 CONCLUSION

The water depth across the OWF survey area ranged between 5m to 47m below LAT. The seabed undulated across the site due to the presence of sand waves, megaripples, sandbanks and canyons. Megaripples and sand waves were observed ubiquitously across the survey area and were orientated east-northeast to west-southwest with typical amplitudes of 1m and 1m to 8m, respectively and wavelengths of 10m to 25m and 100m to 1,250m, respectively. Sandbanks were present along the northern and southern extents of the survey area and had heights equal or greater than 5m. Two canyons were present resulting in a maximum seabed slope of 23°.

The results of the particle size analysis indicated a variable sediment type present across the OWF survey area. The seabed sediments were generally dominated by either sands or sands with a low but variable proportion of fines. Higher proportions of sand were recorded at shallow depths associated with sandbank features. While the proportion of gravel in the form of pebbles and gravel matrixes interspersed with sand was observed in deeper parts of the survey area. The samples collected in the survey area represented seven Folk classifications with most assigned to either ‘gravelly sand’ or ‘sandy gravel’. Regional comparisons to the survey area indicates a natural distribution of sediments, unimpacted by seabed infrastructure is present within the OWF array.

Total organic carbon was relatively low across the survey area and indicated an organically-deprived environment, with lower TOC concentrations recorded on the crests of sandbanks, which was unsurprising given the dominance of sand and gravel with minimal fines.

The total polycyclic aromatic hydrocarbons (PAH) were generally low across the survey area with an elevated ∑16PAH and ∑22PAH recorded at station OWF_19sampled within a canyon feature, which was hypothesised to be an area of accelerated natural deposition. The source of the PAHs across the survey area was determined to be from a mixed source of pyrolytic and petrogenic sources given the equal loading of 22 PAHs across the survey area, which was unsurprising given the proximity to gas and oil exploration. Polychlorinated biphenyls (PCBs), organotins and organochlorine pesticides were recorded at relatively low concentrations, which in conjunction with the low PAHs suggests a natural distribution of aromatic hydrocarbons across the site.

Concentrations of trace metals were generally at background levels but elevated concentrations above UKOOA thresholds was observed for mercury, nickel, zinc, copper and arsenic potentially indicating a residual trace of historical drilling activities within the OWF survey area. However, all metals with the exception of arsenic and nickel were below their respective sediment quality guideline value (SQGV) and were deemed to be ‘low risk’ within the OWF survey area. Arsenic and nickel exceeded their SQGVs at four and three stations respectively, but at levels which would be considered acceptable as the concentrations recorded were below the background levels determined from previous surveys close to the OWF survey area.

Benthic macrofaunal species richness and faunal abundance was variable across the survey area and reflected the sand and gravel dominated sediments across the survey area. A total of 4,429 individuals were recorded, of which 116 annelid species represented 37.7% of the total number of individuals. Simpson’s diversity indices for the macrofauna showed variation across the survey area, where results ranged from 0.126 to 0.976 and indicated a variable community structure. Further analysis using multivariate statistics revealed seven significantly different macrofaunal cluster groupings within the survey area, with differences in macrofaunal assemblages attributed to the exclusion of certain taxa and the underlying MESH sediment classifications. As such, the variation in the macrofaunal community composition was significantly correlated to the sediment particle size, with all other correlations to physico-chemical parameters attributed to autocorrelation to sedimentary parameters due to the relatively low concentrations of trace metals, PAH and TOC.

Epibenthic trawl species richness and faunal abundance reflected the sand and gravel dominated sediments throughout the survey area. A total of 4,866 individuals were recorded across 91 species, of which 23 species of Chordata represented 29.7% of the total number of individuals. Similarly, to the grab macrofaunal, the Simpson's diversity indices of 0.120 to 0.768 were indicative of a variable community structure across the survey area. Further analysis using multivariate statistics identified three significantly different macrofaunal groupings within the survey area, which were differentiated based on the epifaunal differences between sand dominated sandbank crest habitats, while the coarse sediment habitats were differentiated based on the presence/absence of *Sabellaria spinulosa*. The grab macrofaunal and epifaunal trawl datasets were considered to represent natural background infaunal and epifaunal conditions for this region of the southern North Sea.

The seabed across the OWF survey area corresponded well to the reflectivity in side scan sonar data across the site and was therefore assigned seven level four JNCC/EUNIS habitat types: MB52 'Atlantic infralittoral fine sand' (SS.SSa.IFiSa), MC52 'Atlantic circalittoral fine sand' (SS.SSa.CFiSa), MD52 'Atlantic offshore circalittoral sand' (SS.SSa.OSa), MB32 'Atlantic infralittoral coarse sediment' (SS.SCS.ICS), MC32 'Atlantic circalittoral coarse sediment' (SS.SCS.CCS), MD32 'Atlantic offshore circalittoral coarse sediment' (SS.SCS.OCS) or MC32/MC42'Atlantic circalittoral coarse and mixed sediment'(SS.SCS.CCS/SS.SMx.CMx). A review of the infauna and epifaunal datasets indicated the presence of several level five habitat types but all were considered impoverished examples: MB5231 'Infralittoral mobile clean sand with sparse fauna' (SS.SSa.IfiSa.ImoSa), MB5233 '*N. cirrose* and *Bathyporeia* sp. in infralittoral sand' (SSa.IFiSa.NcirBat), MD5212 '*Owenia fusiformis* and *Amphiura filiformis* in offshore circalittoral sand or muddy sand' (SS.SSa.OSa.OfusAfil), MB3231 'Sparse fauna on a highly mobile sublittoral shingle (cobbles and pebbles)' (SS.SCS.ICS.SSh), MC3211 '*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles' (SS.SCS.CCS.SpiB), MD3312 '*Hesionura elongata* and *Protodorvillea kefersteini* in offshore coarse sand' (SS.SCS.OCS.HeloPkef), MC4214 '*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment' (SS.SMx.CMx.FluHyd) and MC2211 '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (SS.SBR.PoR.SspiMx).

The associated fauna evident from video footage and still photographs comprised a high diversity and density of epifauna. The finer sand dominated sediments had an impoverished epifaunal community when compared to visual inspections of the coarse and mixed sediment habitats. This is due to the greater abundance of hard substrate in the form of cobbles and pebbles present across the coarser sediment habitats, which enables the development of complex epifaunal communities. However, Chordata such as sandeels *(Ammodytes* sp.), plaice (*Pleuronectes platessa*), dragonets (*Callionymus lyra*), lesser weever fish (*Echiichthys vipera)*and pogges *(Agonus cataphractus)* were sighted more often in sand dominated habitats.

A number of potential sensitive habitats and species are known to occur in the wider southern North Sea including, geogenic stony reefs (EC Habitats Directive Annex I habitat), biogenic reef (EC Habitats Directive Annex I, Habitat FOCI, OSPAR Threatened and/or Declining Habitat, UKBAP Priority Habitat), lesser sandeel (*Ammodytes marinus*) (Species FOCI, UKBAP Priority Species), herring spawning grounds, shallow sandbanks (EC Habitats Directive Annex I) and ocean quahog (*A. islandica*) (Species FOCI, OSPAR Threatened and/or Declining Species).

The presence of cobbles and boulders indicated the potential for Annex I stony reef to occur in areas of intermediate habitats of 'Atlantic circalittoral mixed sediment' and 'Atlantic circalittoral coarse sediment'; however, the majority of camera transects were classified as 'Not a Reef' according to the Irving (2009) criteria as the percentage cover of cobbles and boulders was <10%. Only a single transect (OWF_VID_57) was classified as 'Low Reef' due to the increased composition and elevation of cobbles present. Station OWF_57 had epifauna present at sufficient densities to be considered 'possible reef with sand veneer' or 'reef with sand veneer' according to Golding *et al.* (2020) criteria; however, the lack of mean reef species restricted the confident assignment of Annex I stony reef. The lack of SSS/MBES signatures further restricted the designation of potential patches of stony reef outside of the camera ground-truthed areas; however, a hard substrate density map of pebbles, cobbles and boulders indicated the presence of several dense regions of hard substrate availability. Although, in light of the current ground-truthed data, it is unlikely that these areas of dense cobble and boulder cover would be classified as Annex I stony reef habitats.

The presence of *S. spinulosa* aggregations at station OWF_76 indicated a conformance to SS.SBR.PoR.SspiMx '*S. spinulosa* on stable circalittoral mixed sediment'. The presence of *S. spinulosa* aggregations could indicate a presence of Annex I *S. spinulosa* reef; however, according to Gubbay (2007), the *S. spinulosa* aggregations observed along transect OWF_76 were unlikely to represent 'reef'. Although, these aggregations of *S. spinulosa* were not reef forming, areas of *S. spinulosa* aggregations had higher epifaunal species diversity when compared to areas where *S. spinulosa* was absent, indicating that even fragmented *Sabellaria* aggregations can have ecological benefits. Similarly, to the stony reef assessment, the absence of textural differences in the SSS/MBES data, restricted the mapping of *Sabellaria* at OWF_76 and across the wider survey area. Therefore, the spatial extent of the SS.SBR.PoR.SspiMx habitat within the wider OWF survey area are not known.

Numerous sandeels (Species FOCI, PMF species Scotland, UKBAP Priority Species) were observed on the video footage in sand dominated areas; however, Greenstreet (2010) indicated a wider spatial preference across multiple habitat boundaries, with 67% of stations classified as 'Prime' and 'Suitable' for sandeels based on PSA. Therefore, indicating that sandeels could potentially occupy larger areas of 'unsuitable' habitats, if the small-scale variability in sediments was within the 'Prime' or 'Preferred' criteria outlined by Greenstreet (2010). The presence of sandeels along with the 'Prime' and 'Suitable' habitat classification is unsurprising given the OWF survey area falls within a sandeel nursery ground and between two spawning grounds. It should also be noted that even optimal habitats may not be occupied by sandeels when populations are below the area's carrying capacity.

Areas of Atlantic circalittoral coarse sediment, Atlantic offshore circalittoral coarse sediment and Atlantic infralittoral coarse sediment were the most optimal for herring spawning grounds, ranging from 'Sub-prime' to 'Prime'. Whereas areas of Atlantic infralittoral sand, Atlantic offshore circalittoral sand and Atlantic circalittoral sand were all unsuitable for herring pawning ground. Similarly, to sand eels, the presence of 'Sub-prime' and 'Prime' sediments for herring spawning within the OWF survey area were unsurprising given the proximity to known spawning and nursey grounds.

The OWF survey area is situated between five areas delineated as sandbanks ('Additional Bank 93'and 'Additional Bank 97', Additional Bank 96', Additional Bank 94' and Additional Bank 92'); however, these sandbanks do not form part of any designated Special Areas of Conservation (SACs). The higher proportions of sandy sediment to the east of the survey area, along with the relatively shallow water depths in this area, provides further evidence for the expected presence of Annex I sandbank habitat beyond the southern and northern edges of the OWF survey area.

No living specimens of ocean quahog (*A. islandica*) (Species FOCI, Scottish PMF OSPAR threatened and/or declining Species) were observed on underwater video footage or recorded in grab/epibenthic trawl macrofauna datasets. Therefore, it is unlikely for the ocean quahog to occur within the OWF survey area.

Non-native marine species are of particular concern when they become invasive thus detrimental to native species. However, invasive species within the OWF survey area were limited to observations of slipper limpets (*C. fornicata),* which have been present in the UK since the late 1800s.

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7 APPENDIX

APPENDIX A – GEO OCEAN III

GEO OCEAN III

Offshore Survey & Support Vessel

SUPPORT ACTIVITIES / VESSEL CAPABILITIES

The GEO OCEAN III is a multi-disciplined DP II offshore survey vessel. With her specifically selected equipment and capabilities for the North Sea survey and light construction support activities, she is the ideal candidate for our Oil & Gas and Renewables clients.

The vessel is equipped with 56 berths, Offshore crane, Survey and ROV systems. Equipment can be rapidly deployed using the large Stern A-Frame, crane or through the 6 x6 m moonpool via the dedicated A-frame and 30t AHC winch. All together making the Geo Ocean III a dynamic platform for subsea operations.

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GEO OCEAN III

Offshore Survey & Support Vessel

TECHNICAL SPECIFICATION

General

Name	Geo Ocean III
Flag	Luxembourg
Port Registry	Luxembourg
Call Sign	LXGP
IMO Number	9285586
Classification	LLOYDS - HULL – MACH
Vessel Type	Survey Vessel SV
Special Service:	Fire fighting ship / Fire fighting 1 Waterspray / Oil Recovery / Stand by rescue
Unrestricted navigation	AUT-UMS - ALM - DYNAPOS-AM/AT-R; SDS

Dimensions and Construction

Builder	De Hoop
Built	2004
LOA	77,30 m
Width Moulded	18 m
Depth Moulded	7,40 m
Draft min. / max.	3,80 m/6,10 m
Gross Tonnage	3,722
Moonpool	6 m x 6m

Accommodation

Total Berths	56 persons
Total Cabins	32
Single cabins	8 x 1 person
Double cabins	24 x 2 persons
Offices	1 x Dedicated Online 1 x Dedicated Offline / Conference room 1 x Client Office 1 x OCM Office 1 x 3rd Party Office
Hospital	1 x Hospital
Other Facilities	Galley, Large Mess room, 2 x day room, Gymnasium, Dirty Mess

Capacities & delivery Rates

Main Deck area:	670 m²
Hangar Deck:	290 m²
Mezzanine Deck Area:	268 m²
Max Deck Loading	Main Deck 5t/m² Mezzanine Deck 2t/m²
Max Deck Load	1,300 t @ 1m above deck
Fuel oil (capacity - transfer):	1,105m³ - 100m³/h @ 8bars
Drill or Water ballast (capacity - transfer):	1,350m³ - 40m³/h @ 4.5bars
Antiheeling (capacity - transfer):	250m³ - 2 x 500m³/h
Fresh water (capacity - transfer):	495 m3 - 40 m³/h @ 4.5bars
Oil recovery:	324 m³
Foam:	24 m³

Safety Equipment

Fi-Fi:	Class 1
Pumps:	2 x 1,200m³/h
Monitors:	2 x 1,200m³/h
Fast Rescue Craft:	1 x Seabear 23 MKII
Rescue capacity:	150 persons in tropical area

MACHINERY & PERFORMANCE

Propulsion - Machinery

Main propulsion:	2 x 1,800 kW FP Azimuth thrusters
Main Engines:	4 x 1360kW Caterpillar
Tunnel thrusters:	1 x Insert manufacturer 780 kW
Fwd Azimuth	1 x Rolls Royce 600kW retractable

SPEED & CONSUMPTION (Information only)

Service Speed	10 kts
Max Speed	12 kts

Fuel consumption

Stand-by in port:	2t/day
Survey Speed:	7t/day
DPII:	6t/day

Deck Equipment and Cranes

Main Crane:	SMST telescopic 40t @ 9m - 6t @ 23.5m
Winch Capacity:	40t / 40t - 200m
Deck Crane	4.5t @9m Man-riding
Stern A- Frame :	54t @ 8m outreach
Max launching Dims	8m clearance up / 10m wide opening
Offshore capacity:	54t @ 8m outreach
Winch Capacity	30t / 30t - 1,500m - AHC
Moonpool A-Frame	30t
Winch Capacity	30t / 30t - 1,500m - AHC
Tuggers:	1 x 10t & 1 x 30t
Capstans:	2 x 5t
Deck Service Air Supply:	66 m³/h @ 8 bars
Deck Power Supply:	3 x 265 kW - 480 VAC /60Hz

Navigation and Dynamic Positioning

DP System:	GE DP21 + IJS
Type:	DP 2
Reference 1:	DGPS 1 Fugro Seastar 9205
Reference 2:	DGPS 2 Fugro Seastar 9205
Reference 3:	G4 and XP2 corrections USBL
Reference 4:	Kongsberg Fan Beam
Primary Heading/motion/INS	POSMV 320 Ocean Master
Secondary Heading/motion/INS	POSMV 320 Ocean master
Subsea Positioning	Sonardyne Ranger 2 c/w 6G HPT 5000

Survey Suite and Offline software

Survey Suite	QINSY EIVA
Offline Software	QINSy, NaviSuite, Beamworks, Oasis Montaj (UXO marine), Visual works, Autodesk, Arc GIS,
Video Distribution	4k ultra high definition
Audio comms	Canford clear comms

Survey Sensors

MBES	Hull Mounted (Optional Dual head) R2Sonic 2024 UHR
Single Beam	XXXXXXX
Sound Velocity Sensor	Valeport Swift
Sidescan Sonar	Edgetech 2200
Sub Bottom Profiler	Silas, Depending on requirements

Subsea Equipment

WROV	1 x 150HP WROV
IROV	Mezzanine deck configured for rapid mobilisation 1 x Seaeye Cougar
Vibrocorer	3/6m electric/hydraulic systems as required
CPT	Optional 1.5 – 20t systems (Neptune or Manta type as required)

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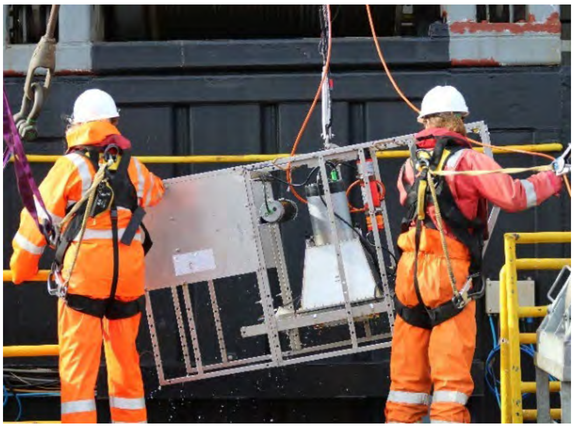
APPENDIX B – SAMPLING EQUIPMENT

Item	Comments
	For detailed assessment of ecologically sensitive habitats. The camera system was housed within a freshwater lens (FWL) adapted sled, which allows this system to take high resolution images and video in areas of poor visibility water clarity. During phase 1, the FWL frame was setup for both the BSL MOD 4.2 and 4.4 camera systems. Two additional camera sleds were retained onboard as backups.
	The Mini-Hamon Grab was the primary sampler used at every station throughout Phase 1 for all MF/PSA/TOC sampling. It is a single shovel sampler designed for operations in mixed, diamicton sands and gravel sediments and acquires a 1 x 0.1m^2 sample from a single deployment.
	The Shipek Grab was utilised at 30 sampling stations to acquire samples for contaminant analysis, with a further 15 sub-sampled for eDNA. When the grab touches the bottom, inertia from a self-contained weight releases a catch and helical springs rotate the inner half cylinder by 180°. After turning, the scoop remains closed by the residual torque of the scoop spring. Because the rotation of the bucket is under tension, its shear strength is far greater than the sediment strength, thus cutting cleanly, particularly in soft clays, muds, silts & sands.

Item	Comments
	The Day Grab was retained onboard as a backup to the Mini-Hamon and was not used in the course of Phase 1 environmental sampling operations. It is normally used to acquire undisturbed samples from muddy or sandy seabed sediment, collecting 1 x 0.1m^2 sample from a single deployment.
	The *Wilson* Auto-siever was loaded with a sieve stack of 5mm and 1mm sieves and utilises seawater to remove excess sediment whilst retaining macrofauna for formaldehyde preservation.
	A robust commercial Jennings-type 2m beam trawl was used in Phase 1 to acquire Macro Faunal samples from a minimum of 500m long trawl transects Comprised of a heavy-duty steel beam, outer commercial mesh, and internal 7.5mm scientific mesh and is configured with a 5mm mesh liner in the cod-end to retain smaller organisms.

APPENDIX C – FIELD OPERATIONS AND SURVEY METHODS

Seabed Photography and Video

Seabed video footage was acquired at 31 locations across the OWF site to provide ground-truthing of sediments indicated in the acoustic data. The 31 camera transects were carried out using MOD4.4 and MOD4.2 camera systems mounted within a BSL freshwater lens drop down frame equipped with a separate strobe, and LED lamps.

Once at the seabed, the camera was moved along the length of the transect at a speed of 0.3 to 0.5 knots. Still photographs were captured remotely using a surface control unit via a soft towed umbilical to the camera system. The stills were uploaded in real-time and saved to the camera and a laptop via specialist software. Live video footage, overlaid with the date, time, position and site details were viewed in real-time. The live video stream was used to assist with targeting of the stills camera. HD footage was saved internally by the video camera; data was downloaded at the end of each day of camera operations and backed-up onto a hard drive

Grab Sampling

A 0.1m^2 mini Hamon grab was used for macrofaunal and physico-chemistry sampling at all sample locations due to coarse sediments encountered across the OWF area. Three consecutive 'no sample' deployments were agreed to be the maximum number of attempts at any location before moving on. Samples above the predetermined minimum of 40% retention were obtained at 71 sampling stations. Coarse material at the remaining nine stations prevented adequate grab penetration and therefore were rejected as an acceptable sample.

A 0.1m^2 Shipek grab used to collect contaminant samples. Three consecutive 'no samples' per grab type was agreed to be the maximum at each location before moving on. At 30 stations both primary and secondary contaminant samples could be acquired from a single grab sample.

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 upon recovery and were flagged if they did not meet the following requirements:

- Water above sample is 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 (ca. 40% of the sampler's capacity);
- No hagfish (*Myxine glutinosa*) and/or other mucus coagulants were found in the sample;
- No obvious contamination from equipment or the vessel;
- 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, smell (including the presence of H_2S), obvious fauna, evidence of bioturbation and evidence of anthropogenic debris. Two successful 0.1m^2 replicates were required per station to acquire enough material for three macrofauna replicates and sub-sampling of physico-chemistry from the remaining sample, achieved through two deployments of the Hamon Grab. The macrofaunal replicates were processed on-board over a 5mm and a 1mm aperture mesh by BSL scientists using a *Wilson* Auto-siever.

Sample Processing

Field processing was conducted on board after they had been subjected to the afore mentioned quality control and proclaimed acceptable. Sub-sampling of physico-chemical parameters was undertaken from the grab samples with the following material retrieved from the surface sediments (0-2cm) for later analysis:

1. Heavy & trace metals and total organic carbon & matter (stored in doubled lined Ziplock plastic bag);
2. Particle size distribution (PSA; stored in doubled lined Ziplock plastic bag).

Sub-sampling of contaminants from the Shipek grab was undertaken by BSL scientists from the grab samples for later analysis. Sediment samples were collected using stainless steel implements and stored in a pre-washed foil capped glass jar.

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.

Benthic Trawls

A 2-metre Jennings style beam trawl was to be deployed along 8 trawl routes across the OWF survey area. Samples were required to be a minimum of 5 litres with smaller trawl catches classed as a 'no samples and repeated at a 50m offset. Three consecutive 'no samples' was agreed to be the maximum number of attempts at any location before moving on. Where preliminary review of co-located camera transects indicated that an area supported sparse epifauna, the trawl length was extended beyond the minimum 500m length to increase the chance of acquiring satisfactory trawl samples.

Samples were extracted from the trawl, photographed with their respective identification label and, if necessary, sieved over a 5mm mesh. Biological organisms were separated into trays by general groups (e.g. crustaceans, echinoderms, mollusc, sponges and others). Individuals were counted and identified to species where possible, those that were unable to be identified in the field were fixed and returned to the onshore laboratory for analysis. One example for each taxa was fixed and kept as a reference collection.

Before fixing, conspicuous specimens were photographed and all specimens were biomassed by taxa. The lengths of fish specimens were also measured and recorded. Larger reference specimens including all fish were stored in bags in the freezer, smaller specimens were fixed in formalin and stored in plastic bags or pots, grouped by trawl into larger buckets.

APPENDIX D – DATA PRESENTATION, LABORATORY AND STATISTICAL ANALYSES

PARTICLE SIZE DISTRIBUTION

The samples recovered from each site were analysed by BSL who participate in the North East Atlantic Marine Biological Analytical Quality Control Scheme (NMBAQC) for PSA analysis.

The sample was homogenised and split into a small sub-sample for laser diffraction and the remaining material was sieved through stainless steel sieves with mesh apertures of 8000µm, 4000µm, 2000µm and 1000µm. In most cases almost the entire sample would pass through the sieve stack, but any material retained on the sieve, such as small shells, shell fragments and stones were removed, and the weight was recorded.

The smaller sub-sample was wet screened through a 1000µm sieve and determined using a Malvern Mastersizer 2000 particle sizer according to Standard Operating Procedures (SOP). The results obtained by a laser sizer have been previously validated by comparison with independent assessment by wet sieving (Hart, 1996). The range of sieve sizes, together with their Wentworth classifications, is given in Table A. For additional quality control, all datasets were run through the Mastersizer in triplicate and the variations in sediment distributions assessed to be within the 95% percentile.

The separate assessments of the fractions above and below 1000µm were combined using a computer programme. This followed a manual input of the sieve results for fractions 16mm-8mm, 8mm-4mm, 4mm-2mm and 2mm-1mm fractions and the electronic data captured by the Mastersizer below 1000µm.

This method defines the particle size distributions in terms of Phi mean, median, fraction percentages (i.e., coarse sediments, sands and fines), sorting (mixture of sediment sizes) and skewness (weighting of sediment fractions above and below the mean sediment size; Folk 1954).

Formulae and classifications for particle calculations made are given below:

- **Graphic Mean (M)** - a very valuable measure of average particle size in Phi units (Folk and Ward, 1957).

$$M = \frac{\o16 + \o50 + \o84}{3}$$

Where *M = The graphic mean particle size in Phi*
ø = the Phi size of the 16th, 50th and 84th percentile of the sample

Table II.I - Phi and Sieve Apertures with Wentworth Classifications

Microns (µm)		Phi (ϕ)		Sediment Description	
Aperture	Sediment Retained	Aperture	Sediment Retained		
4000	≥ 4000	-2	-2 < -1	Pebble	Gravel
2000	2000 < 4000	-1	-1 < -0.5	Granule	
1400	1400 < 2000	-0.5	-0.5 < 0	Very Coarse Sand	Sands
1000	1000 < 1400	0	0 < 0.5		
710	710 < 1000	0.5	0.5 < 1	Coarse Sand	
500	500 < 710	1	1 < 1.5		
355	355 < 500	1.5	1.5 < 2	Medium Sand	
250	250 < 355	2	2 < 2.5		
180	180 < 250	2.5	2.5 < 3	Fine Sand	
125	125 < 180	3	3 < 3.5		
90	90 < 125	3.5	3.5 < 4	Very Fine Sand	
63	63 < 90	4	4 < 4.5		
44	44 < 63	4.5	4.5 < 5	Coarse Silt	Fines (Silts)
31.5	31.5 < 44	5	5 < 5.5		
22	22 < 31.5	5.5	5.5 < 6	Medium Silt	
15.6	15.6 < 22	6	6 < 6.5		
11	11 < 15.6	6.5	6.5 < 7	Fine Silt	
7.8	7.8 < 11	7	7 < 7.5		
5.5	5.5 < 7.8	7.5	7.5 < 8	Very Fine Silt	
3.9	3.9 < 5.5	8	8 < 9		
2	2 < 3.9	9	9 <10	Clay	Fines (Clays)
1	1 < 2	10	≥ 10		

- **Sorting (D)** – the inclusive graphic standard deviation of the sample is a measure of the degree of sorting (Table B).

$$D = \frac{\text{ø}84 + \text{ø}16}{4} + \frac{\text{ø}95 + \text{ø}5}{6.6}$$

where *D = the inclusive graphic standard deviation*
ø = the Phi size of the 84th, 16th, 95th and 5th percentile of the sample

Table II.II - Sorting Classifications

Sorting Coefficient (Graphical Standard Deviation)	Sorting Classifications
0 < 0.35	Very well sorted
0.35 < 0.50	Well sorted
0.50 < 0.71	Moderately well sorted
0.71 < 1	Moderately sorted
1 < 2	Poorly sorted
2 < 4	Very poorly sorted
4 +	Extremely poorly sorted

- **Skewness (S)** – the degree of asymmetry of a frequency or cumulative curve (Table C).

$$S = \frac{\phi 84 + \phi 16 - (\phi 50)}{2(\phi 84 - \phi 16)} + \frac{\phi 95 + \phi 5 - 2(\phi 50)}{2(\phi 95 - \phi 5)}$$

where *S = the skewness of the sample*
ø = the Phi size of the 84th, 16th, 50th, 95th and 5th percentile of the sample

Table II.III - Skewness Classifications

Skewness Coefficient	Mathematical Skewness	Graphical Skewness
+1 > +0.30	Strongly positive	Strongly coarse skewed
+0.30 > +0.10	Positive	Coarse skewed
+0.10 > -0.10	Near symmetrical	Symmetrical
-0.10 > -0.30	Negative	Fine skewed
-0.30 > -1	Strongly negative	Strongly fine skewed

- **Graphic Kurtosis (K) –** The degree of peakedness or departure from the 'normal' frequency or cumulative curve (Table D).

$$K = \frac{\phi 95 - \phi 5}{2.44(\phi 75 - \phi 25)}$$

Where *K = Kurtosis*
ø = the Phi size of the 95th, 5th, 75th and 25th percentile of the sample

Table II.IV - Kurtosis Classifications

Kurtosis Coefficient	Kurtosis Classification	Graphical meaning
0.41 < 0.67	Very Platykurtic	Flat-peaked; the ends are better sorted than the centre
0.67 < 0.90	Platykurtic	
0.90 < 1.10	Mesokurtic	Normal; bell shaped curve
1.11 < 1.50	Leptokurtic	Curves are excessively peaked; the centre is better sorted than the ends.
1.50 < 3	Very Leptokurtic	
3 +	Extremely Leptokurtic	

LABORATORY ANALYSIS

The samples recovered from each site were analysed by SOCOTEC. SOCOTEC is accredited by the Marine Management Organisation and UKAS to test for the following in marine sediments;

- Total Organic Carbon (TOC)
- Petroleum Hydrocarbon (THC) (MMO accreditation)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Trace/Heavy Metals
- Organotins
- Polychlorinated Biphenyls (PCBs)
- Organochlorine Pesticides (OCPs)

TOTAL ORGANIC CARBON CONCENTRATIONS

Total Organic Carbon in Sediment

A portion of air-dried and ground sample is mixed with concentrated sulphurous acid. This is warmed to 40°C for an extended period of time. The resultant mixture is then heated to dryness at 100°C.The dried residue is analysed for carbon content using an Eltra induction furnace fitted with an NDIR cell. The total quantity of carbon liberated is calculated and reported as a percentage of the original mass of sample.

HYDROCARBON CONCENTRATIONS (TOTAL HYDROCARBON CONCENTRATIONS AND ALIPHATICS)

General Precautions

High purity solvents were used throughout the analyses. Solvent purity was assessed by evaporating an appropriate volume to 1ml and analysing the concentrate by GC for general hydrocarbons, target n-alkanes and aromatics. All glassware and extraction sundries were cleaned prior to use by thorough rinsing with hydrocarbon-free deionised water followed by two rinses with dichloromethane. All glassware was heated in a high temperature oven at 450°C for 6 hours.

Total Hydrocarbon Content (THC) in Marine Sediment

Anhydrous Sodium Sulphate, Sodium Chloride and DCM are added to a portion of the As Received sample and is vigorously agitated. The sample is placed in an ultrasonic bath and then centrifuged. The extract is then analysed by UV Fluorescence Screening and quantified by comparing the results against a Forties Oil calibration curve.

Polycyclic Aromatic Hydrocarbons in Marine Sediment

Methanol and DCM are added to a portion of the As Received sample and mixed on a magnetic stirring plate. The solvent extract is then water partitioned and concentrated to a low volume. A double clean-up stage is employed to remove contaminants that may interfere with the analysis. The extract is analysed by GC-MS and quantified by comparing the results against a calibration curve for each of the target analytes.

HEAVY AND TRACE METAL CONCENTRATIONS

Metals in Sediment by ICP- MS

A portion of air-dried and ground sample is digested with Aqua Regia. Once cooled the extract is filtered and pre-diluted before being analysed. Analysis is performed by ICP-MS and quantified by comparing the results against a calibration curve for each of the target analytes

Analytical Methodology

Inductively Coupled-Plasma Optical Emission Spectrometry

The instrument is calibrated using dilutions of the 1ml (=10mg) spectroscopic solutions. The final calibration solutions are matrix matched with the relevant acids. The calibration line consists of five standards.

Inductively Coupled Plasma- Mass Spectrometry

The instrument is calibrated using dilutions of the 1ml (=10mg) spectroscopic solutions. The calibration line consists of seven standards.

The analytes are scaled against internal standards to take account of changes in plasma conditions as a result of matrix differences for standards and samples. The internal standards have a similar mass and ionisation properties to the target metals.

CONTAMINANT CONCENTRATIONS

Organotins in Marine Sediment

A portion of the As Received sample is digested with hydrochloric acid and methanol before being extracted into toluene. The extract is then derivatized using sodium tetraethylborate (STEB) before concentration and a copper/silica clean-up is performed. The extract is analysed by GC-MS and quantified by comparing the results against a calibration curve for each of the target analytes.

Poly Chlorinated Biphenyls (PCBs) in Marine Sediment

A portion of air-dried and sieved sample is spiked with 13C labelled internal standards, ultrasonically solvent extracted and concentrated under nitrogen. A clean-up stage is employed to remove contaminants that may interfere with the analysis. The sample extract is analysed by Gas Chromatography coupled to a triple quadrupole mass spectrometer (GC-MS-MS). Quantification is performed by comparison with a solution containing each of the targeted compounds, normalised to the 13C labelled internal standards.

Organochlorine Pesticides (OCPs) in Marine Sediment

A portion of air-dried and sieved sample is spiked with 13C labelled internal standards, ultrasonically solvent extracted and concentrated under nitrogen. A clean-up stage is employed to remove contaminants that may interfere with the analysis. The sample extract is analysed by Gas Chromatography coupled to a triple quadrupole mass spectrometer (GC-MS-MS). Quantification is performed by comparison with a solution containing each of the targeted compounds, normalised to the 13C labelled internal standards.

MACRO-INVERTEBRATE ANALYSIS

Methodology

All macrofaunal determination was carried out inhouse by the BSL specialist taxonomist team. The BSL specialist taxonomist team are comprised of three senior individuals who possess a wealth of experience in macrofaunal identification in temperate deep-water environments.

Benthic sediment samples were thoroughly washed with freshwater on a 500µm sieve to remove traces of formalin, placed in gridded, white trays and then hand sorted by eye followed by binocular microscope, to remove all fauna. Sorted organisms were preserved in 70% IMS and 5% glycerol. Where possible, all organisms were identified to species level according to appropriate keys for the region. Colonial and encrusting organisms were recorded by presence alone and, where colonies could be identified as a single example, these were also recorded, although these datasets have not been considered in the overall statistical analysis of the material. The presence of anthropogenic components was also recorded where relevant.

All taxa were distinguished to species level and identified to at least family level where possible, and many of the species that could not be fully identified were separated putatively. Nomenclature for species names were allocated either when identity was confirmed, allocated as “cf.” when apparently identifying to a known species but confirmation was not possible (for example, incomplete specimens or descriptions), or allocated as “aff.”

when close to but distinct from a described species. The terms "indet." refers to being unable to identify to a lower taxon and "juv" as a juvenile to that species, genus or family.

Quality Assurance

BSL is committed to total quality control from the start of a project to its completion. All samples taken or received by the company were given a unique identification number. All analytical methods were carried out according to recognised standards for marine analyses. All taxonomic staff are fully qualified to post-doctorate level. Documentation is maintained that indicates the stage of analysis that each sample has reached. A full reference collection of all specimens has been retained for further clarification of putative species groups where/if required. BSL is a participant in the NMBAQC quality assurance scheme.

Digital datasets are kept for all sites in the form of excel spreadsheets (by sample and by station) on BSL's archive computer. This system is duplicated onto a second archive drive in case of electronic failure. These datasets will be stored in this way for a minimum of 3 years or transferred to storage disk (data CD or DVD).

Biological Data Standardisation and Analyses

In accordance with OSPAR Commission (2004) guidelines, all species falling into juvenile, colonial, planktonic of meiofaunal taxa are excluded from the full analyses within the dataset. This helps to reduce the variability of data undertaken during different periods within the year, or where minor changes may occur or where some groups may only be included in a non-quantitative fashion, such as presence/absence. Certain taxa, such as the Nematoda, normally associated with meiofauna, were included where individuals greater than 10mm were recorded. The following primary and univariate parameters were calculated for all data by stations and sample (Table II.VI).

Table II.VI - Primary and Univariate Parameter Calculations

Variable	Parameter	Formula	Description
Total Species	S	Number of species recorded	Species richness
Total Individuals	N	Number of individuals recorded	Sample abundance
Shannon-Wiener Index	H(s)	$H(s) = -\sum_{i=1}^{s} (Pi)(\log_2 Pi)$ where s = number of species & Pi = proportion of total sample belonging to *i*th species.	Diversity: using both richness and equitability, recorded in log 2.
Simpsons Diversity	1-Lambda	$Lambda = \sum \left(\frac{ni(ni-1)}{N(N-1)} \right)$ where ni = number of individuals in the *i*th species & N = total number of individuals	Evenness, related to dominance of most common species (Simpson, 1949)
Pielou's Equitability	J	$J = \frac{H(s)}{(\log S)}$ where s = number of species & H(s) = Shannon-Wiener diversity index.	Evenness or distribution between species (Pielou, 1969)
Margalef's Richness	D_{Mg}	$D_{Mg} = \frac{(S-1)}{(\log N)}$ where s = number of species & N = number of individuals.	Richness derived from number of species and total number of individuals (Clifford and Stevenson, 1975)

In addition to univariate methods of analysis, data for both sample replicates and stations were analysed using multivariate techniques. These serve to reduce complex species-site data to a form that is visually interpretable. A multivariate analysis was based on transformed data (square root) to detect any improved relationships when effects of dominance were reduced. The basis for multivariate analyses was based upon the software PRIMER (Plymouth Routines in Multivariate Ecological Research).

Similarity Matrices and Hierarchical Agglomerative Clustering (CLUSTER)

A similarity matrix is used to compare every individual sample replicate and/or stations with each other. The coefficient used in this process is based upon Bray Curtis (Bray and Curtis, 1957), considered to be the most suitable for community data. These are subsequently assigned into groups of replicates and/or stations according to their level of similarity and clustered together based upon a Group Average Method into a dendrogram of similarity.

Non-metric Multidimensional Scaling (nMDS)

nMDS is currently widely used in the analysis of spatial and temporal change in benthic communities (e.g. Warwick and Clarke, 1991). The recorded observations from data were exposed to computation of triangular matrices of similarities between all pairs of samples. The similarity of every pair of sites was computed using the Bray-Curtis index on transformed data. Clustering was undertaken by a hierarchical agglomerative method using group average sorting, and the results are presented as a dendrogram and as a two-dimensional ordination plot. The degree of distortion involved in producing an ordination gives an indication of the adequacy of the nMDS representation and is recorded as a stress value as outlined in Table II.VII.

Table II.VII - Inference from nMDS Stress Values

nMDS Stress	Adequacy of Representation for Two-Dimensional Plot
≤0.05	Excellent representation with no prospect of misinterpretation.
>0.05 to 0.1	Good ordination with no real prospect of a misleading interpretation.
>0.1 to 0.2	Potentially useful 2-d plot, though for values at the upper end of this range too much reliance should not be placed on plot detail; superimposition of clusters should be undertaken to verify conclusions.
>0.2 to 0.3	Ordination should be treated with scepticism. Clusters may be superimposed to verify conclusions, but ordinations with stress values >2.5 should be discarded. A 3-d ordination may be more appropriate.
>0.3	Ordination is unreliable with points close to being arbitrarily placed in the 2-d plot. A 3-d ordination should be examined.

Similarity Percentages Analysis (SIMPER)

The nMDS clustering program is used to analyse differences between sites. SIMPER enables those species responsible for differences to be identified by examining the contribution of individual species to the similarity measure.

Bioaccumulation Curve

Bioaccumulation Curve Estimates are undertaken using Chao-1 (S*1). This is a formula that estimates how many additional species would be needed to sample all of the asymptotic species richness of a region, based on the samples acquired. It calculates this by comparing the number of species that occur in one sample with those that occur in two samples where;

$$S^*_1 = S_{obs} + (a^2/2b)$$

S_{obs} is the number of species observed
a is the number of species observed just once
b is the number of species observed just twice

Relationship Testing (RELATE)

A non-parametric Mantel test that looks at the relationship between 2 matrices (often biotic and environmental). This shows the degree of seriation, an alternative to cluster analysis, which looks for a sequential pattern in community change. The test computes Spearman's rank correlation coefficient (ρ) between the corresponding elements of each pair of matrices to produce a correlation statistic present between the two datasets, the significance of the correlation determined by a permutation procedure (Clarke and Gorley, 2006).

Analysis of Similarity (ANOSIM)

Non-parametric, multivariate test often used in community ecology that calculates Bray-Curtis coefficient (for biological data) or Euclidean distance (for environmental data) based on permutations of ranked data. It produces an R value which is an effect level on a scale of 0-1; R=1 where all differences between sites are greater than any differences within site, R=0 when there is no separation between groups. P value (<5%) is the likelihood of arriving at that R value by chance, this significance value is determined by a permutation procedure (Clarke and Gorley, 2006).

Similarity Profile (SIMPROF)

Analyses data for significant clusters that show evidence of a multivariate pattern in data that are a priori unstructured, i.e. single samples from each site, this differs from the ANOSIM tests which permutes data based on a grouping factor such as 'site' or 'year'. The test works by comparing samples which have been ranked and ordered by resemblance against an expected profile which is obtained by permuting random species (variables) across the set of samples, a mean of 1000 permutations is taken to produce an expected result for null structure with rare and common species displaying the same pattern. If the actual data deviates outside the 95% limits of the expected profile, then there is evidence for significant structure and vice versa. The 'significant structure' is well represented on a dendrogram which will also show the clusters containing that lack significant differentiation (null structure; Clarke and Gorley, 2006).

NORMALISATION

Normalisation is a procedure used here to correct concentrations for the influence of the natural variability in sediment composition (i.e. grain size, organic matter and mineralogy). Natural and anthropogenic contaminants tend to show a much higher affinity to fine particulate matter compared to coarse (OSPAR, 2009) due to the increased adsorption capacity of organic matter and clay minerals. In sites where there is variability in grain size between stations, effects of sources of contamination will at least partly be obscured by grain size differences.

Normalisation can be performed through linear regression or by simple contaminant/normaliser ratios.

Linear regression normalisation takes into account the possible presence of contaminants and co-factors. The binding capacity of the sediments can be related to the content of fines (primary co-factor) in the sediments. The level of fines can be represented by the contents of major elements of the clay fraction such as aluminium (secondary co-factor). Figure II.I represents the general model for normalisation of the contaminants.

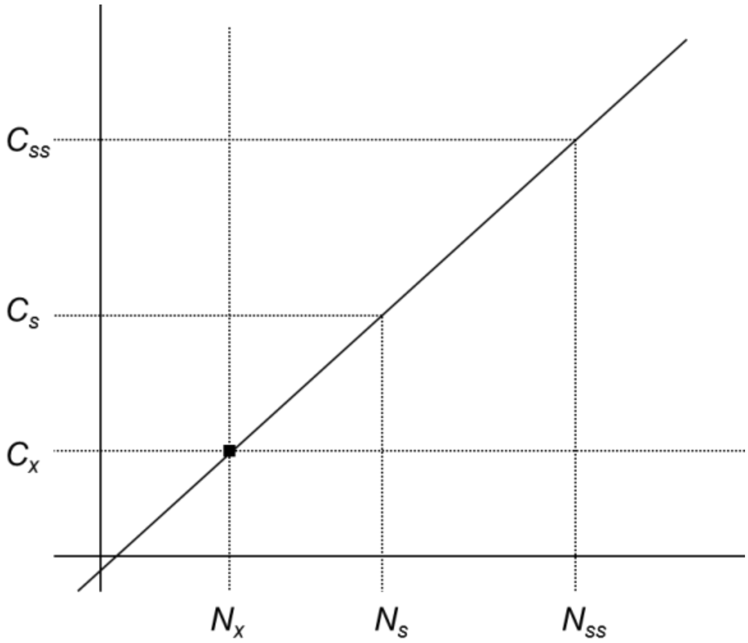


Figure II.I - Relation between the contaminant C and the cofactor N

Cx and Nx represent the contaminant and the co-factor contents, respectively, in pure sand. The regression line will always originate from this point and pivot depending on the sampled contaminant concentrations (Cs and Ns). These 'pivot values' are derived from statistical analysis of contaminant concentrations in pure sand.

The linear relationship between the pivot point and the sampled concentrations allows determination of the contaminant content for any preselected co-factor content (Nss) by interpolation and extrapolation. When comparing to the OSPAR BCs and BACs the secondary cofactors for normalisation are 50ppm of Li for metals and 2.5% TOC when normalising organics. The slope of the regression line (PL) can be represented by Equation 1, which can then be re-arranged to give the contaminant content Css that is normalised to Nss in Equation 2.

$$PL = \frac{dC}{dN} = \frac{C_s - C_x}{N_s - N_x} = \frac{C_{ss} - C_x}{N_{ss} - N_x}$$

Equation 1: Slope of the regression line expressed in terms of N_{ss}

$$C_{ss} = (C_s - C_x)\frac{N_{ss} - N_x}{N_s - N_x} + C_x$$

Equation 2: Rewritten equation giving the contaminant content C_{ss} normalised to N_{ss}

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC / ARMCANZ)

The ANZECC and ARMCANZ framework is a tiered, decision-tree approach to assess contaminated sediments against a set of sediment quality guideline values (SQGV) to establish the level of risk on the biological community (Simpsons *et al.,* 2013; Figure II.I). The SQGVs are tabulated in Table II.IX. If the contaminant concentrations exceed the SQGVs, further investigation is recommended to determine whether there is indeed an environment risk associated with the exceedance.

Table II.IX Sediment Quality Guideline Values (Simpson et al., 2013)

Contaminant	SQGV	SQGV-High
Antimony ($mg.kg^{-1}$)	2.0	25.0
Cadmium ($mg.kg^{-1}$)	1.5	10.0
Chromium ($mg.kg^{-1}$)	80.0	370.0
Copper ($mg.kg^{-1}$)	65.0	270.0
Lead ($mg.kg^{-1}$)	50.0	220.0
Mercury ($mg.kg^{-1}$)	0.15	1.00
Nickel ($mg.kg^{-1}$)	21.0	52.0
Silver ($mg.kg^{-1}$)	1.0	4.0
Zinc ($mg.kg^{-1}$)	200.0	410.0
Arsenic ($mg.kg^{-1}$)	20.0	70.0
Tributyltin ($\mu g.kg^{-1}$)	9.0	70.0
Total PAHs ($\mu g.kg^{-1}$)	10,000	50,000
Total DDT ($\mu g.kg^{-1}$)	1.2	5.0
Total PCBs ($\mu g.kg^{-1}$)	34.0	280.0
Total Petroleum Hydrocarbons (TPHs) ($mg.kg^{-1}$)	280.0	550.0

For metals, if the SQGV is exceeded by the results of the total metals analysis, the metals should be compared to background concentrations in reference sediments of comparable grain size from appropriate sites (Figure II.I part a). Exceedance of the SQGV is acceptable if it is below the background concentration. Note that for most anthropogenic organic contaminants, the background concentrations should be zero, but for metals it is possible for background concentrations to significantly exceed trigger values. If the SQGV is exceeded, and above the background concentration, the next step in the case of metal contaminants is to look at a dilute acid extractable metal concentration (AEM, by 30 min 1 M HCl extraction) which provides a useful measure of the potentially bioavailable metals (Figure II.I part a). Non-available forms of metals in sediments might include mineralised metals that require strong acid dissolution, as achieved by total particulate metal (TPM) measurements (also referred to as total recoverable metals). For many assessments, AEM measurements may be a useful starting point in the decision tree, rather than TPM determinations. However, for some metal phases that are sparing soluble in 1 M HCl (e.g. sulphide phases of Ag, Cu, Hg) and metals associated with organic polymers that may degrade over time (e.g. antifouling paints, tyre rubber), the measurement of TPM allows the potential future transformation of these metals into more bioavailable forms to be adequately considered.). In some jurisdictions, TPM measurements are deemed necessary for comparison with historical data trends. The contaminants whose concentrations exceed SQGVs following consideration of contaminant bioavailability are termed contaminants of potential concern (COPCs). The contaminants whose concentrations exceed SQGVs following consideration of contaminant bioavailability are termed contaminants of potential concern (COPCs). If the SQGV is still exceeded, the third step involves the more explicit consideration of the bioavailable contaminant fraction (Figure II.I part a).

For metals that form insoluble sulphides, amorphous iron sulphide (FeS) measured as so-called acid-volatile sulphides (AVS), is an important metal-binding phase that reduces metal bioavailability. Measurements of metal concentrations in the pore waters and elutriates also provides valuable information on metal bioavailability.

Many organic contaminants are hydrophobic and bind strongly to the organic carbon in sediments. To account for the preferential partitioning of these contaminants to organic matter, organic contaminants and their SQGVs are normalised to the total organic carbon (TOC) concentration of the sediment (i.e. normalised to 1% TOC) ((Figure II.I part b). This normalisation should only be applied for TOC concentrations between 0.2 and 10% (Simpson *et al.*, 2013).

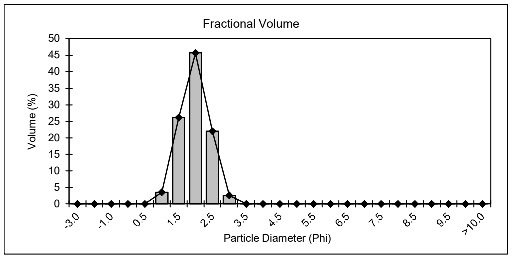
Trawl Sample Processing

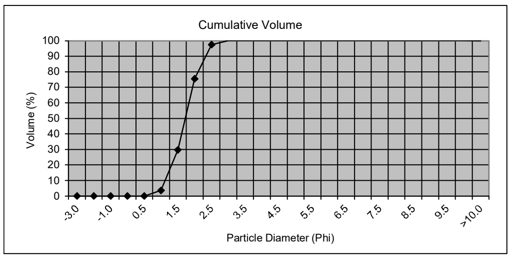
Trawl sample analysis is carried out in accordance with the Recommended operating guidelines (ROG) for MESH trawls and dredges. Upon collection, samples are sieved over a 5mm mesh then sorted into species where possible. A reference collection and any fauna unable to be identified in the field are preserved in 4% buffered formaldehyde solution and transferred to the laboratory. Identification of the reference collection is checked and all other fauna identified to the lowest possible taxonomical level, enumerated and preserved in 70% Industrial Methylated Spirit (IMS).

APPENDIX E – PARTICLE SIZE DISTRIBUTION

Stations 61-80.pdf Stations 31-60.pdf Stations 1-30.pdf

Sample No.:	OWF_01	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 16:24





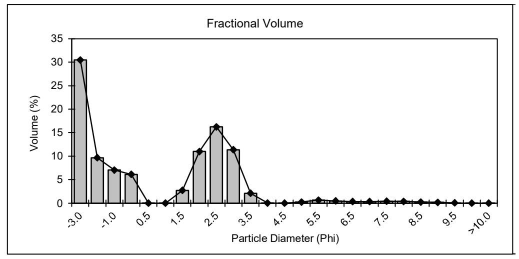
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.00	0.00	
2.0000	-1.0	0.01	0.01	Granule
1.0000	0.0	0.01	0.02	V.Coarse Sand
0.7100	0.5	0.00	0.02	Coarse Sand
0.5000	1.0	3.53	3.55	
0.3550	1.5	26.15	29.70	Medium Sand
0.2500	2.0	45.73	75.44	
0.1800	2.5	21.99	97.42	Fine Sand
0.1250	3.0	2.58	100.00	
0.0900	3.5	0.00	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

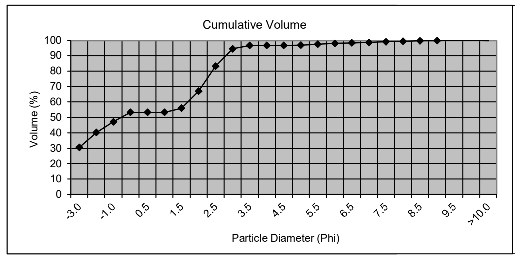
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.309	0.118	1.693
Median	0.308		1.697
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.45	Well Sorted
Skewness	0.01	Symmetrical
Kurtosis	0.95	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.99%	
Gravel (%)	0.01%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_02	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 10:27





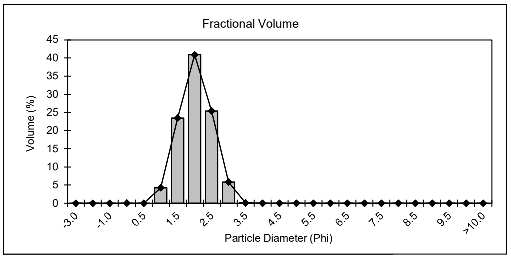
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	30.48	30.48	Pebble
4.0000	-2.0	9.65	40.14	
2.0000	-1.0	7.05	47.19	Granule
1.0000	0.0	6.11	53.30	V.Coarse Sand
0.7100	0.5	0.00	53.30	Coarse Sand
0.5000	1.0	0.01	53.31	
0.3550	1.5	2.73	56.04	Medium Sand
0.2500	2.0	11.00	67.04	
0.1800	2.5	16.23	83.27	Fine Sand
0.1250	3.0	11.38	94.65	
0.0900	3.5	2.11	96.76	V.Fine Sand
0.0630	4.0	0.03	96.79	
0.0440	4.5	0.00	96.79	Coarse Silt
0.0315	5.0	0.25	97.04	
0.0220	5.5	0.63	97.67	Medium Silt
0.0156	6.0	0.46	98.13	
0.0110	6.5	0.33	98.46	Fine silt
0.0078	7.0	0.34	98.80	
0.0055	7.5	0.39	99.19	V.Fine Silt
0.0039	8.0	0.35	99.55	
0.0028	8.5	0.25	99.79	
0.0020	9.0	0.15	99.95	Coarse Clay
0.0014	9.5	0.06	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

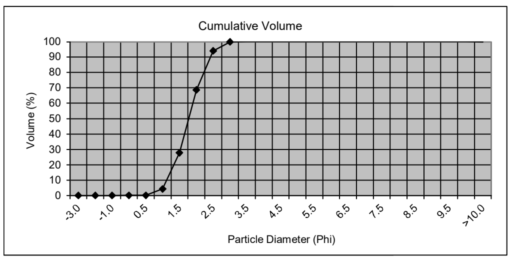
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.561	7.903	-0.643
Median	1.540		-0.623
Wentworth Classification	V. Coarse Sand		

Sorting	Value	Inference
Coefficient	2.68	Very Poorly Sorted
Skewness	0.00	Symmetrical
Kurtosis	0.54	Very Platykurtic
Fines (%)	3.21%	
Sands (%)	49.60%	
Gravel (%)	47.19%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_03	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 12:35





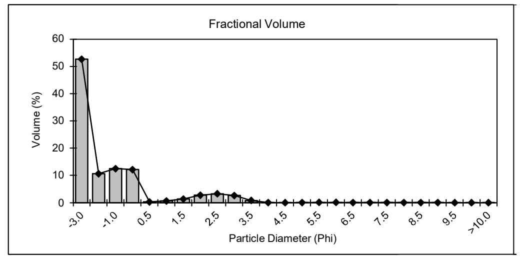
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.00	0.00	
2.0000	-1.0	0.01	0.01	Granule
1.0000	0.0	0.03	0.04	V.Coarse Sand
0.7100	0.5	0.00	0.04	Coarse Sand
0.5000	1.0	4.25	4.29	
0.3550	1.5	23.48	27.77	Medium Sand
0.2500	2.0	40.88	68.65	
0.1800	2.5	25.42	94.07	Fine Sand
0.1250	3.0	5.86	99.93	
0.0900	3.5	0.07	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

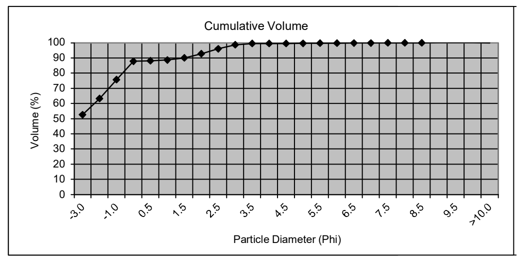
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.298	0.125	1.747
Median	0.298		1.747
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.49	Well Sorted
Skewness	0.02	Symmetrical
Kurtosis	0.93	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.99%	
Gravel (%)	0.01%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_04	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 14:24





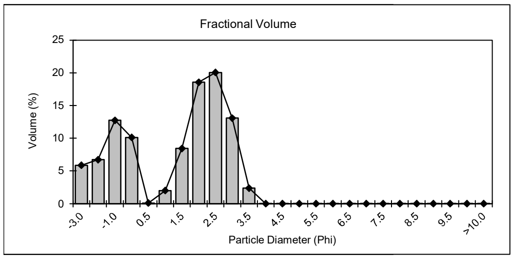
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	52.64	52.64	Pebble
4.0000	-2.0	10.61	63.25	
2.0000	-1.0	12.48	75.72	Granule
1.0000	0.0	12.11	87.83	V.Coarse Sand
0.7100	0.5	0.25	88.08	Coarse Sand
0.5000	1.0	0.61	88.69	
0.3550	1.5	1.36	90.05	Medium Sand
0.2500	2.0	2.74	92.79	
0.1800	2.5	3.27	96.05	Fine Sand
0.1250	3.0	2.62	98.68	
0.0900	3.5	0.81	99.49	V.Fine Sand
0.0630	4.0	0.06	99.55	
0.0440	4.5	0.00	99.55	Coarse Silt
0.0315	5.0	0.03	99.59	
0.0220	5.5	0.11	99.69	Medium Silt
0.0156	6.0	0.07	99.77	
0.0110	6.5	0.04	99.81	Fine silt
0.0078	7.0	0.04	99.84	
0.0055	7.5	0.05	99.90	V.Fine Silt
0.0039	8.0	0.05	99.95	
0.0028	8.5	0.04	99.99	
0.0020	9.0	0.02	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

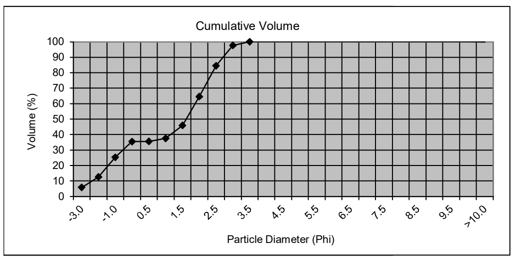
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	6.368	11.018	-2.671
Median	8.994		-3.169
Wentworth Classification	Pebble		

Sorting	Value	Inference
Coefficient	2.07	Very Poorly Sorted
Skewness	0.47	Very Positive (Coarse)
Kurtosis	0.92	Mesokurtic
Fines (%)	0.45%	
Sands (%)	23.83%	
Gravel (%)	75.72%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_05	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 14:17





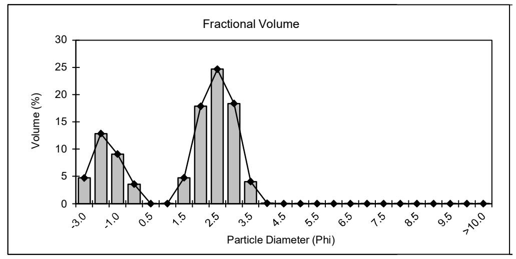
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	5.87	5.87	Pebble
4.0000	-2.0	6.73	12.60	
2.0000	-1.0	12.72	25.32	Granule
1.0000	0.0	10.11	35.43	V.Coarse Sand
0.7100	0.5	0.10	35.54	Coarse Sand
0.5000	1.0	2.00	37.54	
0.3550	1.5	8.42	45.96	Medium Sand
0.2500	2.0	18.55	64.50	
0.1800	2.5	20.04	84.55	Fine Sand
0.1250	3.0	13.07	97.62	
0.0900	3.5	2.38	99.99	V.Fine Sand
0.0630	4.0	0.01	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

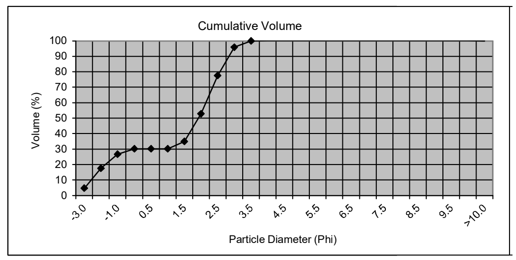
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.594	3.013	0.752
Median	0.332		1.590
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	1.97	Poorly Sorted
Skewness	-0.58	Very Negative(fine)
Kurtosis	0.75	Platykurtic
Fines (%)	0.00%	
Sands (%)	74.68%	
Gravel (%)	25.32%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_06	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 14:59





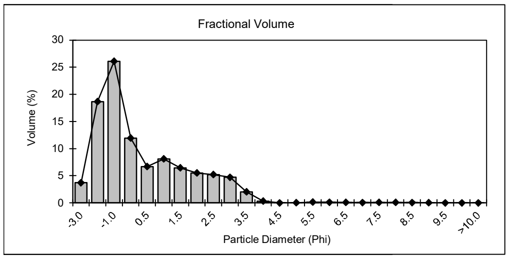
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	4.70	4.70	Pebble
4.0000	-2.0	12.84	17.54	
2.0000	-1.0	9.10	26.64	Granule
1.0000	0.0	3.58	30.22	V.Coarse Sand
0.7100	0.5	0.00	30.22	Coarse Sand
0.5000	1.0	0.02	30.23	
0.3550	1.5	4.75	34.98	Medium Sand
0.2500	2.0	17.87	52.85	
0.1800	2.5	24.66	77.51	Fine Sand
0.1250	3.0	18.37	95.88	
0.0900	3.5	4.04	99.92	V.Fine Sand
0.0630	4.0	0.08	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

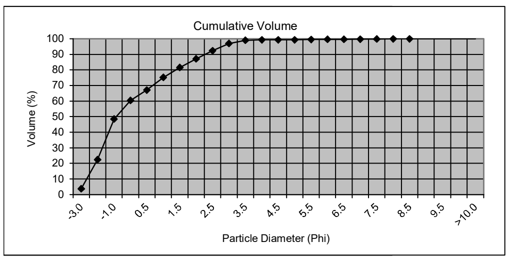
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.577	3.061	0.794
Median	0.267		1.906
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	2.10	Very Poorly Sorted
Skewness	-0.67	Very Negative(fine)
Kurtosis	0.67	Very Platykurtic
Fines (%)	0.00%	
Sands (%)	73.36%	
Gravel (%)	26.64%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_07	Operator	AW
Source Data:	Outer Dowsing OWF 2022	Date & Time:	16/05/2022 10:00





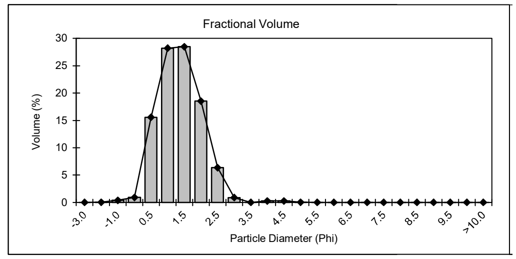
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	3.70	3.70	Pebble
4.0000	-2.0	18.67	22.37	
2.0000	-1.0	26.08	48.46	Granule
1.0000	0.0	11.94	60.40	V.Coarse Sand
0.7100	0.5	6.69	67.09	Coarse Sand
0.5000	1.0	8.10	75.18	
0.3550	1.5	6.44	81.63	Medium Sand
0.2500	2.0	5.51	87.13	
0.1800	2.5	5.20	92.33	Fine Sand
0.1250	3.0	4.72	97.05	
0.0900	3.5	2.03	99.08	V.Fine Sand
0.0630	4.0	0.32	99.41	
0.0440	4.5	0.00	99.41	Coarse Silt
0.0315	5.0	0.01	99.42	
0.0220	5.5	0.14	99.56	Medium Silt
0.0156	6.0	0.11	99.66	
0.0110	6.5	0.07	99.73	Fine silt
0.0078	7.0	0.06	99.79	
0.0055	7.5	0.08	99.87	V.Fine Silt
0.0039	8.0	0.07	99.94	
0.0028	8.5	0.05	99.99	
0.0020	9.0	0.01	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

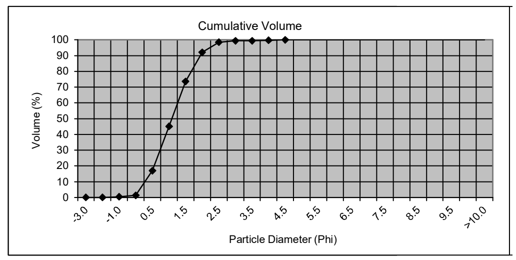
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.459	3.010	-0.545
Median	1.871		-0.904
Wentworth Classification		V. Coarse Sand	

Sorting	Value	Inference
Coefficient	1.89	Poorly Sorted
Skewness	0.27	Positive(Coarse)
Kurtosis	0.80	Platykurtic
Fines (%)	0.60%	
Sands (%)	50.95%	
Gravel (%)	48.46%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_08	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 15:57





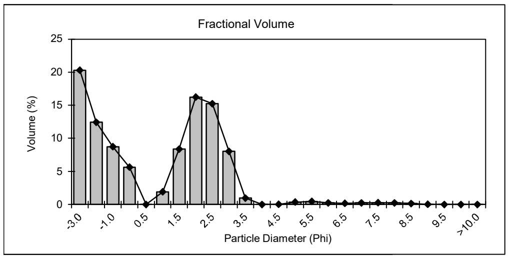
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.04	0.04	
2.0000	-1.0	0.38	0.42	Granule
1.0000	0.0	0.92	1.34	V.Coarse Sand
0.7100	0.5	15.57	16.91	Coarse Sand
0.5000	1.0	28.22	45.12	
0.3550	1.5	28.48	73.61	Medium Sand
0.2500	2.0	18.52	92.13	
0.1800	2.5	6.36	98.49	Fine Sand
0.1250	3.0	0.90	99.39	
0.0900	3.5	0.02	99.41	V.Fine Sand
0.0630	4.0	0.28	99.69	
0.0440	4.5	0.27	99.96	Coarse Silt
0.0315	5.0	0.04	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

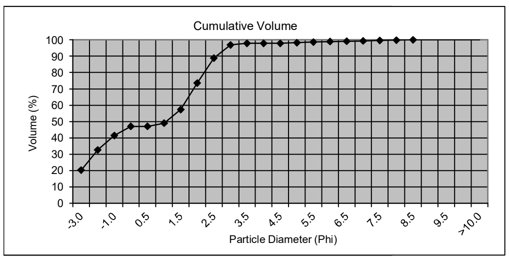
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.468	0.267	1.096
Median	0.475		1.073
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	0.64	Moderately Well Sorted
Skewness	0.06	Symmetrical
Kurtosis	0.95	Mesokurtic
Fines (%)	0.32%	
Sands (%)	99.27%	
Gravel (%)	0.42%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_09	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 16:52





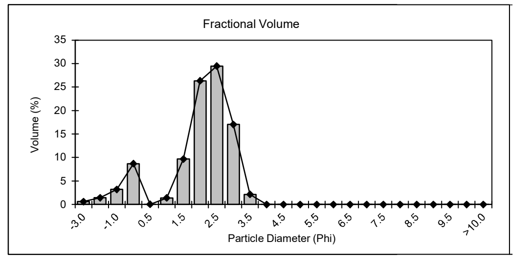
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	20.29	20.29	Pebble
4.0000	-2.0	12.42	32.71	
2.0000	-1.0	8.73	41.44	Granule
1.0000	0.0	5.63	47.07	V.Coarse Sand
0.7100	0.5	0.00	47.07	Coarse Sand
0.5000	1.0	1.90	48.98	
0.3550	1.5	8.37	57.35	Medium Sand
0.2500	2.0	16.24	73.59	
0.1800	2.5	15.24	88.83	Fine Sand
0.1250	3.0	8.02	96.85	
0.0900	3.5	0.98	97.82	V.Fine Sand
0.0630	4.0	0.00	97.82	
0.0440	4.5	0.01	97.84	Coarse Silt
0.0315	5.0	0.37	98.20	
0.0220	5.5	0.46	98.66	Medium Silt
0.0156	6.0	0.24	98.91	
0.0110	6.5	0.17	99.08	Fine silt
0.0078	7.0	0.23	99.32	
0.0055	7.5	0.28	99.59	V.Fine Silt
0.0039	8.0	0.23	99.83	
0.0028	8.5	0.15	99.98	
0.0020	9.0	0.03	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

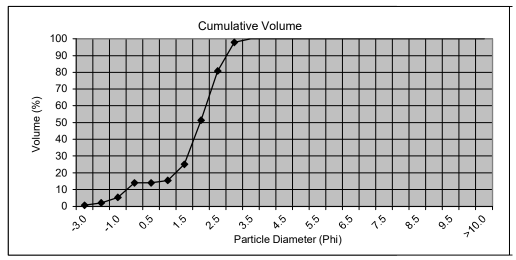
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.971	5.426	0.043
Median	0.482		1.052
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	2.38	Very Poorly Sorted
Skewness	-0.50	Very Negative(fine)
Kurtosis	0.57	Very Platykurtic
Fines (%)	2.18%	
Sands (%)	56.38%	
Gravel (%)	41.44%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_10	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 14:35





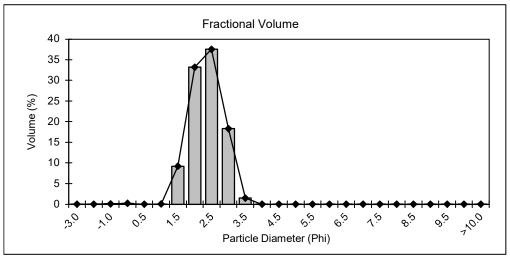
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.63	0.63	Pebble
4.0000	-2.0	1.43	2.05	
2.0000	-1.0	3.20	5.26	Granule
1.0000	0.0	8.68	13.94	V.Coarse Sand
0.7100	0.5	0.03	13.97	Coarse Sand
0.5000	1.0	1.40	15.36	
0.3550	1.5	9.66	25.02	Medium Sand
0.2500	2.0	26.31	51.34	
0.1800	2.5	29.47	80.81	Fine Sand
0.1250	3.0	17.03	97.84	
0.0900	3.5	2.16	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

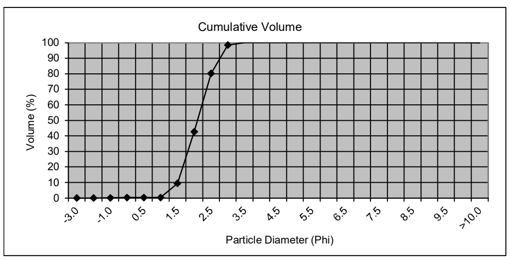
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.277	0.718	1.852
Median	0.255		1.970
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.99	Moderately Sorted
Skewness	-0.38	Very Negative(fine)
Kurtosis	1.88	Very Leptokurtic
Fines (%)	0.00%	
Sands (%)	94.74%	
Gravel (%)	5.26%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_11	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 16:31





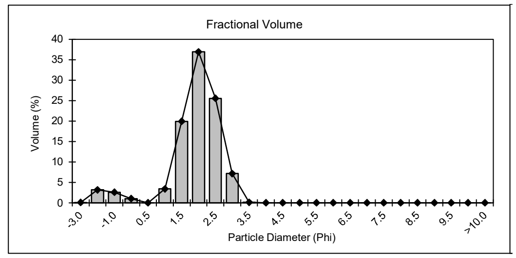
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.01	0.01	
2.0000	-1.0	0.08	0.09	Granule
1.0000	0.0	0.19	0.28	V.Coarse Sand
0.7100	0.5	0.00	0.28	Coarse Sand
0.5000	1.0	0.05	0.33	
0.3550	1.5	9.18	9.51	Medium Sand
0.2500	2.0	33.17	42.68	
0.1800	2.5	37.54	80.22	Fine Sand
0.1250	3.0	18.29	98.51	
0.0900	3.5	1.49	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

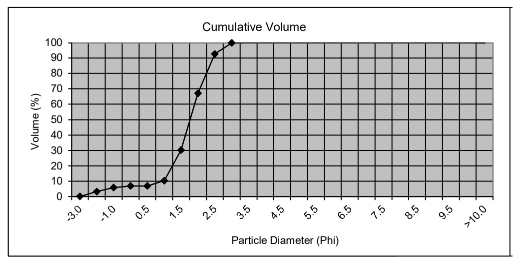
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.237	0.103	2.076
Median	0.236		2.081
Wentworth Classification	Fine Sand		

Sorting	Value	Inference
Coefficient	0.50	Well Sorted
Skewness	-0.02	Symmetrical
Kurtosis	0.98	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.91%	
Gravel (%)	0.09%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_12	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 14:09





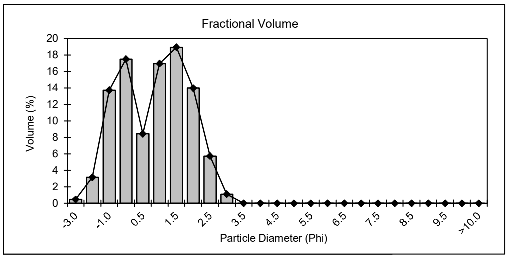
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.07	0.07	Pebble
4.0000	-2.0	3.19	3.25	
2.0000	-1.0	2.56	5.82	Granule
1.0000	0.0	1.04	6.85	V.Coarse Sand
0.7100	0.5	0.00	6.85	Coarse Sand
0.5000	1.0	3.42	10.27	
0.3550	1.5	19.94	30.21	Medium Sand
0.2500	2.0	36.94	67.15	
0.1800	2.5	25.56	92.72	Fine Sand
0.1250	3.0	7.16	99.87	
0.0900	3.5	0.13	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

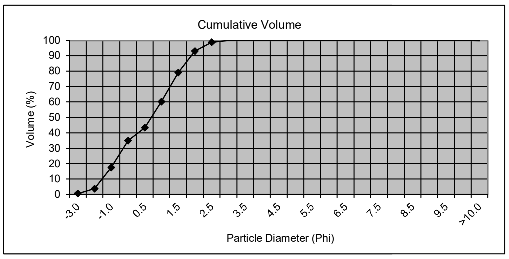
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.303	0.787	1.721
Median	0.299		1.743
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.90	Moderately Sorted
Skewness	-0.31	Very Negative(fine)
Kurtosis	2.11	Very Leptokurtic
Fines (%)	0.00%	
Sands (%)	94.18%	
Gravel (%)	5.82%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_13	Operator	AW
Source Data:	Outer Dowsing OWF 2022	Date & Time:	16/05/2022 10:09





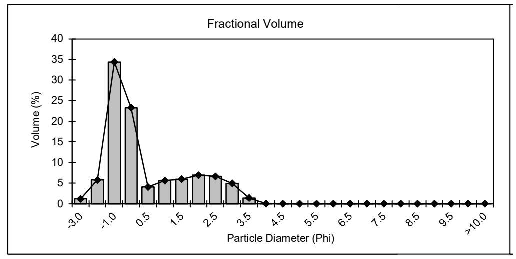
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.46	0.46	Pebble
4.0000	-2.0	3.14	3.60	
2.0000	-1.0	13.73	17.33	Granule
1.0000	0.0	17.51	34.84	V.Coarse Sand
0.7100	0.5	8.42	43.26	Coarse Sand
0.5000	1.0	16.97	60.23	
0.3550	1.5	18.95	79.18	Medium Sand
0.2500	2.0	13.99	93.17	
0.1800	2.5	5.72	98.89	Fine Sand
0.1250	3.0	1.11	100.00	
0.0900	3.5	0.00	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

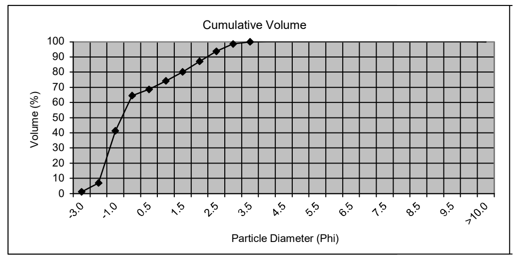
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.760	1.351	0.397
Median	0.627		0.674
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	1.31	Poorly Sorted
Skewness	-0.29	Negative (Fine)
Kurtosis	0.83	Platykurtic
Fines (%)	0.00%	
Sands (%)	82.67%	
Gravel (%)	17.33%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_14	Operator	AW
Source Data:	Outer Dowsing OWF 2022	Date & Time:	16/05/2022 10:21





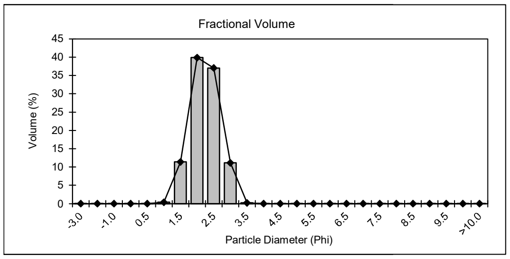
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	1.16	1.16	Pebble
4.0000	-2.0	5.74	6.90	
2.0000	-1.0	34.39	41.29	Granule
1.0000	0.0	23.25	64.55	V.Coarse Sand
0.7100	0.5	4.04	68.58	Coarse Sand
0.5000	1.0	5.61	74.19	
0.3550	1.5	5.94	80.14	Medium Sand
0.2500	2.0	6.93	87.07	
0.1800	2.5	6.61	93.68	Fine Sand
0.1250	3.0	4.93	98.61	
0.0900	3.5	1.37	99.97	V.Fine Sand
0.0630	4.0	0.03	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

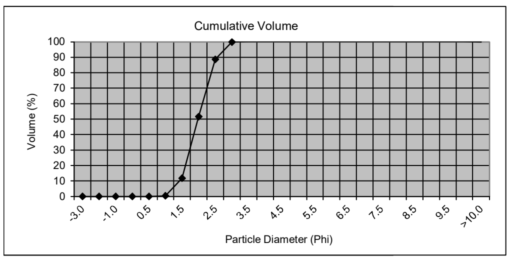
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.187	1.914	-0.247
Median	1.626		-0.701
Wentworth Classification	V. Coarse Sand		

Sorting	Value	Inference
Coefficient	1.65	Poorly Sorted
Skewness	0.35	Very Positive (Coarse)
Kurtosis	0.78	Platykurtic
Fines (%)	0.00%	
Sands (%)	58.71%	
Gravel (%)	41.29%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_15	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 11:58





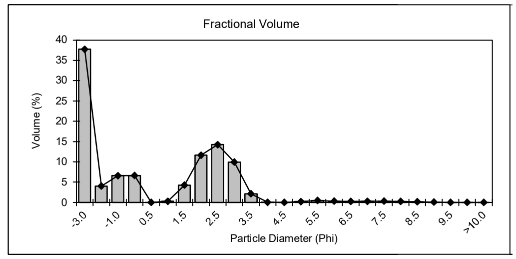
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.00	0.00	
2.0000	-1.0	0.01	0.01	Granule
1.0000	0.0	0.01	0.02	V.Coarse Sand
0.7100	0.5	0.00	0.02	Coarse Sand
0.5000	1.0	0.37	0.39	
0.3550	1.5	11.38	11.77	Medium Sand
0.2500	2.0	39.89	51.66	
0.1800	2.5	37.03	88.69	Fine Sand
0.1250	3.0	11.11	99.80	
0.0900	3.5	0.20	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

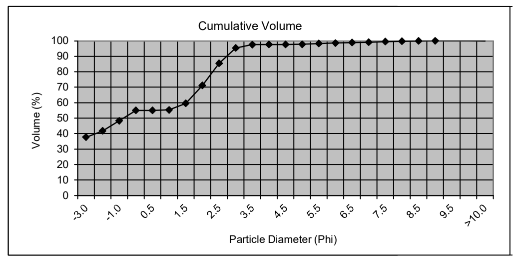
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.255	0.102	1.973
Median	0.254		1.975
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.45	Well Sorted
Skewness	-0.01	Symmetrical
Kurtosis	1.01	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.99%	
Gravel (%)	0.01%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_16	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 14:50





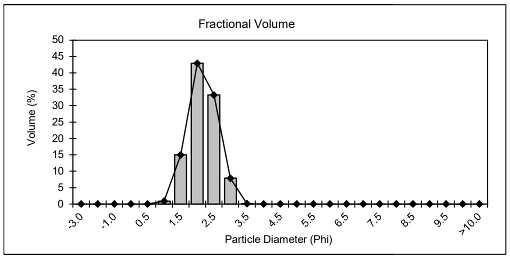
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	37.71	37.71	Pebble
4.0000	-2.0	4.03	41.74	
2.0000	-1.0	6.60	48.34	Granule
1.0000	0.0	6.63	54.97	V.Coarse Sand
0.7100	0.5	0.00	54.97	Coarse Sand
0.5000	1.0	0.31	55.28	
0.3550	1.5	4.28	59.55	Medium Sand
0.2500	2.0	11.65	71.20	
0.1800	2.5	14.25	85.45	Fine Sand
0.1250	3.0	9.96	95.41	
0.0900	3.5	2.13	97.54	V.Fine Sand
0.0630	4.0	0.05	97.59	
0.0440	4.5	0.00	97.59	Coarse Silt
0.0315	5.0	0.20	97.79	
0.0220	5.5	0.48	98.27	Medium Silt
0.0156	6.0	0.34	98.61	
0.0110	6.5	0.25	98.86	Fine silt
0.0078	7.0	0.28	99.13	
0.0055	7.5	0.31	99.45	V.Fine Silt
0.0039	8.0	0.27	99.72	
0.0028	8.5	0.18	99.90	
0.0020	9.0	0.10	100.00	Coarse Clay
0.0014	9.5	0.01	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

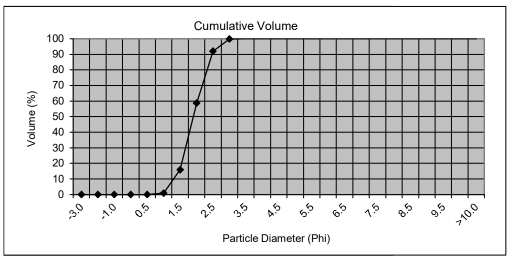
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	2.130	17.175	-1.091
Median	1.749		-0.807
Wentworth Classification	Granule		

Sorting	Value	Inference
Coefficient	3.08	Very Poorly Sorted
Skewness	-0.10	Negative (Fine)
Kurtosis	0.53	Very Platykurtic
Fines (%)	2.42%	
Sands (%)	49.25%	
Gravel (%)	48.34%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_17	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 16:44





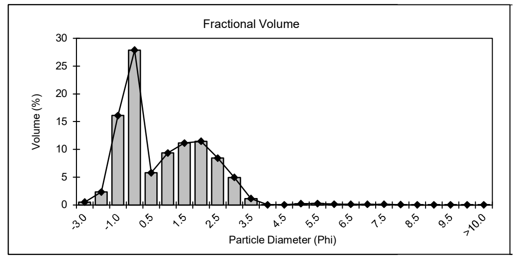
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.00	0.00	
2.0000	-1.0	0.01	0.01	Granule
1.0000	0.0	0.01	0.01	V.Coarse Sand
0.7100	0.5	0.00	0.01	Coarse Sand
0.5000	1.0	0.88	0.90	
0.3550	1.5	14.99	15.89	Medium Sand
0.2500	2.0	42.90	58.79	
0.1800	2.5	33.24	92.02	Fine Sand
0.1250	3.0	7.88	99.90	
0.0900	3.5	0.10	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

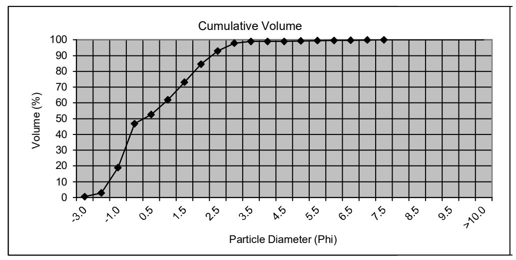
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.267	0.108	1.907
Median	0.272		1.881
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.44	Well Sorted
Skewness	0.05	Symmetrical
Kurtosis	1.01	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.99%	
Gravel (%)	0.01%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_18	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 17:15





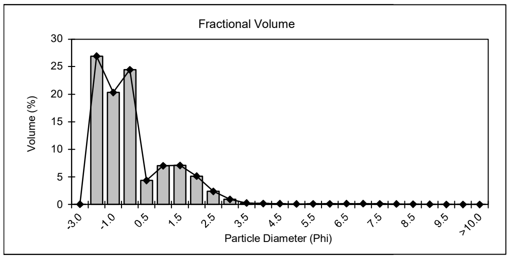
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.51	0.51	Pebble
4.0000	-2.0	2.32	2.83	
2.0000	-1.0	16.10	18.93	Granule
1.0000	0.0	27.90	46.83	V.Coarse Sand
0.7100	0.5	5.76	52.59	Coarse Sand
0.5000	1.0	9.34	61.93	
0.3550	1.5	11.14	73.08	Medium Sand
0.2500	2.0	11.45	84.52	
0.1800	2.5	8.42	92.94	Fine Sand
0.1250	3.0	4.93	97.88	
0.0900	3.5	1.12	99.00	V.Fine Sand
0.0630	4.0	0.02	99.02	
0.0440	4.5	0.01	99.03	Coarse Silt
0.0315	5.0	0.22	99.25	
0.0220	5.5	0.24	99.50	Medium Silt
0.0156	6.0	0.14	99.64	
0.0110	6.5	0.11	99.74	Fine silt
0.0078	7.0	0.11	99.86	
0.0055	7.5	0.11	99.96	V.Fine Silt
0.0039	8.0	0.04	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

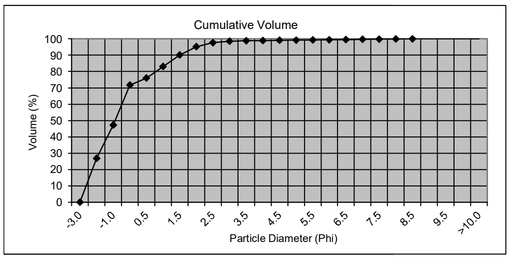
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.797	1.376	0.327
Median	0.840		0.251
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	1.50	Poorly Sorted
Skewness	0.07	Symmetrical
Kurtosis	0.78	Platykurtic
Fines (%)	0.98%	
Sands (%)	80.09%	
Gravel (%)	18.93%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_19	Operator	RI
Source Data:	Outer Dowsing OWF 2022	Date & Time:	17/05/2022 11:22





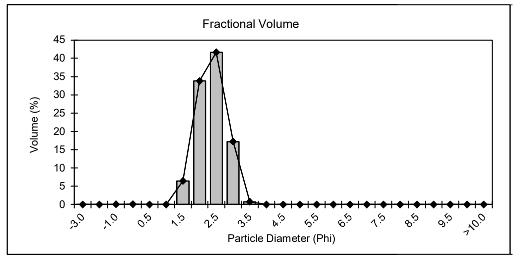
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.03	0.03	Pebble
4.0000	-2.0	26.90	26.93	
2.0000	-1.0	20.32	47.25	Granule
1.0000	0.0	24.43	71.68	V.Coarse Sand
0.7100	0.5	4.35	76.02	Coarse Sand
0.5000	1.0	7.01	83.03	
0.3550	1.5	7.07	90.11	Medium Sand
0.2500	2.0	5.13	95.23	
0.1800	2.5	2.38	97.61	Fine Sand
0.1250	3.0	0.92	98.53	
0.0900	3.5	0.25	98.78	V.Fine Sand
0.0630	4.0	0.16	98.95	
0.0440	4.5	0.14	99.08	Coarse Silt
0.0315	5.0	0.10	99.18	
0.0220	5.5	0.10	99.28	Medium Silt
0.0156	6.0	0.12	99.41	
0.0110	6.5	0.15	99.55	Fine silt
0.0078	7.0	0.14	99.70	
0.0055	7.5	0.12	99.82	V.Fine Silt
0.0039	8.0	0.09	99.91	
0.0028	8.5	0.06	99.97	
0.0020	9.0	0.03	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

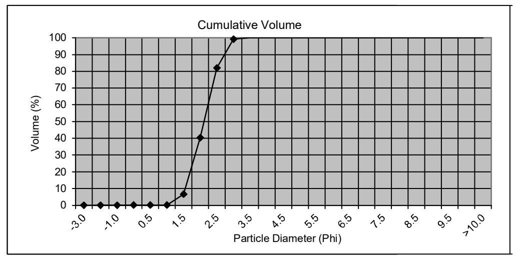
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.721	2.875	-0.783
Median	1.888		-0.917
Wentworth Classification		V. Coarse Sand	

Sorting	Value	Inference
Coefficient	1.62	Poorly Sorted
Skewness	0.15	Positive(Coarse)
Kurtosis	0.80	Platykurtic
Fines (%)	1.06%	
Sands (%)	51.69%	
Gravel (%)	47.25%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_20	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 10:34





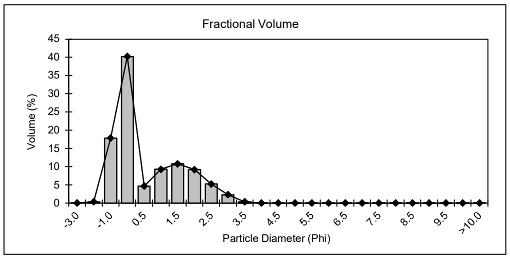
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.00	0.00	
2.0000	-1.0	0.06	0.06	Granule
1.0000	0.0	0.07	0.12	V.Coarse Sand
0.7100	0.5	0.00	0.12	Coarse Sand
0.5000	1.0	0.02	0.14	
0.3550	1.5	6.45	6.58	Medium Sand
0.2500	2.0	33.80	40.38	
0.1800	2.5	41.66	82.04	Fine Sand
0.1250	3.0	17.22	99.26	
0.0900	3.5	0.74	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

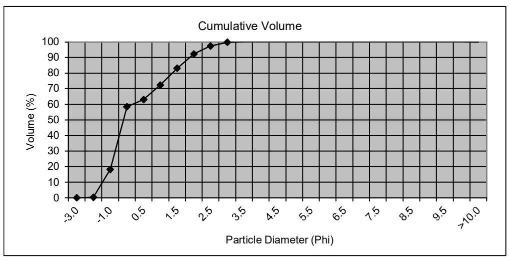
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.237	0.092	2.080
Median	0.234		2.096
Wentworth Classification		Fine Sand	

Sorting	Value	Inference
Coefficient	0.45	Well Sorted
Skewness	-0.02	Symmetrical
Kurtosis	0.97	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.95%	
Gravel (%)	0.06%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_21	Operator	AW
Source Data:	Outer Dowsing OWF 2022	Date & Time:	16/05/2022 10:41





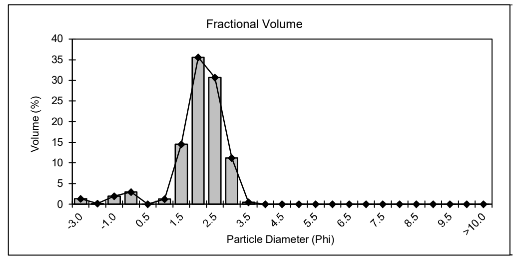
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.34	0.34	
2.0000	-1.0	17.81	18.15	Granule
1.0000	0.0	40.22	58.37	V.Coarse Sand
0.7100	0.5	4.65	63.02	Coarse Sand
0.5000	1.0	9.26	72.28	
0.3550	1.5	10.76	83.04	Medium Sand
0.2500	2.0	9.16	92.20	
0.1800	2.5	5.19	97.39	Fine Sand
0.1250	3.0	2.28	99.67	
0.0900	3.5	0.33	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

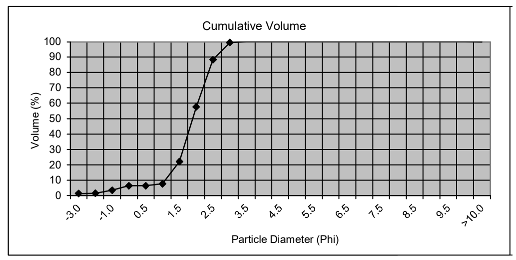
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.977	1.234	0.034
Median	1.208		-0.273
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	1.29	Poorly Sorted
Skewness	0.29	Positive(Coarse)
Kurtosis	0.83	Platykurtic
Fines (%)	0.00%	
Sands (%)	81.85%	
Gravel (%)	18.15%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_22	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 10:04





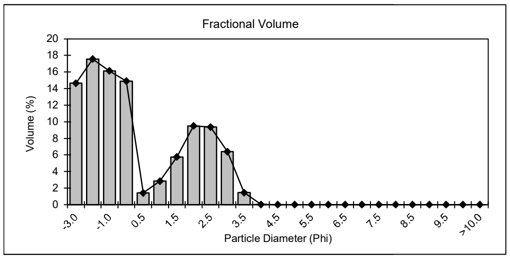
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	1.28	1.28	Pebble
4.0000	-2.0	0.17	1.45	
2.0000	-1.0	1.94	3.38	Granule
1.0000	0.0	2.94	6.33	V.Coarse Sand
0.7100	0.5	0.00	6.33	Coarse Sand
0.5000	1.0	1.21	7.54	
0.3550	1.5	14.52	22.06	Medium Sand
0.2500	2.0	35.57	57.63	
0.1800	2.5	30.72	88.36	Fine Sand
0.1250	3.0	11.19	99.54	
0.0900	3.5	0.46	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

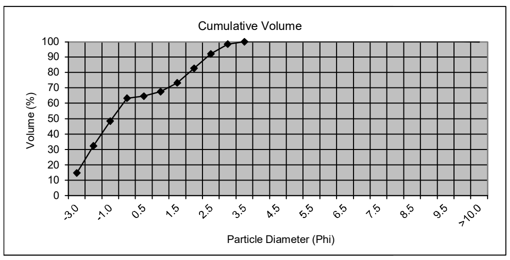
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.278	0.407	1.846
Median	0.273		1.876
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.78	Moderately Sorted
Skewness	-0.27	Negative (Fine)
Kurtosis	1.88	Very Leptokurtic
Fines (%)	0.00%	
Sands (%)	96.62%	
Gravel (%)	3.38%	

BGS Mod. Folk Classification	Slightly Gravelly Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_23	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 11:18





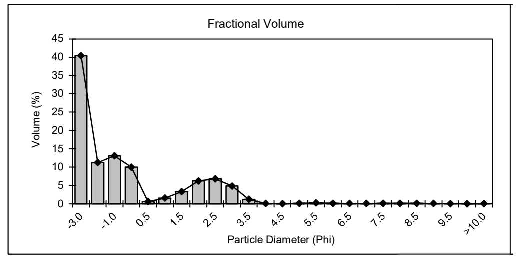
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	14.65	14.65	Pebble
4.0000	-2.0	17.56	32.21	
2.0000	-1.0	16.13	48.35	Granule
1.0000	0.0	14.89	63.24	V.Coarse Sand
0.7100	0.5	1.42	64.66	Coarse Sand
0.5000	1.0	2.85	67.51	
0.3550	1.5	5.75	73.26	Medium Sand
0.2500	2.0	9.49	82.75	
0.1800	2.5	9.36	92.11	Fine Sand
0.1250	3.0	6.40	98.51	
0.0900	3.5	1.46	99.98	V.Fine Sand
0.0630	4.0	0.02	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

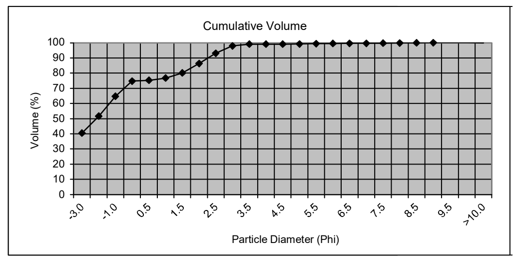
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.518	4.207	-0.602
Median	1.889		-0.918
Wentworth Classification		V. Coarse Sand	

Sorting	Value	Inference
Coefficient	2.16	Very Poorly Sorted
Skewness	0.19	Positive(Coarse)
Kurtosis	0.61	Very Platykurtic
Fines (%)	0.00%	
Sands (%)	51.65%	
Gravel (%)	48.35%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_24	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 17:22





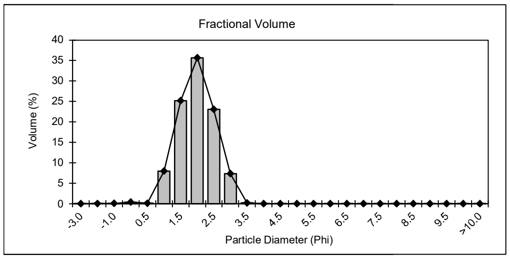
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	40.41	40.41	Pebble
4.0000	-2.0	11.22	51.64	
2.0000	-1.0	13.08	64.72	Granule
1.0000	0.0	9.98	74.70	V.Coarse Sand
0.7100	0.5	0.57	75.27	Coarse Sand
0.5000	1.0	1.52	76.79	
0.3550	1.5	3.30	80.09	Medium Sand
0.2500	2.0	6.21	86.30	
0.1800	2.5	6.78	93.08	Fine Sand
0.1250	3.0	4.82	97.91	
0.0900	3.5	1.19	99.09	V.Fine Sand
0.0630	4.0	0.03	99.13	
0.0440	4.5	0.00	99.13	Coarse Silt
0.0315	5.0	0.09	99.22	
0.0220	5.5	0.21	99.43	Medium Silt
0.0156	6.0	0.12	99.55	
0.0110	6.5	0.05	99.60	Fine silt
0.0078	7.0	0.06	99.66	
0.0055	7.5	0.10	99.76	V.Fine Silt
0.0039	8.0	0.10	99.86	
0.0028	8.5	0.08	99.94	
0.0020	9.0	0.06	100.00	Coarse Clay
0.0014	9.5	0.01	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

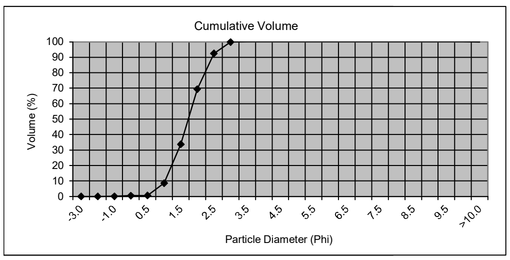
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	2.807	8.843	-1.489
Median	4.584		-2.197
Wentworth Classification		Granule	

Sorting	Value	Inference
Coefficient	2.53	Very Poorly Sorted
Skewness	0.37	Very Positive (Coarse)
Kurtosis	0.72	Platykurtic
Fines (%)	0.87%	
Sands (%)	34.41%	
Gravel (%)	64.72%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_25	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 15:34





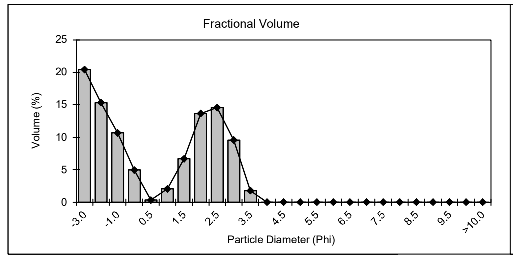
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.02	0.02	
2.0000	-1.0	0.08	0.10	Granule
1.0000	0.0	0.39	0.49	V.Coarse Sand
0.7100	0.5	0.09	0.58	Coarse Sand
0.5000	1.0	7.99	8.57	
0.3550	1.5	25.17	33.73	Medium Sand
0.2500	2.0	35.65	69.39	
0.1800	2.5	23.06	92.45	Fine Sand
0.1250	3.0	7.35	99.79	
0.0900	3.5	0.21	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

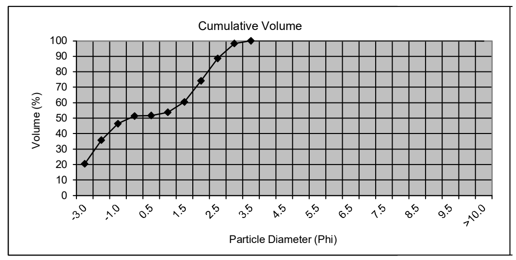
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.307	0.155	1.705
Median	0.307		1.703
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.57	Moderately Well Sorted
Skewness	0.00	Symmetrical
Kurtosis	0.97	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.90%	
Gravel (%)	0.10%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_26	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 10:13





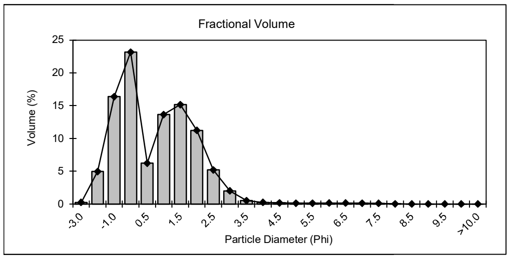
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	20.42	20.42	Pebble
4.0000	-2.0	15.32	35.74	
2.0000	-1.0	10.67	46.41	Granule
1.0000	0.0	4.96	51.37	V.Coarse Sand
0.7100	0.5	0.33	51.70	Coarse Sand
0.5000	1.0	2.06	53.76	
0.3550	1.5	6.69	60.45	Medium Sand
0.2500	2.0	13.66	74.11	
0.1800	2.5	14.55	88.66	Fine Sand
0.1250	3.0	9.56	98.22	
0.0900	3.5	1.77	99.99	V.Fine Sand
0.0630	4.0	0.01	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

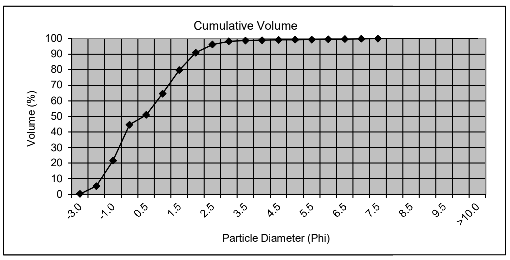
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.332	5.086	-0.414
Median	1.276		-0.352
Wentworth Classification	V. Coarse Sand		

Sorting	Value	Inference
Coefficient	2.34	Very Poorly Sorted
Skewness	-0.02	Symmetrical
Kurtosis	0.55	Very Platykurtic
Fines (%)	0.00%	
Sands (%)	53.59%	
Gravel (%)	46.41%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_27	Operator	AW
Source Data:	Outer Dowsing OWF 2022	Date & Time:	16/05/2022 11:01





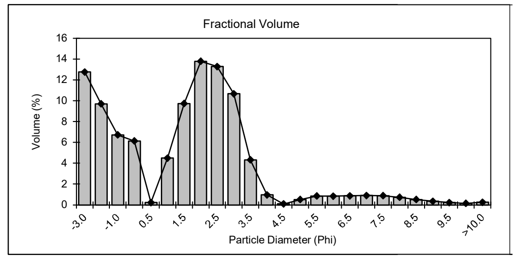
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.24	0.24	Pebble
4.0000	-2.0	4.96	5.20	
2.0000	-1.0	16.37	21.57	Granule
1.0000	0.0	23.16	44.73	V.Coarse Sand
0.7100	0.5	6.22	50.95	Coarse Sand
0.5000	1.0	13.65	64.60	
0.3550	1.5	15.15	79.75	Medium Sand
0.2500	2.0	11.22	90.97	
0.1800	2.5	5.21	96.19	Fine Sand
0.1250	3.0	2.01	98.20	
0.0900	3.5	0.51	98.71	V.Fine Sand
0.0630	4.0	0.25	98.96	
0.0440	4.5	0.18	99.14	Coarse Silt
0.0315	5.0	0.13	99.27	
0.0220	5.5	0.14	99.41	Medium Silt
0.0156	6.0	0.15	99.56	
0.0110	6.5	0.16	99.72	Fine silt
0.0078	7.0	0.14	99.86	
0.0055	7.5	0.11	99.97	V.Fine Silt
0.0039	8.0	0.04	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

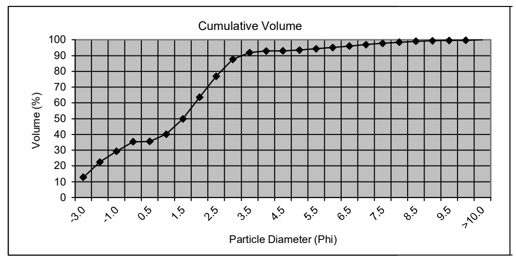
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.861	1.526	0.217
Median	0.754		0.407
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	1.44	Poorly Sorted
Skewness	-0.15	Negative (Fine)
Kurtosis	0.82	Platykurtic
Fines (%)	1.04%	
Sands (%)	77.39%	
Gravel (%)	21.57%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_28	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	44694.67014





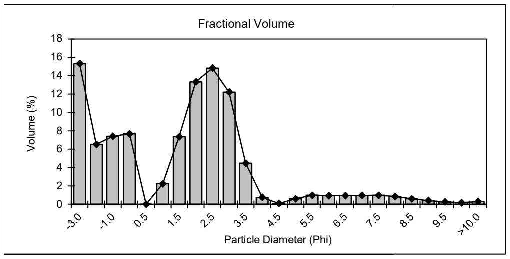
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	12.77	12.77	Pebble
4.0000	-2.0	9.70	22.47	
2.0000	-1.0	6.73	29.20	Granule
1.0000	0.0	6.14	35.34	V.Coarse Sand
0.7100	0.5	0.22	35.56	Coarse Sand
0.5000	1.0	4.50	40.06	
0.3550	1.5	9.74	49.80	Medium Sand
0.2500	2.0	13.79	63.60	
0.1800	2.5	13.29	76.89	Fine Sand
0.1250	3.0	10.68	87.57	
0.0900	3.5	4.32	91.89	V.Fine Sand
0.0630	4.0	0.96	92.86	
0.0440	4.5	0.10	92.96	Coarse Silt
0.0315	5.0	0.52	93.47	
0.0220	5.5	0.85	94.32	Medium Silt
0.0156	6.0	0.84	95.17	
0.0110	6.5	0.87	96.03	Fine silt
0.0078	7.0	0.89	96.93	
0.0055	7.5	0.88	97.80	V.Fine Silt
0.0039	8.0	0.72	98.53	
0.0028	8.5	0.51	99.04	
0.0020	9.0	0.34	99.38	Coarse Clay
0.0014	9.5	0.22	99.60	
0.0010	10.0	0.15	99.74	Medium Clay
<0.001	>10.0	0.26	100.00	Fine Clay

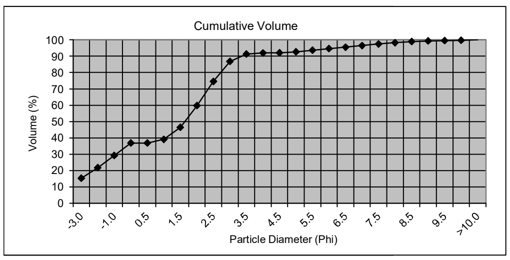
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.697	4.431	0.522
Median	0.354		1.500
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	2.81	Very Poorly Sorted
Skewness	-0.30	Negative (Fine)
Kurtosis	0.94	Mesokurtic
Fines (%)	7.14%	
Sands (%)	63.65%	
Gravel (%)	29.20%	

BGS Mod. Folk Classification	Gravelly Muddy Sand
Mod. Folk for Habitat Classification	Mixed Sediments

Sample No.:	OWF_29	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 15:08





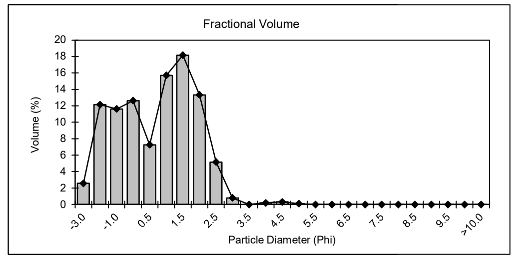
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	15.30	15.30	Pebble
4.0000	-2.0	6.52	21.81	
2.0000	-1.0	7.41	29.22	Granule
1.0000	0.0	7.66	36.88	V.Coarse Sand
0.7100	0.5	0.00	36.88	Coarse Sand
0.5000	1.0	2.23	39.11	
0.3550	1.5	7.34	46.45	Medium Sand
0.2500	2.0	13.31	59.77	
0.1800	2.5	14.81	74.58	Fine Sand
0.1250	3.0	12.21	86.79	
0.0900	3.5	4.45	91.25	V.Fine Sand
0.0630	4.0	0.75	92.00	
0.0440	4.5	0.09	92.09	Coarse Silt
0.0315	5.0	0.58	92.67	
0.0220	5.5	0.97	93.65	Medium Silt
0.0156	6.0	0.93	94.58	
0.0110	6.5	0.93	95.51	Fine silt
0.0078	7.0	0.96	96.48	
0.0055	7.5	0.97	97.45	V.Fine Silt
0.0039	8.0	0.83	98.28	
0.0028	8.5	0.60	98.88	
0.0020	9.0	0.40	99.28	Coarse Clay
0.0014	9.5	0.26	99.54	
0.0010	10.0	0.17	99.71	Medium Clay
<0.001	>10.0	0.30	100.00	Fine Clay

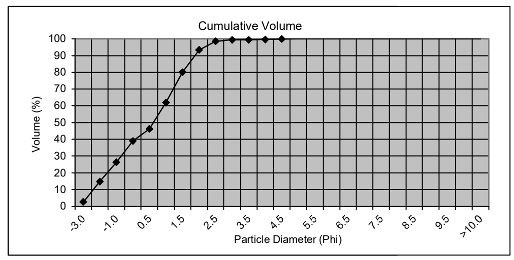
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.698	5.551	0.518
Median	0.327		1.613
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	2.97	Very Poorly Sorted
Skewness	-0.33	Very Negative(fine)
Kurtosis	0.99	Mesokurtic
Fines (%)	8.00%	
Sands (%)	62.78%	
Gravel (%)	29.22%	

BGS Mod. Folk Classification	Gravelly Muddy Sand
Mod. Folk for Habitat Classification	Mixed Sediments

Sample No.:	OWF_30	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 15:21





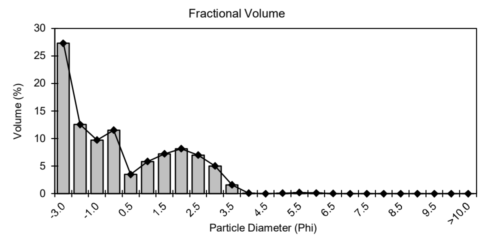
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	2.58	2.58	Pebble
4.0000	-2.0	12.14	14.72	
2.0000	-1.0	11.62	26.34	Granule
1.0000	0.0	12.63	38.97	V.Coarse Sand
0.7100	0.5	7.26	46.22	Coarse Sand
0.5000	1.0	15.71	61.93	
0.3550	1.5	18.16	80.09	Medium Sand
0.2500	2.0	13.34	93.43	
0.1800	2.5	5.15	98.58	Fine Sand
0.1250	3.0	0.80	99.38	
0.0900	3.5	0.00	99.38	V.Fine Sand
0.0630	4.0	0.20	99.58	
0.0440	4.5	0.32	99.90	Coarse Silt
0.0315	5.0	0.10	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

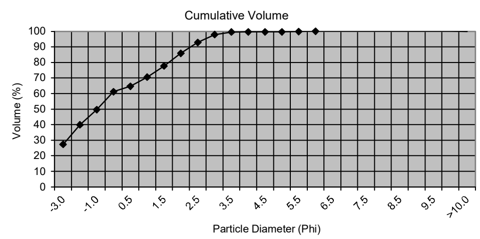
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.931	2.632	0.102
Median	0.659		0.601
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	1.64	Poorly Sorted
Skewness	-0.40	Very Negative(fine)
Kurtosis	0.82	Platykurtic
Fines (%)	0.42%	
Sands (%)	73.25%	
Gravel (%)	26.34%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_31	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 10:48





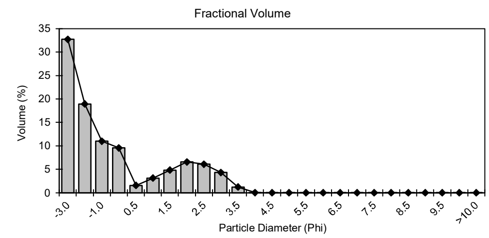
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	27.33	27.33	Pebble
4.0000	-2.0	12.54	39.88	
2.0000	-1.0	9.74	49.62	Granule
1.0000	0.0	11.55	61.16	V.Coarse Sand
0.7100	0.5	3.49	64.66	Coarse Sand
0.5000	1.0	5.83	70.48	
0.3550	1.5	7.22	77.70	Medium Sand
0.2500	2.0	8.16	85.87	
0.1800	2.5	7.01	92.88	Fine Sand
0.1250	3.0	5.02	97.90	
0.0900	3.5	1.58	99.48	V.Fine Sand
0.0630	4.0	0.08	99.57	
0.0440	4.5	0.00	99.57	Coarse Silt
0.0315	5.0	0.09	99.66	
0.0220	5.5	0.20	99.86	Medium Silt
0.0156	6.0	0.11	99.98	
0.0110	6.5	0.03	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

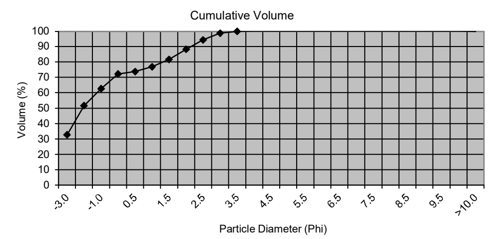
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.843	6.389	-0.882
Median	1.967		-0.976
Wentworth Classification		V. Coarse Sand	

Sorting	Value	Inference
Coefficient	2.35	Very Poorly Sorted
Skewness	0.08	Symmetrical
Kurtosis	0.61	Very Platykurtic
Fines (%)	0.43%	
Sands (%)	49.95%	
Gravel (%)	49.62%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_32	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 12:19





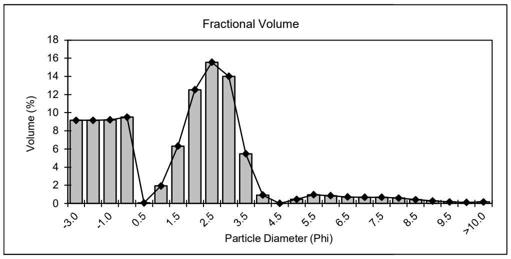
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	32.72	32.72	Pebble
4.0000	-2.0	18.93	51.64	
2.0000	-1.0	11.01	62.65	Granule
1.0000	0.0	9.56	72.21	V.Coarse Sand
0.7100	0.5	1.55	73.76	Coarse Sand
0.5000	1.0	3.13	76.89	
0.3550	1.5	4.83	81.73	Medium Sand
0.2500	2.0	6.57	88.29	
0.1800	2.5	6.10	94.39	Fine Sand
0.1250	3.0	4.33	98.73	
0.0900	3.5	1.24	99.96	V.Fine Sand
0.0630	4.0	0.04	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

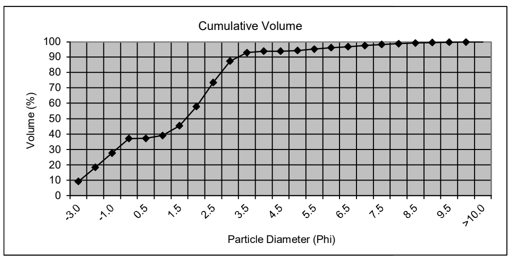
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	2.519	5.946	-1.333
Median	4.347		-2.120
Wentworth Classification		Granule	

Sorting	Value	Inference
Coefficient	2.25	Very Poorly Sorted
Skewness	0.46	Very Positive (Coarse)
Kurtosis	0.66	Very Platykurtic
Fines (%)	0.00%	
Sands (%)	37.35%	
Gravel (%)	62.65%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_33	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 16:13





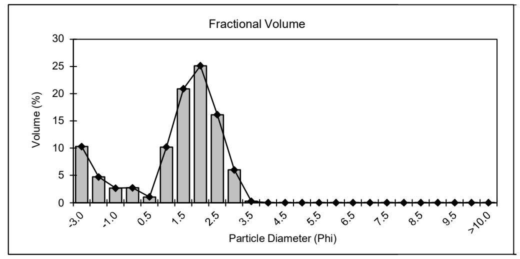
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	9.16	9.16	Pebble
4.0000	-2.0	9.15	18.31	
2.0000	-1.0	9.21	27.52	Granule
1.0000	0.0	9.52	37.03	V.Coarse Sand
0.7100	0.5	0.06	37.10	Coarse Sand
0.5000	1.0	1.94	39.03	
0.3550	1.5	6.32	45.35	Medium Sand
0.2500	2.0	12.53	57.88	
0.1800	2.5	15.55	73.43	Fine Sand
0.1250	3.0	14.01	87.43	
0.0900	3.5	5.47	92.91	V.Fine Sand
0.0630	4.0	0.93	93.84	
0.0440	4.5	0.01	93.85	Coarse Silt
0.0315	5.0	0.46	94.30	
0.0220	5.5	0.96	95.26	Medium Silt
0.0156	6.0	0.86	96.12	
0.0110	6.5	0.72	96.84	Fine silt
0.0078	7.0	0.68	97.52	
0.0055	7.5	0.69	98.21	V.Fine Silt
0.0039	8.0	0.59	98.80	
0.0028	8.5	0.43	99.23	
0.0020	9.0	0.29	99.52	Coarse Clay
0.0014	9.5	0.18	99.70	
0.0010	10.0	0.12	99.82	Medium Clay
<0.001	>10.0	0.18	100.00	Fine Clay

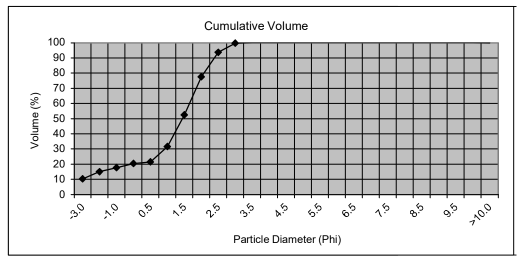
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.603	3.752	0.730
Median	0.316		1.662
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	2.60	Very Poorly Sorted
Skewness	-0.34	Very Negative(fine)
Kurtosis	0.91	Mesokurtic
Fines (%)	6.16%	
Sands (%)	66.32%	
Gravel (%)	27.52%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_34	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 11:40





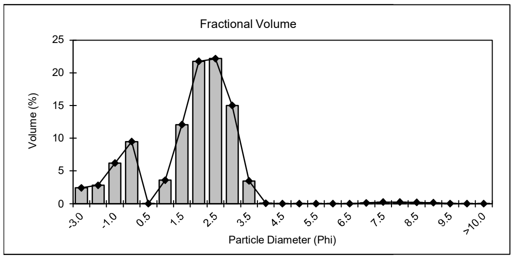
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	10.28	10.28	Pebble
4.0000	-2.0	4.73	15.00	
2.0000	-1.0	2.68	17.68	Granule
1.0000	0.0	2.73	20.41	V.Coarse Sand
0.7100	0.5	1.04	21.45	Coarse Sand
0.5000	1.0	10.19	31.64	
0.3550	1.5	20.87	52.51	Medium Sand
0.2500	2.0	25.12	77.63	
0.1800	2.5	16.13	93.75	Fine Sand
0.1250	3.0	5.99	99.75	
0.0900	3.5	0.25	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

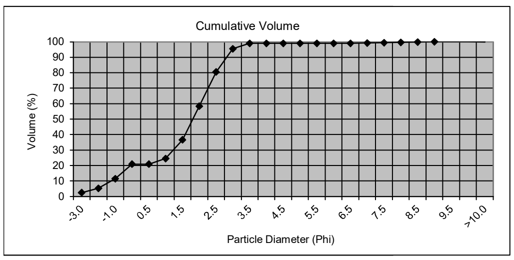
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.646	4.478	0.630
Median	0.372		1.425
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	1.91	Poorly Sorted
Skewness	-0.62	Very Negative(fine)
Kurtosis	1.98	Very Leptokurtic
Fines (%)	0.00%	
Sands (%)	82.32%	
Gravel (%)	17.68%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_35	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 12:28





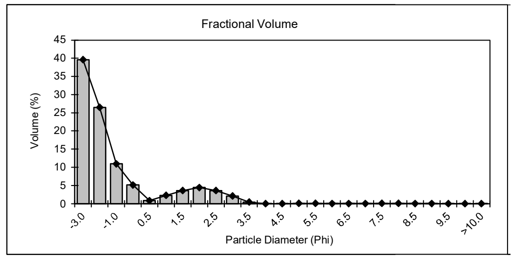
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	2.42	2.42	Pebble
4.0000	-2.0	2.82	5.24	
2.0000	-1.0	6.20	11.44	Granule
1.0000	0.0	9.48	20.92	V.Coarse Sand
0.7100	0.5	0.00	20.92	Coarse Sand
0.5000	1.0	3.60	24.52	
0.3550	1.5	12.07	36.59	Medium Sand
0.2500	2.0	21.75	58.33	
0.1800	2.5	22.16	80.50	Fine Sand
0.1250	3.0	15.01	95.51	
0.0900	3.5	3.46	98.97	V.Fine Sand
0.0630	4.0	0.07	99.04	
0.0440	4.5	0.00	99.04	Coarse Silt
0.0315	5.0	0.00	99.04	
0.0220	5.5	0.00	99.04	Medium Silt
0.0156	6.0	0.00	99.04	
0.0110	6.5	0.00	99.04	Fine silt
0.0078	7.0	0.12	99.16	
0.0055	7.5	0.25	99.41	V.Fine Silt
0.0039	8.0	0.25	99.66	
0.0028	8.5	0.19	99.85	
0.0020	9.0	0.14	99.99	Coarse Clay
0.0014	9.5	0.02	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

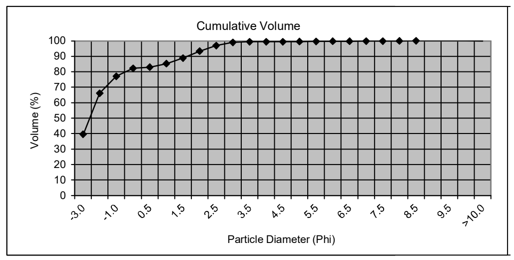
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.419	1.463	1.254
Median	0.290		1.785
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	1.57	Poorly Sorted
Skewness	-0.52	Very Negative(fine)
Kurtosis	1.58	Very Leptokurtic
Fines (%)	0.96%	
Sands (%)	87.60%	
Gravel (%)	11.44%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_36	Operator	RI
Source Data:	Outer Dowsing OWF 2022	Date & Time:	16/05/2022 13:24





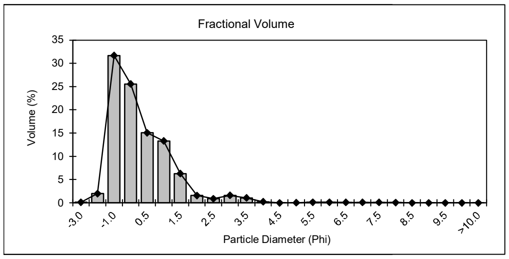
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	39.59	39.59	Pebble
4.0000	-2.0	26.49	66.08	
2.0000	-1.0	10.95	77.03	Granule
1.0000	0.0	5.14	82.17	V.Coarse Sand
0.7100	0.5	0.82	82.99	Coarse Sand
0.5000	1.0	2.27	85.26	
0.3550	1.5	3.58	88.85	Medium Sand
0.2500	2.0	4.44	93.29	
0.1800	2.5	3.61	96.90	Fine Sand
0.1250	3.0	2.11	99.02	
0.0900	3.5	0.42	99.43	V.Fine Sand
0.0630	4.0	0.00	99.44	
0.0440	4.5	0.00	99.44	Coarse Silt
0.0315	5.0	0.07	99.51	
0.0220	5.5	0.10	99.62	Medium Silt
0.0156	6.0	0.06	99.67	
0.0110	6.5	0.04	99.71	Fine silt
0.0078	7.0	0.06	99.77	
0.0055	7.5	0.08	99.85	V.Fine Silt
0.0039	8.0	0.07	99.92	
0.0028	8.5	0.05	99.98	
0.0020	9.0	0.03	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

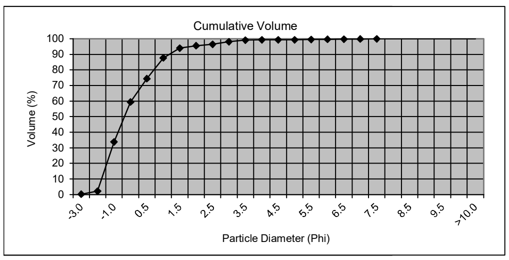
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	3.579	5.582	-1.840
Median	6.428		-2.684
Wentworth Classification		Granule	

Sorting	Value	Inference
Coefficient	1.96	Poorly Sorted
Skewness	0.62	Very Positive (Coarse)
Kurtosis	1.15	Leptokurtic
Fines (%)	0.56%	
Sands (%)	22.40%	
Gravel (%)	77.03%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_37	**Operator**	RI
Source Data:	Outer Dowsing OWF 2022	**Date & Time:**	16/05/2022 15:15





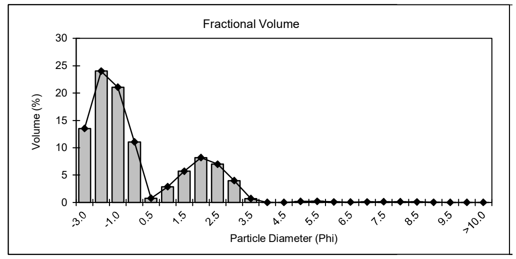
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.13	0.13	Pebble
4.0000	-2.0	1.97	2.10	
2.0000	-1.0	31.67	33.77	Granule
1.0000	0.0	25.56	59.34	V.Coarse Sand
0.7100	0.5	15.06	74.40	Coarse Sand
0.5000	1.0	13.31	87.71	
0.3550	1.5	6.30	94.01	Medium Sand
0.2500	2.0	1.58	95.59	
0.1800	2.5	0.89	96.48	Fine Sand
0.1250	3.0	1.61	98.09	
0.0900	3.5	1.06	99.15	V.Fine Sand
0.0630	4.0	0.24	99.39	
0.0440	4.5	0.00	99.39	Coarse Silt
0.0315	5.0	0.01	99.40	
0.0220	5.5	0.14	99.54	Medium Silt
0.0156	6.0	0.14	99.68	
0.0110	6.5	0.10	99.77	Fine silt
0.0078	7.0	0.08	99.86	
0.0055	7.5	0.09	99.94	V.Fine Silt
0.0039	8.0	0.06	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

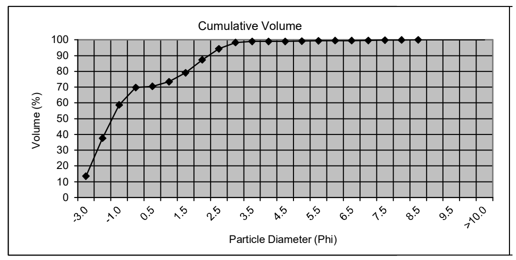
Graphical	**mm**	**StDev (mm)**	**Phi**
Mean (MZ)	1.335	1.429	-0.417
Median	1.365		-0.449
Wentworth Classification		V. Coarse Sand	

Sorting	**Value**	**Inference**
Coefficient	1.18	Poorly Sorted
Skewness	0.12	Positive(Coarse)
Kurtosis	0.82	Platykurtic
Fines (%)	0.61%	
Sands (%)	65.62%	
Gravel (%)	33.77%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_38	**Operator**	HB
Source Data:	Outer Dowsing OWF 2022	**Date & Time:**	13/05/2022 12:08





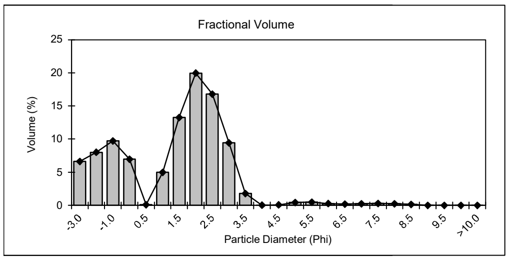
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	13.54	13.54	Pebble
4.0000	-2.0	24.02	37.56	
2.0000	-1.0	21.08	58.64	Granule
1.0000	0.0	11.07	69.71	V.Coarse Sand
0.7100	0.5	0.78	70.49	Coarse Sand
0.5000	1.0	2.88	73.37	
0.3550	1.5	5.71	79.08	Medium Sand
0.2500	2.0	8.20	87.28	
0.1800	2.5	6.99	94.27	Fine Sand
0.1250	3.0	3.98	98.25	
0.0900	3.5	0.71	98.96	V.Fine Sand
0.0630	4.0	0.00	98.96	
0.0440	4.5	0.01	98.97	Coarse Silt
0.0315	5.0	0.18	99.14	
0.0220	5.5	0.20	99.35	Medium Silt
0.0156	6.0	0.11	99.45	
0.0110	6.5	0.08	99.53	Fine silt
0.0078	7.0	0.10	99.63	
0.0055	7.5	0.13	99.76	V.Fine Silt
0.0039	8.0	0.11	99.87	
0.0028	8.5	0.08	99.96	
0.0020	9.0	0.05	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

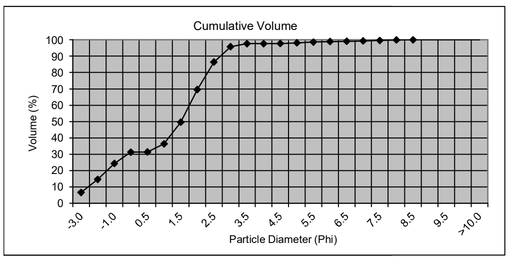
Graphical	**mm**	**StDev (mm)**	**Phi**
Mean (MZ)	1.842	3.942	-0.881
Median	2.820		-1.496
Wentworth Classification		V. Coarse Sand	

Sorting	**Value**	**Inference**
Coefficient	2.05	Very Poorly Sorted
Skewness	0.40	Very Positive (Coarse)
Kurtosis	0.64	Very Platykurtic
Fines (%)	1.04%	
Sands (%)	40.32%	
Gravel (%)	58.64%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_39	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	13/05/2022 10:59





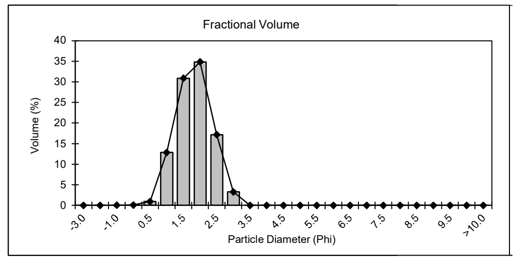
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	6.64	6.64	Pebble
4.0000	-2.0	8.00	14.64	
2.0000	-1.0	9.73	24.37	Granule
1.0000	0.0	6.96	31.33	V.Coarse Sand
0.7100	0.5	0.09	31.42	Coarse Sand
0.5000	1.0	4.97	36.39	
0.3550	1.5	13.25	49.64	Medium Sand
0.2500	2.0	19.96	69.60	
0.1800	2.5	16.77	86.37	Fine Sand
0.1250	3.0	9.44	95.81	
0.0900	3.5	1.80	97.61	V.Fine Sand
0.0630	4.0	0.03	97.64	
0.0440	4.5	0.07	97.71	Coarse Silt
0.0315	5.0	0.44	98.15	
0.0220	5.5	0.48	98.63	Medium Silt
0.0156	6.0	0.26	98.89	
0.0110	6.5	0.20	99.09	Fine silt
0.0078	7.0	0.25	99.35	
0.0055	7.5	0.28	99.63	V.Fine Silt
0.0039	8.0	0.23	99.86	
0.0028	8.5	0.14	100.00	
0.0020	9.0	0.01	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

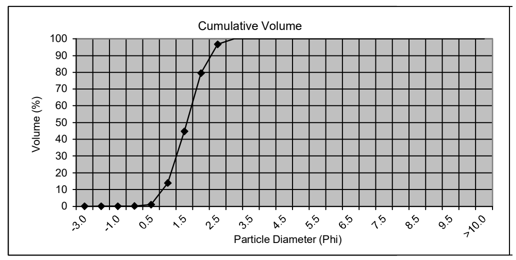
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.629	3.211	0.668
Median	0.353		1.502
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	2.00	Poorly Sorted
Skewness	-0.55	Very Negative(fine)
Kurtosis	0.81	Platykurtic
Fines (%)	2.36%	
Sands (%)	73.27%	
Gravel (%)	24.37%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_40	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 13:59





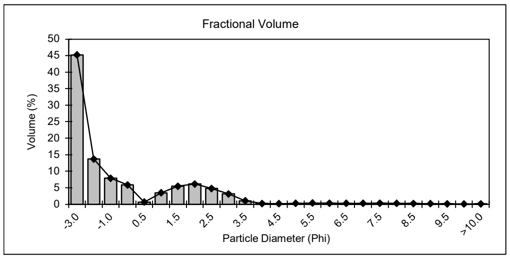
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.00	0.00	
2.0000	-1.0	0.03	0.03	Granule
1.0000	0.0	0.06	0.09	V.Coarse Sand
0.7100	0.5	0.92	1.01	Coarse Sand
0.5000	1.0	12.84	13.85	
0.3550	1.5	30.87	44.72	Medium Sand
0.2500	2.0	34.85	79.56	
0.1800	2.5	17.15	96.72	Fine Sand
0.1250	3.0	3.28	100.00	
0.0900	3.5	0.00	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

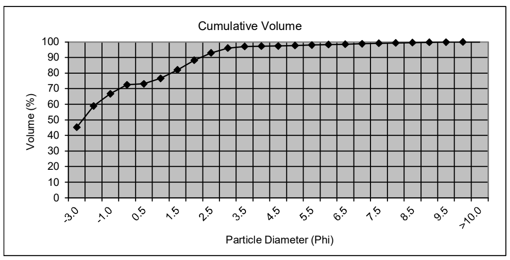
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.338	0.167	1.566
Median	0.339		1.560
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.54	Moderately Well Sorted
Skewness	-0.01	Symmetrical
Kurtosis	0.96	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.97%	
Gravel (%)	0.03%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_41	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 10:45





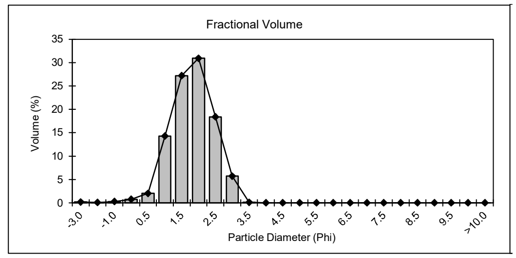
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	45.21	45.21	Pebble
4.0000	-2.0	13.65	58.86	
2.0000	-1.0	7.84	66.70	Granule
1.0000	0.0	5.81	72.50	V.Coarse Sand
0.7100	0.5	0.62	73.12	Coarse Sand
0.5000	1.0	3.46	76.58	
0.3550	1.5	5.46	82.04	Medium Sand
0.2500	2.0	6.12	88.16	
0.1800	2.5	4.75	92.91	Fine Sand
0.1250	3.0	3.10	96.02	
0.0900	3.5	1.02	97.03	V.Fine Sand
0.0630	4.0	0.21	97.24	
0.0440	4.5	0.14	97.38	Coarse Silt
0.0315	5.0	0.27	97.66	
0.0220	5.5	0.33	97.99	Medium Silt
0.0156	6.0	0.28	98.27	
0.0110	6.5	0.26	98.53	Fine silt
0.0078	7.0	0.27	98.80	
0.0055	7.5	0.28	99.09	V.Fine Silt
0.0039	8.0	0.26	99.34	
0.0028	8.5	0.20	99.55	
0.0020	9.0	0.15	99.70	Coarse Clay
0.0014	9.5	0.11	99.80	
0.0010	10.0	0.07	99.87	Medium Clay
<0.001	>10.0	0.13	100.00	Fine Clay

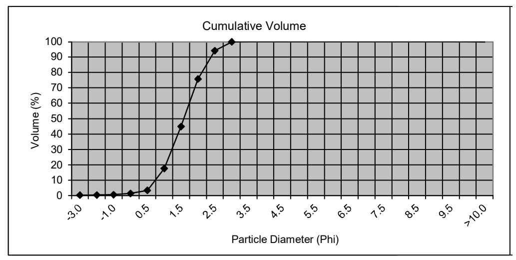
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	3.274	8.583	-1.711
Median	6.596		-2.722
Wentworth Classification	Granule		

Sorting	Value	Inference
Coefficient	2.50	Very Poorly Sorted
Skewness	0.54	Very Positive (Coarse)
Kurtosis	0.64	Very Platykurtic
Fines (%)	2.76%	
Sands (%)	30.55%	
Gravel (%)	66.70%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_42	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 10:36





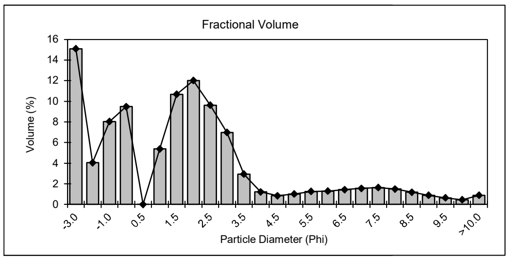
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.19	0.19	Pebble
4.0000	-2.0	0.09	0.28	
2.0000	-1.0	0.27	0.55	Granule
1.0000	0.0	0.76	1.31	V.Coarse Sand
0.7100	0.5	2.03	3.33	Coarse Sand
0.5000	1.0	14.29	17.62	
0.3550	1.5	27.21	44.83	Medium Sand
0.2500	2.0	30.96	75.79	
0.1800	2.5	18.40	94.19	Fine Sand
0.1250	3.0	5.72	99.91	
0.0900	3.5	0.10	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

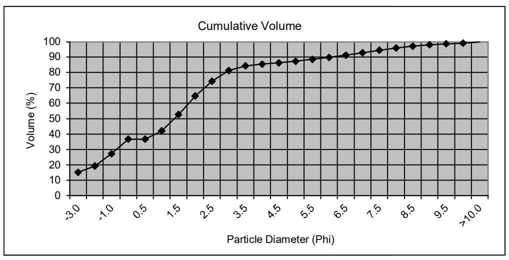
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.338	0.192	1.564
Median	0.337		1.567
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.62	Moderately Well Sorted
Skewness	-0.02	Symmetrical
Kurtosis	0.94	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.45%	
Gravel (%)	0.55%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_43	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 17:48





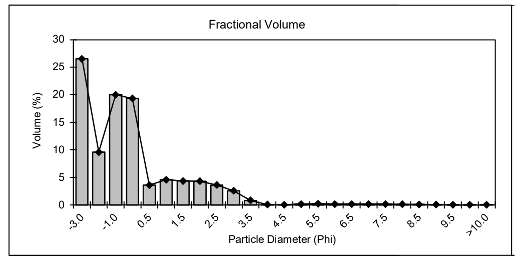
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	15.09	15.09	Pebble
4.0000	-2.0	4.04	19.13	
2.0000	-1.0	8.03	27.17	Granule
1.0000	0.0	9.47	36.64	V.Coarse Sand
0.7100	0.5	0.00	36.64	Coarse Sand
0.5000	1.0	5.38	42.02	
0.3550	1.5	10.68	52.70	Medium Sand
0.2500	2.0	12.02	64.72	
0.1800	2.5	9.62	74.33	Fine Sand
0.1250	3.0	6.98	81.32	
0.0900	3.5	2.94	84.26	V.Fine Sand
0.0630	4.0	1.21	85.47	
0.0440	4.5	0.84	86.30	Coarse Silt
0.0315	5.0	1.01	87.31	
0.0220	5.5	1.26	88.57	Medium Silt
0.0156	6.0	1.28	89.85	
0.0110	6.5	1.43	91.28	Fine silt
0.0078	7.0	1.56	92.84	
0.0055	7.5	1.64	94.48	V.Fine Silt
0.0039	8.0	1.49	95.97	
0.0028	8.5	1.19	97.15	
0.0020	9.0	0.89	98.04	Coarse Clay
0.0014	9.5	0.64	98.68	
0.0010	10.0	0.44	99.12	Medium Clay
<0.001	>10.0	0.88	100.00	Fine Clay

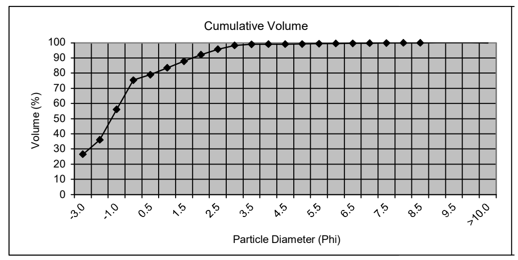
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.637	6.713	0.650
Median	0.392		1.352
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	3.36	Very Poorly Sorted
Skewness	-0.14	Negative (Fine)
Kurtosis	1.26	Leptokurtic
Fines (%)	14.53%	
Sands (%)	58.30%	
Gravel (%)	27.17%	

BGS Mod. Folk Classification	Gravelly Muddy Sand
Mod. Folk for Habitat Classification	Mixed Sediments

Sample No.:	OWF_44	Operator	RI
Source Data:	Outer Dowsing OWF 2022	Date & Time:	16/05/2022 15:48





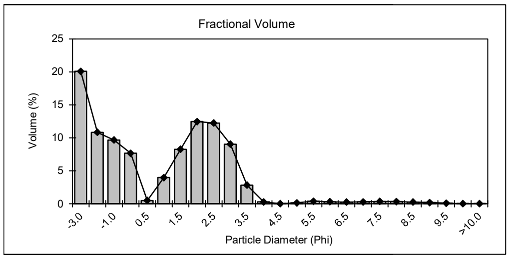
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	26.50	26.50	Pebble
4.0000	-2.0	9.57	36.07	
2.0000	-1.0	19.99	56.06	Granule
1.0000	0.0	19.33	75.39	V.Coarse Sand
0.7100	0.5	3.57	78.96	Coarse Sand
0.5000	1.0	4.55	83.51	
0.3550	1.5	4.32	87.83	Medium Sand
0.2500	2.0	4.28	92.11	
0.1800	2.5	3.59	95.70	Fine Sand
0.1250	3.0	2.55	98.25	
0.0900	3.5	0.79	99.03	V.Fine Sand
0.0630	4.0	0.04	99.07	
0.0440	4.5	0.00	99.08	Coarse Silt
0.0315	5.0	0.11	99.19	
0.0220	5.5	0.17	99.36	Medium Silt
0.0156	6.0	0.13	99.49	
0.0110	6.5	0.11	99.60	Fine silt
0.0078	7.0	0.11	99.71	
0.0055	7.5	0.11	99.82	V.Fine Silt
0.0039	8.0	0.09	99.91	
0.0028	8.5	0.06	99.97	
0.0020	9.0	0.03	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

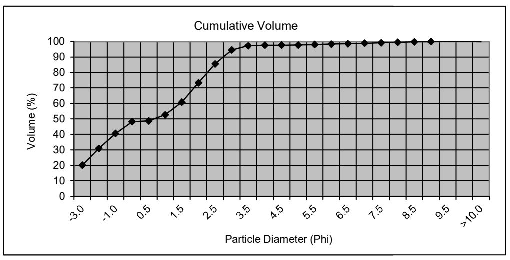
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	2.500	6.885	-1.322
Median	2.606		-1.382
Wentworth Classification	Granule		

Sorting	Value	Inference
Coefficient	2.15	Very Poorly Sorted
Skewness	0.10	Positive(Coarse)
Kurtosis	0.86	Platykurtic
Fines (%)	0.93%	
Sands (%)	43.01%	
Gravel (%)	56.06%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_45	Operator	RI
Source Data:	Outer Dowsing OWF 2022	Date & Time:	16/05/2022 16:38





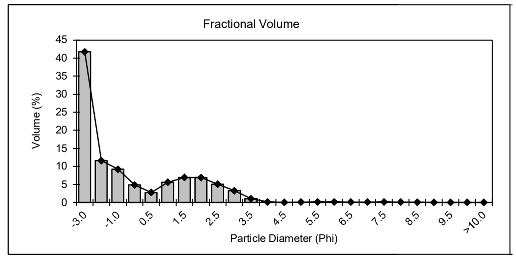
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	20.06	20.06	Pebble
4.0000	-2.0	10.83	30.90	
2.0000	-1.0	9.65	40.55	Granule
1.0000	0.0	7.65	48.20	V.Coarse Sand
0.7100	0.5	0.48	48.68	Coarse Sand
0.5000	1.0	3.94	52.62	
0.3550	1.5	8.25	60.87	Medium Sand
0.2500	2.0	12.45	73.32	
0.1800	2.5	12.23	85.55	Fine Sand
0.1250	3.0	9.02	94.57	
0.0900	3.5	2.80	97.37	V.Fine Sand
0.0630	4.0	0.26	97.63	
0.0440	4.5	0.00	97.63	Coarse Silt
0.0315	5.0	0.12	97.76	
0.0220	5.5	0.35	98.11	Medium Silt
0.0156	6.0	0.28	98.39	
0.0110	6.5	0.23	98.62	Fine silt
0.0078	7.0	0.26	98.88	
0.0055	7.5	0.33	99.21	V.Fine Silt
0.0039	8.0	0.32	99.53	
0.0028	8.5	0.24	99.77	
0.0020	9.0	0.16	99.94	Coarse Clay
0.0014	9.5	0.07	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

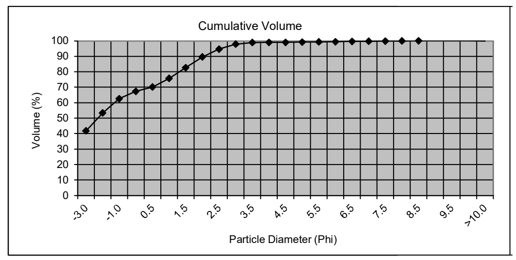
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.047	5.606	-0.066
Median	0.640		0.645
Wentworth Classification		V. Coarse Sand	

Sorting	Value	Inference
Coefficient	2.45	Very Poorly Sorted
Skewness	-0.33	Very Negative(fine)
Kurtosis	0.60	Very Platykurtic
Fines (%)	2.37%	
Sands (%)	57.09%	
Gravel (%)	40.55%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_46	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 09:58





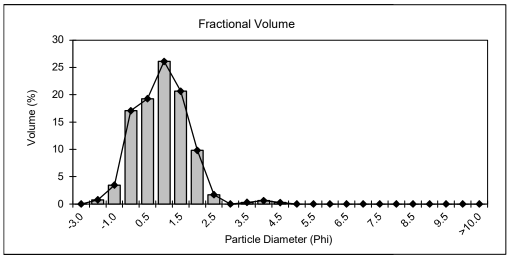
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	41.75	41.75	Pebble
4.0000	-2.0	11.59	53.34	
2.0000	-1.0	9.19	62.53	Granule
1.0000	0.0	4.83	67.36	V.Coarse Sand
0.7100	0.5	2.75	70.12	Coarse Sand
0.5000	1.0	5.59	75.70	
0.3550	1.5	6.94	82.65	Medium Sand
0.2500	2.0	6.90	89.55	
0.1800	2.5	5.05	94.60	Fine Sand
0.1250	3.0	3.25	97.85	
0.0900	3.5	1.05	98.90	V.Fine Sand
0.0630	4.0	0.13	99.03	
0.0440	4.5	0.00	99.03	Coarse Silt
0.0315	5.0	0.11	99.14	
0.0220	5.5	0.17	99.30	Medium Silt
0.0156	6.0	0.14	99.44	
0.0110	6.5	0.12	99.56	Fine silt
0.0078	7.0	0.12	99.69	
0.0055	7.5	0.13	99.81	V.Fine Silt
0.0039	8.0	0.10	99.92	
0.0028	8.5	0.07	99.99	
0.0020	9.0	0.01	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

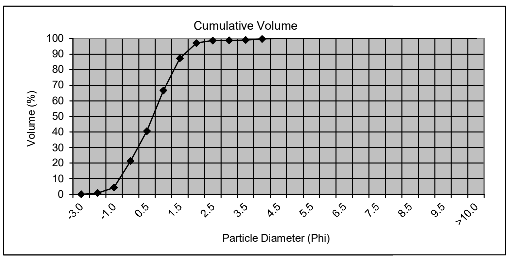
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	3.075	8.906	-1.621
Median	5.152		-2.365
Wentworth Classification		Granule	

Sorting	Value	Inference
Coefficient	2.46	Very Poorly Sorted
Skewness	0.41	Very Positive (Coarse)
Kurtosis	0.60	Very Platykurtic
Fines (%)	0.98%	
Sands (%)	36.50%	
Gravel (%)	62.53%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_47	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 14:23





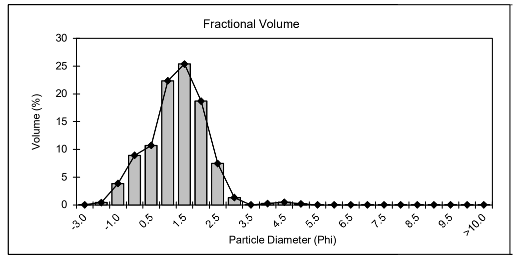
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.78	0.78	
2.0000	-1.0	3.46	4.24	Granule
1.0000	0.0	17.08	21.31	V.Coarse Sand
0.7100	0.5	19.26	40.57	Coarse Sand
0.5000	1.0	26.09	66.66	
0.3550	1.5	20.63	87.30	Medium Sand
0.2500	2.0	9.81	97.10	
0.1800	2.5	1.71	98.81	Fine Sand
0.1250	3.0	0.00	98.81	
0.0900	3.5	0.30	99.11	V.Fine Sand
0.0630	4.0	0.62	99.74	
0.0440	4.5	0.26	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

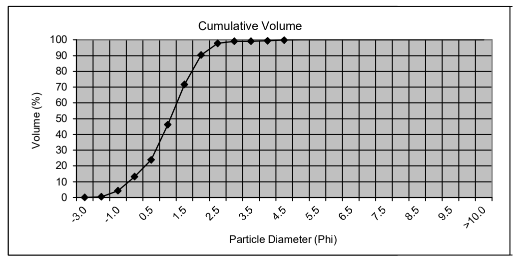
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.680	0.626	0.556
Median	0.634		0.657
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	0.88	Moderately Sorted
Skewness	-0.16	Negative (Fine)
Kurtosis	1.06	Mesokurtic
Fines (%)	0.26%	
Sands (%)	95.50%	
Gravel (%)	4.24%	

BGS Mod. Folk Classification	Slightly Gravelly Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_48	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 11:40





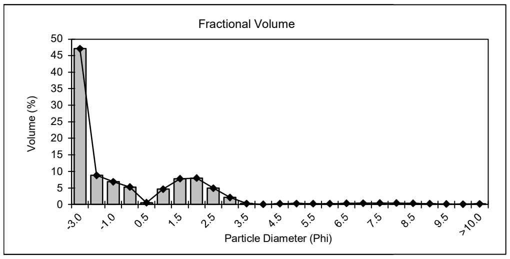
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.02	0.02	Pebble
4.0000	-2.0	0.41	0.43	
2.0000	-1.0	3.83	4.26	Granule
1.0000	0.0	8.91	13.16	V.Coarse Sand
0.7100	0.5	10.72	23.88	Coarse Sand
0.5000	1.0	22.36	46.24	
0.3550	1.5	25.40	71.63	Medium Sand
0.2500	2.0	18.70	90.34	
0.1800	2.5	7.45	97.79	Fine Sand
0.1250	3.0	1.31	99.10	
0.0900	3.5	0.00	99.10	V.Fine Sand
0.0630	4.0	0.24	99.34	
0.0440	4.5	0.47	99.81	Coarse Silt
0.0315	5.0	0.19	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

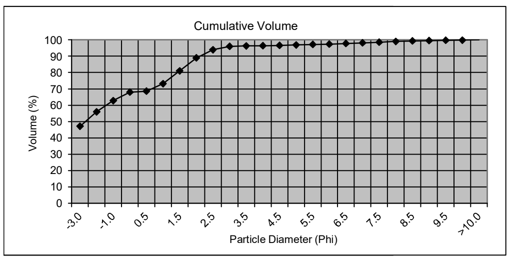
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.502	0.587	0.996
Median	0.479		1.063
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	0.91	Moderately Sorted
Skewness	-0.18	Negative (Fine)
Kurtosis	1.25	Leptokurtic
Fines (%)	0.66%	
Sands (%)	95.09%	
Gravel (%)	4.26%	

BGS Mod. Folk Classification	Slightly Gravelly Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_49	Operator	RI
Source Data:	Outer Dowsing OWF 2022	Date & Time:	16/05/2022 17:16





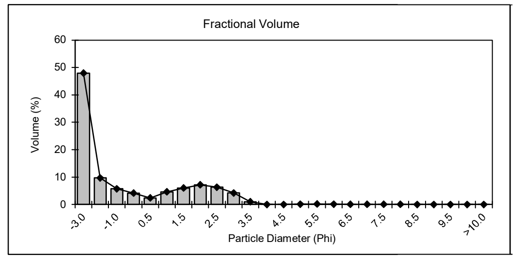
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	47.12	47.12	Pebble
4.0000	-2.0	8.80	55.92	
2.0000	-1.0	6.85	62.77	Granule
1.0000	0.0	5.26	68.03	V.Coarse Sand
0.7100	0.5	0.52	68.55	Coarse Sand
0.5000	1.0	4.65	73.20	
0.3550	1.5	7.80	80.99	Medium Sand
0.2500	2.0	7.99	88.99	
0.1800	2.5	4.92	93.91	Fine Sand
0.1250	3.0	2.13	96.04	
0.0900	3.5	0.27	96.31	V.Fine Sand
0.0630	4.0	0.04	96.35	
0.0440	4.5	0.24	96.59	Coarse Silt
0.0315	5.0	0.28	96.87	
0.0220	5.5	0.26	97.12	Medium Silt
0.0156	6.0	0.25	97.38	
0.0110	6.5	0.33	97.71	Fine silt
0.0078	7.0	0.41	98.12	
0.0055	7.5	0.45	98.57	V.Fine Silt
0.0039	8.0	0.42	98.99	
0.0028	8.5	0.33	99.32	
0.0020	9.0	0.24	99.56	Coarse Clay
0.0014	9.5	0.16	99.72	
0.0010	10.0	0.11	99.83	Medium Clay
<0.001	>10.0	0.17	100.00	Fine Clay

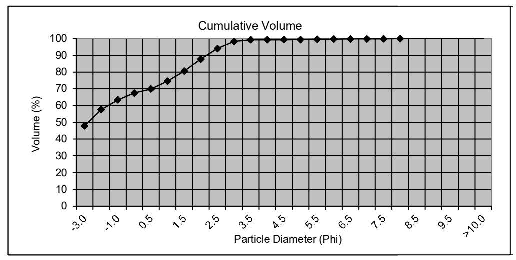
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	3.602	11.748	-1.849
Median	6.689		-2.742
Wentworth Classification	Granule		

Sorting	Value	Inference
Coefficient	2.67	Very Poorly Sorted
Skewness	0.45	Very Positive (Coarse)
Kurtosis	0.58	Very Platykurtic
Fines (%)	3.66%	
Sands (%)	33.58%	
Gravel (%)	62.77%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_50	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 10:27





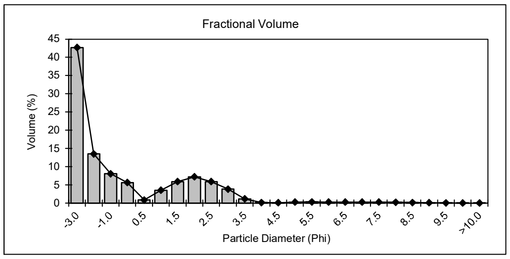
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	47.92	47.92	Pebble
4.0000	-2.0	9.70	57.63	
2.0000	-1.0	5.73	63.36	Granule
1.0000	0.0	4.15	67.51	V.Coarse Sand
0.7100	0.5	2.41	69.92	Coarse Sand
0.5000	1.0	4.63	74.55	
0.3550	1.5	6.04	80.59	Medium Sand
0.2500	2.0	7.20	87.78	
0.1800	2.5	6.31	94.09	Fine Sand
0.1250	3.0	4.18	98.27	
0.0900	3.5	1.01	99.28	V.Fine Sand
0.0630	4.0	0.03	99.31	
0.0440	4.5	0.00	99.31	Coarse Silt
0.0315	5.0	0.09	99.40	
0.0220	5.5	0.19	99.59	Medium Silt
0.0156	6.0	0.11	99.70	
0.0110	6.5	0.06	99.75	Fine silt
0.0078	7.0	0.07	99.82	
0.0055	7.5	0.09	99.90	V.Fine Silt
0.0039	8.0	0.08	99.98	
0.0028	8.5	0.02	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

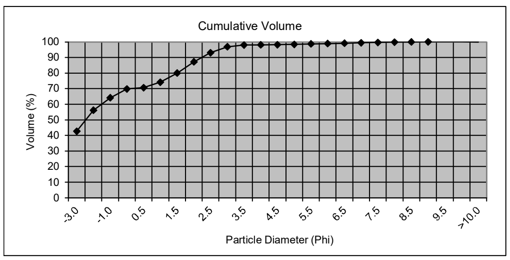
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	3.587	11.140	-1.843
Median	7.144		-2.837
Wentworth Classification	Granule		

Sorting	Value	Inference
Coefficient	2.63	Very Poorly Sorted
Skewness	0.49	Very Positive (Coarse)
Kurtosis	0.58	Very Platykurtic
Fines (%)	0.69%	
Sands (%)	35.95%	
Gravel (%)	63.36%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_51	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 17:23





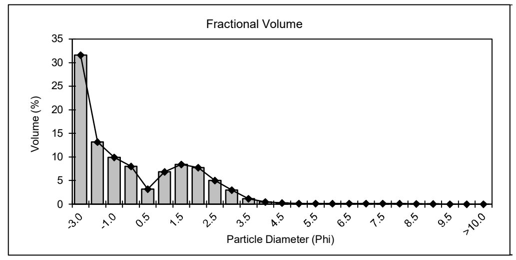
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	42.67	42.67	Pebble
4.0000	-2.0	13.47	56.14	
2.0000	-1.0	8.04	64.18	Granule
1.0000	0.0	5.60	69.78	V.Coarse Sand
0.7100	0.5	0.80	70.58	Coarse Sand
0.5000	1.0	3.52	74.10	
0.3550	1.5	5.86	79.96	Medium Sand
0.2500	2.0	7.20	87.15	
0.1800	2.5	5.88	93.04	Fine Sand
0.1250	3.0	3.81	96.85	
0.0900	3.5	1.11	97.96	V.Fine Sand
0.0630	4.0	0.11	98.07	
0.0440	4.5	0.06	98.13	Coarse Silt
0.0315	5.0	0.24	98.37	
0.0220	5.5	0.30	98.66	Medium Silt
0.0156	6.0	0.24	98.90	
0.0110	6.5	0.23	99.13	Fine silt
0.0078	7.0	0.24	99.37	
0.0055	7.5	0.23	99.60	V.Fine Silt
0.0039	8.0	0.18	99.79	
0.0028	8.5	0.12	99.91	
0.0020	9.0	0.07	99.98	Coarse Clay
0.0014	9.5	0.02	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

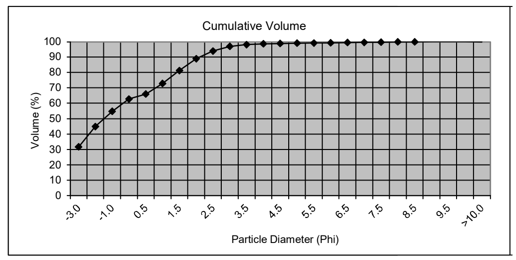
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	3.017	8.309	-1.593
Median	5.824		-2.542
Wentworth Classification	Granule		

Sorting	Value	Inference
Coefficient	2.50	Very Poorly Sorted
Skewness	0.50	Very Positive (Coarse)
Kurtosis	0.60	Very Platykurtic
Fines (%)	1.93%	
Sands (%)	33.89%	
Gravel (%)	64.18%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_52	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 16:00





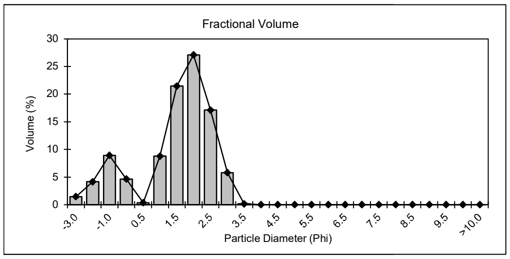
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	31.64	31.64	Pebble
4.0000	-2.0	13.18	44.82	
2.0000	-1.0	9.92	54.75	Granule
1.0000	0.0	8.01	62.76	V.Coarse Sand
0.7100	0.5	3.20	65.96	Coarse Sand
0.5000	1.0	6.85	72.81	
0.3550	1.5	8.46	81.27	Medium Sand
0.2500	2.0	7.76	89.03	
0.1800	2.5	5.01	94.04	Fine Sand
0.1250	3.0	3.00	97.03	
0.0900	3.5	1.16	98.20	V.Fine Sand
0.0630	4.0	0.49	98.68	
0.0440	4.5	0.23	98.91	Coarse Silt
0.0315	5.0	0.16	99.07	
0.0220	5.5	0.14	99.21	Medium Silt
0.0156	6.0	0.13	99.34	
0.0110	6.5	0.14	99.47	Fine silt
0.0078	7.0	0.14	99.62	
0.0055	7.5	0.14	99.76	V.Fine Silt
0.0039	8.0	0.12	99.88	
0.0028	8.5	0.08	99.96	
0.0020	9.0	0.04	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

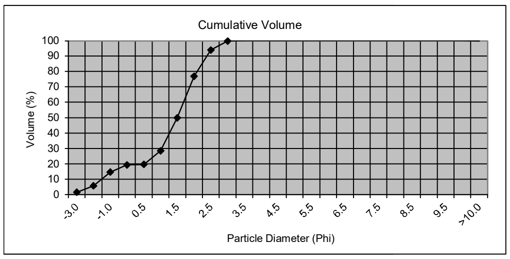
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	2.289	6.846	-1.194
Median	2.957		-1.564
Wentworth Classification	Granule		

Sorting	Value	Inference
Coefficient	2.34	Very Poorly Sorted
Skewness	0.24	Positive(Coarse)
Kurtosis	0.61	Very Platykurtic
Fines (%)	1.32%	
Sands (%)	43.94%	
Gravel (%)	54.75%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_53	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 11:48





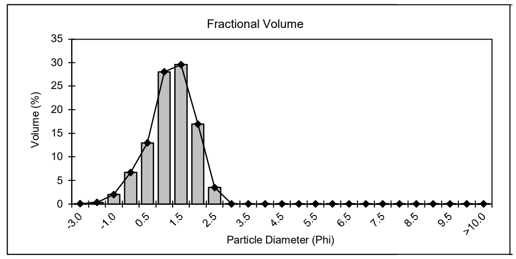
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	1.47	1.47	Pebble
4.0000	-2.0	4.16	5.63	
2.0000	-1.0	8.94	14.57	Granule
1.0000	0.0	4.65	19.22	V.Coarse Sand
0.7100	0.5	0.37	19.59	Coarse Sand
0.5000	1.0	8.77	28.35	
0.3550	1.5	21.46	49.81	Medium Sand
0.2500	2.0	27.09	76.90	
0.1800	2.5	17.12	94.02	Fine Sand
0.1250	3.0	5.81	99.83	
0.0900	3.5	0.17	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

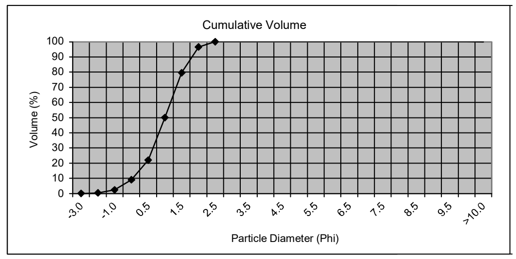
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.510	1.588	0.972
Median	0.354		1.497
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	1.45	Poorly Sorted
Skewness	-0.55	Very Negative(fine)
Kurtosis	1.66	Very Leptokurtic
Fines (%)	0.00%	
Sands (%)	85.43%	
Gravel (%)	14.57%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_54	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 12:26





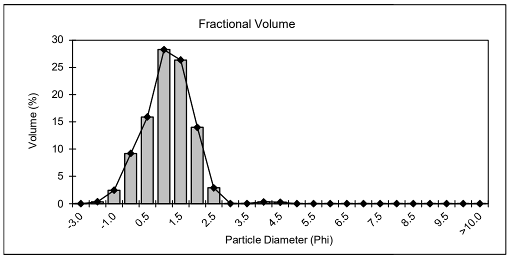
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.05	0.05	Pebble
4.0000	-2.0	0.32	0.37	
2.0000	-1.0	1.97	2.34	Granule
1.0000	0.0	6.68	9.02	V.Coarse Sand
0.7100	0.5	12.96	21.98	Coarse Sand
0.5000	1.0	28.04	50.03	
0.3550	1.5	29.57	79.59	Medium Sand
0.2500	2.0	16.92	96.51	
0.1800	2.5	3.48	99.99	Fine Sand
0.1250	3.0	0.01	100.00	
0.0900	3.5	0.00	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

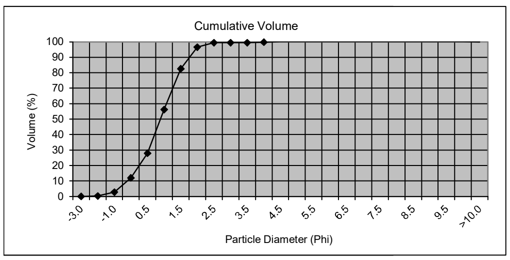
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.517	0.438	0.951
Median	0.500		0.999
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	0.74	Moderately Sorted
Skewness	-0.19	Negative (Fine)
Kurtosis	1.25	Leptokurtic
Fines (%)	0.00%	
Sands (%)	97.66%	
Gravel (%)	2.34%	

BGS Mod. Folk Classification	Slightly Gravelly Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_55	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 17:40





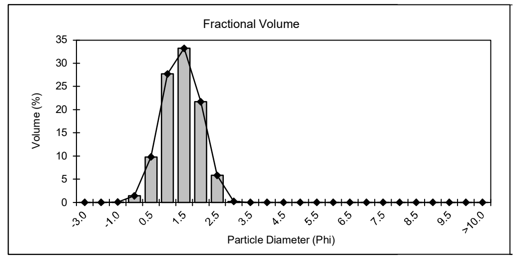
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.34	0.34	
2.0000	-1.0	2.46	2.80	Granule
1.0000	0.0	9.21	12.01	V.Coarse Sand
0.7100	0.5	15.90	27.92	Coarse Sand
0.5000	1.0	28.24	56.15	
0.3550	1.5	26.35	82.50	Medium Sand
0.2500	2.0	13.98	96.48	
0.1800	2.5	2.91	99.39	Fine Sand
0.1250	3.0	0.02	99.40	
0.0900	3.5	0.03	99.43	V.Fine Sand
0.0630	4.0	0.32	99.75	
0.0440	4.5	0.25	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

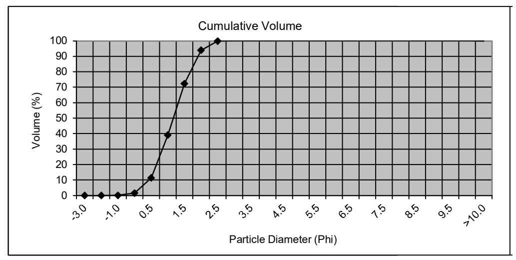
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.558	0.505	0.841
Median	0.546		0.874
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	0.78	Moderately Sorted
Skewness	-0.15	Negative (Fine)
Kurtosis	1.19	Leptokurtic
Fines (%)	0.25%	
Sands (%)	96.95%	
Gravel (%)	2.80%	

BGS Mod. Folk Classification	Slightly Gravelly Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_56	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 10:12





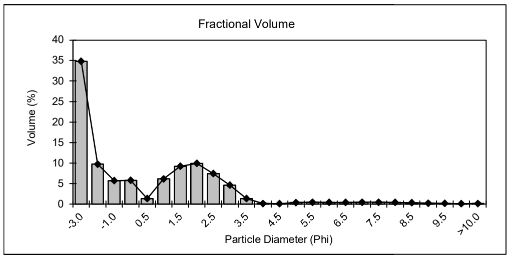
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.01	0.01	
2.0000	-1.0	0.07	0.08	Granule
1.0000	0.0	1.43	1.51	V.Coarse Sand
0.7100	0.5	9.82	11.33	Coarse Sand
0.5000	1.0	27.70	39.03	
0.3550	1.5	33.23	72.26	Medium Sand
0.2500	2.0	21.69	93.95	
0.1800	2.5	5.85	99.80	Fine Sand
0.1250	3.0	0.20	100.00	
0.0900	3.5	0.00	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

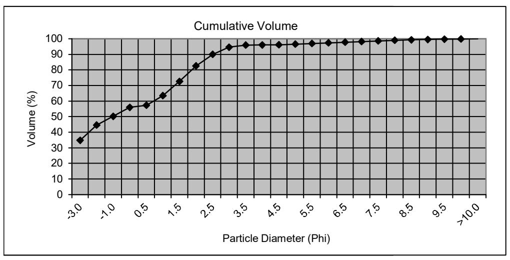
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.450	0.238	1.153
Median	0.452		1.145
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.59	Moderately Well Sorted
Skewness	-0.01	Symmetrical
Kurtosis	0.95	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.92%	
Gravel (%)	0.08%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_57	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 12:33





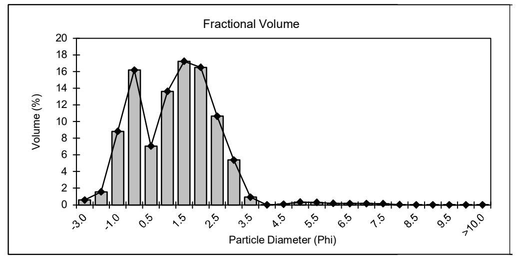
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	34.84	34.84	Pebble
4.0000	-2.0	9.71	44.55	
2.0000	-1.0	5.69	50.24	Granule
1.0000	0.0	5.78	56.01	V.Coarse Sand
0.7100	0.5	1.35	57.36	Coarse Sand
0.5000	1.0	6.12	63.49	
0.3550	1.5	9.20	72.69	Medium Sand
0.2500	2.0	9.92	82.61	
0.1800	2.5	7.41	90.02	Fine Sand
0.1250	3.0	4.62	94.64	
0.0900	3.5	1.35	95.99	V.Fine Sand
0.0630	4.0	0.14	96.13	
0.0440	4.5	0.09	96.22	Coarse Silt
0.0315	5.0	0.34	96.56	
0.0220	5.5	0.44	97.00	Medium Silt
0.0156	6.0	0.39	97.39	
0.0110	6.5	0.40	97.78	Fine silt
0.0078	7.0	0.43	98.21	
0.0055	7.5	0.45	98.66	V.Fine Silt
0.0039	8.0	0.40	99.06	
0.0028	8.5	0.31	99.37	
0.0020	9.0	0.22	99.59	Coarse Clay
0.0014	9.5	0.16	99.75	
0.0010	10.0	0.11	99.86	Medium Clay
<0.001	>10.0	0.15	100.00	Fine Clay

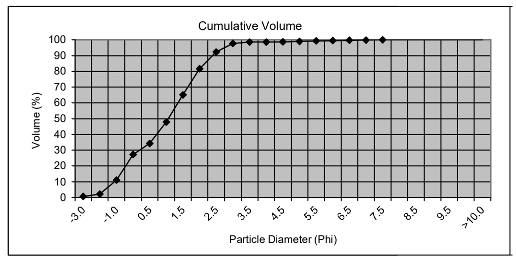
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.981	8.725	-0.987
Median	2.084		-1.059
Wentworth Classification		V. Coarse Sand	

Sorting	Value	Inference
Coefficient	2.64	Very Poorly Sorted
Skewness	0.08	Symmetrical
Kurtosis	0.59	Very Platykurtic
Fines (%)	3.88%	
Sands (%)	45.89%	
Gravel (%)	50.24%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_58	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	44691.67361





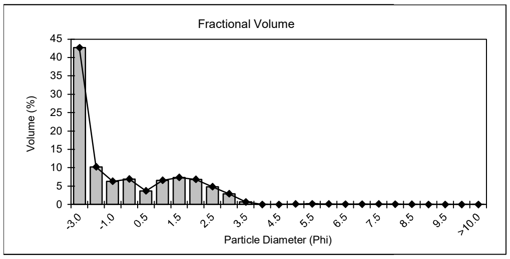
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.58	0.58	Pebble
4.0000	-2.0	1.56	2.14	
2.0000	-1.0	8.84	10.98	Granule
1.0000	0.0	16.18	27.16	V.Coarse Sand
0.7100	0.5	7.06	34.22	Coarse Sand
0.5000	1.0	13.64	47.86	
0.3550	1.5	17.25	65.11	Medium Sand
0.2500	2.0	16.52	81.62	
0.1800	2.5	10.65	92.28	Fine Sand
0.1250	3.0	5.39	97.67	
0.0900	3.5	0.93	98.60	V.Fine Sand
0.0630	4.0	0.00	98.60	
0.0440	4.5	0.09	98.69	Coarse Silt
0.0315	5.0	0.33	99.02	
0.0220	5.5	0.30	99.32	Medium Silt
0.0156	6.0	0.18	99.50	
0.0110	6.5	0.16	99.66	Fine silt
0.0078	7.0	0.16	99.82	
0.0055	7.5	0.14	99.97	V.Fine Silt
0.0039	8.0	0.04	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

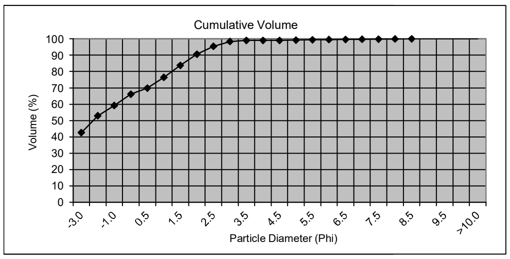
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.576	1.128	0.796
Median	0.482		1.053
Wentworth Classification		Coarse Sand	

Sorting	Value	Inference
Coefficient	1.39	Poorly Sorted
Skewness	-0.26	Negative (Fine)
Kurtosis	0.93	Mesokurtic
Fines (%)	1.40%	
Sands (%)	87.63%	
Gravel (%)	10.98%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_59	Operator	RI
Source Data:	Outer Dowsing OWF 2022	Date & Time:	17/05/2022 10:21





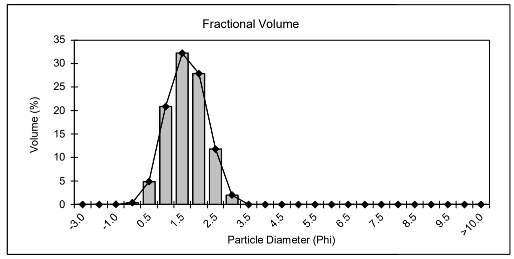
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	42.64	42.64	Pebble
4.0000	-2.0	10.24	52.88	
2.0000	-1.0	6.29	59.17	Granule
1.0000	0.0	6.94	66.11	V.Coarse Sand
0.7100	0.5	3.71	69.83	Coarse Sand
0.5000	1.0	6.57	76.40	
0.3550	1.5	7.35	83.75	Medium Sand
0.2500	2.0	6.85	90.60	
0.1800	2.5	4.84	95.44	Fine Sand
0.1250	3.0	2.90	98.34	
0.0900	3.5	0.71	99.05	V.Fine Sand
0.0630	4.0	0.02	99.06	
0.0440	4.5	0.01	99.07	Coarse Silt
0.0315	5.0	0.15	99.22	
0.0220	5.5	0.19	99.41	Medium Silt
0.0156	6.0	0.12	99.53	
0.0110	6.5	0.10	99.63	Fine silt
0.0078	7.0	0.11	99.74	
0.0055	7.5	0.11	99.85	V.Fine Silt
0.0039	8.0	0.09	99.94	
0.0028	8.5	0.06	100.00	
0.0020	9.0	0.01	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

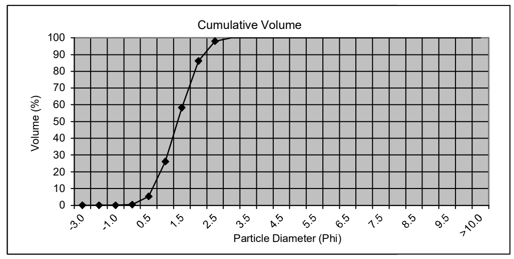
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	3.211	9.771	-1.683
Median	5.124		-2.357
Wentworth Classification	Granule		

Sorting	Value	Inference
Coefficient	2.48	Very Poorly Sorted
Skewness	0.37	Very Positive (Coarse)
Kurtosis	0.59	Very Platykurtic
Fines (%)	0.94%	
Sands (%)	39.89%	
Gravel (%)	59.17%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_60	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 10:58





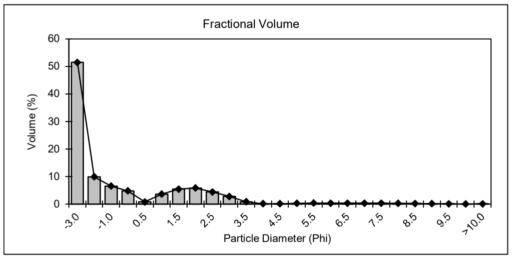
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.00	0.00	
2.0000	-1.0	0.04	0.04	Granule
1.0000	0.0	0.39	0.42	V.Coarse Sand
0.7100	0.5	4.86	5.28	Coarse Sand
0.5000	1.0	20.84	26.13	
0.3550	1.5	32.21	58.33	Medium Sand
0.2500	2.0	27.87	86.20	
0.1800	2.5	11.77	97.98	Fine Sand
0.1250	3.0	2.03	100.00	
0.0900	3.5	0.00	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

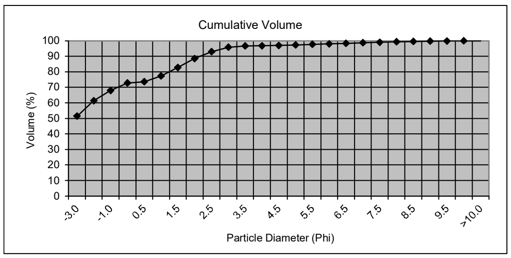
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.394	0.201	1.345
Median	0.393		1.349
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.59	Moderately Well Sorted
Skewness	0.02	Symmetrical
Kurtosis	0.95	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.97%	
Gravel (%)	0.04%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_61	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 14:33





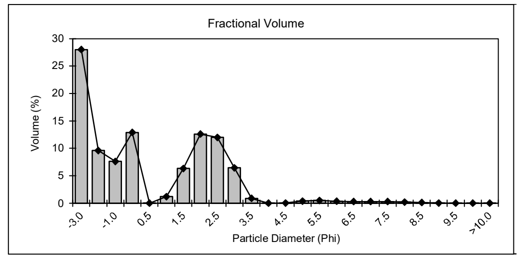
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	51.49	51.49	Pebble
4.0000	-2.0	9.93	61.42	
2.0000	-1.0	6.57	68.00	Granule
1.0000	0.0	4.82	72.82	V.Coarse Sand
0.7100	0.5	0.82	73.63	Coarse Sand
0.5000	1.0	3.65	77.28	
0.3550	1.5	5.43	82.71	Medium Sand
0.2500	2.0	5.85	88.56	
0.1800	2.5	4.41	92.98	Fine Sand
0.1250	3.0	2.79	95.76	
0.0900	3.5	0.85	96.62	V.Fine Sand
0.0630	4.0	0.16	96.78	
0.0440	4.5	0.16	96.94	Coarse Silt
0.0315	5.0	0.30	97.25	
0.0220	5.5	0.37	97.62	Medium Silt
0.0156	6.0	0.34	97.97	
0.0110	6.5	0.35	98.32	Fine silt
0.0078	7.0	0.36	98.68	
0.0055	7.5	0.35	99.03	V.Fine Silt
0.0039	8.0	0.30	99.33	
0.0028	8.5	0.22	99.55	
0.0020	9.0	0.15	99.70	Coarse Clay
0.0014	9.5	0.11	99.81	
0.0010	10.0	0.07	99.88	Medium Clay
<0.001	>10.0	0.12	100.00	Fine Clay

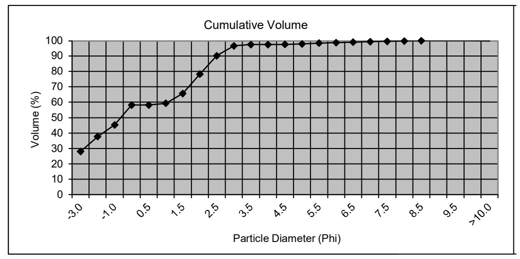
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	3.993	11.628	-1.997
Median	8.601		-3.105
Wentworth Classification		Granule	

Sorting	Value	Inference
Coefficient	2.67	Very Poorly Sorted
Skewness	0.56	Very Positive (Coarse)
Kurtosis	0.64	Very Platykurtic
Fines (%)	3.22%	
Sands (%)	28.79%	
Gravel (%)	68.00%	

BGS Mod. Folk Classification	Muddy Sandy Gravel
Mod. Folk for Habitat Classification	Mixed Sediments

Sample No.:	OWF_62	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 17:31





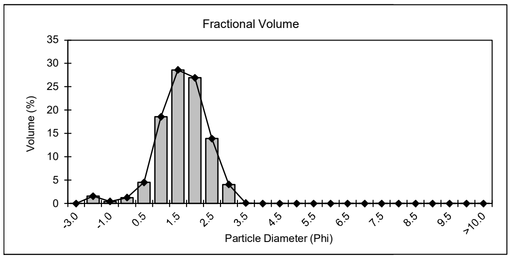
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	28.03	28.03	Pebble
4.0000	-2.0	9.59	37.61	
2.0000	-1.0	7.63	45.24	Granule
1.0000	0.0	12.90	58.15	V.Coarse Sand
0.7100	0.5	0.00	58.15	Coarse Sand
0.5000	1.0	1.18	59.33	
0.3550	1.5	6.32	65.65	Medium Sand
0.2500	2.0	12.61	78.26	
0.1800	2.5	11.99	90.25	Fine Sand
0.1250	3.0	6.46	96.71	
0.0900	3.5	0.87	97.58	V.Fine Sand
0.0630	4.0	0.00	97.58	
0.0440	4.5	0.01	97.59	Coarse Silt
0.0315	5.0	0.37	97.96	
0.0220	5.5	0.49	98.45	Medium Silt
0.0156	6.0	0.35	98.80	
0.0110	6.5	0.29	99.09	Fine silt
0.0078	7.0	0.29	99.39	
0.0055	7.5	0.27	99.66	V.Fine Silt
0.0039	8.0	0.20	99.86	
0.0028	8.5	0.12	99.98	
0.0020	9.0	0.02	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

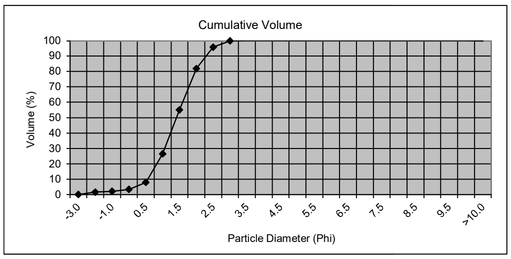
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.663	7.391	-0.734
Median	1.631		-0.706
Wentworth Classification		V. Coarse Sand	

Sorting	Value	Inference
Coefficient	2.53	Very Poorly Sorted
Skewness	0.00	Symmetrical
Kurtosis	0.56	Very Platykurtic
Fines (%)	2.42%	
Sands (%)	52.34%	
Gravel (%)	45.24%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_63	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 14:06





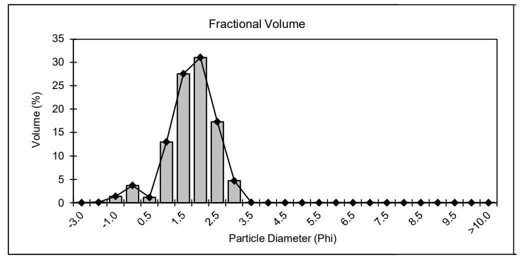
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	1.58	1.58	
2.0000	-1.0	0.46	2.04	Granule
1.0000	0.0	1.28	3.32	V.Coarse Sand
0.7100	0.5	4.53	7.85	Coarse Sand
0.5000	1.0	18.57	26.42	
0.3550	1.5	28.61	55.03	Medium Sand
0.2500	2.0	26.93	81.96	
0.1800	2.5	13.90	95.86	Fine Sand
0.1250	3.0	4.06	99.92	
0.0900	3.5	0.08	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

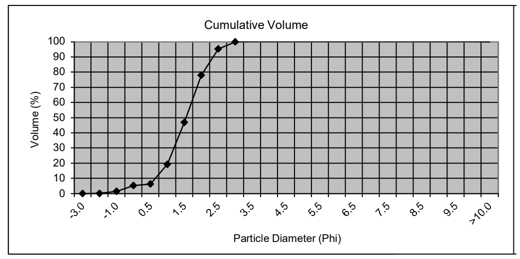
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.383	0.248	1.383
Median	0.380		1.394
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.69	Moderately Well Sorted
Skewness	-0.05	Symmetrical
Kurtosis	1.04	Mesokurtic
Fines (%)	0.00%	
Sands (%)	97.96%	
Gravel (%)	2.04%	

BGS Mod. Folk Classification	Slightly Gravelly Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_64	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 15:22





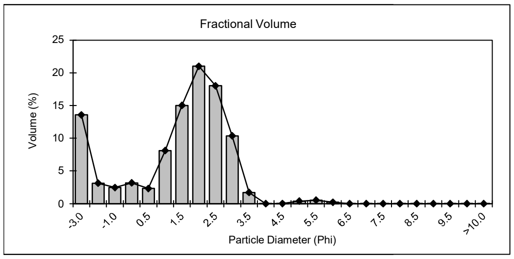
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.11	0.11	
2.0000	-1.0	1.38	1.48	Granule
1.0000	0.0	3.70	5.19	V.Coarse Sand
0.7100	0.5	1.14	6.32	Coarse Sand
0.5000	1.0	12.99	19.31	
0.3550	1.5	27.57	46.88	Medium Sand
0.2500	2.0	31.07	77.95	
0.1800	2.5	17.30	95.25	Fine Sand
0.1250	3.0	4.69	99.94	
0.0900	3.5	0.06	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

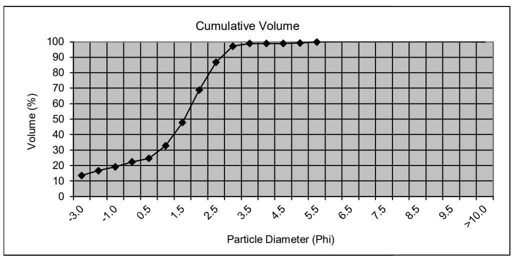
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.350	0.283	1.513
Median	0.344		1.538
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.71	Moderately Well Sorted
Skewness	-0.16	Negative (Fine)
Kurtosis	1.22	Leptokurtic
Fines (%)	0.00%	
Sands (%)	98.52%	
Gravel (%)	1.48%	

BGS Mod. Folk Classification	Slightly Gravelly Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_65	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 11:06





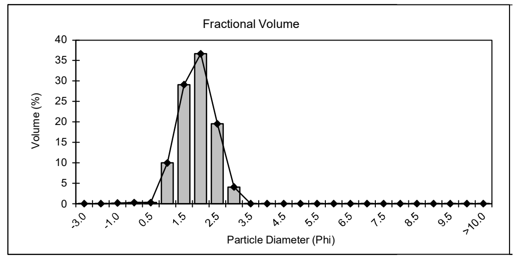
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	13.56	13.56	Pebble
4.0000	-2.0	3.12	16.67	
2.0000	-1.0	2.47	19.15	Granule
1.0000	0.0	3.18	22.33	V.Coarse Sand
0.7100	0.5	2.33	24.66	Coarse Sand
0.5000	1.0	8.12	32.77	
0.3550	1.5	15.00	47.77	Medium Sand
0.2500	2.0	21.00	68.77	
0.1800	2.5	18.02	86.79	Fine Sand
0.1250	3.0	10.35	97.14	
0.0900	3.5	1.70	98.85	V.Fine Sand
0.0630	4.0	0.00	98.85	
0.0440	4.5	0.01	98.86	Coarse Silt
0.0315	5.0	0.39	99.25	
0.0220	5.5	0.52	99.77	Medium Silt
0.0156	6.0	0.23	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

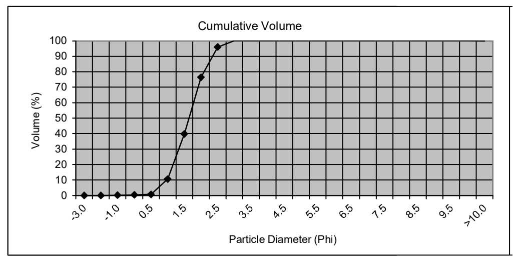
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.683	6.896	0.549
Median	0.344		1.540
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	2.25	Very Poorly Sorted
Skewness	-0.63	Very Negative(fine)
Kurtosis	1.79	Very Leptokurtic
Fines (%)	1.16%	
Sands (%)	79.70%	
Gravel (%)	19.15%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_66	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 16:41





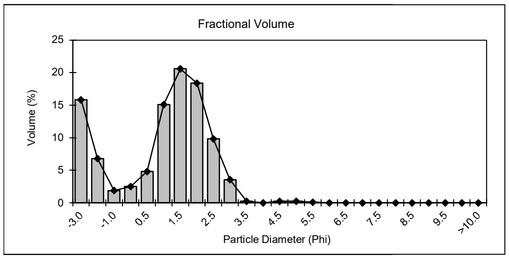
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.01	0.01	
2.0000	-1.0	0.14	0.14	Granule
1.0000	0.0	0.27	0.41	V.Coarse Sand
0.7100	0.5	0.27	0.68	Coarse Sand
0.5000	1.0	9.98	10.66	
0.3550	1.5	29.11	39.77	Medium Sand
0.2500	2.0	36.66	76.43	
0.1800	2.5	19.50	95.94	Fine Sand
0.1250	3.0	4.06	100.00	
0.0900	3.5	0.00	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

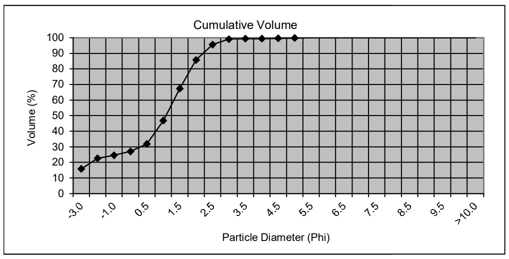
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.325	0.157	1.621
Median	0.326		1.618
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.54	Moderately Well Sorted
Skewness	-0.02	Symmetrical
Kurtosis	0.95	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.86%	
Gravel (%)	0.14%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_67	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 12:11





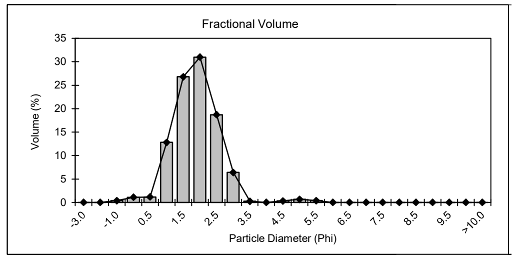
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	15.81	15.81	Pebble
4.0000	-2.0	6.81	22.62	
2.0000	-1.0	1.87	24.49	Granule
1.0000	0.0	2.50	26.99	V.Coarse Sand
0.7100	0.5	4.80	31.79	Coarse Sand
0.5000	1.0	15.08	46.88	
0.3550	1.5	20.57	67.45	Medium Sand
0.2500	2.0	18.38	85.82	
0.1800	2.5	9.82	95.64	Fine Sand
0.1250	3.0	3.55	99.19	
0.0900	3.5	0.24	99.43	V.Fine Sand
0.0630	4.0	0.00	99.43	
0.0440	4.5	0.24	99.68	Coarse Silt
0.0315	5.0	0.24	99.91	
0.0220	5.5	0.09	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

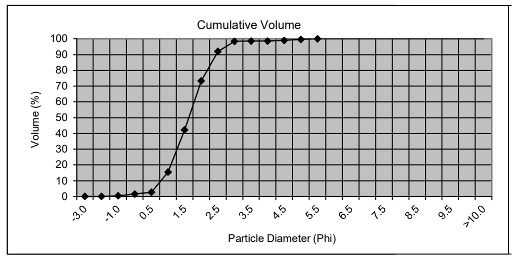
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.994	5.600	0.009
Median	0.478		1.065
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	2.18	Very Poorly Sorted
Skewness	-0.60	Very Negative(fine)
Kurtosis	1.02	Mesokurtic
Fines (%)	0.57%	
Sands (%)	74.94%	
Gravel (%)	24.49%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_68	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 16:33





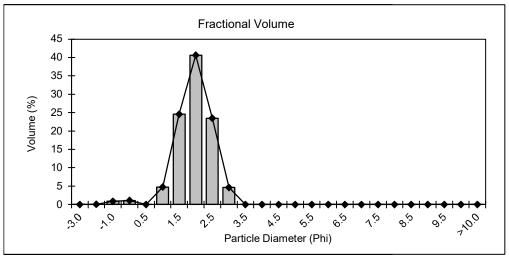
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.01	0.01	
2.0000	-1.0	0.37	0.38	Granule
1.0000	0.0	1.12	1.50	V.Coarse Sand
0.7100	0.5	1.19	2.68	Coarse Sand
0.5000	1.0	12.79	15.48	
0.3550	1.5	26.80	42.28	Medium Sand
0.2500	2.0	31.01	73.28	
0.1800	2.5	18.71	91.99	Fine Sand
0.1250	3.0	6.39	98.39	
0.0900	3.5	0.24	98.63	V.Fine Sand
0.0630	4.0	0.00	98.63	
0.0440	4.5	0.33	98.96	Coarse Silt
0.0315	5.0	0.64	99.60	
0.0220	5.5	0.39	99.99	Medium Silt
0.0156	6.0	0.01	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

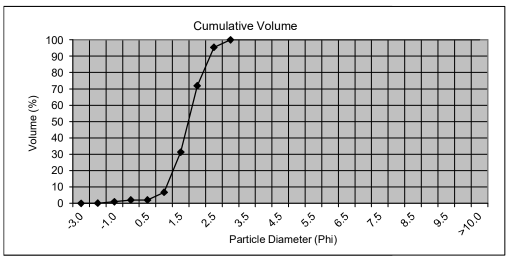
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.325	0.189	1.622
Median	0.329		1.605
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.63	Moderately Well Sorted
Skewness	0.04	Symmetrical
Kurtosis	0.99	Mesokurtic
Fines (%)	1.38%	
Sands (%)	98.24%	
Gravel (%)	0.38%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_69	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 15:13





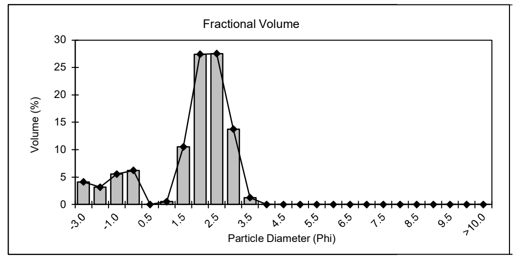
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.01	0.01	Pebble
4.0000	-2.0	0.04	0.05	
2.0000	-1.0	0.87	0.92	Granule
1.0000	0.0	1.10	2.02	V.Coarse Sand
0.7100	0.5	0.00	2.02	Coarse Sand
0.5000	1.0	4.75	6.77	
0.3550	1.5	24.55	31.32	Medium Sand
0.2500	2.0	40.60	71.92	
0.1800	2.5	23.45	95.38	Fine Sand
0.1250	3.0	4.62	99.99	
0.0900	3.5	0.01	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

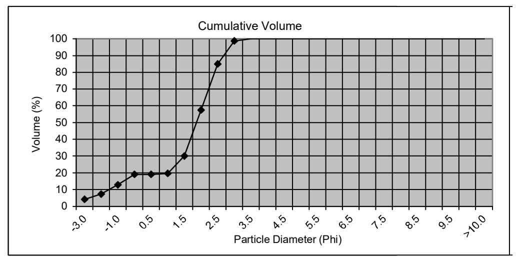
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.308	0.143	1.699
Median	0.307		1.705
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	0.52	Moderately Well Sorted
Skewness	-0.06	Symmetrical
Kurtosis	0.97	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.08%	
Gravel (%)	0.92%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_70	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 17:09





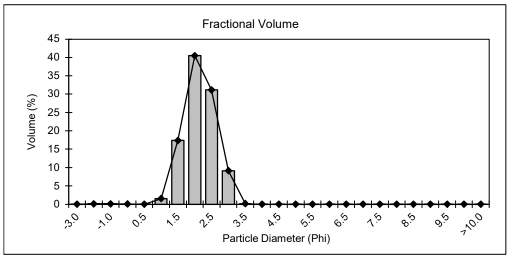
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	4.10	4.10	Pebble
4.0000	-2.0	3.15	7.26	
2.0000	-1.0	5.56	12.82	Granule
1.0000	0.0	6.23	19.05	V.Coarse Sand
0.7100	0.5	0.00	19.05	Coarse Sand
0.5000	1.0	0.52	19.56	
0.3550	1.5	10.51	30.07	Medium Sand
0.2500	2.0	27.41	57.48	
0.1800	2.5	27.53	85.01	Fine Sand
0.1250	3.0	13.74	98.75	
0.0900	3.5	1.26	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

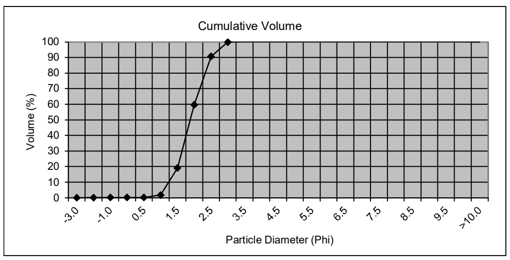
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.423	2.256	1.241
Median	0.279		1.843
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	1.61	Poorly Sorted
Skewness	-0.62	Very Negative(fine)
Kurtosis	2.19	Very Leptokurtic
Fines (%)	0.00%	
Sands (%)	87.19%	
Gravel (%)	12.82%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_71	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 16:57





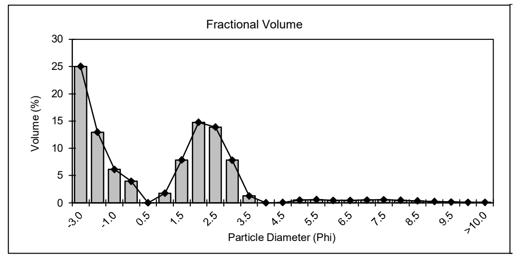
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.09	0.09	
2.0000	-1.0	0.07	0.16	Granule
1.0000	0.0	0.06	0.22	V.Coarse Sand
0.7100	0.5	0.00	0.22	Coarse Sand
0.5000	1.0	1.52	1.74	
0.3550	1.5	17.37	19.11	Medium Sand
0.2500	2.0	40.47	59.58	
0.1800	2.5	31.13	90.71	Fine Sand
0.1250	3.0	9.14	99.84	
0.0900	3.5	0.16	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

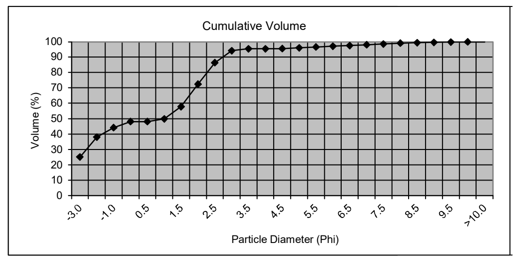
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.273	0.117	1.871
Median	0.275		1.863
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.49	Well Sorted
Skewness	0.03	Symmetrical
Kurtosis	1.01	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.84%	
Gravel (%)	0.16%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_72	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 15:42





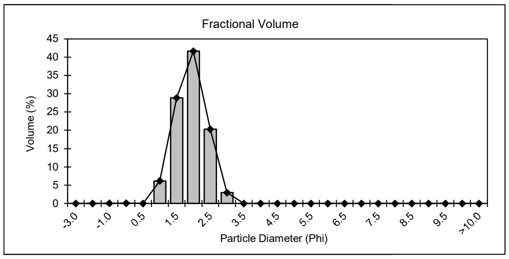
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	25.03	25.03	Pebble
4.0000	-2.0	12.97	38.00	
2.0000	-1.0	6.14	44.13	Granule
1.0000	0.0	3.96	48.09	V.Coarse Sand
0.7100	0.5	0.00	48.09	Coarse Sand
0.5000	1.0	1.78	49.87	
0.3550	1.5	7.84	57.71	Medium Sand
0.2500	2.0	14.77	72.48	
0.1800	2.5	13.89	86.36	Fine Sand
0.1250	3.0	7.83	94.19	
0.0900	3.5	1.27	95.46	V.Fine Sand
0.0630	4.0	0.01	95.47	
0.0440	4.5	0.07	95.54	Coarse Silt
0.0315	5.0	0.49	96.03	
0.0220	5.5	0.60	96.63	Medium Silt
0.0156	6.0	0.44	97.07	
0.0110	6.5	0.44	97.51	Fine silt
0.0078	7.0	0.51	98.02	
0.0055	7.5	0.55	98.57	V.Fine Silt
0.0039	8.0	0.48	99.06	
0.0028	8.5	0.35	99.41	
0.0020	9.0	0.24	99.65	Coarse Clay
0.0014	9.5	0.15	99.81	
0.0010	10.0	0.10	99.90	Medium Clay
<0.001	>10.0	0.10	100.00	Fine Clay

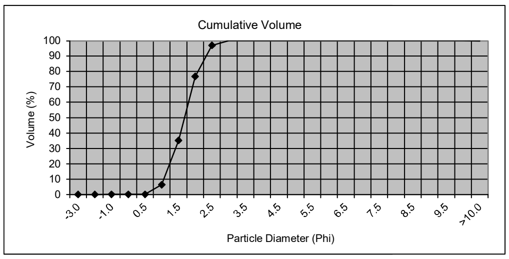
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.010	6.106	-0.014
Median	0.498		1.007
Wentworth Classification	V. Coarse Sand		

Sorting	Value	Inference
Coefficient	2.53	Very Poorly Sorted
Skewness	-0.44	Very Negative(fine)
Kurtosis	0.57	Very Platykurtic
Fines (%)	4.53%	
Sands (%)	51.34%	
Gravel (%)	44.13%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_73	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 14:42





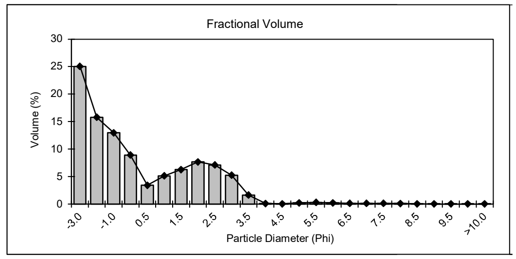
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.01	0.01	
2.0000	-1.0	0.04	0.05	Granule
1.0000	0.0	0.06	0.11	V.Coarse Sand
0.7100	0.5	0.00	0.11	Coarse Sand
0.5000	1.0	6.18	6.29	
0.3550	1.5	28.84	35.13	Medium Sand
0.2500	2.0	41.64	76.77	
0.1800	2.5	20.27	97.04	Fine Sand
0.1250	3.0	2.96	100.00	
0.0900	3.5	0.00	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

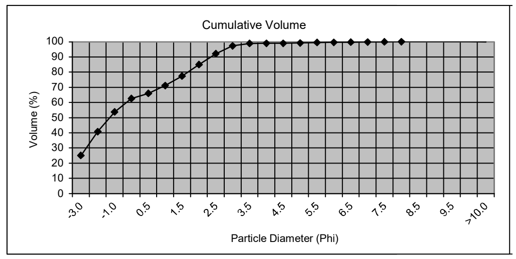
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.318	0.133	1.652
Median	0.318		1.655
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	0.48	Well Sorted
Skewness	-0.01	Symmetrical
Kurtosis	0.94	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.96%	
Gravel (%)	0.05%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

Sample No.:	OWF_74	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 11:54





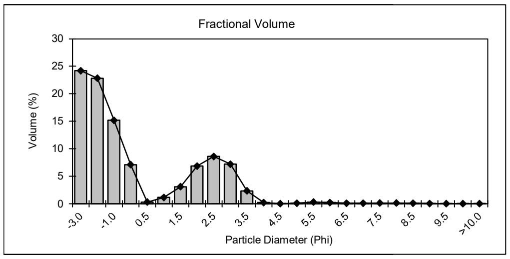
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	25.01	25.01	Pebble
4.0000	-2.0	15.77	40.79	
2.0000	-1.0	12.94	53.72	Granule
1.0000	0.0	8.90	62.62	V.Coarse Sand
0.7100	0.5	3.38	66.00	Coarse Sand
0.5000	1.0	5.11	71.12	
0.3550	1.5	6.23	77.35	Medium Sand
0.2500	2.0	7.64	84.99	
0.1800	2.5	7.10	92.09	Fine Sand
0.1250	3.0	5.22	97.32	
0.0900	3.5	1.61	98.92	V.Fine Sand
0.0630	4.0	0.08	99.00	
0.0440	4.5	0.00	99.00	Coarse Silt
0.0315	5.0	0.17	99.18	
0.0220	5.5	0.28	99.46	Medium Silt
0.0156	6.0	0.17	99.63	
0.0110	6.5	0.10	99.73	Fine silt
0.0078	7.0	0.09	99.82	
0.0055	7.5	0.10	99.91	V.Fine Silt
0.0039	8.0	0.08	99.99	
0.0028	8.5	0.01	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

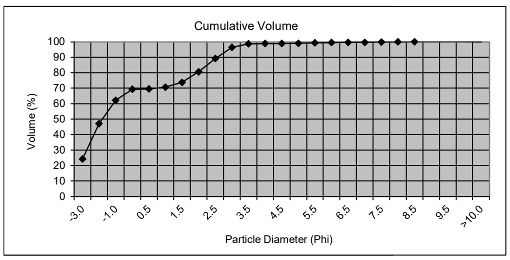
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.912	5.524	-0.935
Median	2.576		-1.365
Wentworth Classification		V. Coarse Sand	

Sorting	Value	Inference
Coefficient	2.30	Very Poorly Sorted
Skewness	0.26	Positive(Coarse)
Kurtosis	0.62	Very Platykurtic
Fines (%)	1.00%	
Sands (%)	45.28%	
Gravel (%)	53.72%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_75	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 14:13





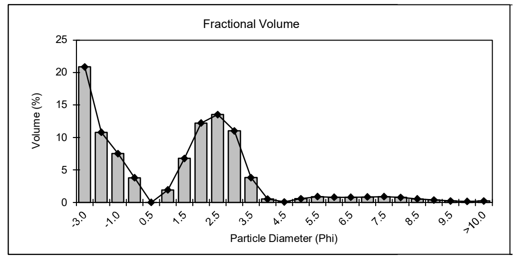
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	24.20	24.20	Pebble
4.0000	-2.0	22.82	47.01	
2.0000	-1.0	15.15	62.17	Granule
1.0000	0.0	7.11	69.28	V.Coarse Sand
0.7100	0.5	0.28	69.56	Coarse Sand
0.5000	1.0	1.12	70.68	
0.3550	1.5	3.07	73.75	Medium Sand
0.2500	2.0	6.84	80.59	
0.1800	2.5	8.60	89.19	Fine Sand
0.1250	3.0	7.19	96.38	
0.0900	3.5	2.33	98.71	V.Fine Sand
0.0630	4.0	0.19	98.90	
0.0440	4.5	0.00	98.90	Coarse Silt
0.0315	5.0	0.10	99.00	
0.0220	5.5	0.29	99.29	Medium Silt
0.0156	6.0	0.19	99.48	
0.0110	6.5	0.09	99.57	Fine silt
0.0078	7.0	0.09	99.66	
0.0055	7.5	0.12	99.78	V.Fine Silt
0.0039	8.0	0.12	99.90	
0.0028	8.5	0.09	99.99	
0.0020	9.0	0.02	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

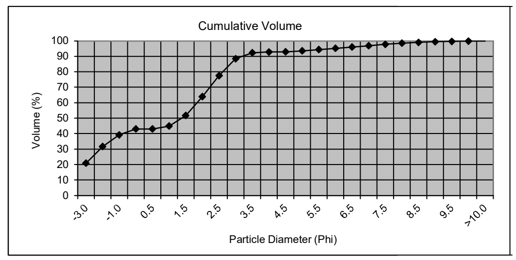
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	1.963	4.896	-0.973
Median	3.606		-1.850
Wentworth Classification		V. Coarse Sand	

Sorting	Value	Inference
Coefficient	2.32	Very Poorly Sorted
Skewness	0.48	Very Positive (Coarse)
Kurtosis	0.58	Very Platykurtic
Fines (%)	1.10%	
Sands (%)	36.73%	
Gravel (%)	62.17%	

BGS Mod. Folk Classification	Sandy Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_76	Operator	RI
Source Data:	Outer Dowsing OWF 2022	Date & Time:	17/05/2022 11:06





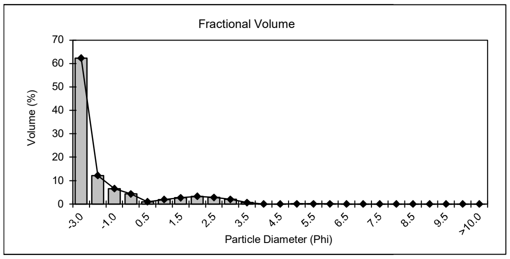
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	20.87	20.87	Pebble
4.0000	-2.0	10.80	31.67	
2.0000	-1.0	7.53	39.20	Granule
1.0000	0.0	3.80	42.99	V.Coarse Sand
0.7100	0.5	0.00	42.99	Coarse Sand
0.5000	1.0	1.93	44.92	
0.3550	1.5	6.78	51.70	Medium Sand
0.2500	2.0	12.22	63.93	
0.1800	2.5	13.52	77.45	Fine Sand
0.1250	3.0	11.01	88.46	
0.0900	3.5	3.82	92.27	V.Fine Sand
0.0630	4.0	0.53	92.80	
0.0440	4.5	0.09	92.89	Coarse Silt
0.0315	5.0	0.58	93.48	
0.0220	5.5	0.88	94.36	Medium Silt
0.0156	6.0	0.80	95.15	
0.0110	6.5	0.80	95.95	Fine silt
0.0078	7.0	0.85	96.80	
0.0055	7.5	0.89	97.69	V.Fine Silt
0.0039	8.0	0.76	98.45	
0.0028	8.5	0.55	99.00	
0.0020	9.0	0.37	99.37	Coarse Clay
0.0014	9.5	0.24	99.61	
0.0010	10.0	0.15	99.76	Medium Clay
<0.001	>10.0	0.24	100.00	Fine Clay

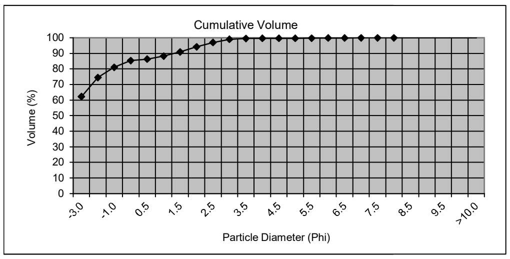
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.827	5.807	0.274
Median	0.391		1.353
Wentworth Classification		Coarse Sand	

Sorting	Value	Inference
Coefficient	2.98	Very Poorly Sorted
Skewness	-0.30	Negative (Fine)
Kurtosis	0.78	Platykurtic
Fines (%)	7.20%	
Sands (%)	53.61%	
Gravel (%)	39.20%	

BGS Mod. Folk Classification	Muddy Sandy Gravel
Mod. Folk for Habitat Classification	Mixed Sediments

Sample No.:	OWF_77	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 14:53





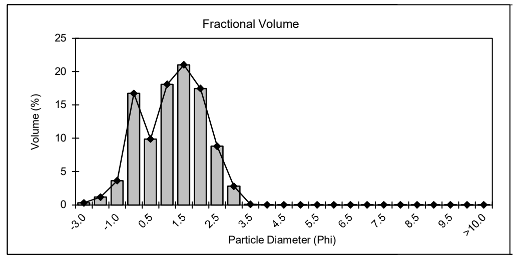
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	62.29	62.29	Pebble
4.0000	-2.0	12.20	74.49	
2.0000	-1.0	6.59	81.08	Granule
1.0000	0.0	4.30	85.38	V.Coarse Sand
0.7100	0.5	0.97	86.35	Coarse Sand
0.5000	1.0	1.92	88.27	
0.3550	1.5	2.69	90.95	Medium Sand
0.2500	2.0	3.27	94.22	
0.1800	2.5	2.83	97.05	Fine Sand
0.1250	3.0	1.97	99.02	
0.0900	3.5	0.60	99.62	V.Fine Sand
0.0630	4.0	0.03	99.66	
0.0440	4.5	0.00	99.66	Coarse Silt
0.0315	5.0	0.07	99.73	
0.0220	5.5	0.10	99.82	Medium Silt
0.0156	6.0	0.05	99.88	
0.0110	6.5	0.03	99.91	Fine silt
0.0078	7.0	0.03	99.94	
0.0055	7.5	0.03	99.97	V.Fine Silt
0.0039	8.0	0.03	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

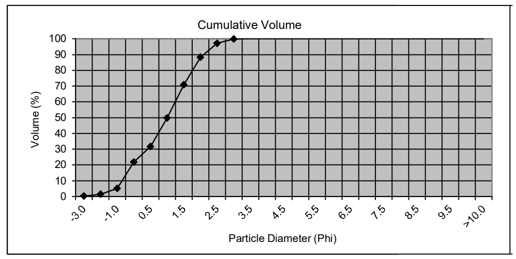
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	7.168	11.372	-2.842
Median	12.029		-3.588
Wentworth Classification	Pebble		

Sorting	Value	Inference
Coefficient	2.07	Very Poorly Sorted
Skewness	0.60	Very Positive (Coarse)
Kurtosis	1.17	Leptokurtic
Fines (%)	0.35%	
Sands (%)	18.58%	
Gravel (%)	81.08%	

BGS Mod. Folk Classification	Gravel
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_78	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 16:19





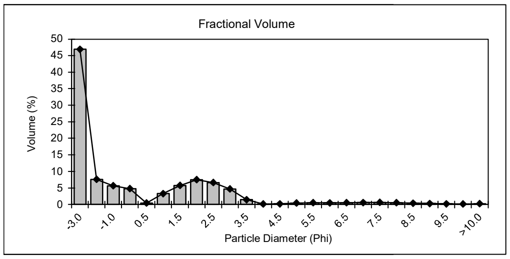
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.29	0.29	Pebble
4.0000	-2.0	1.17	1.46	
2.0000	-1.0	3.63	5.10	Granule
1.0000	0.0	16.73	21.83	V.Coarse Sand
0.7100	0.5	9.88	31.71	Coarse Sand
0.5000	1.0	18.10	49.81	
0.3550	1.5	21.04	70.85	Medium Sand
0.2500	2.0	17.47	88.33	
0.1800	2.5	8.79	97.12	Fine Sand
0.1250	3.0	2.79	99.91	
0.0900	3.5	0.09	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

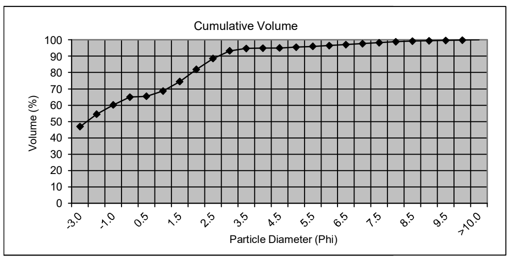
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.570	0.704	0.810
Median	0.499		1.004
Wentworth Classification	Coarse Sand		

Sorting	Value	Inference
Coefficient	1.08	Poorly Sorted
Skewness	-0.23	Negative (Fine)
Kurtosis	0.95	Mesokurtic
Fines (%)	0.00%	
Sands (%)	94.90%	
Gravel (%)	5.10%	

BGS Mod. Folk Classification	Gravelly Sand
Mod. Folk for Habitat Classification	Coarse Sediments

Sample No.:	OWF_79	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	11/05/2022 12:02





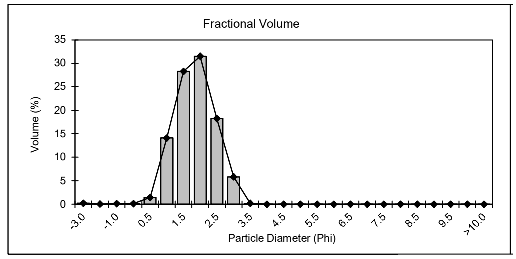
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	46.93	46.93	Pebble
4.0000	-2.0	7.59	54.52	
2.0000	-1.0	5.66	60.17	Granule
1.0000	0.0	4.80	64.97	V.Coarse Sand
0.7100	0.5	0.45	65.42	Coarse Sand
0.5000	1.0	3.27	68.70	
0.3550	1.5	5.76	74.45	Medium Sand
0.2500	2.0	7.48	81.93	
0.1800	2.5	6.65	88.58	Fine Sand
0.1250	3.0	4.67	93.25	
0.0900	3.5	1.45	94.70	V.Fine Sand
0.0630	4.0	0.16	94.87	
0.0440	4.5	0.17	95.04	Coarse Silt
0.0315	5.0	0.43	95.46	
0.0220	5.5	0.54	96.00	Medium Silt
0.0156	6.0	0.50	96.50	
0.0110	6.5	0.54	97.04	Fine silt
0.0078	7.0	0.59	97.64	
0.0055	7.5	0.61	98.25	V.Fine Silt
0.0039	8.0	0.53	98.78	
0.0028	8.5	0.40	99.18	
0.0020	9.0	0.28	99.45	Coarse Clay
0.0014	9.5	0.19	99.64	
0.0010	10.0	0.13	99.77	Medium Clay
<0.001	>10.0	0.24	100.00	Fine Clay

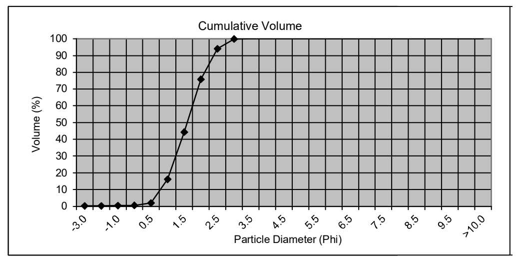
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	3.283	13.059	-1.715
Median	6.381		-2.674
Wentworth Classification	Granule		

Sorting	Value	Inference
Coefficient	3.09	Very Poorly Sorted
Skewness	0.47	Very Positive (Coarse)
Kurtosis	0.65	Very Platykurtic
Fines (%)	5.14%	
Sands (%)	34.69%	
Gravel (%)	60.17%	

BGS Mod. Folk Classification	Muddy Sandy Gravel
Mod. Folk for Habitat Classification	Mixed Sediments

Sample No.:	OWF_80	Operator	HB
Source Data:	Outer Dowsing OWF 2022	Date & Time:	10/05/2022 16:48





Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.21	0.21	Pebble
4.0000	-2.0	0.02	0.23	
2.0000	-1.0	0.14	0.37	Granule
1.0000	0.0	0.13	0.50	V.Coarse Sand
0.7100	0.5	1.43	1.93	Coarse Sand
0.5000	1.0	14.09	16.02	
0.3550	1.5	28.25	44.27	Medium Sand
0.2500	2.0	31.50	75.78	
0.1800	2.5	18.26	94.04	Fine Sand
0.1250	3.0	5.81	99.85	
0.0900	3.5	0.15	100.00	V.Fine Sand
0.0630	4.0	0.00	100.00	
0.0440	4.5	0.00	100.00	Coarse Silt
0.0315	5.0	0.00	100.00	
0.0220	5.5	0.00	100.00	Medium Silt
0.0156	6.0	0.00	100.00	
0.0110	6.5	0.00	100.00	Fine silt
0.0078	7.0	0.00	100.00	
0.0055	7.5	0.00	100.00	V.Fine Silt
0.0039	8.0	0.00	100.00	
0.0028	8.5	0.00	100.00	
0.0020	9.0	0.00	100.00	Coarse Clay
0.0014	9.5	0.00	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.332	0.183	1.589
Median	0.336		1.574
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.60	Moderately Well Sorted
Skewness	0.02	Symmetrical
Kurtosis	0.95	Mesokurtic
Fines (%)	0.00%	
Sands (%)	99.63%	
Gravel (%)	0.37%	

BGS Mod. Folk Classification	Sand
Mod. Folk for Habitat Classification	Sand and Muddy Sand

APPENDIX F – SAMPLE LOG SHEETS

Geodetics: WGS84 UTM31N 3°E															
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
1	OWF_80	HG	22	15:33	03/04/2022	80%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	2.5Y 4/4	Coarse sand with silty component	-	402 906.56	5 933 512.67
2	OWF_80	HG	22	16:01	03/04/2022	90%	F1	1L Bucket	-	201.2mV @7.5˚C	2.5Y 4/4	Coarse sand with silty component	Polychaetes, amphipods	402 906.75	5 933 515.50
3	OWF_77	HG	18	17:15	03/04/2022	30%	N/S	-	Deck slate says 15:15 instead of 17:15	-	-	Gravelly Sand w/ pebbles and cobbles	-	400 472.31	5 933 645.99
4	OWF_77	HG	18	17:27	03/04/2022	20%	N/S	-	-	-	-	Gravelly Sand w/ pebbles and cobbles	-	400 472.28	5 933 646.08
5	OWF_77	HG	19	17:38	03/04/2022	50%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	2.5Y 4/4	Gravelly Sand w/ pebbles and cobbles	-	400 472.14	5 933 647.41
6	OWF_77	HG	18	17:55	03/04/2022	60%	F1	1L Bucket	Redox not taken as sediment is too pebbly and could damage probe	-	2.5Y 4/4	Gravelly Sand w/ pebbles and cobbles	Crab, whelk	400 472.89	5 933 647.05
7	OWF_73	HG	17	19:35	03/04/2022	90%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3	Coarse sand with silty component	Sandeel - picture taken	398 488.40	5 931 847.23
8	OWF_73	HG	18	19:57	03/04/2022	80%	F1	1L Bucket	-	158.2mV @7.4	10YR 4/3	Coarse sand with silty component	Amphipods, polychaetes, worms	398 489.42	5 931 847.09
9	OWF_73	SG	18	20:37	03/04/2022	60%	Contaminants	2x 1L glass jars	-	-	10YR 4/3	Coarse sand with silty component	-	398 488.64	5 931 846.02
10	OWF_67	HG	25	21:23	03/04/2022	70%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3	Coarse sand with small pebbles	Sandeel	396 319.72	5 931 265.14
11	OWF_67	HG	25	21:36	03/04/2022	60%	F1	3L Bucket	-	188.mV @7.3˚C	10YR 4/3	Coarse sand with small pebbles	Polychaetes, brittle star	396 318.68	5 931 265.40
12	OWF_63	HG	17	22:10	03/04/2022	80%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3	Coarse sand with silt	-	394 359.53	5 930 657.28
13	OWF_63	HG	17	22:24	03/04/2022	70%	F1	1L Bucket	Wrong station number on deck slate (67)	192.2mV @7.4˚C	10YR 4/3	Coarse sand with silt	Juvenile fish	394 360.39	5 930 656.64
14	OWF_62	HG	21	00:11	04/04/2022	<30%	N/S	-	-	-	-	-	-	394 093.76	5 933 200.42
15	OWF_62	HG	21	00:19	04/04/2022	30%	F1 (Held)	1L Bucket	Down on weather after this station	65.3mV @7.1˚C	10YR 4/3	Gravelly muddy sand	Small crab, ascidians	394 095.83	5 933 199.29
16	OWF_62	HG	21	00:35	04/04/2022	<30%	N/S	-	No sample (>10%)	-	-	Gravelly muddy sand	-	394 094.66	5 933 198.84
17	OWF_62	HG	21	00:45	04/04/2022	<30%	N/S	-	No sample (>10%)	-	-	Gravelly muddy sand	-	394 095.47	5 933 197.61
18	OWF_62	HG	18	00:55	04/04/2022	40%	PC	3x Ziplock bags (TOC, Spare, PSA)	Slight organic smell	-	10YR 4/5	Gravelly muddy sand, some pebbles	-	394 095.44	5 933 197.76
19	OWF_62	HG	18.8	10:20	04/04/2022	0%	N/S	-	Sampler did not trigger	-	-	-	-	394 091.02	5 933 195.65
20	OWF_62	HG	18.8	10:30	04/04/2022	<5%	N/S	-	No sample, wrong sample in deck slate photo, deck slate incorrectly labelled as Shipek	-	-	-	-	394 096.36	5 933 198.32
21	OWF_62	SG	18	12:15	04/04/2022	<5%	N/S	-	Insufficient material for any sample	-	-	-	Bryozoan, finger bryozoan	394 095.31	5 933 197.16

Geodetics: WGS84 UTM31N 3°E																
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
22	OWF_62	SG	18	12:29	04/04/2022	<5%	N/S	-	Insufficient material for any sample	-	-	-	Anemone, bryozoan	394 091.42	5 933 197.38
23	OWF_62_A	SG	19	12:53	04/04/2022	<5%	N/S	-	Location moved 25m NE Residues taken for primary contaminant. Due to maximum amount of attempts station abandoned	-	-	-	-	394 108.92	5 933 218.29
24	OWF_60	HG	17	14:46	04/04/2022	95%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3	Coarse sand with silty component and shell fragments	-	393 245.55	5 931 743.33
25	OWF_60	HG	17	15:04	04/04/2022	70%	F1	1L Bucket	Weight removed	137.2mV @ 7.7˚C	10YR 4/3	Coarse sand with silty component and shell fragments	Urchin fragments	393 248.27	5 931 742.22
26	OWF_61	HG	18	16:01	04/04/2022	30%	N/S	-	-	-	-	Coarse sand with silt component and shell fragments	Anemone	393 412.88	5 935 266.52
27	OWF_61	HG	18	16:51	04/04/2022	50%	PC	3x Ziplock bags (TOC, Spare, PSA)	Mixed sediment, Redox reading not taken to prevent contamination and fauna sample was marginal	-	10YR 4/3	Coarse sand with silt component and shell fragments	Anemone on cobble	393 411.00	5 935 264.00
28	OWF_61	HG	18	17:06	04/04/2022	<5%	N/S	-	-	-	-	-	-	393 411.00	5 935 262.00
29	OWF_61	HG	18	17:16	04/04/2022	30%	F1	3L Bucket	Marginal sample retained in case of next N/S, Labelled "H" (held) on grab photo	-	-	Mixed sediment Muddy sand with shell and pebbles	Polychaetes	393 415.00	5 935 262.00
30	OWF_61	HG	18	17:29	04/04/2022	<5%	N/S	-	Residues - scraped the seabed	-	10YR 4/3	Mixed sediment Muddy sand with shell and pebbles	-	393 415.00	5 935 261.00
31	OWF_61	HG	18	17:42	04/04/2022	<5%	N/S	-	Last attempt at fauna, Marginal 30% sample @ 17:16 accepted	-	10YR 4/3	Mixed sediment Muddy sand with shell and pebbles	-	393 406.00	5 935 265.00
32	OWF_70	HG	22	19:37	04/04/2022	40%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Coarse sand with large pebbles	-	397 298.00	5 935 576.00
33	OWF_70	HG	22	19:52	04/04/2022	20%	N/S	-	-	-	-	-	-	397 297.00	5 935 576.00
34	OWF_70	HG	22	20:07	04/04/2022	30%	N/S	-	-	-	-	-	-	397 298.00	5 935 576.00
35	OWF_70	HG	22	20:20	04/04/2022	60%	F1	1L Bucket	Deck slate = 20:22	189.9mV @ 7.5˚C	10YR 4/2	Coarse sand with silt component and small pebbles	-	397 298.00	5 935 582.00
36	OWF_71	HG	21	21:02	04/04/2022	80%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	-	-	398 094.00	5 937 269.00
37	OWF_71	HG	21	21:18	04/04/2022	95%	F1	1L Buckets	-	177.7mV @7.5˚C	-	-	Nephtyid	398 093.00	5 937 270.00
38	OWF_76	HG	26	23:58	04/04/2022	90%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	70.1mV @ 7.5˚C	10YR 4/2	Muddy sand with pebbles and cobbles	*Sabellaria*	399 997.00	5 935 262.00
39	OWF_76	HG	26	00:14	05/04/2022	<30%	N/S	-	Cobble in jaw	-	-	-	-	399 997.00	5 935 262.00
40	OWF_76	HG	24.5	00:23	05/04/2022	65%	F1	5L Bucket	*Sabellaria* within sample	-	10YR 4/2	Muddy sandy gravel with *Sabellaria*	Sea star, Flustra, hermit crab, anemone, barnacle, anemone	399 998.00	5 935 262.00
41	OWF_79	HG	24.3	00:59	05/04/2022	70%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Gravelly muddy sand	-	401 370.00	5 936 295.00
42	OWF_79	HG	24	01:14	05/04/2022	70%	F1	5L and 3L Buckets	-	108.4mV @ 7.5˚C	10YR 4/2	Mix of cobbles and pebbles with fragmented *Sabellaria*	-	401 369.00	5 936 295.00
43	OWF_79	SG	23	01:39	05/04/2022	10%	N/S	-	-	-	10YR 4/2	Gravelly muddy sand with pebbles	-	401 369.00	5 936 296.00

Geodetics: WGS84 UTM31N 3°E															
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
44	OWF_79	SG	23	01:48	05/04/2022	20%	Held contaminant	1L glass jar	Low sample retention - 250ml sediment sampled as spare/potential	-	10YR 4/2	-	-	401 370.00	5 936 295.00
45	OWF_79	SG	23	02:01	05/04/2022	20%	Held contaminant	1L glass jar	Low sample retention - 250ml sediment sampled as spare/potential	-	10YR 4/2	-	-	401 371.00	5 936 295.00
46	OWF_78	HG	23	2:49	05/04/2022	80%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Gravelly muddy sand	-	400 605.00	5 940 261.00
47	OWF_78	HG	23	03:04	05/04/2022	90%	F1	3L Bucket	-	157.1mV @7.5˚C	10YR 4/2	Gravelly muddy sand	-	400 604.89	5 940 261.34
48	OWF_75	HG	23	05:56	05/04/2022	70%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3	Gravelly muddy sand	*Sabellaria*	399 546.10	5 940 260.95
49	OWF_75	HG	23	06:11	05/04/2022	45%	F1	3L Bucket	-	193.2mV @ 7.5˚C	10YR 4/3	Gravelly muddy sand	No visible fauna	399 547.07	5 940 261.12
50	OWF_69	HG	26	07:31	05/04/2022	90%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	2.5Y 5/2	Coarse sand	-	397 270.42	5 941 078.99
51	OWF_69	HG	26	07:46	05/04/2022	90%	F1	1L Bucket	-	184.5mV @ 7.5˚C	2.5Y 5/2	Coarse sand	Polychaete	397 272.54	5 941 080.25
52	OWF_09	HG	21	14:02	05/04/2022	90%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	2.5Y 5/2	Gravelly (shelly) sand with pebbles	-	392 179.74	5 940 379.75
53	OWF_09	HG	21	14:22	05/04/2022	50%	F1	1L and 3L Buckets	-	146.3mV @ 7.7˚C	2.5Y 5/2	Gravelly (shelly) sand with pebbles	Polychaetes	392 178.99	5 940 380.15
54	OWF_55	HG	14	14:58	05/04/2022	80%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	2.5Y 4/3	Gravelly (shelly) sand	-	390 497.27	5 939 123.11
55	OWF_55	HG	14	15:40	05/04/2022	80%	F1	5L Bucket	-	195.3mV @ 7.6˚C	2.5Y 4/3	Gravelly (shelly) sand	Sandeels and polychaetes	390 498.13	5 939 124.54
56	OWF_55	SG	14	16:13	05/04/2022	95%	Contaminants	2x 1L glass jars	-	-	2.5Y 4/3	Gravelly (shelly) sand	-	390 499.03	5 939 122.90
57	OWF_59	HG	23	19:03	05/04/2022	<5%	N/S	-	No sample, reduce winch speed	-	2.5Y 4/3	Sand with pebbles	-	393 196.59	5 942 429.96
58	OWF_59	HG	23	19:16	05/04/2022	<10%	N/S	-	No sample, reduce winch speed	-	2.5Y 4/3	Sand with pebbles	-	393 195.88	5 942 427.52
59	OWF_59	HG	23	19:27	05/04/2022	<30%	F1 (Held)	3L Bucket	Unable to obtain Redox measurement due to sub surface pebbles		2.5Y 4/3	Sand with pebbles	*Sabellaria*	393 192.03	5 942 431.33
60	OWF_59	HG	23	19:44	05/04/2022	0%	N/S	-	Empty grab	-	-	-	-	393 198.11	5 942 434.26
61	OWF_59	HG	23	19:58	05/04/2022	40	PC	3x Ziplock bags (TOC, Spare, PSA)	No more macrofauna sample attempts	-	2.5Y 4/3	Sand with pebbles	No visible fauna	393 190.12	5 942 430.41
62	OWF_58	HG	24	22:02	05/04/2022	95%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10Y 4/3	Coarse sand with shell fragments	-	392 721.00	5 945 815.97
63	OWF_58	HG	24	22:30	05/04/2022	80	F1	5L and 3L Buckets	-	125.8mV @ 7.6˚C	10Y 4/3	Sandy gravel	No visible fauna	392 721.32	5 945 817.44
64	OWF_64	HG	26	00:24	06/04/2022	85	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10Y 4/2	Fine sand	-	394 729.29	5 945 870.79
65	OWF_64	HG	26	00:38	06/04/2022	75%	F1	1L Bucket	-	175.5mV @ 7.6˚C	10Y 4/2	Fine sand	No visible fauna	394 730.53	5 945 870.67

Geodetics: WGS84 UTM31N 3°E															
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
66	OWF_72	HG	28	01:33	06/04/2022	85%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 3/2	Muddy gravelly sand with cobbles and subsurface clay layer	-	398 433.81	5 947 803.09
67	OWF_72	HG	27	01:48	06/04/2022	70%	F1	2x 3L Buckets	-	183.6mV @ 7.5˚C	10YR 3/2	Gravelly mud	Polychaetes	398 433.76	5 947 802.60
68	OWF_72	SG	27	02:09	06/04/2022	<30	N/S	-	-	-	10YR 3/2	Fine sand	-	398 432.82	5 947 807.91
69	OWF_72	SG	27	02:21	06/04/2022	55%	Contaminants	2x 1L glass jars	-	-	10YR 3/2	Fine sand	-	398 433.32	5 947 801.93
70	OWF_74	HG	26.9	03:06	06/04/2022	45%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Gravelly sand	-	399 146.68	5 945 631.35
71	OWF_74	HG	26.8	03:21	06/04/2022	5%	N/S	-	Small amount of gravel in bucket	-	10YR 4/2	Gravelly sand	-	399 147.35	5 945 630.70
72	OWF_74	HG	26.9	03:29	06/04/2022	50%	N/S	-	Cobble in jaw caused washout	-	-	Gravelly sand	-	399 149.72	5 945 631.32
73	OWF_74	HG	26.9	03:39	06/04/2022	65%	F1	5L Bucket	-	174.4mV @ 7.6˚C	-	Gravelly sand	Polychaetes, *Sabellaria*	399 150.13	5 945 632.15
74	OWF_68	HG	24.6	04:58	06/04/2022	90%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	147.8mV @ 7.6˚C	10YR 4/2	Slightly gravelly sand	*Asterias rubens*	397 373.83	5 944 017.98
75	OWF_68	HG	24.8	05:13	06/04/2022	90%	F1	3L Bucket	-	-	10YR 4/2	Slightly gravelly sand	Brittle star, anemone, Polychaetes	397 375.52	5 944 017.33
76	OWF_68	SG	24.3	05:32	06/04/2022	<10%	N/S	-	-	-	10YR 4/2	-	-	397 375.85	5 944 017.99
77	OWF_68	SG	25.5	05:42	06/04/2022	50%	Contaminants	2x 1L glass jars	-	-	10YR 4/2	Slightly gravelly sand	-	397 372.74	5 944 018.96
78	OWF_66	HG	25.8	06:45	06/04/2022	90%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Fine sand	-	395 949.26	5 947 272.84
79	OWF_66	HG	25.6	07:01	06/04/2022	90%	F1	1L Bucket	-	178.6mV @ 7.6˚C	10YR 4/2	Fine sand	Annelids, polychaete	395 949.22	5 947 271.50
80	OWF_08	HG	25	07:59	06/04/2022	90%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 3/2	Gravelly sand	-	399 171.24	5 942 280.31
81	OWF_08	HG	25.3	08:10	06/04/2022	90%	F1	3L Bucket	-	185.2mV @ 7.6˚C	10YR 3/2	Gravelly sand	-	399 172.63	5 942 281.06
82	OWF_65	HG	26.9	09:55	06/04/2022	0%	N/S	-	Grab empty - no photo obtained	-	-	-	-	394 833.49	5 939 259.93
83	OWF_65	HG	26.3	10:03	06/04/2022	60%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	77.4mV @ 7.6˚C	-	Gravelly sand	-	394 835.48	5 939 254.20
84	OWF_65	HG	26.2	10:20	06/04/2022	60%	F1	5L Bucket	-	-	-	Gravelly sand with pebbles and subsurface clay layer	-	394 835.82	5 939 255.71
85	OWF_65	SG	26.2	10:34	06/04/2022	20%	N/S	-	-	-	-	Gravelly sand with pebbles and subsurface clay layer	-	394 836.69	5 939 253.31
86	OWF_65	SG	26.1	10:45	06/04/2022	30%	N/S	1L glass jar	Low retention, 1x 500ml sampled	-	-	Gravelly sand with pebbles and subsurface clay layer	-	394 837.74	5 939 255.21
87	OWF_65	SG	25.6	10:58	06/04/2022	<20%	N/S	-	-	-	-	Gravelly sand with pebbles and subsurface clay layer	-	394 836.21	5 939 254.04

Geodetics: WGS84 UTM31N 3°E																
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
88	OWF_65	HG	19	12:24	06/04/2022	60%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3	Sand with pebbles	-	392 596.04	5 937 977.62
89	OWF_65	HG	19	12:37	06/04/2022	20%	N/S	-	Low grab retention	-	10YR 4/3	Sand with pebbles	-	392 597.04	5 937 975.78
90	OWF_26	HG	19	12:47	06/04/2022	50%	F1	5L Bucket	Redox not taken as below 2cm pebbles matrix found	-	10YR 4/3	Sand with pebbles	Polychaetes	392 595.98	5 937 977.90
91	OWF_54	HG	19	13:33	06/04/2022	95%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3	Coarse sand with shell fragments	-	389 703.51	5 935 683.13
92	OWF_54	HG	19	13:46	06/04/2022	95%	F1	3L Bucket	-	181.5mV @ 7.4˚C	10YR 4/3	Coarse sand with shell fragments	-	389 703.80	5 935 685.79
93	OWF_57	HG	18	15:23	06/04/2022	60%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3	Coarse sand with shell fragments and gravel, pebbles and lumps of hard clay	*Alcyonidium diaphanum*	390 624.31	5 932 906.64
94	OWF_57	HG	18	15:42	06/04/2022	40%	F1	5L Bucket	-	129.5mV @ 7.7˚C	10YR 4/3	Coarse sand with shell fragments and gravel, pebbles and lumps of hard clay	*Alcyonidium diaphanum*, Polychaetes	390 623.51	5 932 905.96
95	OWF_51	HG	18	19:03	06/04/2022	60%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Muddy sand with shell fragments and pebbles	-	388 515.26	5 933 803.14
96	OWF_51	HG	18	19:19	06/04/2022	60%	F1	5L and 1L Buckets	Redox not taken due to coarse sediment	-	10YR 4/2	Coarse mixed sediment with pebbles, gravel and shell fragments	Barnacles	388 515.29	5 933 801.81
97	OWF_48	HG	19	20:35	06/04/2022	80%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Sand with shell fragments	-	387 376.88	5 939 388.03
98	OWF_48	HG	19	20:49	06/04/2022	80%	F1	3L Bucket	-	158.7mV @ 7.6˚C	10YR 4/2	Sand with shell fragments	-	387 375.73	5 939 387.34
99	OWF_56	HG	19	12:11	08/04/2022	90%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Sand with shell fragments	-	390 746.75	5 941 518.27
100	OWF_56	HG	19	12:36	08/04/2022	90%	F1	1L Bucket	-	166.9mV @ 7.5˚C	10YR 4/2	Sand with shell fragments	Polychaetes	390 745.84	5 941 517.01
101	OWF_53	HG	22	13:37	08/04/2022	10%	N/S	-	-	-	-	-	-	389 149.56	5 944 651.66
102	OWF_53	HG	22	13:48	08/04/2022	60%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Sand with shell fragments	-	389 147.22	5 944 653.75
103	OWF_53	HG	22	14:01	08/04/2022	50%	F1	5L Bucket	-	131.3 @ 7.5˚C	10YR 4/2	Sand with shell fragments	Nephtyidae	389 147.66	5 944 652.65
104	OWF_50	HG	18	15:19	08/04/2022	20%	N/S	-	-	-	-	Sand with pebbles	-	387 946.69	5 942 706.78
105	OWF_50	HG	21.6	15:29	08/04/2022	30%	F1	3L Bucket	Retained as marginal F1	-	-	Sand with pebbles	Polychaetes, Bryozoa	387 948.08	5 942 711.94
106	OWF_50	HG	21.8	15:40	08/04/2022	10%	N/S	-	-	-	-	-	Polychaetes, Bryozoa	387 946.45	5 942 710.26
107	OWF_50	HG	21	15:53	08/04/2022	5%	N/S	-	-	-	-	-	-	387 945.13	5 942 708.95
108	OWF_50	HG	21	16:00	08/04/2022	40%	PC	3x ziplock bags (TOC, Spare, PSA)	Unable to record redox due to subsurface gravel	-	10yr 4/4	Sand	-	387 946.05	5 942 698.90
109	OWF_50	SG	20	16:26	08/04/2022	<5%	N/S	-	No sample taken, due to insufficient retention (<50ml)	-	-	-	-	387 944.25	5 942 702.26

Geodetics: WGS84 UTM31N 3°E																
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
110	OWF_50	SG	20.2	16:35	08/04/2022	<5%	N/S	-	No sample taken, due to insufficient retention (<50ml)	-	-	-	-	387 942.94	5 942 701.64
111	OWF_50	SG	20.1	16:47	08/04/2022	20%	N/S	1L glass jar	Marginal sample (300ml) only one contaminant taken	-	10YR 4/4	Sand with shell fragments	-	387 951.59	5 942 708.51
112	OWF_42	HG	21.6	18:15	08/04/2022	90%	PC	3x ziplock bags (TOC, Spare, PSA)	Deck slate labelled wrongly as Shipek	-	10YR 4/2	Sand	Sandeel	384 941.74	5 943 991.16
113	OWF_42	HG	21.4	18:28	08/04/2022	80%	F1	1L Bucket	-	163.9mV @ 7.5˚C	10YR 4/2	Sand	Sandeels, Ophelia sp., Nephyidae	384 941.85	5 943 991.48
114	OWF_44	HG	21	19:29	08/04/2022	70%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 3/3	Slightly gravelly sand with pebbles	-	385 577.04	5 940 949.18
115	OWF_44	HG	21	19:42	08/04/2022	60%	F1	5L Bucket	-	156.9mV @ 7.5˚C	10YR 3/3	Slightly gravelly sand with pebbles	-	385 577.18	5 940 950.67
116	OWF_39	HG	21	20:25	08/04/2022	80%	PC	-	-	-	10YR 4/2	Muddy gravelly sand with pebbles and subsurface clay	*Asterias rubens*	384 808.04	5 940 130.34
117	OWF_39	HG	24	20:43	08/04/2022	80%	F1	5L Bucket	-	92.5mV @ 7.5˚C	10YR 4/2	Muddy gravelly sand with pebbles and subsurface clay	*Golfingia*, barnacles, sand mason worm casts, finger bryozoans	384 810.68	5 940 128.54
118	OWF_39	SG	24	21:04	08/04/2022	10%	N/S	-	-	-	-	-	-	384 808.16	5 940 129.21
119	OWF_39	SG	24	21:16	08/04/2022	20%	N/S	1L glass jar	Partial sample A (460ml)	-	-	-	-	384 810.16	5 940 128.69
120	OWF_39	SG	24	21:31	08/04/2022	15%	N/S	1L glass jar	Partial sample B (300ml)	-	-	-	*Flustra*, barnacles, juvenile crabs	384 807.71	5 940 122.97
121	OWF_33	HG	25.8	07:08	09/04/2022	70%	PC	3x Ziplock bags (TOC, Spare, PSA)	-	66.1mV @ 7.5˚C	10YR 4/2	Muddy gravelly sand with pebbles and cobbles	-	382 665.92	5 940 286.89
122	OWF_33	HG	26.0	07:24	09/04/2022	60%	F1	5L Bucket	Black sediment, deck slates may say 8th (should be 9th)	-	10YR 4/2	Muddy gravelly sand with pebbles and cobbles	*Sabellaria* fragments, juvenile *Munida rugosa*, barnacles	382 666.26	5 940 285.47
123	OWF_29	HG	27.6	08:08	09/04/2022	50%	PC	3x ziplock bags (TOC, Spare, PSA)	-	26.0mV @ 7.5˚C	10YR 4/2	Muddy gravelly sand	*Munida rugosa*, nephtyidae	382 189.66	5 942 983.29
124	OWF_29	HG	26.7	08:28	09/04/2022	5%	N/S	-	-	-	-	-	-	382 190.74	5 942 983.47
125	OWF_29	HG	26.8	08:36	09/04/2022	10%	N/S	-	-	-	-	-	-	382 192.05	5 942 986.70
126	OWF_29	HG	27.5	08:45	09/04/2022	60%	F1	5L Bucket	-	-	10YR 4/2	Muddy sandy gravel with pebbles and cobbles	Nereididae (bivalves), barnacles, dead man's fingers, Bryozoa, *Alcyonidium*	382 187.82	5 942 984.47
127	OWF_23	HG	25.8	11:04	09/04/2022	80%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Muddy sandy gravel with pebbles and cobbles	-	379 012.17	5 943 302.63
128	OWF_23	HG	25.8	11:22	09/04/2022	40%	F1	3L Bucket	Deck slate grab photo says 08/04/22	174.8mV @ 7.5˚C	10YR 4/2	Muddy sandy gravel	Polychaetes	379 012.83	5 943 304.93
129	OWF_23	SG	25	11:55	09/04/2022	25%	Partial contaminant	1L glass jar	Grab retention not enough for 2 full samples - one contaminant taken	-	10YR 4/2	Muddy sandy gravel	-	379 014.18	5 943 302.79
130	OWF_23	SG	24.8	12:12	09/04/2022	25%	Partial contaminant	1L glass jar	Grab retention not enough for 2 full samples - one contaminant taken	-	10YR 4/2	Muddy sandy gravel	-	379 014.48	5 943 304.24

Geodetics: WGS84 UTM31N 3°E																
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
131	OWF_23	SG	25	12:23	09/04/2022	25%	N/S	-	2x 500ml collected from previous grabs - 3rd attempt to see if it can be improved	-	10YR 4/2	Muddy sandy gravel	-	379 014.10	5 943 305.41
132	OWF_15	HG	20.3	13:50	09/04/2022	70%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Muddy sandy gravel	-	376 342.44	5 942 245.61
133	OWF_15	HG	19.8	14:11	09/04/2022	85%	F1	1L Bucket	-	213.7mV @ 7.5˚C	10YR 4/2	Slightly muddy sand	Sea potato, *Flustra*	376 341.39	5 942 245.75
134	OWF_12	HG	21.8	15:05	09/04/2022	85%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3	Sand with shell fragments	-	375 072.54	5 939 862.53
135	OWF_12	HG	21.8	15:18	09/04/2022	85%	F1	1L Bucket	-	193.4mV @ 7.6˚C	10YR 4/3	Sandy gravel	*Ophelia*	375 071.24	5 939 860.91
136	OWF_12	SG	20.8	15:37	09/04/2022	45%	Contaminant	3x ziplock bags (TOC, Spare, PSA)	Labelled as N/S on deck slate but had enough retention	-	10YR 4/3	Sand with shell fragments	-	375 071.74	5 939 864.62
137	OWF_17	HG	17.9	17:52	09/04/2022	90%	PC	3x ziplock bags		-	10YR 4/2	Sand	-	376 766.08	5 939 971.42
138	OWF_17	HG	18.3	18:10	09/04/2022	60%	F1	1L Bucket	-	200.9mV @ 7.7˚C	10YR 4/2	Sand with some shell fragments	Sea potato	376 766.09	5 939 971.59
139	OWF_17	SG	16.1	18:35	09/04/2022	50%	Contaminant	2x 1L glass jars	-	-	10YR 4/2	Sandy	-	376 764.92	5 939 971.22
140	OWF_13	HG	19	19:33	09/04/2022	90%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3	Gravelly sand with shell fragments	-	375 787.96	5 937 614.29
141	OWF_13	HG	19	19:42	09/04/2022	95%	F1	5L Bucket	Sediment too firm to get redox	-	10YR 4/3	Sand with shell fragments	Polychaetes	375 787.48	5 937 615.90
142	OWF_05	HG	21	20:31	09/04/2022	80%	N/S	-	Sample washout	-	10YR 4/2	Sand with shell	-	372 032.52	5 937 086.33
143	OWF_05	HG	21	20:38	09/04/2022	95%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Sand with shell	-	372 031.64	5 937 084.92
144	OWF_05	HG	21	20:51	09/04/2022	50%	F1	3L Bucket	-	176.4mV @ 7.7˚C	10YR 4/2	Sand with shell	-	372 030.30	5 937 086.41
145	OWF_04	HG	19	21:39	09/04/2022	70%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/2	Slightly muddy sand with shell	-	371 113.69	5 934 755.95
146	OWF_04	HG	19	21:53	09/04/2022	30%	N/S	-	-	-	10YR 4/2	Slightly muddy sand with shell	-	371 113.76	5 934 754.86
147	OWF_04	HG	19	22:07	09/04/2022	70%	F1	5L Bucket	-	179.0mV @ 7.8˚C	10YR 4/2	Slightly muddy sand with shell and pebbles	Slipper limpet, Bryozoa, barnacles, Polychaetes, spider crab, chiton	371 113.53	5 934 754.49
148	OWF_10	HG	21.3	23:46	09/04/2022	30%	N/S	-	-	-	-	-	-	374 490.88	5 934 093.98
149	OWF_10	HG	23.5	23:54	09/04/2022	50%	F1	3L Bucket	-	-	10YR 4/2	Muddy gravelly sandeels	Polychaetes (possible lugworm)	374 491.47	5 934 096.85
150	OWF_10	HG	23.9	00:04	10/04/2022	50%	PC	3x ziplock bags (TOC, Spare, PSA)	-	90.7mV @ 7.7˚C	10YR 4/2	Muddy gravelly sand with pebbles	-	374 490.82	5 934 096.76
151	OWF_10	SG	22.7	00:31	10/04/2022	30%	Contaminant	1L glass jar	500ml of retained for first contaminant sample	-	10YR 4/2	Muddy gravelly sand with pebbles	-	374 492.29	5 934 095.44
152	OWF_10	SG	24	00:43	10/04/2022	30%	Contaminant	1L glass jar	500ml retained for second contaminant sample, Shipek unable to penetrate shelly subsurface layers	-	10YR 4/2	Muddy gravelly sand with pebbles	-	374 492.80	5 934 095.09

Geodetics: WGS84 UTM31N 3°E																
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
153	OWF_10	SG	23.5	01:06	10/04/2022	30%	N/S	-	30% retention - not needed due to previous samples	-	-	Muddy gravelly sand with pebbles	-	374 493.50	5 934 093.99
154	OWF_16	HG	23.7	01:42	10/04/2022	<5%	N/S	-	Less than 5% retention	-	-	Gravelly shells	-	376 474.59	5 934 624.89
155	OWF_16	HG	23.9	01:49	10/04/2022	<5%	N/S	-	Cobble in jaw	-	-	Gravelly shells	-	376 475.23	5 934 624.99
156	OWF_16	HG	20	01:56	10/04/2022	50%	PC	3x ziplock bags (TOC, Spare, PSA)	-	157.2mV @ 7.7˚C	10YR 4/2	Muddy gravel with varying colours	-	376 474.65	5 934 625.65
157	OWF_16	HG	24.1	02:09	10/04/2022	N/S	-	-	Less than 5% retention	-	-	-	-	376 474.82	5 934 624.35
158	OWF_16	HG	24.3	02:16	10/04/2022	N/S	F1	1L Bucket	10% held as best sample	-	10YR4/2	Muddy gravel	Juvenile crab	376 475.78	5 934 626.02
159	OWF_16	HG	24.6	02:23	10/04/2022	N/S	-	-	Less than 5% retention	-	-	-	-	376 475.24	5 934 623.56
160	OWF_19	HG	42.1	03:54	10/04/2022	95%	PC	3x ziplock bags (TOC, Spare, PSA)	Varying colours	-	7.5YR 5/3 7.5YR 5/2	Sandy gravel	-	377 955.78	5 933 910.72
161	OWF_19	HG	42.3	04:09	10/04/2022	95%	F1	5L Bucket	-	221.0mV @ 7.7˚C	-	-	-	377 957.49	5 933 911.15
162	OWF_19	SG	42.7	04:57	10/04/2022	80%	Contaminant	2x 1L glass jars		-	-	-	-	377 953.18	5 933 911.47
163	OWF_25	HG	21.7	09:44	10/04/2022	80%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR 4/3 10YR 5/3	Slightly gravelly sand	-	379 700.01	5 935 603.99
164	OWF_25	HG	21.4	09:56	10/04/2022	80%	F1	1L Bucket	-	217.6mV @ 7.8˚C	-	-	-	379 704.66	5 935 605.09
165	OWF_18	HG	22.2	10:37	10/04/2022	75%	PC	3x ziplock bags (TOC, Spare, PSA)	Mixed colour layer and finer sediment	-	7.5 YR 4/2 10YR 5/2	Gravel with shells	-	377 424.53	5 936 529.24
166	OWF_18	HG	22.2	11:33	10/04/2022	50%	F1	3L Bucket	-	195.8mV 7.7˚C	-	Gravel with shells	-	377 424.94	5 936 527.56
167	OWF_20	HG	19	12:08	10/04/2022	70%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	2.5Y 4/3	Muddy sand	Polychaetes	378 434.11	5 938 541.91
168	OWF_20	HG	19.3	12:27	10/04/2022	70%	F1	1L Bucket	-	181.8mV @ 7.7˚C	2.5Y 4/3	Muddy sand	Polychaetes, trivia shell	378 434.47	5 938 541.81
169	OWF_22	HG	23	13:08	10/04/2022	30%	N/S	-	-	-	2.5Y 4/4	Muddy sand	-	378 962.78	5 940 391.27
170	OWF_22	HG	23	13:21	10/04/2022	45%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	2.5Y 4/4	Muddy sand	-	378 963.26	5 940 391.12
171	OWF_22	HG	23	13:39	10/04/2022	55%	F1	3L Bucket	-	201.9mV @ 7.7˚C	2.5Y 4/4	Muddy sand with cobbles, pebbles and shell fragments	Bryozoans Anemone Polychaetes	378 963.52	5 940 392.50
172	OWF_27	HG	19	18:11	10/04/2022	80%	PC	3x ziplock bags (TOC, Spare, PSA)		-	2.5Y 4/4	Coarse sand with shell fragments	-	381 289.35	5 938 699.75
173	OWF_27	HG	19	18:24	10/04/2022	80%	F1	5L Bucket	Difficult to get Munsell colour of sediment due to shell content	220.0mV @ 7.8˚C	-	Coarse sand with shell fragments	Polychaetes	381 289.23	5 938 700.87
174	OWF_27	SG	19	18:47	10/04/2022	50%	Contaminant	2x 1L glass jars	Difficult to get Munsell colour of sediment due to shell content	-	-	Coarse sand with shell fragments	-	381 287.82	5 938 702.07

Geodetics: WGS84 UTM31N 3°E																
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
175	OWF_30	HG	20	20:11	10/04/2022	80%	PC	3x ziplock bags (TOC, Spare, PSA)		-	2.5Y 4/4	Coarse sand with shell gravel	-	382 215.01	5 936 873.71
176	OWF_30	HG	20	20:45	10/04/2022	60%	F1	5L Bucket	-	250.0mV @ 7.8˚C	2.5Y 4/4	Coarse sand with shell gravel	Polychaetes	382 215.31	5 936 873.28
177	OWF_30	SG	20	21:22	10/04/2022	50%	Contaminant	2x 1L glass jars	-	-	2.5Y 4/4	Coarse sand with shell gravel	-	382 214.73	5 936 874.60
178	OWF_35	SG	19	22:06	10/04/2022	N/S	N/S	-	Less than 10% retention	-	-	Sand	-	383 117.01	5 935 026.10
179	OWF_35	SG	19	22:15	10/04/2022	N/S	N/S	-	Less than 5% retention (dead man's fingers trapped in jaw)	-	-	Sand	*Alcyonium digitatum*	383 116.68	5 935 026.23
180	OWF_35	SG	19	22:24	10/04/2022	N/S	Contaminant	1L glass jar	Less than 15% retention. 200ml of residue kept	-	-	Sand	-	383 117.81	5 935 024.09
181	OWF_35	HG	23.9	23:33	10/04/2022	N/S	N/S	-	5% retention	-	-	Cobble and some sand	-	383 118.67	5 935 025.57
182	OWF_35	HG	23.9	00:00	11/04/2022	5%	N/S	-	-	-	-	Cobble, some sand and shell fragments	-	383 118.90	5 935 025.70
183	OWF_35	HG	23.9	00:07	11/04/2022	10%	N/S	-	No fauna sample was obtained from this station	-	-	-	-	383 118.73	5 935 025.68
184	OWF_35	HG	24.6	00:17	11/04/2022	40%	PC	3x ziplock bags (TOC, Spare, PSA)	-	204.4mV @ 7.8˚C	10YR 4/2	Muddy gravel (thin veneer of shell) and clumps of clay)	-	383 117.70	5 935 025.23
185	OWF_38	HG	24.7	00:52	11/04/2022	30%	F1	3L Bucket	30% retention but grabbed clay layer so sampled 100% of fauna layer	-	-	Muddy gravel with clay	No visible fauna	384 544.37	5 934 494.88
186	OWF_38	HG	24.4	01:01	11/04/2022	20%	N/S	-	Cobble in jaw layer of clay obtained	-	-	Muddy gravel with layer of clay	-	384 544.41	5 934 494.41
187	OWF_38	HG	24.6	01:11	11/04/2022	10%	N/S	-	Large cobble in jaw	-	-	-	-	384 545.07	5 934 493.91
188	OWF_38	HG	24.7	01:21	11/04/2022	40%	PC	3x ziplock bags (TOC, Spare, PSA)	Varying colours	193.0mV @ 7.8˚C	7.5YR 4/2 10YR 4/3	Muddy gravel with clay layer	-	384 543.26	5 934 491.34
189	OWF_38	SG	24.3	01:44	11/04/2022	15%	N/S	-	-	-	-	-	-	384 543.66	5 934 490.93
190	OWF_38	SG	23.8	01:54	11/04/2022	5%	N/S	-	-	-	-	-	-	384 543.73	5 934 490.35
191	OWF_38	SG	24.8	02:06	11/04/2022	30%	Contaminant	1L glass jar	500ml retention (minimal retention on all deployments) (this 3rd attempt is the best one)	-	-	Gravelly sand with pebbles	-	384 542.90	5 934 493.61
192	OWF_47	HG	41.2	03:43	11/04/2022	80%	PC	3x ziplock bags (TOC, Spare, PSA)	-	221.5mV @ 7.8˚C	-	Gravelly sand	-	386 555.26	5 935 791.46
193	OWF_47	HG	41.1	04:00	11/04/2022	80%	F1	3L Bucket	-	-	-	Gravelly sand	Sandeel, annelid, bivalve shell (potential *Arcopagia crassa*)	386 554.11	5 935 790.97
194	OWF_47	SG	41.0	04:18	11/04/2022	50%	Contaminant	2x 1L glass jars	-	-	-	-	-	386 555.64	5 935 789.78
195	OWF_43	HG	26.7	08:48	11/04/2022	60%	PC	2x 1L glass jars	-	186.4mV @ 7.8˚C	7.5Y 4/2	Slightly gravelly muddy sand with pebbles and cobbles	-	384 965.79	5 938 223.03

Geodetics: WGS84 UTM31N 3°E															
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
196	OWF_43	HG	27.2	09:04	11/04/2022	50%	F1	5L Bucket	-	-	-	-	Polychaetes Anemones Bryozoan fingers Bryozoa	384 965.37	5 938 223.47
197	OWF_37	HG	23.1	10:08	11/04/2022	80%	PC	2x 1L glass jars	-	213.0mV @ 7.8˚C	-	Gravel	-	384 463.04	5 936 267.44
198	OWF_37	HG	23.1	10:20	11/04/2022	90%	F1	2x 5L Buckets	-	-	Mix of colours Mostly 7.5	Gravel	Polychaetes	384 462.95	5 936 266.31
199	OWF_36	HG	20	13:18	11/04/2022	60%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	Mix of colours Mostly 7.5	Sandy gravel with small pebbles	-	384 015.74	5 933 223.35
200	OWF_36	HG	20	13:50	11/04/2022	60%	F1	5L and 1L Buckets	Unable to record redox due to gravel	-	Mix of colours 7.5	Sandy gravel with small pebbles	Bivalves, razor clam, barnacles	384 014.66	5 933 222.49
201	OWF_36	SG	18	14:16	11/04/2022	50%	Contaminant	2x 1L glass jars		-	Mix of colours Mostly 7.5	Sandy gravel with small pebbles	-	384 016.26	5 933 222.49
202	OWF_32	HG	20	16:27	11/04/2022	10%	N/S	-	Low retention	-	-	Muddy sand with shell	-	382 663.54	5 933 671.56
203	OWF_32	HG	20	16:43	11/04/2022	45%	F1	5L Bucket	Labelled 'H' on deck slate but further inspection revealed 45%	-	-	Muddy sand with shell	No visible fauna	382 664.00	5 933 672.00
204	OWF_32	HG	20	16:57	11/04/2022	40%	PC	3x ziplock bags (TOC, Spare, PSA)		-	-	Muddy sand with shell	-	382 669.42	5 933 673.88
205	OWF_32	SG	20	17:50	11/04/2022	20%	Contaminant	1L glass jar	500ml contaminant taken	-	-	Muddy sand with shell	-	382 670.82	5 933 674.75
206	OWF_32	SG	20	18:06	11/04/2022	<10%	N/S	-	<100ml sediment	-	-	-	*Alcyonidium diaphanum*	382 662.00	5 933 674.00
207	OWF_32	SG	20	18:19	11/04/2022	0%	N/S	-	Grab failed to trigger	-	-	-	-	382 664.96	5 933 673.61
208	OWF_34	HG	20	19:37	11/04/2022	50%	PC	3x ziplock bags (TOC, Spare, PSA)		-	10YR, 4/4	Coarse sand with shell	-	383 061.00	5 931 425.00
209	OWF_34	HG	20	20:02	11/04/2022	35%	N/S	-	-	-	10YR, 4/5	Coarse sand	-	383 060.78	5 931 425.01
210	OWF_34	HG	20	20:14	11/04/2022	15%	N/S	-	-	-	10YR, 4/6	Coarse sand	-	383 061.03	5 931 424.16
211	OWF_34	HG	20	20:36	11/04/2022	45%	F1	1L Bucket	-	201.2mV @7.9˚C	10YR, 4/7	Coarse sand	Crab	383 062.88	5 931 423.34
212	OWF_34	SG	20	20:51	11/04/2022	20%	Partial contaminant	1L glass jar	500ml contaminant A taken	-	10YR, 4/8	Coarse sand	-	383 062.29	5 931 423.71
213	OWF_34	SG	20	21:05	11/04/2022	20%	Partial contaminant	1L glass jar	500ml contaminant B taken	-	10YR, 4/9	Coarse sand	-	383 063.02	5 931 424.48
214	OWF_34	SG	20	21:17	11/04/2022	20%	N/S			-	10YR 4/10	Coarse sand	-	383 060.40	5 931 419.92
215	OWF_41	SG	18	22:02	11/04/2022	<5%	N/S	-	mostly pebbles, very little sand	-	-	-	-	384 914.79	5 931 425.76
216	OWF_41	SG	18	22:12	11/04/2022	<10%	N/S	-	Partial contaminant taken, 200ml retained	-	-	-	-	384 912.26	5 931 424.48

Geodetics: WGS84 UTM31N 3°E																
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
217	OWF_41	SG	18	22:30	11/04/2022	<5%	N/S	-	Just pebbles, very little sand to retain.	-	-	-	-	384 915.69	5 931 420.89
218	OWF_41	HG	23.3	23:52	11/04/2022	20%	N/S	-	Cobbles and pebbles in jaw	-	-	Sandy, muddy gravel with pebbles	-	384 918.15	5 931 426.38
219	OWF_41	HG	23.2	00:00	12/04/2022	15%	N/S	-	Cobbles and pebbles in jaw	-	-	-	-	384 912.10	5 931 420.82
220	OWF_41	HG	23.6	00:09	12/04/2022	40%	F1	5L and 1L Buckets	-	-	-	muddy, gravel, pebbles	-	384 912.46	5 931 422.31
221	OWF_41	HG	23.6	00:21	12/04/2022	<5%	N/S	-	-	-	-	Large whelk, sea star	-	384 913.69	5 931 423.56
222	OWF_41	HG	23.8	00:33	12/04/2022	<5%	N/S	-	-	-	-	-	-	384 914.74	5 931 424.53
223	OWF_41	HG	23.5	00:41	12/04/2022	40%	PC	3x ziplock bags (TOC, Spare, PSA)	Unable to take redox due to pebbles and gravel	-	mix of colours 7.5YR, 4/2, 5/2, 4/1	Muddy gravel	-	384 915.19	5 931 422.97
224	OWF_49	HG	23.0	01:39	12/04/2022	20%	N/S	-	-	-	-	-	-	387 848.55	5 930 602.24
225	OWF_49	HG	22.9	01:45	12/04/2022	50%	PC	3x ziplock bags (TOC, Spare, PSA)	No redox due to pebbles and gravel	-	-	-	-	387 851.45	5 930 601.99
226	OWF_49	HG	23.6	02:01	12/04/2022	1%	N/S	-	Grab sampled in water	-	-	-	-	387 852.84	5 930 601.67
227	OWF_49	HG	23.3	02:10	12/04/2022	40%	F1	-	Clay layer	-	7.5YR, 4/2, 10YR, 4/2	Muddy gravel, large cobble	*Alcyonidium diaphanum*	387 851.06	5 930 601.90
228	OWF_52	HG	27.6	02:47	12/04/2022	60%	PC	3x ziplock bags (TOC, Spare, PSA)		251.6mV @ 7.9˚C	10YR, 4/2	-	-	389 066.22	5 930 894.06
229	OWF_52	HG	28.0	03:05	12/04/2022	70%	F1	5L and 1L Buckets	-	-	-	-	Razor shell and polychaetes	389 066.37	5 930 893.59
230	OWF_52	SG	27.3	03:20	12/04/2022	<10%	N/S	-	-	-	-	-	-	389 067.77	5 930 891.54
231	OWF_52	SG	27.5	03:29	12/04/2022	25%	Contaminant	1L glass jar	500ml sample retained	-	-	Gravelly sand	-	389 069.42	5 930 895.30
232	OWF_52	SG	27.8	03:43	12/04/2022	<10%	N/S	-	-	-	-	-	-	389 069.63	5 930 894.90
233	OWF_45	HG	21.2	09:31	12/04/2022	40%	PC	3x ziplock bags (TOC, Spare, PSA)		148.7mV @ 8.0˚C	10YR, 4/3	-	-	385 840.69	5 929 678.27
234	OWF_45	HG	20.9	09:46	12/04/2022	50%	F1	-	-	-	-	Gravelly sand	Polychaetes, bivalves, razor shell, amphipods, tube worm	385 839.31	5 929 676.25
235	OWF_45	SG	21.0	09:59	12/04/2022	10%	N/S	-	-	-	-	-	-	385 838.20	5 929 678.73
236	OWF_45	SG	20.6	10:09	12/04/2022	20%	Contaminant	1L glass jar	<500ml sample taken for Contaminant A, no spare	-	-	-	-	385 838.79	5 929 679.48
237	OWF_45	SG	21.0	10:21	12/04/2022	10%	N/S	-	-	-	-	-	-	385 838.37	5 929 678.42
238	OWF_46	HG	20	11:27	12/04/2022	45%	PC	3x ziplock bags		-	10YR, 4/3	Slightly muddy, gravelly sand with shell	-	386 508.36	5 928 374.73

Geodetics: WGS84 UTM31N 3°E															
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
239	OWF_46	HG	20	11:41	12/04/2022	45%	F1	5L Bucket	-	238.2mV @ 8.0°C	10YR, 4/3	Slightly muddy, gravelly sand with shell	*Mya truncata*, bivalves	386 509.02	5 928 378.70
240	OWF_46	SG	20	12:03	12/04/2022	<20%	Partial contaminant	1L glass jar	500ml for contaminant A	-	10YR, 4/3	Slightly muddy, gravelly sand with shell	-	386 508.08	5 928 378.22
241	OWF_46	SG	20	12:20	12/04/2022	<20%	Partial contaminant	1L glass jar	500ml for contaminant B	-	-	-	*Alcyonidium diaphanum*	386 508.22	5 928 377.87
242	OWF_46	SG	20	12:36	12/04/2022	5%	N/S		-	-	-	-	*Alcyonidium diaphanum*	386 505.99	5 928 378.33
243	OWF_40	HG	15	13:12	12/04/2022	85%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR, 5/3	-	-	384 834.84	5 928 514.11
244	OWF_40	HG	15	13:39	12/04/2022	80%	F1	1L Bucket	-	216.2mV @ 8.1°C	-	Sand	Polychaetes (*Ophelia*)	384 834.20	5 928 513.40
245	OWF_31	HG	17	14:54	12/04/2022	50%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR, 4/3	Mixed sediment Slightly muddy gravelly sand	-	382 453.62	5 928 327.45
246	OWF_31	HG	17	15:15	12/04/2022	40%	F1	3L Bucket	Sample too coarse for redox probe	-	10YR, 4/3	Mixed sediment Slightly muddy gravelly sand	Polychaetes	382 454.50	5 928 327.25
247	OWF_28	HG	17	16:00	12/04/2022	35%	F1	3L Bucket	On hold (kept)	-	10YR, 4/4	Mixed sediment Slightly muddy gravelly sand	Barnacles, painted top shell, *Sabellaria*, crab	381 897.24	5 931 026.11
248	OWF_28	HG	18	16:11	12/04/2022	<5%	N/S	-	-	-	-	-	-	381 897.31	5 931 025.07
249	OWF_28	HG	18	16:22	12/04/2022	<5%	N/S	-	3rd N/S for fauna attempt, accepted first sample	-	-	-	-	381 900.93	5 931 029.81
250	OWF_28	HG	18	16:36	12/04/2022	50%	PC	3x ziplock bags (TOC, Spare, PSA)	Too firm for redox probe	-	-	Slightly muddy sand with pebbles	-	381 892.83	5 931 029.64
251	OWF_24	HG	21	17:40	12/04/2022	30%	N/S	-	Insufficient sample	-	-	Sand	-	379 491.83	5 932 722.32
252	OWF_24	HG	21	17:54	12/04/2022	50%	PC	3x ziplock bags (TOC, Spare, PSA)	-	-	10YR, 4/4	-	-	379 488.80	5 932 717.66
253	OWF_24	HG	21	18:11	12/04/2022	30%	N/S	-	Cobble in jaws, sample washout	-	-	-	-	379 488.15	5 932 718.43
254	OWF_24	HG	21	18:22	12/04/2022	50%	F1	5L Bucket	-	218.9mV @ 8.1°C	10YR, 4/4	Muddy sand with gravel and shell	Polychaetes, crab, barnacles	379 488.58	5 932 719.63
255	OWF_21	HG	10	20:41	12/04/2022	70%	PC	3x ziplock bags (TOC, Spare, PSA)		-	Difficult to determine colour of pea gravel	Coarse sand with shell	-	378 587.65	5 928 937.87
256	OWF_21	HG	10	20:50	12/04/2022	70%	F1	5L and 3L Buckets	-	224.2mV @ 8.4°C	Difficult to determine colour of pea gravel	Coarse sand with shell	Bivalve	378 590.08	5 928 938.72
257	OWF_21	SG	10	21:01	12/04/2022	90%	Contaminant	2x 1L glass jars	500ml for both contaminants	-	Difficult to determine colour of pea gravel	Coarse sand with shell	-	378 588.96	5 928 939.84
258	OWF_14	HG	19.5	23:46	12/04/2022	90%	PC	3x ziplock bags (TOC, Spare, PSA)	-	260.3mV @ 8.1°C	Mixed	muddy gravel	-	375 563.97	5 930 200.97
259	OWF_14	HG	19.4	00:04	13/04/2022	50%	F1	5L bucket	-	-	-	muddy gravel	No visible fauna	375 563.76	5 930 201.13
260	OWF_11	HG	22.9	01:30	13/04/2022	60%	PC	3x ziplock bags (TOC, Spare, PSA)	-	233.0mV @ 8.1°C	7.5YR, 4/2	Fine sand	-	374 805.63	5 932 217.68

Geodetics: WGS84 UTM31N 3°E																
Cast#	Station	Sampler Used	Depth (m)	Time (UTC; hh:mm)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Sediment Description			Conspicuous Fauna/Comments	Easting (m)	Northing (m)
										Redox (4cm)	Colour	Sediment Description/Stratification			
261	OWF_11	HG	23.0	01:43	13/04/2022	60%	F1	1L Bucket	-	-	7.5YR, 4/2	Fine sand	-	374 807.49	5 932 218.06
262	OWF_11	SG	22.8	01:59	13/04/2022	10%	N/S	-	-	-	-	-	-	374 808.23	5 932 215.90
263	OWF_11	SG	22.8	02:12	13/04/2022	15%	Contaminant	1L glass jar	500ml sampled from different grabs	-	-	Fine sand	-	374 808.48	5 932 215.61
264	OWF_11	HG	23.0	02:26	13/04/2022	15%	Contaminant	1L glass jar	500ml sampled from different grabs	-	-	-	-	374 808.98	5 932 215.65
265	OWF_07	HG	22.6	03:07	13/04/2022	70%	PC	3x ziplock bags (TOC, Spare, PSA)	-	212.9mV @ 8.1˚C	10YR 4/2 very mixed	Fine sand layer over gravel	-	373 062.27	5 931 766.26
266	OWF_07	HG	22.4	03:22	13/04/2022	70%	F1	2x 5L Buckets	-	-	10YR 4/2 very mixed	-	Polychaete	373 062.77	5 931 766.38
267	OWF_06	HG	25.5	04:01	13/04/2022	60%	PC	3x ziplock bags (TOC, Spare, PSA)	-	251.0mV @ 8.1˚C	10YR, 5/2, 4/2	-	-	373 189.19	5 929 296.50
268	OWF_06	HG	25.6	04:17	13/04/2022	5%	F1	-	-	-	10YR, 5/2, 4/2	-	-	373 189.49	5 929 295.47
269	OWF_06	SG	24.8	04:33	13/04/2022	10%	N/S	-	-	-	-	-	-	373 190.50	5 929 292.76
270	OWF_06	SG	24.6	04:42	13/04/2022	15%	Contaminant	1L glass jar	Partial sample	-	-	-	-	373 188.85	5 929 296.20
271	OWF_06	SG	24.7	04:52	13/04/2022	10%	N/S	-	-	-	-	-	-	373 188.59	5 929 296.64
272	OWF_02	HG	25.8	05:57	13/04/2022	10%	N/S	-	-	-	-	-	-	370 678.92	5 931 582.54
273	OWF_02	HG	25.5	06:04	13/04/2022	<5%	N/S	-	Large cobble in jaw	-	-	-	-	370 679.54	5 931 582.32
274	OWF_02	HG	25.3	06:10	13/04/2022	<5%	N/S	-	Cobbles and pebbles in jaw	-	-	-	-	370 678.22	5 931 584.22
275	OWF_02	HG	25.1	06:17	13/04/2022	40%	PC	3x ziplock bags (TOC, Spare, PSA)	No F1 sample	148.9mV @ 8.2˚C	-	Black layer in sediment (potentially anoxic)	-	370 676.89	5 931 586.71
276	OWF_03	HG	15.5	10:22	13/04/2022	70%	PC	3x ziplock bags (TOC, Spare, PSA)	-	199.3mV @ 8.1˚C	10YR 4.5/3	Fine sand	-	370 788.53	5 928 857.35
277	OWF_03	HG	15.2	10:33	13/04/2022	90%	F1	1L Bucket	-	-	10YR 4.5/4	Fine sand	Polychaetes	370 786.24	5 928 856.57
278	OWF_01	HG	17:8	13:31	13/04/2022	90%	PC	3x ziplock bags (TOC, Spare, PSA)		-	10YR, 4/2	-	-	368 324.95	5 933 909.91
279	OWF_01	HG	18.1	13:44	13/04/2022	80%	F1	1L Bucket	-	252.7mV @ 8.1˚C	10YR, 4/2	Fine sand	Shell fragments and polychaetes	368 324.50	5 933 910.88
280	OWF_01	SG	15.8	13:59	13/04/2022	80%	Contaminant	2x 1L glass jars	-	-	10YR, 4/2	Fine sand	-	368 324.48	5 933 909.18

APPENDIX G – CAMERA TRANSECT LOG SHEET

Station	Date	Time (UTC)	Easting (m)	Northing (m)	Length of section (m)	Video quality per video segment (%) Good	Satisfactory	Poor	Not visible	Water depth (m) (LAT)	Sediment type
OWF_VID_01	13/04/2022	13:13:02	368334.6	5933885.4	56.7	64	36	0	0	10.16	Rippled sand with rare shell fragments
	13/04/2022	13:19:33	368314.5	5933938.4						10.63	
OWF_VID_03	13/04/2022	10:04:02	370794.7	5928832.2	55.3	71	29	0	0	10.07	Rippled sand with rare shell fragments
	13/04/2022	10:10:11	370775.9	5928884.3						10.07	
OWF_VID_11	13/04/2022	01:11:18	374799.3	5932242.7	55.2	83	3	14	0	19.97	Rippled sand with rare fragments
	13/04/2022	01:17:07	374816.2	5932190.2						20.01	
OWF_VID_14	12/04/2022	22:22:27	375554.2	5930226.3	61.4	53	27	20	0	17.12	Rippled sandy gravel with abundant shell fragments
	12/04/2022	22:29:04	375574.0	5930168.1						17.77	
OWF_VID_15	09/04/2022	13:24:07	376353.9	5942222.8	53.2	50	30	10	10	18.20	Rippled sand with rare shell fragments
	09/04/2022	13:30:05	376332.0	5942271.3						18.31	
OWF_VID_17	09/04/2022	17:27:40	376762.8	5939942.4	55.2	68	32	0	0	16.93	Rippled sand with rare shell fragments
	09/04/2022	17:33:50	376764.0	5939997.6						16.81	
OWF_VID_19	10/04/2022	03:27:06	377960.1	5933886.2	53.2	28	43	9	20	40.29	Rippled sand with abundant shell fragments and surface fine organic matter that form distinct bands
	10/04/2022	03:38:01	377948.5	5933938.1						40.07	
OWF_VID_23	09/04/2022	09:49:55	379021.4	5943292.7	46.1	53	37	10	0	23.42	Rippled sand with abundant shell fragments and rare pebbles and cobbles
	09/04/2022	09:55:12	379006.3	5943336.2						23.03	
	09/04/2022	09:55:12	379006.3	5943336.2	7.5	34	44	22	0	23.03	Rippled sand with abundant shell fragments and an increased abundance of pebbles and cobbles
	09/04/2022	09:56:19	379003.0	5943343.0						23.03	
OWF_VID_25	10/04/2022	09:17:46	379694.8	5935627.2	51.7	25	30	45	0	18.28	Rippled sand with rare shell fragments
	10/04/2022	09:28:07	379712.2	5935578.5						16.01	
OWF_VID_26	06/04/2022	11:57:32	392625.1	5937985.1	51.3	84	16	0	0	21.56	Rippled sand with frequent pebbles
	06/04/2022	12:03:05	392577.1	5937967.1						21.48	
	06/04/2022	12:03:05	392577.1	5937967.1	7.8	83	17	0	0	21.48	Rippled sand with a reduced occurrence of pebbles (rippled sand boundary)
	06/04/2022	12:03:54	392569.5	5937964.9						21.40	
OWF_VID_30	10/04/2022	19:47:09	382206.8	5936897.0	53.4	33	51	16	0	19.54	Rippled sand with abundant shell fragments forming peaks and small pebbles within the troughs
	10/04/2022	19:53:04	382224.7	5936846.7						19.55	
OWF_VID_31	12/04/2022	14:31:29	382462.2	5928305.7	54.6	77	13	10	0	19.08	Mosaic of small pebbles and relic shell fragments
	12/04/2022	14:37:38	382444.6	5928357.5						19.08	
OWF_VID_32	11/04/2022	15:50:30	382677.2	5933650.4	45.0	62	16	22	0	19.86	Rippled sand with frequent shell fragments, pebbles, and occasional cobbles
	11/04/2022	15:55:38	382660.9	5933692.4						19.87	
	11/04/2022	15:55:38	382660.9	5933692.4	0.8	100	0	0	0	19.87	Increased abundance of cobbles, pebbles, and shell fragments
	11/04/2022	15:55:42	382660.3	5933693.0						19.87	
	11/04/2022	15:55:42	382660.3	5933693.0	8.0	72	28	0	0	19.87	Rippled sand with frequent shell fragments, pebbles, and occasional cobbles
	11/04/2022	15:56:36	382656.5	5933700.0						19.82	
OWF_VID_33	09/04/2022	06:50:28	382670.6	5940266.7	51.6	70	21	3	6	22.85	Mosaic of small pebbles and relic shell fragments
	09/04/2022	06:55:40	382656.6	5940316.4						23.03	
OWF_VID_37	11/04/2022	09:47:02	384455.4	5936291.2	53.6	52	42	6	0	18.79	Rippled slightly sandy gravel with abundant shell fragments
	11/04/2022	09:58:02	384472.4	5936240.3						18.39	
OWF_VID_45	12/04/2022	09:02:27	385833.4	5929702.1	54.6	95	5	0	0	18.94	Mosaic of small pebbles and relic shell fragments (same as 32)
	12/04/2022	09:08:43	385851.0	5929650.4						19.23	

Conspicuous fauna presence/absence

Station	*Actiniaria* sp.	Actinopterygii	*Agonus cataphractus*	*Alcyonidium diaphanum*	*Alcyonium digitatum*	Ammodytidae sp.	*Asterias rubens*	Brachyura sp.	Bryozoan/Hydrozoan turf	*Buccinum undatum*	*Callionymus lyra*	*Cancer pagurus*	Caridea	Cheilostomatida	*Crepidula fornicata*	Cirripedia	*Urticina felina*	Echichthys vipera	*Ensis* sp.	*Flustra foliacea*	Haleciidae	*Hyas* sp.	Lanice conchilega	*Liocarcinus* sp.	Necora puber	Nemertesia sp.	Ophiuroidea	*Pagurus* sp.	Pleuronectes platessa	Pleuronectiformes	Porifera	*Sabellaria spinulosa*	Serpulidae	Sertulariidae	*Tubularia* sp.	*Vesicularia spinosa*
OWF_VID_01		P				P																														
OWF_VID_03		P				P					P							P										P								
OWF_VID_11						P	P	P			P									P								P						P		
OWF_VID_14				P		P																						P								
OWF_VID_15							P																					P								
OWF_VID_17						P																														
OWF_VID_19		P					P															P						P								
OWF_VID_23				P			P																													P
OWF_VID_23					P				P							P																				P
OWF_VID_25						P																														
OWF_VID_26				P			P									P					P															P
OWF_VID_26				P																														P		P
OWF_VID_30				P		P	P															P														
OWF_VID_31				P			P	P		P				P		P	P		P														P	P		
OWF_VID_32				P			P		P							P	P			P																P
OWF_VID_32					P												P														P					
OWF_VID_32				P													P																			
OWF_VID_33				P	P		P		P							P	P			P	P					P							P	P		
OWF_VID_37							P																					P								
OWF_VID_45				P			P		P							P	P		P	P	P												P	P		

Station	Date	Time (UTC)	Easting (m)	Northing (m)	Length of section (m)	Video quality per video segment (%)				Water depth (m) (LAT)	Sediment type	Conspicuous fauna presence/absence																																			
						Good	Satisfactory	Poor	Not visible			*Actiniaria* sp.	Actinopterygii	*Agonus cataphractus*	*Alcyonidium diaphanum*	*Alcyonium digitatum*	Ammodytidae sp.	*Asterias rubens*	Brachyura sp.	Bryozoan/Hydrozoan turf	*Buccinum undatum*	*Callionymus lyra*	*Cancer pagurus*	Caridea	Cheilostomatida	*Crepidula fornicata*	Cirripedia	*Urticina felina*	Echichthys vipera	*Ensis* sp.	*Flustra foliacea*	Haleciidae	*Hyas* sp.	Lanice conchilega	*Liocarcinus* sp.	Necora puber	Nemertesia sp.	Ophiuroidea	*Pagurus* sp.	Pleuronectes platessa	Pleuronectiformes	Porifera	*Sabellaria spinulosa*	Serpulidae	Sertulariidae	*Tubularia* sp.	*Vesicularia spinosa*
OWF_VID_47	11/04/2022	03:09:39	386566.2	5935766.2	9.1	100	0	0	0	35.06	Abundant shell fragments form peaks between rippled sand troughs				P																																
	11/04/2022	03:10:33	386563.0	5935774.8						35.48																																					
	11/04/2022	03:10:33	386563.0	5935774.8	2.6	100	0	0	0	35.48	Rippled sand with an increased abundance of surface shell fragments and bands of organic matter				P																										P						
	11/04/2022	03:11:30	386561.9	5935777.2						35.76																																					
	11/04/2022	03:11:30	386561.9	5935777.2	1.4	5	81	14	0	35.76	Period of time when camera was relatively stationary							P																													
	11/04/2022	03:14:50	386561.1	5935778.3						35.69																																					
	11/04/2022	03:14:50	386561.1	5935778.3	3.4	95	5	0	0	35.69	Rippled sand with an increased abundance of surface shell fragments and bands of organic matter							P																													
	11/04/2022	03:18:03	386560.1	5935775.0						35.50																																					
	11/04/2022	03:18:03	386560.1	5935775.0	43.6	82	18	0	0	35.50	Abundant shell fragments form peaks between rippled sand troughs			P	P			P	P					P							P							P	P						P		P
	11/04/2022	03:23:19	386545.7	5935816.2						37.74																																					
OWF_VID_50	08/04/2022	14:49:27	387947.4	5942679.1	3.4	100	0	0	0	20.20	Mosaic of cobbles and pebbles overlaying sand				P	P				P							P	P			P																
	08/04/2022	14:49:44	387947.5	5942682.5						20.18																																					
	08/04/2022	14:49:44	387947.5	5942682.5	8.1	57	29	14	0	20.18	Occasional cobbles interspersed across rippled sand with frequent shell fragments				P	P				P																									P		
	08/04/2022	14:50:53	387946.4	5942690.6						20.21																																					
	08/04/2022	14:50:53	387946.4	5942690.6	1.4	33	67	0	0	20.21	Mosaic of cobbles and pebbles overlaying sand				P			P		P							P																				
	08/04/2022	14:51:09	387946.3	5942691.9						20.23																																					
	08/04/2022	14:51:09	387946.3	5942691.9	3.7	67	33	0	0	20.23	Occasional pebbles interspersed across rippled sand with frequent shell fragments				P																																
	08/04/2022	14:51:38	387945.7	5942695.5						20.23																																					
	08/04/2022	14:51:38	387945.7	5942695.5	6.9	50	50	0	0	20.23	Frequent pebbles and cobbles interspersed across rippled sand with frequent shell fragments				P												P	P			P														P		
	08/04/2022	14:53:04	387944.7	5942702.4						20.26																																					
	08/04/2022	14:53:04	387944.7	5942702.4	2.9	75	25	0	0	20.26	Occasional pebbles interspersed across rippled sand with frequent shell fragments				P																P																
	08/04/2022	14:53:40	387943.9	5942705.2						20.27																																					
	08/04/2022	14:53:40	387943.9	5942705.2	32.0	46	36	12	6	20.27	Frequent pebbles and cobbles interspersed across rippled sand with frequent shell fragments				P	P		P		P							P	P			P	P					P		P			P			P	P	P
	08/04/2022	14:59:05	387943.1	5942737.2						20.43																																					
OWF_VID_56	08/04/2022	11:45:24	390756.1	5941496.0	54.7	81	19	0	0	20.18	Rippled sand with rare shell fragments																																				
	08/04/2022	11:51:34	390735.8	5941546.8						19.81																																					
OWF_VID_57	06/04/2022	14:54:49	390615.4	5932929.6	29.3	100	0	0	0	20.84	Abundant cobbles and pebbles and a single boulder surrounded by rippled sand with abundant shell fragments				P	P		P		P		P					P	P			P					P	P					P	P	P	P		P
	06/04/2022	14:58:11	390625.9	5932902.3						20.53																																					
	06/04/2022	14:58:11	390625.9	5932902.3	25.6	100	0	0	0	20.53	Increased abundance of cobbles, pebbles and shell fragments				P	P		P		P			P				P	P	P		P	P					P					P		P	P		P
	06/04/2022	15:01:37	390635.2	5932878.4						20.49																																					
OWF_VID_58	05/04/2022	21:38:10	392729.7	5945792.8	55.2	70	30	0	0	25.14	Rippled sand with abundant shell fragments and pebbles accumulated in the troughs																														P						
	05/04/2022	21:44:06	392710.3	5945844.5						24.93																																					
OWF_VID_60	04/04/2022	14:15:44	393238.5	5931764.5	4.4	75	25	0	0	20.39	Rippled sand with rare shell fragments																																				
	04/04/2022	14:16:26	393240.8	5931760.8						20.45																																					
	04/04/2022	14:16:26	393240.8	5931760.8	4.4	100	0	0	0	20.45	Rippled sand with an abundant shell fragments and pebbles																																				
	04/04/2022	14:16:54	393242.3	5931756.6						20.38																																					
	04/04/2022	14:16:54	393242.3	5931756.6	27.5	87	13	0	0	20.38	Rippled sand with rare shell fragments		P																					P													
	04/04/2022	14:20:00	393252.9	5931731.2						19.61																																					

Station	Date	Time (UTC)	Easting (m)	Northing (m)	Length of section (m)	Video quality per video segment (%)				Water depth (m) (LAT)	Sediment type	Conspicuous fauna presence/absence																																			
						Good	Satisfactory	Poor	Not visible			Actiniaria sp.	Actinopterygii	*Agonus cataphractus*	*Alcyonidium diaphanum*	*Alcyonium digitatum*	Ammodytidae sp.	*Asterias rubens*	Brachyura sp.	Bryozoan/Hydrozoan turf	*Buccinum undatum*	*Callionymus lyra*	*Cancer pagurus*	Caridea	Cheilostomatida	*Crepidula fornicata*	Cirripedia	*Urticina felina*	Echichthys vipera	*Ensis* sp.	*Flustra foliacea*	Haleciidae	*Hyas* sp.	Lanice conchilega	*Liocarcinus* sp.	Necora puber	Nemertesia sp.	Ophiuroidea	*Pagurus* sp.	Pleuronectes platessa	Pleuronectiformes	Porifera	*Sabellaria spinulosa*	Serpulidae	Sertulariidae	*Tubularia* sp.	*Vesicularia spinosa*
OWF_VID_64	06/04/2022	00:04:31	394723.1	5945894.6	34.1	83	17	0	0	24.62	Rippled sand with frequent shell fragments and pebbles accumulated in the troughs and rare cobbles				P		P		P												P								P		P						
	06/04/2022	00:08:13	394734.3	5945862.4						23.92																																					
	06/04/2022	00:08:13	394734.3	5945862.4	19.9	94	6	0	0	23.92	Increased abundance of pebbles and shell fragments in the troughs of the sand ripples							P																						P							
	06/04/2022	00:10:39	394740.4	5945843.4						22.63																																					
OWF_VID_65	06/04/2022	09:28:20	394855.5	5939296.9	11.7	100	0	0	0	23.11	Rippled sand with frequent cobbles, pebbles and shell fragments	P			P	P		P									P	P			P	P										P					P
	06/04/2022	09:29:24	394850.5	5939286.4						23.08																																					
	06/04/2022	09:29:24	394850.5	5939286.4	7.1	67	33	0	0	23.08	Rippled sand with increased abundance of cobbles and pebbles				P	P		P		P							P	P			P																P
	06/04/2022	09:30:09	394847.3	5939280.0						23.09																																					
	06/04/2022	09:30:09	394847.3	5939280.0	40.8	72	28	0	0	23.09	Rippled sand with common cobbles, pebbles and abundant shell fragments				P	P		P		P							P	P			P								P								P
	06/04/2022	09:34:31	394830.3	5939242.9						23.04																																					
OWF_VID_69	05/04/2022	07:08:17	397272.3	5941056.8	56.9	84	16	0	0	22.14	Rippled sand with rare shell fragments						P	P																P													
	05/04/2022	07:15:19	397271.6	5941113.7						22.19																																					
OWF_VID_70	04/04/2022	18:53:15	397304.6	5935554.1	52.8	92	8	0	0	22.74	Rippled sand with frequent shell fragments and gravel in troughs		P		P		P																	P													
	04/04/2022	18:59:23	397287.9	5935604.2						22.82																																					
OWF_VID_73	03/04/2022	19:09:19	398497.5	5931823.4	53.4	100	0	0	0	19.15	Rippled sand with rare shell fragments						P																														P
	03/04/2022	19:15:34	398479.6	5931873.6						18.17																																					
OWF_VID_75	05/04/2022	05:33:11	399555.4	5940235.5	55.6	54	34	12	0	23.07	Rippled sand with abundant shell fragments and pebbles accumulated in the troughs				P		P	P		P								P			P				P									P	P		P
	05/04/2022	05:39:21	399536.7	5940287.9						23.11																																					
OWF_VID_76	04/04/2022	22:17:53	399987.6	5935227.8	2.6	100	0	0	0	23.13	Rippled sand with shell fragments and occasional cobbles and pebbles	P				P		P										P			P						P					P			P		P
	04/04/2022	22:18:12	399988.5	5935230.3						23.13																																					
	04/04/2022	22:18:12	399988.5	5935230.3	8.9	100	0	0	0	23.13	Sand with abundant aggregations of *Sabellaria* overlying frequent cobbles and pebbles	P			P	P		P		P								P			P				P		P		P			P	P	P	P		P
	04/04/2022	22:19:16	399991.5	5935238.7						23.09																																					
	04/04/2022	22:19:16	399991.5	5935238.7	42.3	92	8	0	0	23.09	Increased abundance of pebbles and cobbles forming a mosaic with frequent aggregations of *Sabellaria*	P			P	P		P	P	P						P	P	P		P	P	P	P		P			P	P				P	P	P	P	P
	04/04/2022	22:23:45	400000.8	5935280.0						23.11																																					
	04/04/2022	22:23:45	400000.8	5935280.0	16.2	91	9	0	0	23.11	Decreased abundance of cobbles and increased abundance of pebbles		P		P					P								P			P				P				P					P	P		
	04/04/2022	22:25:31	400005.8	5935295.4						23.18																																					
OWF_VID_79 A	08/04/2022	09:13:56	401359.2	5936262.6	52.4	78	17	5	0	22.25	Rippled sand with abundant shell fragments and pebbles and occasional cobbles.	P		P	P	P		P				P					P	P			P						P					P	P	P	P		P
	08/04/2022	09:19:53	401340.2	5936311.5						22.20																																					
OWF_VID_80	03/04/2022	14:57:33	402895.9	5933538.2	55.8	81	19	0	0	24.35	Rippled sand with rare shell fragments						P																														
	03/04/2022	15:04:19	402916.7	5933486.4						22.63																																					

APPENDIX H – EPIBENTHIC TRAWL LOGS

Epibenthic Trawl Deck Log Observations

Cast#	Station	Sampler Used	Water Depth (m)	Time	Length of Trawl (m)	Date	Volume Recovered (L)	Comments	Conspicuous Fauna
1	OWF_T7	Beam Trawl	22	10:58 (time on seabed)	-	05/04/2022	-	Due to incorrect positioning this small part of a transect was a "practice run"	*Flustra foliacea*, weaverfish, comb jelly
2	OWF_T7	Beam Trawl	22	12:17 (started hauling)	677	05/04/2022	15	Small amount of plastic	High abundance of weaverfish (over 100) and *Alcyonidium diaphanum*, one brittle star
3	OWF_T6	Beam Trawl	20	17:36 (started hauling)	796	06/04/2022	4	Not enough sample to count as a sample (needs to be at least 5L), twine was re-tied around codend as a new addition ready to deploy again	*Flustra foliacea, Alcyonidium diaphanum*
4	OWF_T6_A	Beam Trawl	20	19:10 (started hauling)	702	06/04/2022	80	This position was moved 50m east from the original trawl line after the first attempt was unsuccessful. Transit to shelter after this station due to weather becoming un-workable	3 large boulders recovered in this trawl colonised with *Alcyonidium digitatum* (24.5kilos) also present was *Alcyonidium diaphanum, scorpion fish, flatfish including Pleuronectes platessa* and velvet swimming crabs
5	OWF_T3	Beam Trawl	38	In: 06:14 SOL: 06:18 EOL: 06:38	723	10/04/2022	320 (including high amount of sediment)	-	Razor clams
6	OWF_T2	Beam Trawl	15	Shoot: 15:58 SOL: 16:02 EOL: 16:23	588	10/04/2022	4 (N/S)	Not enough sample to count as a sample (needs to be at least 5L). Location moved 50m west	Weaverfish, *Flustra foliacea, Alcyonidium diaphanum*
7	OWF_T2_A	Beam Trawl	15	Shoot: 17:22 SOL: 17:27 EOL: 17:53	671	10/04/2022	5.5	-	*Merlangius merlangus*
8	OWF_T5	Beam Trawl	20	Shoot: 07:29 SOL:07:33 EOL: 07:47	508	11/04/2022	100	-	*Asterias rubens, Merlangius merlangus, Alcyonidium diaphanum, Alcyonidium digatatum*
9	OWF_T4	Beam Trawl	20	Shoot: 12:42 SOL: EOL: 13:09	621	11/04/2022	100	-	50L of *Alcyonidium diaphanum*
10	OWF_T9	Beam Trawl	22m	Shoot: 07:40 Seabed: 07:44 EOL: 08:00	517.64	12/04/2022	140	-	Large rocks, some with *Alcyonidium digitatum*
11	OWF_T1	Beam Trawl	10m	Shoot: 15:36 On seabed: 15:39 SOL: 15:43 EOL: 16:10	812.59	13/04/2022	40	-	Abundance of weaverfish and *Alcyonidium diaphanum*

Epibenthic Trawl Field Weight Logs

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T1**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	15:36	1	368 472.2	5 933 352.6
Distance		Photographed?	Y	Lock	15:43	3	368 460.1	5 933 585.0
Vessel Speed		Sieve Mesh Size	5mm	Haul	16:10	4	368 150.2	5 934 336.2
Trawl Length (m)	812.59	Sample Volume	40L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	9.8 – 10.4
Notes								
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Alcyonidium diaphanum	N	P	13700 (6x5L)			
Flustra foliacea	N	P	960 (5L)			
Hydrozoa	N	P	920 (10L)			
Gastropoda #E	N	P	/			
Ascidiacea	Y	5	50 (1L)			
Sepiola atlantica	N	7	50 (1L)			
Pisidia longicornis	N	4	50 (1L)			
Crangon crangon	N	138	260 (3L)			
Shrimp #1	N	2	40(1L)			
Liocarcinus holsatus	N	1	60 (1L)			
Munida	Y	3	40 (1L)			
Echiichthys vipera	N	414	1000 (5L)			
Agonus cataphractus	N	1	50 (1L)			
Pomatoschistus pictus	N	2	40 (1L)			
Hyperoplus lanceolatus	N	1	140 (3L)			
Sandeel #1	Y	44	240 (3L)			
Pleuronectes platessa	N	9	200 (3L)			
Microstomus kitt	N	1	120 (3L)			
Sandeel #2	Y	5	50 (1L)			
Limanda limanda	Y	10	650 (5L)			
Flatfish #J	Y	6	50 (3L)			
Macropodia ?	Y	5	40 (1L)			
Inachus	Y	2	40 (1L0			
Arnoglossus Laterna ?	Y	5	300 (3L)			

** Taxon weights include the weight of containers, i.e. buckets or bags, used to weigh the organisms.*

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T2_A**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	17:21	1	376 724.5	5 940 437.8
Distance		Photographed?	Y	Lock	17:27	3	376 725.2	5 940 395.8
Vessel Speed		Sieve Mesh Size	5mm	Haul	17:49	4	376 705.9	5 939 724.6
Trawl Length (m)	671.45	Sample Volume	5.5L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	13.8 - 15.8
Notes	Plastic litter present.							
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Alcyonidium diaphanum	N	P	1200 (3L)			
Flustra foliacea	N	P	300 (5L)			
Hydrozoa	N	P	140 (3L)			
Sepiola atlantica	N	7	60 (1L)			
Pleurobranchia pileus	N	2	40 (1L)			
Macropodia	Y	1	40 (1L)			
Asterias rubens	N	7	420 (3L)			
Balanus crenatus	N	4	/			
Liocarcinus depurator	N	3	180 (3L)			
Liocarcinus holsatus	N	6	200 (3L)			
Crangon crangon	N	202	400 (3L)			
Echiichthys vipera	N	305	1100 (3L)			
Pholis gunnellus	N	1	120 (3L)			
Merlangius merlangus	Y	1	260 (3L)			
Sandeel #J	Y	35	100 (1L)			
Pomatoschistus pictus	N	4	20 (1L)			
Solea solea	N	4	60 (1L)			
Platichthys flesus	N	13	200 (3L)			
Limanda limanda	N	9	440 (3L)			
Pleuronectes platessa	N	4	200 (3L)			
Microstomus kitt	N	3	120 (120)			
Flatfish #J	Y	37	100 (1L)			

** Taxon weights include the weight of containers, i.e. buckets or bags, used to weigh the organisms.*

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T3**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	07:14	1	377 899.0	5 934 181.8
Distance		Photographed?	Y	Lock	07:18	3	377 917.3	5 934 078.0
Vessel Speed		Sieve Mesh Size	5mm	Haul	07:38	4	378 073.7	5 933 371.8
Trawl Length (m)	723.33	Sample Volume	320L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	38-40
Notes	Bag + Label (B+L) = 2g							
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data

Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Alcyonidium diaphanum	N	P	2900 (5L)			
Flustra foliacea	N	P	500 (3L)			
Hydrozoa	N	P	300 (3L)			
Gastropoda #E	N	p	60 (1L)			
Bryozoa (Dead?)	Y	P	/			
Alcyonidium parasiticum	N	P	20 (1L)			
Porifera	Y	P	100 (1L)			
Serpulidae	N	7	/			
Ophelia	Y	2	7 (Bag)			
Nephtyidae	Y	13	80 (1L)			
Actiniaria	N	5	120 (1L)			
Sepiola atlantica	N	8	60 (1L)			
Ensis	Y®	7	130 (2x1L)			
Nudibranchia	N	1	8 (Bag)			
Clausinella fasciata	Y	1	9 (Bag)			
Abra prismatica	Y	2	3 (B+L)			
Moerella donacina	Y	2	4 (B+L)			
Mactridae	Y	57	140 (1L)			
Sipuncula ?	Y	2	3 (B+L)			
Holothuroidea	Y	1	2 (B+L)			
Echinocyamus pusillus	N	3	2 (B+L)			
Asterias rubens	N	19	1000 (5L)			
Ophiura	Y	1	2 (B+L)			
Inachus	Y	1	3 (B+L)			
Ebalia	Y	3	4 (B+L)			
Liocarcinus depurator	Y	31	500 (5L)			
Balanus crenatus	N	Hundreds	/			
Crepidula fornicata	Y	3	3 (B+L)			
Crangon crangon	N	85	300 (5L)			
Liocarcinus holsatus	Y	14	260 (5L)			
Liocarcinus #J	Y	27	60 (1L)			
Shrimp #1	N	9	60 (1L)			
Pagurus bernhardus	Y	25	320 (3L)			
Branchiostoma lanceolata	Y	4	50 (1L)			
Callionymus lyra	Y	7	300 (5L)			
Eutrigla gurnardus	Y	1	120 (3L)			

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T3**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	07:14	1	377 899.0	5 934 181.8
Distance		Photographed?	Y	Lock	07:18	3	377 917.3	5 934 078.0
Vessel Speed		Sieve Mesh Size	5mm	Haul	07:38	4	378 073.7	5 933 371.8
Trawl Length (m)	723.33	Sample Volume	320L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	38-40
Notes	Bag + Label (B+L) = 2g							
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Agonus cataphractus	Y	36	280(3L)			
Hyperoplus lanceolatus	Y	13	600 (5L)			.0
Sandeel #1	Y	1	120 (3L)			
Pomatoschistus pictus	Y	2	40 (1L)			
Pleuronectes platessa	N	1	180 (3L)			
Microstomus kitt	N	1	140 (3L)			
Solea solea	N	11	500 (3L)			
Limanda	Y	2	160 (3L)			
Limanda limanda ?	Y	13	780 (5L)			
Platichthys flesus	Y	4	300 (3L)			

** Taxon weights include the weight of containers, i.e. buckets or bags, used to weigh the organisms.*

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T4**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	12:42	1	384 558.1	5 935 982.1
Distance		Photographed?	Y	Lock	12:46	3	384 544.8	5 936 017.4
Vessel Speed		Sieve Mesh Size	5mm	Haul	13:09	4	384 349.2	5 936 607.4
Trawl Length (m)	621.57	Sample Volume	100L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	16.9-17.5
Notes								
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Alcyonidium diaphanum	N	P	30200 (12x5L)			
Flustra foliacea	N	P	2420 (2x5L)			
Hydrozoa	N	P	2820 (2x5L)			
Alcyonidium parasiticum	N	P	120 (3L)			
Gastropoda #E	N	P	/			
Animalia #E	N	P	/			
Ascidiacea #J	N	1	40 (1L)			
Porifera	N	P	140 (1L)			
Fucus?	Y	P	50 (1L)			
Edwardsiidae?	Y	1	40 (1L)			
Platyhelminthes	N	1	50 (1L)			
Sepiola atlantica	N	4	50 (1L)			
Ensis	Y	117	740 (2x3L)			
Mactridae	Y	222	800 (3L)			
Arcopagia crassa	Y	16	440 (3L)			
Clausinella fasciata	Y	9	50 (1L)			
Venus	Y	1	70 (1L)			
Dosinia	Y	2	50 (1L)			
Tellinidae	Y	12	50 (1L)			
Astartidae?	Y	1	40 (1L)			
Euspira nitida	Y	4	40 (1L)			
Naticidae	Y	1	40 (1L)			
Asterias rubens	N	22	840 (5L)			
Macropodia	Y	3	50 (1L)			
Inachus?	Y	2	40 (1L)			
Liocarcinus depurator	N	5	120 (3L)			
Liocarcinus holsatus	N	5	140 (3L)			
Idotea	Y	2	40 (1L)			
Pagurus bernhardus	Y	17	280 (3L)			
Balanus crenatus	N	Tens	/			
Crangon crangon	N	39	60 (1L)			
Shrimp #3	Y	8	40 (1L)			
Nephtyidae	Y	83	300 (1L)			

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T4**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	12:42	1	384 558.1	5 935 982.1
Distance		Photographed?	Y	Lock	12:46	3	384 544.8	5 936 017.4
Vessel Speed		Sieve Mesh Size	5mm	Haul	13:09	4	384 349.2	5 936 607.4
Trawl Length (m)	621.57	Sample Volume	100L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	16.9-17.5
Notes								
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Branchiostoma lanceolata	N	3	40 (1L)			
Agonus cataphractus	N	2	160 (3L)			
Callionymuys lyra	N	10	200 (3L)			
Hyperoplus lanceolatus	Y	2	220 (3L)			
Sandeel #1	Y	8	180 (3L)			
Pomatoschistus pictus	N	7	50 (L)			
Pleuronectes platessa	Y	16	400 (3L)			
Limanda limanda	Y	2	200 (3L)			

** Taxon weights include the weight of containers, i.e. buckets or bags, used to weigh the organisms.*

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T5**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	07:29	1	387 965.0	5 942 333.5
Distance		Photographed?	Y	Lock	07:33	3	387 954.3	5 942 500.6
Vessel Speed		Sieve Mesh Size	5mm	Haul	07:47	4	387 930.7	5 943 008.9
Trawl Length (m)	508.85	Sample Volume	100L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	18.6-19.2
Notes	Plastic litter present.							
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Alcyonidium diaphanum	N	P	18800 (7x5L)			
Alcyonium digitatum	N	P	22400 (7x5L)			
Alcyonidium parasiticum	N	P	12 (Bag)			
Porifera	N	P	2400 (3L)			
Flustra foliacea	N	P	1100 (5L)			
Hydrozoa	N	P	400 (5L)			
Animalia #E	N	P	/			
Asterias rubens	N	190	7000 (2x5L)			
Ascidiacea	Y	13	140 (1L)			
Nudibranchia	N	28	60 (1L)			
Sepiola atlantica	N	4	40 (1L)			
Hiatella arctica	Y	8	40 (1L)			
Mytilus edulis	Y	1	40 (1L)			
Venerupis corrugata	Y	4	40 (1L)			
Rhizorus acuminatus	N	2	40 (1L)			
Gastropoda	Y	1	40 (1L)			
Mytilidae #J	N	2	40 (1L)			
Ophiothrix fragilis	Y	2	40 (1L)			
Bryozoa	Y	P	/			
Mytilidae	Y	1	3 (B+L)			
Sabellaria spinulosa	Y	Hundreds	/			
Scale worm	Y	3	3 (B+L)			
Balanus crenatus	N	Tens	/			
Macropodia	Y	5	80 (2x1L)			
Hyas	Y	8	55 (2x1L)			
Pisidia longicornis	N	4	40 (1L)			
Actiniaria	N	2	40 (1L)			
Munida	Y	1	3 (B+L)			
Necora puber	N	16	3200 (5L)			
Liocarcinus depurator	N	8	220 (3L)			
Liocarcinus #J	N	1	40 (1L)			
Cancer pagurus	N	8	1900 (2x5L + 1x3L)			

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T5**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	07:29	1	387 965.0	5 942 333.5
Distance		Photographed?	Y	Lock	07:33	3	387 954.3	5 942 500.6
Vessel Speed		Sieve Mesh Size	5mm	Haul	07:47	4	387 930.7	5 943 008.9
Trawl Length (m)	508.85	Sample Volume	100L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	18.6-19.2
Notes	Plastic litter present.							
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Crangon crangon	N	87	180 (3L)			
Crepidula fornicata	N	1	40 (1L)			
Pagurus bernhardus	Y	1	40 (1L)			
Shrimp #1	N	172	340 (3L)			
Sandeel #1	Y	1	40 (1L)			
Pholis gunnellus	N	4	85 (1L)			
Merlangius merlangus	N	1	80 (1L)			
Fish #1	Y	1	140 (1L)			
Agonus cataphractus	N	6	180 (3L)			
Myoxocephalus scorpius	N	24	700 (3L)			
Pomatoschistus pictus	N	2	45 (1L)			
Pleuronectes platessa	Y	29	1100 (3L)			
Microstomus kitt	N	1	180 (3L)			
Limanda limanda	Y	1	140 (3L)			

** Taxon weights include the weight of containers, i.e. buckets or bags, used to weigh the organisms.*

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T6_A**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	18:44	1	390 563.2	5 933 272.7
Distance		Photographed?	Y	Lock	18:46	3	390 589.3	5 933 290.0
Vessel Speed		Sieve Mesh Size	5mm	Haul	19:10	4	390 800.0	5 932 619.8
Trawl Length (m)	702.59	Sample Volume	80L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	19.4-19.1
Notes	First attempt was a no sample (4L catch), moved 50m East and moved the shackles attaching the chain to the beam down to the middle hole. One large *Cancer pagurus* and 3 boulders.							
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Flustra foliacea	N	P	1530 (5L)			
Alcyonidium diaphanum	N	P	13200 (5x5L)			
Alcyonium digitatum	N	P	24,500 (6x5L + 1x3L)			
Hydrozoa (Sertulariidae present)	N	P	440 (3L)			
Alcyonidium (?)	Y	P	220 (3L)			
Porifera	Y	P	1410 (2x3L)			
Alcyonidium parasiticum	N	P	18 (bag)			
Animalia #E	N	P	On Hydrozoa			
Ascidiacea	Y	6	37 (Bag)			
Actiniaria	Y	10	100 (1L)			
Sepiola atlantica	N	4	40 (1L)			
Nudibranchia	Y	6	100 (1L)			
Hiatella arctica	Y	4	13 (Bag)			
Polititapes rhomboides	Y	1	9 (Bag)			
Rhizorus Acuminatus (?)	Y	1	10 (Bag)			
Sabellaria spinulosa	Y	Tens	/			
Scaleworm	Y	1	12 (Bag)			
Asterias rubens	N	114	3300 (5L)			
Microstomus kitt	Y	1	60 (1L)			
Cancer pagurus	Y	2	480 (3L)			
Hyas areneus	N	1	140 (3L)			
Liocarcinus holsatus	Y	6	240 (3L)			
Necora puber	Y	29	2300 (2x5L)			
Liocarcinus (?)	Y	1	10 (Bag)			
Inachus (?)	Y	2	50 (1x1L + 1xBag)			
Crab #1	Y	1	11 (Bag)			
Macropodia	Y	5	40 (1L)			
Crangon crangon	N	97	140 (1L)			
Shrimp #1	Y	134	300 (3L)			
Shrimp #2	Y	1	10 (Bag)			

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T6_A**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	18:44	1	390 563.2	5 933 272.7
Distance		Photographed?	Y	Lock	18:46	3	390 589.3	5 933 290.0
Vessel Speed		Sieve Mesh Size	5mm	Haul	19:10	4	390 800.0	5 932 619.8
Trawl Length (m)	702.59	Sample Volume	80L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	19.4-19.1
Notes	First attempt was a no sample (4L catch), moved 50m East and moved the shackles attaching the chain to the beam down to the middle hole. One large *Cancer pagurus* and 3 boulders.							
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Pleuronectes platessa	N	9	375 (3L)			
Solea solea	N	1	200 (3L)			
Pomatoschistus pictus	Y	5	50 (1L)			
Pholis gunnellus	Y	7	150 (1L)			
Callionymus lyra	Y	2	100 (1L)			
Molva molva	Y	1	50 (1L)			
Agonus cataphractus	Y	1	60 (1L)			
Taurulus bubalis	Y	16	400 (3L)			
Limanda limanda	Y	10	430 (3L)			

** Taxon weights include the weight of containers, i.e. buckets or bags, used to weigh the organisms.*

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T7**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	11:49	1	397 234.8	5 940 639.5
Distance		Photographed?	Y	Lock	11:51	3	397 296.7	5 940 733.0
Vessel Speed		Sieve Mesh Size	5mm	Haul	12:10	4	397 189.9	5 941 402.2
Trawl Length (m)	677.67	Sample Volume	15L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	22.2
Notes	Practice attempt before this one was 1.5km from SOL. Some plastic litter.							
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Flustra foliacea	Y	P	420 (3L)			
Alcyonidium diaphanum	Y	P	4200 (5L)			
Alcyonidium parasiticum	Y	P	110 (3L)			
Alcyonium digitatum	Y	P	190 (3L)			
Sertulariidae	Y	P	140 (3L)			
Hydrozoa	Y	P	160 (3L)			
Ascidiacea	Y	1	16 (Bag)			
Ophiocten affinis	Y	1	7 (Bag)			
Asterias rubens	Y	3	120 (1L)			
Mactridae	Y	1	8 (Bag)			
Pleurobrachia pileus	Y	4	11 (Bag)			
Sepiola atlantica	Y	8	60 (1L)			
Pisidia longicornis	Y	2	8 (Bag)			
Macropodia	Y	1	7 (Bag)			
Liocarcinus holsatus	Y	3	55 (1L)			
Hyas areneus	Y	1	130 (3L)			
Hyas coarctatus	Y	1	200 (3L)			
Crangon crangon	Y	70	210 (3L)			
Shrimp #1	Y	3	60 (1L)			
Agonus cataphractus	Y	1	50 (3L)			
Echiichthys vipera	Y	109	720 (3L)			
Pleuronectes platessa	Y	4	280 (3L)			
Solea solea	Y	2	120 (3L)			
Arnoglossus laterna	Y	4	180 (3L)			
Platichthys plesus	Y	3	160 (3L)			
Microstomus kitt	Y	6	120 (3L)			
Callionymus lyra	Y	1	8 (Bag)			
Serpulidae	Y	Tens	On *Hyas coarctatus*			
Animalia #E	y	P	On Hydrozoa			

** Taxon weights include the weight of containers, i.e. buckets or bags, used to weigh the organisms.*

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T7**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	11:49	1	397 234.8	5 940 639.5
Distance		Photographed?	Y	Lock	11:51	3	397 296.7	5 940 733.0
Vessel Speed		Sieve Mesh Size	5mm	Haul	12:10	4	397 189.9	5 941 402.2
Trawl Length (m)	677.67	Sample Volume	15L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	22.2
Notes								
Storage Equipment Weights								

Fish Length Data

Taxon	Kept (Y/N)	Length (cm)	Count	
Agonus cataphractus	Y	10	1	
Echiichthys vipera	Y	10	10	
Echiichthys vipera	N	12	11	
Echiichthys vipera	N	13.5	1	
Echiichthys vipera	N	9	12	
Echiichthys vipera	N	13	2	
Echiichthys vipera	N	12.5	6	
Echiichthys vipera	N	11	3	
Echiichthys vipera	N	10.5	1	
Echiichthys vipera	N	2.5	2	
Echiichthys vipera	N	9.5	8	
Echiichthys vipera	N	11.5	1	
Echiichthys vipera	N	8	3	
Echiichthys vipera	N	7	5	
Echiichthys vipera	N	6	10	
Echiichthys vipera	N	3	11	
Echiichthys vipera	N	4	25	
Echiichthys vipera	N	6.5	1	
Echiichthys vipera	N	3.5	5	
Echiichthys vipera	N	5	1	
Echiichthys vipera	N	4.5	1	
Pleuronectes platessa	Y	19.5	1	
Pleuronectes platessa	Y	20	1	
Pleuronectes platessa	Y	11	1	
Pleuronectes platessa	Y	9	1	
Solea solea	Y	9.5	1	
Solea solea	Y	9	1	
Arnoglossus laterna	Y	14	1	
Arnoglossus laterna	Y	13.5	1	
Arnoglossus laterna	Y	13	1	
Arnoglossus laterna	Y	6.5	1	
Arnoglossus laterna	Y	5	1	
Platichthys plesus	Y	19	1	
Platichthys plesus	Y	7.5	1	
Platichthys plesus	Y	8	1	
Microstomus kitt	Y	7	1	
Microstomus kitt	Y	6	1	
Microstomus kitt	Y	4	1	

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T7**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	11:49	1	397 234.8	5 940 639.5
Distance		Photographed?	Y	Lock	11:51	3	397 296.7	5 940 733.0
Vessel Speed		Sieve Mesh Size	5mm	Haul	12:10	4	397 189.9	5 941 402.2
Trawl Length (m)	677.67	Sample Volume	15L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	22.2
Notes								
Storage Equipment Weights								

Fish Length Data				
Taxon	Kept (Y/N)	Length (cm)	Count	
Microstomus kitt	Y	8	1	
Callionymus lyra	Y	3	1	

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T9**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	07:40	1	401 226.2	5 936 615.8
Distance		Photographed?	Y	Lock	07:44	3	401 256.1	5 936 524.9
Vessel Speed		Sieve Mesh Size	5mm	Haul	08:00	4	401 451.7	5 936 045.6
Trawl Length (m)	517.64	Sample Volume	140L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	22.4-22.2
Notes								
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Alcyonidium diaphanum	N	P	6500 (3x5L)			
Alcyonium digitatum	N	P	24300 (7x5L)			
Flustra foliacea	N	P	2200 (10L)			
Hydrozoa	N	P	1600 (10L)			
Alcyonidium parasiticum	N	P	80 (1L)			
Porifera	N	P	2500 (5L)			
Asterias rubens	N	365	5400 (2x5L)			
Ascidiacea	Y	27	200 (1L)			
Actiniaria	N	32	120 (1L)			
Sepiola atlantica	N	6	60 (1L)			
Nudibranchia	N	17	100 (2x1L)			
Rhizorus acuminatus	N	6	40 (1L)			
Pectinidae	Y®	1	60 (1L)			
Nephtyidae	Y	1	40 (1L)			
Actinopterygii #E	N	P	/			
Animalia #E	N	P	/			
Sabellaria spinulosa	Y	Tens	/			
Hiatella arctica	N	11	50 (1L)			
Abra alba	Y®	2	40 (1L)			
Ebalia	Y	1	3 (B+L)			
Polititapes rhomboides	Y	1	3 (B+L)			
Pycnogonum littorale	Y	2	3 (B+L)			
Pisidia longicornis	N	36	80 (2x1L)			
Balanus balanus	N	Tens	/			
Balanus crenatus	N	Tens	/			
Bryozoa	Y	P	/			
Psammechinus miliaris	Y®	1	4 (B+L)			
Ophiocten affinis	N	1	2 (B+L)			
Ophiothrix fragilis	N	10	40 (1L)			
Pagurus bernhardus	N	1	25 (1L)			
Necora puber	N	7	500 (5L)			
Cancer pagurus	N	9	1160 (x3L + 1x5L)			

Geodetics: WGS84 UTM31N 3°E								
Station Name	**OWF_T9**	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	07:40	1	401 226.2	5 936 615.8
Distance		Photographed?	Y	Lock	07:44	3	401 256.1	5 936 524.9
Vessel Speed		Sieve Mesh Size	5mm	Haul	08:00	4	401 451.7	5 936 045.6
Trawl Length (m)	517.64	Sample Volume	140L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	22.4-22.2
Notes								
Storage Equipment Weights	Bag = 7g 1L bucket = 35g 3L bucket = 90g 5L bucket = 140g 10L bucket = 300g							

Bulk Trawl Data						
Taxon	Kept (Y/N)	Count	Weight (g)*	Sub Vol.	Raised Count	Raised Weight
Hyas areneus	Y	4	240 (1L)			
Macropodia	Y	16	1200 (3L)			
Inachus	Y	4	50 (1L)			
Liocarcinus holsatus	N	10	240 (3L)			
Liocarcinus depurator	N	7	100 (1L)			
Liocarcinus #J	N	4	40 (1L)			
Munida	Y	44	60m (1L)			
Crangon crangon	N	116	248 (3L)			
Polynoidae	Y	1	2 (B+L)			
Shrimp #1	N	223	230 (3L)			
Shrimp #2	Y	1	50 (1L)			
Pholis gunnellus	N	1	60 (1L)			
Pomatoschistus pictus	N	4	50 (1L)			
Callionymus lyra	N	14	220 (1L)			
Myoxocephalus scorpius	N	12	340 (1L)			
Agonus cataphractus	N	4	100 (1L)			
Solea solea	N	5	90 (1L)			
Microstomus kitt	N	1	160 (3L)			
Pleuronectes platessa	N	8	500 (5L)			
Limanda limanda	Y	30	1400 (5L)			

** Taxon weights include the weight of containers, i.e. buckets or bags, used to weigh the organisms.*

APPENDIX I – MACROFAUNAL SPECIES LIST

Benthic Macrofauna Infauna Matrix

Benthic
Macrofauna Infauna

Benthic Macrofauna Epifauna Matrix

Benthic
Macrofauna Epifaur

Epibenthic Trawl Matrix

Epibenthic Trawl
Matrix.pdf

Benthic Macrofauna Biomass Matrix

Benthic
Macrofauna Biomas:

Epibenthic Trawl Biomass Matrix

Epibenthic Trawl
Biomass Matrix.pdf

2210	Outer Dowsing OWF	Blotted Wet Weight (0.0001g)							
AphiaID	Major Group	Authority	OWF_01_F1	OWF_03_F1	OWF_04_F1	OWF_05_F1	OWF_06_F1	OWF_07_F1	OWF_08_F1
-	Other minor phyla	-			0.1328	0.0007		0.0025	0.0001
1267	Cnidaria	Hatschek, 1888			0.0263				
882	Annelida	Lamarck, 1802 [as Annelides]							
883	Polychaeta	Grube, 1850	0.2759	0.2430	5.5308	0.1710	0.2108	1.4947	0.1573
2036	Oligochaeta	Grube, 1850			0.0013				
1065	Arthropoda	von Siebold, 1848			0.0018				
1066	Crustacea	Brünnich, 1772	0.0027		2.0415		0.0047		0.0074
51	Mollusca				28.2790	0.2468	0.8520	19.2917	0.0185
1806	Echinodermata	Klein, 1778			0.0247	0.0407			
1821	Chordata	Haeckel, 1874							
2210	Outer Dowsing OWF	Blotted Wet Weight (0.0001g)							
AphiaID	Major Group	Authority	OWF_09_F1	OWF_10_F1	OWF_11_F1	OWF_12_F1	OWF_13_F1	OWF_14_F1	OWF_15_F1
-	Other minor phyla	-	0.0037		0.0025			0.0001	
1267	Cnidaria	Hatschek, 1888							
882	Annelida	Lamarck, 1802 [as Annelides]							
883	Polychaeta	Grube, 1850	0.4216	0.2016	0.2471	0.3608	0.1011	0.0580	0.1548
2036	Oligochaeta	Grube, 1850							
1065	Arthropoda	von Siebold, 1848		0.0008					
1066	Crustacea	Brünnich, 1772	0.0285	0.0117	0.0038	0.0177	0.0453		0.0367
51	Mollusca		0.0078	0.0008	0.0009		0.3861		0.5746
1806	Echinodermata	Klein, 1778							55.5300
1821	Chordata	Haeckel, 1874							
2210	Outer Dowsing OWF	Blotted Wet Weight (0.0001g)							
AphiaID	Major Group	Authority	OWF_17_F1	OWF_18_F1	OWF_19_F1	OWF_20_F1	OWF_21_F1	OWF_22_F1	OWF_23_F1
-	Other minor phyla	-					0.0001		0.1045
1267	Cnidaria	Hatschek, 1888						0.0521	
882	Annelida	Lamarck, 1802 [as Annelides]							
883	Polychaeta	Grube, 1850	0.0909	0.2569	0.3838	0.6714	0.0650	0.4024	0.2902
2036	Oligochaeta	Grube, 1850							
1065	Arthropoda	von Siebold, 1848							
1066	Crustacea	Brünnich, 1772	0.0565	0.0006	0.0038	0.0668		0.0175	0.0030
51	Mollusca			0.0062	0.8101		1.3184	0.0088	0.1524
1806	Echinodermata	Klein, 1778	34.9221		0.0527				
1821	Chordata	Haeckel, 1874							

2210	Outer Dowsing OWF	Blotted Wet Weight (0.0001g)							
AphiaID	Major Group	Authority	OWF_24_F1	OWF_25_F1	OWF_26_F1	OWF_27_F1	OWF_29_F1	OWF_30_F1	OWF_31_F1
-	Other minor phyla	-	0.0051			0.0001	0.0641		0.0065
1267	Cnidaria	Hatschek, 1888					0.0169		
882	Annelida	Lamarck, 1802 [as Annelides]					0.0001		
883	Polychaeta	Grube, 1850	0.4112	0.3236	0.3771	0.5933	1.7650	0.2674	0.3349
2036	Oligochaeta	Grube, 1850				0.0001	0.0001		
1065	Arthropoda	von Siebold, 1848							
1066	Crustacea	Brünnich, 1772	0.0232	0.0017	0.0012	0.0013	0.0472		
51	Mollusca		0.0060	0.0237	0.0640		3.5536	0.0195	20.4764
1806	Echinodermata	Klein, 1778					0.0538	0.0115	
1821	Chordata	Haeckel, 1874							

2210	Outer Dowsing OWF	Blotted Wet Weight (0.0001g)							
AphiaID	Major Group	Authority	OWF_32_F1	OWF_33_F1	OWF_34_F1	OWF_36_F1	OWF_37_F1	OWF_39_F1	OWF_40_F1
-	Other minor phyla	-	0.0198	0.0056	0.0167	0.0017	0.0155		
1267	Cnidaria	Hatschek, 1888						0.3274	
882	Annelida	Lamarck, 1802 [as Annelides]		0.0010					
883	Polychaeta	Grube, 1850	0.1870	0.8225	0.7175	0.2606	0.7104	2.1208	0.3797
2036	Oligochaeta	Grube, 1850							
1065	Arthropoda	von Siebold, 1848	0.0002	0.0006				0.0005	
1066	Crustacea	Brünnich, 1772	0.0111	0.0910	0.0021	0.0334		0.0226	0.0044
51	Mollusca		0.2402	0.1326	0.0035	56.9002	0.0352	0.0525	
1806	Echinodermata	Klein, 1778	0.0035	0.0043		0.0373		0.0493	
1821	Chordata	Haeckel, 1874					0.1607	0.0052	

2210	Outer Dowsing OWF	Blotted Wet Weight (0.0001g)							
AphiaID	Major Group	Authority	OWF_41_F1	OWF_42_F1	OWF_43_F1	OWF_44_F1	OWF_45_F1	OWF_46_F1	OWF_47_F1
-	Other minor phyla	-	0.0116	0.0001	0.0329	0.0223	0.1834		0.0001
1267	Cnidaria	Hatschek, 1888	0.0852		0.0043				
882	Annelida	Lamarck, 1802 [as Annelides]					0.0021	0.0027	
883	Polychaeta	Grube, 1850	1.8378	0.1519	1.2173	0.0427	1.0199	0.6358	0.2747
2036	Oligochaeta	Grube, 1850							0.0001
1065	Arthropoda	von Siebold, 1848	0.0001		0.0022				
1066	Crustacea	Brünnich, 1772	0.0964	0.0001	0.2356	0.0006	0.1073	0.0051	0.0188
51	Mollusca		0.3361	0.0071	0.5295	0.0318	8.6850	28.7390	24.4062
1806	Echinodermata	Klein, 1778	0.0041		0.2121			0.0008	
1821	Chordata	Haeckel, 1874		2.1320					12.1173

2210	Outer Dowsing OWF	Blotted Wet Weight (0.0001g)							
AphiaID	Major Group	Authority	OWF_48_F1	OWF_49_F1	OWF_51_F1	OWF_52_F1	OWF_53_F1	OWF_54_F1	OWF_55_F1
-	Other minor phyla	-			0.0049			0.0242	
1267	Cnidaria	Hatschek, 1888							
882	Annelida	Lamarck, 1802 [as Annelides]							
883	Polychaeta	Grube, 1850	0.2143	0.0861	0.2819	1.0303	0.1296	0.3738	0.0583
2036	Oligochaeta	Grube, 1850	0.0001						
1065	Arthropoda	von Siebold, 1848							
1066	Crustacea	Brünnich, 1772	0.0043	0.0072	0.0055	0.0253	0.0049	0.0067	
51	Mollusca		0.0175		0.6297	0.0434		0.0062	0.0150
1806	Echinodermata	Klein, 1778			0.0011			0.0001	
1821	Chordata	Haeckel, 1874							0.3649

2210	Outer Dowsing OWF	Blotted Wet Weight (0.0001g)							
AphiaID	Major Group	Authority	OWF_56_F1	OWF_57_F1	OWF_58_F1	OWF_60_F1	OWF_63_F1	OWF_64_F1	OWF_65_F1
-	Other minor phyla	-		0.0091	0.0001			0.0169	
1267	Cnidaria	Hatschek, 1888		0.3986					
882	Annelida	Lamarck, 1802 [as Annelides]							
883	Polychaeta	Grube, 1850	0.1478	1.8781	0.3546	0.2082	0.1841	0.2728	0.2474
2036	Oligochaeta	Grube, 1850			0.0001				
1065	Arthropoda	von Siebold, 1848		0.0001					
1066	Crustacea	Brünnich, 1772		0.0189	0.0075	0.0027	0.0043	0.0388	0.0217
51	Mollusca			0.0612	0.0877	0.4422		0.7019	
1806	Echinodermata	Klein, 1778				11.7803		0.0296	
1821	Chordata	Haeckel, 1874					0.3352		

2210	Outer Dowsing OWF	Blotted Wet Weight (0.0001g)							
AphiaID	Major Group	Authority	OWF_66_F1	OWF_67_F1	OWF_68_F1	OWF_69_F1	OWF_70_F1	OWF_71_F1	OWF_72_F1
-	Other minor phyla	-		0.1989			0.0013		0.0010
1267	Cnidaria	Hatschek, 1888							
882	Annelida	Lamarck, 1802 [as Annelides]							
883	Polychaeta	Grube, 1850	0.2797	0.1937	0.4586	0.5600	0.5650	0.9981	0.7883
2036	Oligochaeta	Grube, 1850							
1065	Arthropoda	von Siebold, 1848							0.0001
1066	Crustacea	Brünnich, 1772	0.0030	0.0067	0.0172	0.0449	0.0130	0.1312	0.0140
51	Mollusca		0.1380			0.0016	0.0796		3.8637
1806	Echinodermata	Klein, 1778		0.0499	0.4175				
1821	Chordata	Haeckel, 1874							

2210	Outer Dowsing OWF	Blotted Wet Weight (0.0001g)							
AphiaID	**Major Group**	**Authority**	**OWF_73_F1**	**OWF_74_F1**	**OWF_75_F1**	**OWF_76_F1**	**OWF_77_F1**	**OWF_78_F1**	**OWF_79_F1**
-	Other minor phyla	-		0.0130	0.0020	0.0516	0.0161	0.0096	0.0136
1267	Cnidaria	Hatschek, 1888				7.1584			2.0205
882	Annelida	Lamarck, 1802 [as Annelides]							
883	Polychaeta	Grube, 1850	0.2499	0.3099	0.1259	7.2552	0.0798	0.2429	1.6094
2036	Oligochaeta	Grube, 1850					0.0001		
1065	Arthropoda	von Siebold, 1848				0.0015			
1066	Crustacea	Brünnich, 1772	0.0536	0.0059	0.0012	1.2484	0.0182	0.0022	0.0396
51	Mollusca				15.0120	0.4454	0.5222	0.0062	0.3866
1806	Echinodermata	Klein, 1778	0.0021			1.1956	0.0001		0.0030
1821	Chordata	Haeckel, 1874							
2210	**Outer Dowsing OWF**	**Blotted Wet Weight (0.0001g)**							
AphiaID	**Major Group**	**Authority**	**OWF_80_F1**						
-	Other minor phyla	-							
1267	Cnidaria	Hatschek, 1888							
882	Annelida	Lamarck, 1802 [as Annelides]							
883	Polychaeta	Grube, 1850	0.3912						
2036	Oligochaeta	Grube, 1850							
1065	Arthropoda	von Siebold, 1848							
1066	Crustacea	Brünnich, 1772	0.1716						
51	Mollusca		0.0384						
1806	Echinodermata	Klein, 1778							
1821	Chordata	Haeckel, 1874							
2210	**Outer Dowsing OWF**	**Blotted Wet Weight (0.0001g)**							
AphiaID	**Major Group**	**Authority**							
-	Other minor phyla	-							
1267	Cnidaria	Hatschek, 1888							
882	Annelida	Lamarck, 1802 [as Annelides]							
883	Polychaeta	Grube, 1850							
2036	Oligochaeta	Grube, 1850							
1065	Arthropoda	von Siebold, 1848							
1066	Crustacea	Brünnich, 1772							
51	Mollusca								
1806	Echinodermata	Klein, 1778							
1821	Chordata	Haeckel, 1874							

2210 Outer Dousing Offshore Wind Farm - Macrofauna Epifaunal Matrix																										
Aphia ID	**Phylum**	**Taxa**	**Authority**	**OWF_01_F1**	**OWF_03_F1**	**OWF_04_F1**	**OWF_05_F1**	**OWF_06_F1**	**OWF_07_F1**	**OWF_08_F1**	**OWF_09_F1**	**OWF_10_F1**	**OWF_11_F1**	**OWF_12_F1**	**OWF_13_F1**	**OWF_14_F1**	**OWF_15_F1**	**OWF_17_F1**	**OWF_18_F1**	**OWF_19_F1**	**OWF_20_F1**	**OWF_21_F1**	**OWF_22_F1**	**OWF_23_F1**	**OWF_24_F1**	**OWF_25_F1**
Epifaunal Species																										
110829	Bryozoa	*Schizomavella*	Canu & Bassler, 1917																							
111147	Bryozoa	*Bicellariella ciliata*	(Linnaeus, 1758)																							
111196	Bryozoa	*Callopora dumerilii*	(Audouin, 1826)																							
111250	Bryozoa	*Scrupocellaria scruposa*	(Linnaeus, 1758)			P	P	P																		
111304	Bryozoa	*Chorizopora brongniartii*	(Audouin, 1826)																							
111314	Bryozoa	*Cribrilina punctata*	(Hassall, 1841)																							
111351	Bryozoa	*Conopeum reticulum*	(Linnaeus, 1767)					P															P			
111355	Bryozoa	*Electra pilosa*	(Linnaeus, 1767)																							
111361	Bryozoa	*Eucratea loricata*	(Linnaeus, 1758)																				P			
408266	Bryozoa	*Fenestrulina delicia*	Winston, Hayward & Craig, 2000																							
111367	Bryozoa	*Flustra foliacea*	(Linnaeus, 1758)			P	P	P											P				P		P	
111397	Bryozoa	*Celleporella hyalina*	(Linnaeus, 1767)																							
111398	Bryozoa	*Haplota clavata*	(Hincks, 1857)																							
111411	Bryozoa	*Membranipora membranacea*	(Linnaeus, 1767)																							
111421	Bryozoa	*Microporella ciliata*	(Pallas, 1766)																							
111484	Bryozoa	*Escharella immersa*	(Fleming, 1828)																							
111539	Bryozoa	*Scruparia ambigua*	(d'Orbigny, 1841)																							
111597	Bryozoa	*Alcyonidium diaphanum*	(Hudson, 1778)			P	P	P																		
111604	Bryozoa	*Alcyonidium parasiticum*	(Fleming, 1828)				P				P													P	P	
111607	Bryozoa	*Arachnidium fibrosum*	Hincks, 1880				P																			
111669	Bryozoa	*Vesicularia spinosa*	(Linnaeus, 1758)			P	P																P			
111032	Bryozoa	*Crisia*	Lamouroux, 1812																							
125333	Cnidaria	*Alcyonium digitatum*	Linnaeus, 1758																							
1599	Cnidaria	*Corynidae*	Johnston, 1836			P																				
117093	Cnidaria	*Eudendrium*	Ehrenberg, 1834																							
1606	Cnidaria	Campanulariidae	Johnston, 1836			P																				
117368	Cnidaria	*Clytia hemisphaerica*	(Linnaeus, 1767)																							
117034	Cnidaria	*Obelia*	Péron & Lesueur, 1810																							
117399	Cnidaria	*Rhizocaulus verticillatus*	(Linnaeus, 1758)																							
117402	Cnidaria	*Calycella syringa*	(Linnaeus, 1767)																							
117103	Cnidaria	*Halecium*	Oken, 1815																							
1613	Cnidaria	Plumulariidae	McCrady, 1859			P																				
117890	Cnidaria	*Hydrallmania falcata*	(Linnaeus, 1758)			P																				
117234	Cnidaria	*Sertularia*	Linnaeus, 1758			P		P																		
111796	Entoprocta	*Pedicellina*	Sars, 1835																							
132833	Porifera	*Haliclona (Haliclona) oculata*	(Linnaeus, 1759)			P																				
558	Porifera	Porifera	Grant, 1836																							

2210 Outer Dousing Offshore Wind Farm - Macrofauna Epifaunal Matrix

Aphia ID	Phylum	Taxa	Authority	OWF_01_F1	OWF_03_F1	OWF_04_F1	OWF_05_F1	OWF_06_F1	OWF_07_F1	OWF_08_F1	OWF_09_F1	OWF_10_F1	OWF_11_F1	OWF_12_F1	OWF_13_F1	OWF_14_F1	OWF_15_F1	OWF_17_F1	OWF_18_F1	OWF_19_F1	OWF_20_F1	OWF_21_F1	OWF_22_F1	OWF_23_F1	OWF_24_F1	OWF_25_F1
Damaged Species																										
939	Annelida	Polynoidae	Kinberg, 1856			1																				
985	Annelida	Sabellidae	Latreille, 1825																							
988	Annelida	Serpulidae	Rafinesque, 1815																							
101376	Arthropoda	Corophiidae	Leach, 1814																							
101400	Arthropoda	Oedicerotidae	Lilljeborg, 1865																							
106674	Arthropoda	Caridea	Dana, 1852																							
105	Mollusca	Bivalvia	Linnaeus, 1758																							
101	Mollusca	Gastropoda	Cuvier, 1795																							
Juvenile Species																										
129243	Annelida	*Cirratulus*	Lamarck, 1818																							
129296	Annelida	*Glycera*	Lamarck, 1818																			1		1		
956	Annelida	Nephtyidae	Grube, 1850			4		2			2	1		1											1	
22496	Annelida	Nereididae	Blainville, 1818					1																		
902	Annelida	Orbiniidae	Hartman, 1942																							
943	Annelida	Sigalionidae	Kinberg, 1856			1																				
982	Annelida	Terebellidae	Johnston, 1846																							
107276	Arthropoda	*Cancer pagurus*	Linnaeus, 1758			3																				
106834	Arthropoda	*Galathea*	J. C. Fabricius, 1793																							
106905	Arthropoda	*Inachus*	Weber, 1795			1																				
106889	Arthropoda	*Ebalia*	Leach, 1817			1									1											
106738	Arthropoda	Paguridae	Latreille, 1802			2																				
106925	Arthropoda	*Liocarcinus*	Stimpson, 1871			2																			1	
107079	Arthropoda	*Upogebia*	Leach, 1814																							
1130	Arthropoda	Decapoda	Latreille, 1802																							
1302	Arthropoda	Pycnogonida	Latreille, 1810																							
1082	Arthropoda	Cirripedia	Burmeister, 1834					1															5			
10194	Chordata	Actinopterygii																								
1839	Chordata	Ascidiacea	Blainville, 1824																					2		
123106	Echinodermata	Spatangoida	L. Agassiz, 1840																							
123626	Echinodermata	*Ophiothrix*	Müller & Troschel, 1840																							
123084	Echinodermata	Ophiuroidea	Gray, 1840				1																			
138333	Mollusca	*Ensis*	Schumacher, 1817						3																	
138474	Mollusca	*Abra*	Lamarck, 1818																							
228	Mollusca	Astartidae	d'Orbigny, 1844 (1840)																							
247	Mollusca	Myidae	Lamarck, 1809			6																				
211	Mollusca	Mytilidae	Rafinesque, 1815			2																				
214	Mollusca	Anomiidae	Rafinesque, 1815																							
230	Mollusca	Mactridae	Lamarck, 1809							1					1					1		1				
138636	Mollusca	*Dosinia*	Scopoli, 1777												1								1			
243	Mollusca	Veneridae	Rafinesque, 1815												1											
382318	Mollusca	Thracioidea	Stoliczka, 1870 (1839)							2	1				1								1			
145	Mollusca	Naticidae	Guilding, 1834																							
246140	Mollusca	*Tritia*	Risso, 1826																							
2		Animalia eggs							1	1														1		

2210 Outer Dousing Offshore Wind Farm - Macrofauna Epifaunal Matrix																										
Aphia ID	Phylum	Taxa	Authority	OWF_26_F1	OWF_27_F1	OWF_29_F1	OWF_30_F1	OWF_31_F1	OWF_32_F1	OWF_33_F1	OWF_34_F1	OWF_36_F1	OWF_37_F1	OWF_39_F1	OWF_40_F1	OWF_41_F1	OWF_42_F1	OWF_43_F1	OWF_44_F1	OWF_45_F1	OWF_46_F1	OWF_47_F1	OWF_48_F1	OWF_49_F1	OWF_51_F1	OWF_52_F1
Epifaunal Species																										
110829	Bryozoa	*Schizomavella*	Canu & Bassler, 1917							P										P						
111147	Bryozoa	*Bicellariella ciliata*	(Linnaeus, 1758)															P								
111196	Bryozoa	*Callopora dumerilii*	(Audouin, 1826)																							
111250	Bryozoa	*Scrupocellaria scruposa*	(Linnaeus, 1758)										P				P									
111304	Bryozoa	*Chorizopora brongniartii*	(Audouin, 1826)											P		P										P
111314	Bryozoa	*Cribrilina punctata*	(Hassall, 1841)							P				P												
111351	Bryozoa	*Conopeum reticulum*	(Linnaeus, 1767)																	P						P
111355	Bryozoa	*Electra pilosa*	(Linnaeus, 1767)					P	P							P		P								
111361	Bryozoa	*Eucratea loricata*	(Linnaeus, 1758)											P				P								
408266	Bryozoa	*Fenestrulina delicia*	Winston, Hayward & Craig, 2000																	P						P
111367	Bryozoa	*Flustra foliacea*	(Linnaeus, 1758)				P		P				P					P								
111397	Bryozoa	*Celleporella hyalina*	(Linnaeus, 1767)																							
111398	Bryozoa	*Haplota clavata*	(Hincks, 1857)																							
111411	Bryozoa	*Membranipora membranacea*	(Linnaeus, 1767)											P												
111421	Bryozoa	*Microporella ciliata*	(Pallas, 1766)																	P						
111484	Bryozoa	*Escharella immersa*	(Fleming, 1828)							P						P				P					P	P
111539	Bryozoa	*Scruparia ambigua*	(d'Orbigny, 1841)															P								
111597	Bryozoa	*Alcyonidium diaphanum*	(Hudson, 1778)			P				P		P		P		P		P		P				P		P
111604	Bryozoa	*Alcyonidium parasiticum*	(Fleming, 1828)			P		P	P	P		P						P	P			P		P		P
111607	Bryozoa	*Arachnidium fibrosum*	Hincks, 1880											P												
111669	Bryozoa	*Vesicularia spinosa*	(Linnaeus, 1758)			P								P												
111032	Bryozoa	*Crisia*	Lamouroux, 1812															P								
125333	Cnidaria	*Alcyonium digitatum*	Linnaeus, 1758			P												P								
1599	Cnidaria	*Corynidae*	Johnston, 1836																							
117093	Cnidaria	*Eudendrium*	Ehrenberg, 1834							P																
1606	Cnidaria	Campanulariidae	Johnston, 1836															P		P						P
117368	Cnidaria	*Clytia hemisphaerica*	(Linnaeus, 1767)															P						P		
117034	Cnidaria	*Obelia*	Péron & Lesueur, 1810			P																				
117399	Cnidaria	*Rhizocaulus verticillatus*	(Linnaeus, 1758)																					P		
117402	Cnidaria	*Calycella syringa*	(Linnaeus, 1767)																					P		
117103	Cnidaria	*Halecium*	Oken, 1815																					P		
1613	Cnidaria	Plumulariidae	McCrady, 1859																							
117890	Cnidaria	*Hydrallmania falcata*	(Linnaeus, 1758)					P		P			P					P			P					
117234	Cnidaria	*Sertularia*	Linnaeus, 1758					P					P	P		P		P		P				P		P
111796	Entoprocta	*Pedicellina*	Sars, 1835															P				P				
132833	Porifera	*Haliclona (Haliclona) oculata*	(Linnaeus, 1759)																							
558	Porifera	Porifera	Grant, 1836									P														

2210 Outer Dousing Offshore Wind Farm - Macrofauna Epifaunal Matrix																										
Aphia ID	**Phylum**	**Taxa**	**Authority**	**OWF_26_F1**	**OWF_27_F1**	**OWF_29_F1**	**OWF_30_F1**	**OWF_31_F1**	**OWF_32_F1**	**OWF_33_F1**	**OWF_34_F1**	**OWF_36_F1**	**OWF_37_F1**	**OWF_39_F1**	**OWF_40_F1**	**OWF_41_F1**	**OWF_42_F1**	**OWF_43_F1**	**OWF_44_F1**	**OWF_45_F1**	**OWF_46_F1**	**OWF_47_F1**	**OWF_48_F1**	**OWF_49_F1**	**OWF_51_F1**	**OWF_52_F1**
Damaged Species																										
939	Annelida	Polynoidae	Kinberg, 1856						4									1								
985	Annelida	Sabellidae	Latreille, 1825			1																				
988	Annelida	Serpulidae	Rafinesque, 1815															1			1					
101376	Arthropoda	Corophiidae	Leach, 1814															2						1		
101400	Arthropoda	Oedicerotidae	Lilljeborg, 1865																			1				
106674	Arthropoda	Caridea	Dana, 1852															1								
105	Mollusca	Bivalvia	Linnaeus, 1758															1								
101	Mollusca	Gastropoda	Cuvier, 1795						2																	
Juvenile Species																										
129243	Annelida	*Cirratulus*	Lamarck, 1818						1																	
129296	Annelida	*Glycera*	Lamarck, 1818										1			1			1						1	1
956	Annelida	Nephtyidae	Grube, 1850			2						2	1	1						1					1	
22496	Annelida	Nereididae	Blainville, 1818									5														
902	Annelida	Orbiniidae	Hartman, 1942				2								1											
943	Annelida	Sigalionidae	Kinberg, 1856																							
982	Annelida	Terebellidae	Johnston, 1846									1														
107276	Arthropoda	*Cancer pagurus*	Linnaeus, 1758															1								
106834	Arthropoda	*Galathea*	J. C. Fabricius, 1793							1																
106905	Arthropoda	*Inachus*	Weber, 1795																							
106889	Arthropoda	*Ebalia*	Leach, 1817															2								
106738	Arthropoda	Paguridae	Latreille, 1802													1										
106925	Arthropoda	*Liocarcinus*	Stimpson, 1871																							
107079	Arthropoda	*Upogebia*	Leach, 1814													2										
1130	Arthropoda	Decapoda	Latreille, 1802													1	1	1								
1302	Arthropoda	Pycnogonida	Latreille, 1810						4																	
1082	Arthropoda	Cirripedia	Burmeister, 1834					49	9	4						8		28		1					4	
10194	Chordata	Actinopterygii		1																						
1839	Chordata	Ascidiacea	Blainville, 1824															1								
123106	Echinodermata	Spatangoida	L. Agassiz, 1840																							
123626	Echinodermata	*Ophiothrix*	Müller & Troschel, 1840							1		5						1								
123084	Echinodermata	Ophiuroidea	Gray, 1840									1														
138333	Mollusca	*Ensis*	Schumacher, 1817									4									1				2	
138474	Mollusca	*Abra*	Lamarck, 1818			1								2				3							1	1
228	Mollusca	Astartidae	d'Orbigny, 1844 (1840)																							
247	Mollusca	Myidae	Lamarck, 1809			7		2		6				4		1		6								1
211	Mollusca	Mytilidae	Rafinesque, 1815			1			1			1		1				3			2					1
214	Mollusca	Anomiidae	Rafinesque, 1815					1		1								2								
230	Mollusca	Mactridae	Lamarck, 1809													1					1					
138636	Mollusca	*Dosinia*	Scopoli, 1777																			1			1	
243	Mollusca	Veneridae	Rafinesque, 1815															1								
382318	Mollusca	Thracioidea	Stoliczka, 1870 (1839)				1										2		1							2
145	Mollusca	Naticidae	Guilding, 1834										1			1						1				1
246140	Mollusca	*Tritia*	Risso, 1826															6								
2		Animalia eggs							1														1			

2210 Outer Dousing Offshore Wind Farm - Macrofauna Epifaunal Matrix																												
Aphia ID	Phylum	Taxa	Authority	OWF_53_F1	OWF_54_F1	OWF_55_F1	OWF_56_F1	OWF_57_F1	OWF_58_F1	OWF_60_F1	OWF_63_F1	OWF_64_F1	OWF_65_F1	OWF_66_F1	OWF_67_F1	OWF_68_F1	OWF_69_F1	OWF_70_F1	OWF_71_F1	OWF_72_F1	OWF_73_F1	OWF_74_F1	OWF_75_F1	OWF_76_F1	OWF_77_F1	OWF_78_F1	OWF_79_F1	OWF_80_F1
Epifaunal Species																												
110829	Bryozoa	*Schizomavella*	Canu & Bassler, 1917																									
111147	Bryozoa	*Bicellariella ciliata*	(Linnaeus, 1758)																									
111196	Bryozoa	*Callopora dumerilii*	(Audouin, 1826)																							P				
111250	Bryozoa	*Scrupocellaria scruposa*	(Linnaeus, 1758)					P														P						
111304	Bryozoa	*Chorizopora brongniartii*	(Audouin, 1826)																									
111314	Bryozoa	*Cribrilina punctata*	(Hassall, 1841)																									
111351	Bryozoa	*Conopeum reticulum*	(Linnaeus, 1767)																									
111355	Bryozoa	*Electra pilosa*	(Linnaeus, 1767)					P																P		P		
111361	Bryozoa	*Eucratea loricata*	(Linnaeus, 1758)										P											P				
408266	Bryozoa	*Fenestrulina delicia*	Winston, Hayward & Craig, 2000																									
111367	Bryozoa	*Flustra foliacea*	(Linnaeus, 1758)										P											P	P			
111397	Bryozoa	*Celleporella hyalina*	(Linnaeus, 1767)												P													
111398	Bryozoa	*Haplota clavata*	(Hincks, 1857)																					P				
111411	Bryozoa	*Membranipora membranacea*	(Linnaeus, 1767)																									
111421	Bryozoa	*Microporella ciliata*	(Pallas, 1766)																									
111484	Bryozoa	*Escharella immersa*	(Fleming, 1828)																									
111539	Bryozoa	*Scruparia ambigua*	(d'Orbigny, 1841)																									
111597	Bryozoa	*Alcyonidium diaphanum*	(Hudson, 1778)					P														P		P	P			
111604	Bryozoa	*Alcyonidium parasiticum*	(Fleming, 1828)		P			P					P							P		P		P			P	
111607	Bryozoa	*Arachnidium fibrosum*	Hincks, 1880										P		P					P							P	
111669	Bryozoa	*Vesicularia spinosa*	(Linnaeus, 1758)										P		P	P				P				P			P	
111032	Bryozoa	*Crisia*	Lamouroux, 1812																									
125333	Cnidaria	*Alcyonium digitatum*	Linnaeus, 1758					P																				
1599	Cnidaria	*Corynidae*	Johnston, 1836																									
117093	Cnidaria	*Eudendrium*	Ehrenberg, 1834																									
1606	Cnidaria	Campanulariidae	Johnston, 1836																									
117368	Cnidaria	*Clytia hemisphaerica*	(Linnaeus, 1767)																									
117034	Cnidaria	*Obelia*	Péron & Lesueur, 1810																									
117399	Cnidaria	*Rhizocaulus verticillatus*	(Linnaeus, 1758)																									
117402	Cnidaria	*Calycella syringa*	(Linnaeus, 1767)																									
117103	Cnidaria	*Halecium*	Oken, 1815																									
1613	Cnidaria	Plumulariidae	McCrady, 1859																									
117890	Cnidaria	*Hydrallmania falcata*	(Linnaeus, 1758)																									
117234	Cnidaria	*Sertularia*	Linnaeus, 1758					P					P									P		P	P	P	P	
111796	Entoprocta	*Pedicellina*	Sars, 1835																									
132833	Porifera	*Haliclona (Haliclona) oculata*	(Linnaeus, 1759)																									
558	Porifera	Porifera	Grant, 1836																									

2210 Outer Dousing Offshore Wind Farm - Macrofauna Epifaunal Matrix																												
Aphia ID	**Phylum**	**Taxa**	**Authority**	**OWF_53_F1**	**OWF_54_F1**	**OWF_55_F1**	**OWF_56_F1**	**OWF_57_F1**	**OWF_58_F1**	**OWF_60_F1**	**OWF_63_F1**	**OWF_64_F1**	**OWF_65_F1**	**OWF_66_F1**	**OWF_67_F1**	**OWF_68_F1**	**OWF_69_F1**	**OWF_70_F1**	**OWF_71_F1**	**OWF_72_F1**	**OWF_73_F1**	**OWF_74_F1**	**OWF_75_F1**	**OWF_76_F1**	**OWF_77_F1**	**OWF_78_F1**	**OWF_79_F1**	**OWF_80_F1**
Damaged Species																												
939	Annelida	Polynoidae	Kinberg, 1856																					6				
985	Annelida	Sabellidae	Latreille, 1825																									
988	Annelida	Serpulidae	Rafinesque, 1815																					17				
101376	Arthropoda	Corophiidae	Leach, 1814																									
101400	Arthropoda	Oedicerotidae	Lilljeborg, 1865																									
106674	Arthropoda	Caridea	Dana, 1852																									
105	Mollusca	Bivalvia	Linnaeus, 1758																									
101	Mollusca	Gastropoda	Cuvier, 1795																									
Juvenile Species																												
129243	Annelida	*Cirratulus*	Lamarck, 1818																									
129296	Annelida	*Glycera*	Lamarck, 1818	2			1		7																2		1	
956	Annelida	Nephtyidae	Grube, 1850	1		1		1						1														3
22496	Annelida	Nereididae	Blainville, 1818																									
902	Annelida	Orbiniidae	Hartman, 1942																									
943	Annelida	Sigalionidae	Kinberg, 1856																					1				
982	Annelida	Terebellidae	Johnston, 1846																					1				
107276	Arthropoda	*Cancer pagurus*	Linnaeus, 1758																					5				
106834	Arthropoda	*Galathea*	J. C. Fabricius, 1793																						1			
106905	Arthropoda	*Inachus*	Weber, 1795																									
106889	Arthropoda	*Ebalia*	Leach, 1817																									
106738	Arthropoda	Paguridae	Latreille, 1802																									
106925	Arthropoda	*Liocarcinus*	Stimpson, 1871																									
107079	Arthropoda	*Upogebia*	Leach, 1814																									
1130	Arthropoda	Decapoda	Latreille, 1802					1																				
1302	Arthropoda	Pycnogonida	Latreille, 1810																									
1082	Arthropoda	Cirripedia	Burmeister, 1834																					1				
10194	Chordata	Actinopterygii																										
1839	Chordata	Ascidiacea	Blainville, 1824																					2				
123106	Echinodermata	Spatangoida	L. Agassiz, 1840													1												
123626	Echinodermata	*Ophiothrix*	Müller & Troschel, 1840																									
123084	Echinodermata	Ophiuroidea	Gray, 1840												2									1				
138333	Mollusca	*Ensis*	Schumacher, 1817																				1					
138474	Mollusca	*Abra*	Lamarck, 1818																					2				
228	Mollusca	Astartidae	d'Orbigny, 1844 (1840)						1																			
247	Mollusca	Myidae	Lamarck, 1809					1																1			1	
211	Mollusca	Mytilidae	Rafinesque, 1815					1															1					
214	Mollusca	Anomiidae	Rafinesque, 1815																									
230	Mollusca	Mactridae	Lamarck, 1809			1																						
138636	Mollusca	*Dosinia*	Scopoli, 1777									1						1										
243	Mollusca	Veneridae	Rafinesque, 1815					1																				
382318	Mollusca	Thracioidea	Stoliczka, 1870 (1839)									2								1			1					
145	Mollusca	Naticidae	Guilding, 1834						1			1														1		
246140	Mollusca	*Tritia*	Risso, 1826																									
2		Animalia eggs																						1				

2210 Outer Dousing Offshore Wind Farm - Macrofauna Infaunal Matrix

Aphia ID	Phylum	Taxa	Authority	OWF_01_F1	OWF_03_F1	OWF_04_F1	OWF_05_F1	OWF_06_F1	OWF_07_F1	OWF_08_F1	OWF_09_F1	OWF_10_F1	OWF_11_F1	OWF_12_F1	OWF_13_F1	OWF_14_F1	OWF_15_F1	OWF_17_F1	OWF_18_F1	OWF_19_F1	OWF_20_F1	OWF_21_F1	OWF_22_F1	OWF_23_F1	OWF_24_F1	OWF_25_F1
Infaunal Species																										
175026	Annelida	*Golfingia (Golfingia) elongata*	(Keferstein, 1862)																							
136060	Annelida	*Nephasoma (Nephasoma) minutum*	(Keferstein, 1862)																							
137582	Annelida	*Tubificoides pseudogaster*	(Dahl, 1960)																							
137349	Annelida	*Grania*	Southern, 1913																							
129781	Annelida	*Ampharete lindstroemi*	Malmgren, 1867 sensu Hessle, 1917			1																			1	
129156	Annelida	*Amphicteis*	Grube, 1850																							
129789	Annelida	*Anobothrus gracilis*	(Malmgren, 1866)																							
129211	Annelida	*Capitella*	Blainville, 1828			3																				
129892	Annelida	*Mediomastus fragilis*	Rasmussen, 1973			7																				
129220	Annelida	*Notomastus*	M. Sars, 1851																				2			
129911	Annelida	*Pseudonotomastus southerni*	Warren & Parker, 1994					1	1											1						
129943	Annelida	*Caulleriella alata*	(Southern, 1914)			2																		1		
152217	Annelida	*Chaetozone christiei*	Chambers, 2000					5				1			2				4							
129955	Annelida	*Chaetozone setosa*	Malmgren, 1867																							
336485	Annelida	*Chaetozone zetlandica*	McIntosh, 1911			1																				
129964	Annelida	*Cirriformia tentaculata*	(Montagu, 1808)			1																	1			
152269	Annelida	*Tharyx killariensis*	(Southern, 1914)							2																
130041	Annelida	*Protodorvillea kefersteini*	(McIntosh, 1869)			2	2	4	5																2	
130044	Annelida	*Schistomeringos neglecta*	(Fauvel, 1923)					4								1										
130116	Annelida	*Glycera alba*	(O.F. Müller, 1776)																							
130123	Annelida	*Glycera lapidum*	Quatrefages, 1866				3		3						1	4				4		2				
130126	Annelida	*Glycera oxycephala*	Ehlers, 1887													1				1				1		
130136	Annelida	*Glycinde nordmanni*	(Malmgren, 1866)				1																			
130140	Annelida	*Goniada maculata*	Örsted, 1843																							
130145	Annelida	*Goniadella gracilis*	(Verrill, 1873)													1										
130195	Annelida	*Podarkeopsis capensis*	(Day, 1963)																							
152249	Annelida	*Psamathe fusca*	Johnston, 1836			2																				
130240	Annelida	*Lumbrineris cingulata*	Ehlers, 1897																							
130266	Annelida	*Magelona alleni*	Wilson, 1958																							
130268	Annelida	*Magelona filiformis*	Wilson, 1959																							
130269	Annelida	*Magelona johnstoni*	Fiege, Licher & Mackie, 2000						1				1				2				1					
146991	Annelida	*Leiochone*	Grube, 1868			1		1			3	1														
130322	Annelida	*Praxillella affinis*	(M. Sars in G.O. Sars, 1872)			1																				
129313	Annelida	*Microphthalmus*	Mecznikow, 1865																							
130355	Annelida	*Nephtys caeca*	(Fabricius, 1780)			1			1											1						
130357	Annelida	*Nephtys cirrosa*	Ehlers, 1868	2						5	1	1		1			2		3		3		1			2
130364	Annelida	*Nephtys longosetosa*	Örsted, 1842										1								3		1			
130375	Annelida	*Eunereis longissima*	(Johnston, 1840)			5																				
492034	Annelida	*Rullierinereis ancornunezi*	Núñez & Brito, 2006					2								1										
130491	Annelida	*Ophelia borealis*	Quatrefages, 1866	7	2	1	4	9			8	8	1	10		3	2	6	6	10	3	7	3	40	9	42
130537	Annelida	*Scoloplos armiger*	(Müller, 1776)			2					4		3	4	1		2		1				6	1		1
146951	Annelida	*Galathowenia fragilis*	(Nilsen & Holthe, 1985)																							
146950	Annelida	*Galathowenia oculata*	(Zachs, 1923)			3																				
129427	Annelida	Owenia	Delle Chiaje, 1844																							
152367	Annelida	*Lagis koreni*	Malmgren, 1866				1																		2	
130616	Annelida	*Eteone longa*	(Fabricius, 1780)			3					1														1	
130631	Annelida	*Eulalia mustela*	Pleijel, 1987				2	1																		
130632	Annelida	*Eulalia ornata*	Saint-Joseph, 1888																							
130639	Annelida	*Eulalia viridis*	(Linnaeus, 1767)			1																				
129446	Annelida	*Eumida*	Malmgren, 1865																							
130641	Annelida	*Eumida bahusiensis*	Bergstrom, 1914																							
130644	Annelida	*Eumida sanguinea*	(Örsted, 1843)			5																				
130649	Annelida	*Hesionura elongata*	(Southern, 1914)																							
152250	Annelida	*Hypereteone foliosa*	(Quatrefages, 1865)																							
147026	Annelida	*Mysta picta*	(Quatrefages, 1866)																							
334506	Annelida	*Phyllodoce groenlandica*	Örsted, 1842									1														
334508	Annelida	*Phyllodoce lineata*	(Claparède, 1870)																							
130673	Annelida	*Phyllodoce longipes*	Kinberg, 1866			1																				
334510	Annelida	*Phyllodoce maculata*	(Linnaeus, 1767)			8																				
334514	Annelida	*Phyllodoce rosea*	(McIntosh, 1877)								1															

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Aphia ID	Phylum	Taxa	Authority	OWF_01_F1	OWF_03_F1	OWF_04_F1	OWF_05_F1	OWF_06_F1	OWF_07_F1	OWF_08_F1	OWF_09_F1	OWF_10_F1	OWF_11_F1	OWF_12_F1	OWF_13_F1	OWF_14_F1	OWF_15_F1	OWF_17_F1	OWF_18_F1	OWF_19_F1	OWF_20_F1	OWF_21_F1	OWF_22_F1	OWF_23_F1	OWF_24_F1	OWF_25_F1
Infaunal Species																										
130683	Annelida	*Pseudomystides limbata*	(Saint-Joseph, 1888)																							
130711	Annelida	*Poecilochaetus serpens*	Allen, 1904																							
129472	Annelida	*Polygordius*	Schneider, 1868																						1	
130754	Annelida	*Harmothoe antilopes*	McIntosh, 1876			1																				
130770	Annelida	*Harmothoe impar*	(Johnston, 1839)																							
130801	Annelida	*Lepidonotus squamatus*	(Linnaeus, 1758)																							
152276	Annelida	*Malmgrenia arenicolae*	(Saint-Joseph, 1888)																							
863197	Annelida	*Malmgrenia darbouxi*	(Pettibone, 1993)																							
236678	Annelida	*Pettibonesia furcosetosa*	(Loshamn, 1981)																							
130867	Annelida	*Sabellaria spinulosa*	(Leuckart, 1849)			39			1																1	
130889	Annelida	*Chone fauveli*	McIntosh, 1916																							
325958	Annelida	*Parasabella*	Bush, 1905																							
530920	Annelida	*Parasabella cambrensis*	(Knight-Jones & Walker, 1985)			1																				
530926	Annelida	*Parasabella langerhansi*	(Knight-Jones, 1983)																							
130967	Annelida	*Sabella pavonina*	Savigny, 1822																							
130979	Annelida	*Scalibregma celticum*	Mackie, 1991																							
130980	Annelida	*Scalibregma inflatum*	Rathke, 1843																							
131009	Annelida	*Hydroides norvegica*	Gunnerus, 1768																							
560033	Annelida	*Spirobranchus lamarcki*	(Quatrefages, 1866)																							
555935	Annelida	*Spirobranchus triqueter*	(Linnaeus, 1758)			7																				
130599	Annelida	*Pholoe baltica*	Örsted, 1843			3																			2	
130601	Annelida	*Pholoe inornata*	Johnston, 1839																							
130707	Annelida	*Pisione remota*	(Southern, 1914)							2					2					9				1		
131074	Annelida	*Sthenelais boa*	(Johnston, 1833)			2																				
131077	Annelida	*Sthenelais limicola*	(Ehlers, 1864)																							
131106	Annelida	*Aonides oxycephala*	(Sars, 1862)																							
131107	Annelida	*Aonides paucibranchiata*	Southern, 1914					2	2											4				2		
478336	Annelida	*Atherospio guillei*	(Laubier & Ramos, 1974)																							
131116	Annelida	*Dipolydora caulleryi*	(Mesnil, 1897)																							
131118	Annelida	*Dipolydora flava*	(Claparède, 1870)																							
131123	Annelida	*Dipolydora saintjosephi*	(Eliason, 1920)																							
131127	Annelida	*Laonice bahusiensis*	Söderström, 1920				1																			
129620	Annelida	*Prionospio*	Malmgren, 1867																							
129623	Annelida	*Scolelepis*	Blainville, 1828																							
131171	Annelida	*Scolelepis bonnieri*	(Mesnil, 1896)								1										1					
129625	Annelida	*Spio*	Fabricius, 1785		1																					
131180	Annelida	*Spio armata*	(Thulin, 1957)			2																				
131184	Annelida	*Spio goniocephala*	Thulin, 1957								1			1												
596189	Annelida	*Spio symphyta*	Meißner, Bick & Bastrop, 2011						2							1				3				1		
131187	Annelida	*Spiophanes bombyx*	(Claparède, 1870)								3	1											1			
131290	Annelida	*Eusyllis blomstrandi*	Malmgren, 1867			1																				
327985	Annelida	*Exogone naidina*	Örsted, 1845																					2		
129659	Annelida	*Myrianida*	Milne Edwards, 1845			1																				
757970	Annelida	*Parexogone hebes*	(Webster & Benedict, 1884)			1									1											
129671	Annelida	*Proceraea*	Ehlers, 1864																							
131379	Annelida	*Sphaerosyllis bulbosa*	Southern, 1914				1									1										
131394	Annelida	*Sphaerosyllis taylori*	Perkins, 1981																							
238207	Annelida	*Streptodonta pterochaeta*	(Southern, 1914)					1																		
238248	Annelida	*Streptosyllis campoyi*	Brito, Núñez & San Martín, 2000																							
129679	Annelida	*Syllides*	Örsted, 1845																							
129680	Annelida	*Syllis*	Lamarck, 1818			3																				
131431	Annelida	*Syllis garciai*	(Campoy, 1982)					1																		
131435	Annelida	*Syllis gracilis*	Grube, 1840																							
712175	Annelida	*Syllis mercedesae*	Lucas, San Martín & Parapar, 2012																			1				
131495	Annelida	*Lanice conchilega*	(Pallas, 1766)			1																				
131501	Annelida	*Lysilla nivea*	Langerhans, 1884																							
131508	Annelida	*Nicolea zostericola*	Örsted, 1844																							
129710	Annelida	*Polycirrus*	Grube, 1850			2			2							1										
131543	Annelida	*Thelepus cincinnatus*	(Fabricius, 1780)			1																				
130512	Annelida	*Travisia forbesii*	Johnston, 1840												2									1		

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Aphia ID	Phylum	Taxa	Authority	OWF_01_F1	OWF_03_F1	OWF_04_F1	OWF_05_F1	OWF_06_F1	OWF_07_F1	OWF_08_F1	OWF_09_F1	OWF_10_F1	OWF_11_F1	OWF_12_F1	OWF_13_F1	OWF_14_F1	OWF_15_F1	OWF_17_F1	OWF_18_F1	OWF_19_F1	OWF_20_F1	OWF_21_F1	OWF_22_F1	OWF_23_F1	OWF_24_F1	OWF_25_F1
Infaunal Species																										
101896	Arthropoda	*Ampelisca diadema*	(Costa, 1853)																							
101933	Arthropoda	*Ampelisca typica*	(Spence Bate, 1856)																							
102012	Arthropoda	*Aora gracilis*	(Spence Bate, 1857)																							
101368	Arthropoda	Aoridae	Stebbing, 1899																							
102139	Arthropoda	*Nototropis falcatus*	(Metzger, 1871)			1														1						
488966	Arthropoda	*Nototropis swammerdamei*	(H. Milne Edwards, 1830)																							
101742	Arthropoda	*Bathyporeia*	Lindström, 1855								3	1		1												
103058	Arthropoda	*Bathyporeia elegans*	Watkin, 1938	1				2			12	5	2	9	1		8	13			25		5	1	1	1
103060	Arthropoda	*Bathyporeia guilliamsoniana*	(Spence Bate, 1857)							1	1										2		2			
103066	Arthropoda	*Bathyporeia pelagica*	(Spence Bate, 1857)	1														4								
101839	Arthropoda	*Caprella linearis*	(Linnaeus, 1767)																							
101857	Arthropoda	*Pariambus typicus*	(Krøyer, 1845)																							
237004	Arthropoda	*Crassicorophium bonellii*	(H. Milne Edwards, 1830)																							
397383	Arthropoda	*Crassicorophium crassicorne*	(Bruzelius, 1859)																							
102036	Arthropoda	*Leptocheirus hirsutimanus*	(Spence Bate, 1862)																							
102141	Arthropoda	*Tritaeta gibbosa*	(Spence Bate, 1862)																							
102345	Arthropoda	*Iphimedia minuta*	G.O. Sars, 1883			1																				
101567	Arthropoda	*Ericthonius*	H. Milne Edwards, 1830																							
102408	Arthropoda	*Ericthonius punctatus*	(Spence Bate, 1857)																							
102439	Arthropoda	*Microjassa cumbrensis*	(Stebbing & Robertson, 1891)																							
102460	Arthropoda	*Leucothoe incisa*	Robertson, 1892																							
102466	Arthropoda	*Leucothoe procera*	Spence Bate, 1857																							
102788	Arthropoda	*Abludomelita obtusata*	(Montagu, 1813)																	1					1	
102364	Arthropoda	*Gammaropsis maculata*	(Johnston, 1828)																							
102383	Arthropoda	*Photis longicaudata*	(Spence Bate & Westwood, 1862)																							
102387	Arthropoda	*Photis reinhardi*	Krøyer, 1842																							
102989	Arthropoda	*Phoxocephalus holbolli*	(Krøyer, 1842)																						1	
103008	Arthropoda	*Parapleustes bicuspis*	(Krøyer, 1838)																							
103132	Arthropoda	*Metopa pusilla*	Sars, 1892																							
103166	Arthropoda	*Stenothoe marina*	(Spence Bate, 1857)																							
102057	Arthropoda	*Unciola crenatipalma*	(Spence Bate, 1862)			2																				
101658	Arthropoda	*Tmetonyx*	Stebbing, 1906																							
101789	Arthropoda	*Urothoe*	Dana, 1852															1								
103226	Arthropoda	*Urothoe brevicornis*	Spence Bate, 1862															4			2					
103228	Arthropoda	*Urothoe elegans*	Spence Bate, 1857			23						3					1								1	
103235	Arthropoda	*Urothoe poseidonis*	Reibish, 1905														9	3								
110488	Arthropoda	*Diastylis rugosa*	Sars, 1865																							
107729	Arthropoda	*Callianassa subterranea*	(Montagu, 1808)																							
107150	Arthropoda	*Galathea intermedia*	Lilljeborg, 1851			4																				
107333	Arthropoda	*Inachus phalangium*	(J. C. Fabricius, 1775)			1																				
107301	Arthropoda	*Ebalia tuberosa*	(Pennant, 1777)																							
107188	Arthropoda	*Pisidia longicornis*	(Linnaeus, 1767)			43																				
107742	Arthropoda	*Upogebia stellata*	(Montagu, 1808)																							
148637	Arthropoda	*Eurydice spinigera*	Hansen, 1890																							
118995	Arthropoda	*Gnathia oxyuraea*	(Lilljeborg, 1855)																							
459311	Arthropoda	*Nebalia reboredae*	Moreira & Urgorri, 2009	1		2																				
120020	Arthropoda	*Gastrosaccus spinifer*	(Goës, 1864)												1											
136458	Arthropoda	*Tanaopsis graciloides*	(Lilljeborg, 1864)			1																				
134599	Arthropoda	*Achelia echinata*	Hodge, 1864			3						1														
134723	Arthropoda	*Anoplodactylus petiolatus*	(Krøyer, 1844)																							
106213	Arthropoda	*Balanus balanus*	(Linnaeus, 1758)																							
106215	Arthropoda	*Balanus crenatus*	Bruguière, 1789			14																				
106257	Arthropoda	*Verruca stroemia*	(O.F. Müller, 1776)			1																				
126751	Chordata	*Ammodytes marinus*	Raitt, 1934																							
126754	Chordata	*Gymnammodytes semisquamatus*	(Jourdain, 1879)																							
150630	Chordata	*Echiichthys vipera*	(Cuvier, 1829)																							
104906	Chordata	*Branchiostoma lanceolatum*	(Pallas, 1774)																							

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Aphia ID	Phylum	Taxa	Authority	OWF_01_F1	OWF_03_F1	OWF_04_F1	OWF_05_F1	OWF_06_F1	OWF_07_F1	OWF_08_F1	OWF_09_F1	OWF_10_F1	OWF_11_F1	OWF_12_F1	OWF_13_F1	OWF_14_F1	OWF_15_F1	OWF_17_F1	OWF_18_F1	OWF_19_F1	OWF_20_F1	OWF_21_F1	OWF_22_F1	OWF_23_F1	OWF_24_F1	OWF_25_F1
Infaunal Species																										
283798	Cnidaria	*Cerianthus lloydii*	Gosse, 1859																							
100665	Cnidaria	Edwardsiidae	Andres, 1881			1																				
1360	Cnidaria	Actiniaria	Hertwig, 1882			3																	1			
123776	Echinodermata	*Asterias rubens*	Linnaeus, 1758																							
124273	Echinodermata	*Echinocyamus pusillus*	(O.F. Müller, 1776)				1													2						
124392	Echinodermata	*Echinocardium cordatum*	(Pennant, 1777)														2	1								
124462	Echinodermata	*Leptosynapta bergensis*	(Östergren, 1905)																							
125064	Echinodermata	*Amphipholis squamata*	(Delle Chiaje, 1828)			12																				
125131	Echinodermata	*Ophiothrix fragilis*	(Abildgaard in O.F. Müller, 1789)			1																				
124913	Echinodermata	*Ophiura albida*	Forbes, 1839																							
112299	Foraminifera	*Astrorhiza*	Sandahl, 1858																							
1818	Hemichordata	Hemichordata	Bateson, 1885				1																			
140103	Mollusca	*Hiatella arctica*	(Linnaeus, 1767)			2																				
160539	Mollusca	*Ensis magnus*	Schumacher, 1817																							
141433	Mollusca	*Abra alba*	(W. Wood, 1802)			7																				
141436	Mollusca	*Abra prismatica*	(Montagu, 1808)																							
141577	Mollusca	*Arcopagia crassa*	(Pennant, 1777)																							
879714	Mollusca	*Asbjornsenia pygmaea*	(Lovén, 1846)												1					1						
146907	Mollusca	*Fabulina fabula*	(Gmelin, 1791)										1				1									
138831	Mollusca	*Goodallia triangularis*	(Montagu, 1803)				121	3	1						173				3	219			1	97		
345281	Mollusca	*Kurtiella bidentata*	(Montagu, 1803)			1						1														
140218	Mollusca	*Lepton squamosum*	(Montagu, 1803)																							
146952	Mollusca	*Tellimya ferruginosa*	(Montagu, 1808)														1									
140283	Mollusca	*Lucinoma borealis*	(Linnaeus, 1767)			1																				
140431	Mollusca	*Mya truncata*	Linnaeus, 1758			1																				
140300	Mollusca	*Spisula elliptica*	(T. Brown, 1827)					2												1						
140301	Mollusca	*Spisula solida*	(Linnaeus, 1758)						1													1				
141911	Mollusca	*Dosinia exoleta*	(Linnaeus, 1758)																							
141912	Mollusca	*Dosinia lupinus*	(Linnaeus, 1758)																							
745846	Mollusca	*Polititapes rhomboides*	(Pennant, 1777)																							
141929	Mollusca	*Timoclea ovata*	(Pennant, 1777)																					1	1	
181364	Mollusca	*Venerupis corrugata*	(Gmelin, 1791)			1																				
141651	Mollusca	*Thracia villosiuscula*	(MacGillivray, 1827)																							
141134	Mollusca	*Retusa obtusa*	(Montagu, 1803)					1															1			
138952	Mollusca	*Caecum glabrum*	(Montagu, 1803)																	1						
138963	Mollusca	*Crepidula fornicata*	(Linnaeus, 1758)			5																				
140129	Mollusca	*Hyala vitrea*	(Montagu, 1803)																							
151894	Mollusca	*Euspira nitida*	(Donovan, 1803)																	1						1
141365	Mollusca	*Rissoa parva*	(da Costa, 1778)																							
138878	Mollusca	*Buccinum undatum*	Linnaeus, 1758																							
876825	Mollusca	*Tritia incrassata*	(Strøm, 1768)			7																				
1389226	Mollusca	*Cyrillia linearis*	(Montagu, 1803)																							
1473658	Mollusca	*Duvaucelia plebeia*	(G. Johnston, 1828)																							
1762	Mollusca	Nudibranchia	Cuvier, 1817																							
1477356	Mollusca	*Steromphala tumida*	(Montagu, 1803)																							
1039839	Mollusca	*Steromphala cineraria*	(Linnaeus, 1758)			2																				
140199	Mollusca	*Leptochiton asellus*	(Gmelin, 1791)			1																				
799	Nematoda	Nematoda				14					1		1									1			3	
152391	Nemertea	Nemertea				7			2		1											1			3	
128545	Phoronida	Phoronis	Wright, 1856																							
793	Platyhelminthes	Platyhelminthes	Minot, 1876			1																				
			S	5	2	63	11	15	12	4	14	11	7	6	10	9	10	7	5	16	8	6	12	12	15	5
			N	12	3	279	138	39	22	10	41	24	10	26	185	14	30	32	17	260	40	13	25	149	30	47
			D	1.61	0.91	11.01	2.03	3.82	3.56	1.30	3.50	3.15	2.61	1.53	1.72	3.03	2.65	1.73	1.41	2.70	1.90	1.95	3.42	2.20	4.12	1.04
			J'	0.77	0.92	0.81	0.27	0.90	0.94	0.88	0.84	0.84	0.94	0.78	0.16	0.91	0.85	0.84	0.92	0.29	0.65	0.79	0.90	0.41	0.88	0.30
			H'(log2)	1.78	0.92	4.85	0.92	3.52	3.35	1.76	3.18	2.90	2.65	2.02	0.55	2.90	2.82	2.36	2.15	1.15	1.96	2.03	3.21	1.47	3.44	0.69
			1-Lambda'	0.67	0.67	0.94	0.23	0.91	0.93	0.73	0.87	0.85	0.91	0.73	0.13	0.90	0.84	0.78	0.80	0.29	0.60	0.72	0.90	0.51	0.90	0.20
			ITI	22.2	33.3	70.9	92.0	38.9	54.0	43.3	58.5	54.2	50.0	48.7	96.9	43.6	78.9	76.0	41.2	91.3	79.2	25.6	49.3	70.2	31.0	5.0

2210 Outer Dousing Offshore Wind Farm - Macrofauna Infaunal Matrix																										
Aphia ID	Phylum	Taxa	Authority	OWF_26_F1	OWF_27_F1	OWF_29_F1	OWF_30_F1	OWF_31_F1	OWF_32_F1	OWF_33_F1	OWF_34_F1	OWF_36_F1	OWF_37_F1	OWF_39_F1	OWF_40_F1	OWF_41_F1	OWF_42_F1	OWF_43_F1	OWF_44_F1	OWF_45_F1	OWF_46_F1	OWF_47_F1	OWF_48_F1	OWF_49_F1	OWF_51_F1	OWF_52_F1
Infaunal Species																										
175026	Annelida	*Golfingia (Golfingia) elongata*	(Keferstein, 1862)			2														3						
136060	Annelida	*Nephasoma (Nephasoma) minutum*	(Keferstein, 1862)			1				1											3					
137582	Annelida	*Tubificoides pseudogaster*	(Dahl, 1960)			1																				
137349	Annelida	*Grania*	Southern, 1913		1																	1	1			
129781	Annelida	*Ampharete lindstroemi*	Malmgren, 1867 sensu Hessle, 1917			10				1				2				1		1						1
129156	Annelida	*Amphicteis*	Grube, 1850			1																				
129789	Annelida	*Anobothrus gracilis*	(Malmgren, 1866)			1																				
129211	Annelida	*Capitella*	Blainville, 1828				1																			
129892	Annelida	*Mediomastus fragilis*	Rasmussen, 1973					2				2		7		3		1			1					1
129220	Annelida	*Notomastus*	M. Sars, 1851			8		4										1		1	4		1	1	4	9
129911	Annelida	*Pseudonotomastus southerni*	Warren & Parker, 1994		1		1															1	1			
129943	Annelida	*Caulleriella alata*	(Southern, 1914)			2		1				1				1										
152217	Annelida	*Chaetozone christiei*	Chambers, 2000																							
129955	Annelida	*Chaetozone setosa*	Malmgren, 1867																							
336485	Annelida	*Chaetozone zetlandica*	McIntosh, 1911						2							1										
129964	Annelida	*Cirriformia tentaculata*	(Montagu, 1808)																							
152269	Annelida	*Tharyx killariensis*	(Southern, 1914)									1		1			1									
130041	Annelida	*Protodorvillea kefersteini*	(McIntosh, 1869)						2			1				2						1				
130044	Annelida	*Schistomeringos neglecta*	(Fauvel, 1923)																		1					3
130116	Annelida	*Glycera alba*	(O.F. Müller, 1776)																							
130123	Annelida	*Glycera lapidum*	Quatrefages, 1866				2	2					1						5					1	1	
130126	Annelida	*Glycera oxycephala*	Ehlers, 1887																		1					
130136	Annelida	*Glycinde nordmanni*	(Malmgren, 1866)																							
130140	Annelida	*Goniada maculata*	Örsted, 1843	1																						
130145	Annelida	*Goniadella gracilis*	(Verrill, 1873)																							
130195	Annelida	*Podarkeopsis capensis*	(Day, 1963)	1																						
152249	Annelida	*Psamathe fusca*	Johnston, 1836																							
130240	Annelida	*Lumbrineris cingulata*	Ehlers, 1897			2		1		1				2												
130266	Annelida	*Magelona alleni*	Wilson, 1958			1																				
130268	Annelida	*Magelona filiformis*	Wilson, 1959																							
130269	Annelida	*Magelona johnstoni*	Fiege, Licher & Mackie, 2000																							
146991	Annelida	*Leiochone*	Grube, 1868	3					1					1		1										
130322	Annelida	*Praxillella affinis*	(M. Sars in G.O. Sars, 1872)											1												
129313	Annelida	*Microphthalmus*	Mecznikow, 1865																							
130355	Annelida	*Nephtys caeca*	(Fabricius, 1780)					1		1				1		1	2				2					1
130357	Annelida	*Nephtys cirrosa*	Ehlers, 1868				1										1						2			1
130364	Annelida	*Nephtys longosetosa*	Örsted, 1842	1								1				1				2						
130375	Annelida	*Eunereis longissima*	(Johnston, 1840)										1					1								
492034	Annelida	*Rullierinereis ancornunezi*	Núñez & Brito, 2006									2				1										1
130491	Annelida	*Ophelia borealis*	Quatrefages, 1866	9			16	1	7		7	14	3	1	9		11	1	2		5	10	5	4	2	3
130537	Annelida	*Scoloplos armiger*	(Müller, 1776)	3	2	18			1	7		4		2		1	1	1						1		2
146951	Annelida	*Galathowenia fragilis*	(Nilsen & Holthe, 1985)							1				3												
146950	Annelida	*Galathowenia oculata*	(Zachs, 1923)			13								1												
129427	Annelida	Owenia	Delle Chiaje, 1844			2								1												
152367	Annelida	*Lagis koreni*	Malmgren, 1866											1												
130616	Annelida	*Eteone longa*	(Fabricius, 1780)			2						1				1		1						1		
130631	Annelida	*Eulalia mustela*	Pleijel, 1987						1			6				1					1					
130632	Annelida	*Eulalia ornata*	Saint-Joseph, 1888																							
130639	Annelida	*Eulalia viridis*	(Linnaeus, 1767)																							
129446	Annelida	*Eumida*	Malmgren, 1865							1			1													
130641	Annelida	*Eumida bahusiensis*	Bergstrom, 1914																							
130644	Annelida	*Eumida sanguinea*	(Örsted, 1843)																							
130649	Annelida	*Hesionura elongata*	(Southern, 1914)		1																					
152250	Annelida	*Hypereteone foliosa*	(Quatrefages, 1865)																							
147026	Annelida	*Mysta picta*	(Quatrefages, 1866)																	1						
334506	Annelida	*Phyllodoce groenlandica*	Örsted, 1842																							
334508	Annelida	*Phyllodoce lineata*	(Claparède, 1870)																							
130673	Annelida	*Phyllodoce longipes*	Kinberg, 1866																							
334510	Annelida	*Phyllodoce maculata*	(Linnaeus, 1767)					2		13								3								
334514	Annelida	*Phyllodoce rosea*	(McIntosh, 1877)	1										5												

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Aphia ID	**Phylum**	**Taxa**	**Authority**	**OWF_26_F1**	**OWF_27_F1**	**OWF_29_F1**	**OWF_30_F1**	**OWF_31_F1**	**OWF_32_F1**	**OWF_33_F1**	**OWF_34_F1**	**OWF_36_F1**	**OWF_37_F1**	**OWF_39_F1**	**OWF_40_F1**	**OWF_41_F1**	**OWF_42_F1**	**OWF_43_F1**	**OWF_44_F1**	**OWF_45_F1**	**OWF_46_F1**	**OWF_47_F1**	**OWF_48_F1**	**OWF_49_F1**	**OWF_51_F1**	**OWF_52_F1**
Infaunal Species																										
130683	Annelida	*Pseudomystides limbata*	(Saint-Joseph, 1888)					1																		
130711	Annelida	*Poecilochaetus serpens*	Allen, 1904			1							1	8						1						
129472	Annelida	*Polygordius*	Schneider, 1868		1				1				5													
130754	Annelida	*Harmothoe antilopes*	McIntosh, 1876																							
130770	Annelida	*Harmothoe impar*	(Johnston, 1839)															1								
130801	Annelida	*Lepidonotus squamatus*	(Linnaeus, 1758)																							
152276	Annelida	*Malmgrenia arenicolae*	(Saint-Joseph, 1888)									1														
863197	Annelida	*Malmgrenia darbouxi*	(Pettibone, 1993)															1								
236678	Annelida	*Pettibonesia furcosetosa*	(Loshamn, 1981)			2																				
130867	Annelida	*Sabellaria spinulosa*	(Leuckart, 1849)			3				22				3				24	2	13	2					
130889	Annelida	*Chone fauveli*	McIntosh, 1916			1																				
325958	Annelida	*Parasabella*	Bush, 1905																						1	
530920	Annelida	*Parasabella cambrensis*	(Knight-Jones & Walker, 1985)																							
530926	Annelida	*Parasabella langerhansi*	(Knight-Jones, 1983)																							1
130967	Annelida	*Sabella pavonina*	Savigny, 1822																	1						
130979	Annelida	*Scalibregma celticum*	Mackie, 1991															1								
130980	Annelida	*Scalibregma inflatum*	Rathke, 1843			3								2												
131009	Annelida	*Hydroides norvegica*	Gunnerus, 1768																							
560033	Annelida	*Spirobranchus lamarcki*	(Quatrefages, 1866)																		2				1	
555935	Annelida	*Spirobranchus triqueter*	(Linnaeus, 1758)			4										2		1		8				1		
130599	Annelida	*Pholoe baltica*	Örsted, 1843			6						1		2		6		2		3				1		1
130601	Annelida	*Pholoe inornata*	Johnston, 1839					2		1								3								
130707	Annelida	*Pisione remota*	(Southern, 1914)	1	5		3						11						1			1				
131074	Annelida	*Sthenelais boa*	(Johnston, 1833)															1								
131077	Annelida	*Sthenelais limicola*	(Ehlers, 1864)																							
131106	Annelida	*Aonides oxycephala*	(Sars, 1862)			1								1												
131107	Annelida	*Aonides paucibranchiata*	Southern, 1914		1		2	2	3			8				1			2						1	1
478336	Annelida	*Atherospio guillei*	(Laubier & Ramos, 1974)																							
131116	Annelida	*Dipolydora caulleryi*	(Mesnil, 1897)																		1					
131118	Annelida	*Dipolydora flava*	(Claparède, 1870)							1																
131123	Annelida	*Dipolydora saintjosephi*	(Eliason, 1920)																	1						
131127	Annelida	*Laonice bahusiensis*	Söderström, 1920			1																				
129620	Annelida	*Prionospio*	Malmgren, 1867					1																		
129623	Annelida	*Scolelepis*	Blainville, 1828	1																						
131171	Annelida	*Scolelepis bonnieri*	(Mesnil, 1896)														1									
129625	Annelida	*Spio*	Fabricius, 1785																							
131180	Annelida	*Spio armata*	(Thulin, 1957)																						4	1
131184	Annelida	*Spio goniocephala*	Thulin, 1957												1		1						2			
596189	Annelida	*Spio symphyta*	Meißner, Bick & Bastrop, 2011																			1				
131187	Annelida	*Spiophanes bombyx*	(Claparède, 1870)	1					1					8							1					
131290	Annelida	*Eusyllis blomstrandi*	Malmgren, 1867			1			18	1	11	1	1			1		12						3		
327985	Annelida	*Exogone naidina*	Örsted, 1845						1			2											1			
129659	Annelida	*Myrianida*	Milne Edwards, 1845			1														1				2		
757970	Annelida	*Parexogone hebes*	(Webster & Benedict, 1884)				1	3				7		2												
129671	Annelida	*Proceraea*	Ehlers, 1864																					1		
131379	Annelida	*Sphaerosyllis bulbosa*	Southern, 1914																							
131394	Annelida	*Sphaerosyllis taylori*	Perkins, 1981			1										1										
238207	Annelida	*Streptodonta pterochaeta*	(Southern, 1914)																							
238248	Annelida	*Streptosyllis campoyi*	Brito, Núñez & San Martín, 2000		2																					
129679	Annelida	*Syllides*	Örsted, 1845					1																		
129680	Annelida	*Syllis*	Lamarck, 1818																							
131431	Annelida	*Syllis garciai*	(Campoy, 1982)																		1			1		
131435	Annelida	*Syllis gracilis*	Grube, 1840																							
712175	Annelida	*Syllis mercedesae*	Lucas, San Martín & Parapar, 2012																							
131495	Annelida	*Lanice conchilega*	(Pallas, 1766)																	2						
131501	Annelida	*Lysilla nivea*	Langerhans, 1884					1																		
131508	Annelida	*Nicolea zostericola*	Örsted, 1844											1				3								
129710	Annelida	*Polycirrus*	Grube, 1850		1	2	1	1			1		2	3		4		2			1					2
131543	Annelida	*Thelepus cincinnatus*	(Fabricius, 1780)															1		1						
130512	Annelida	*Travisia forbesii*	Johnston, 1840								2				1											

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Aphia ID	Phylum	Taxa	Authority	OWF_26_F1	OWF_27_F1	OWF_29_F1	OWF_30_F1	OWF_31_F1	OWF_32_F1	OWF_33_F1	OWF_34_F1	OWF_36_F1	OWF_37_F1	OWF_39_F1	OWF_40_F1	OWF_41_F1	OWF_42_F1	OWF_43_F1	OWF_44_F1	OWF_45_F1	OWF_46_F1	OWF_47_F1	OWF_48_F1	OWF_49_F1	OWF_51_F1	OWF_52_F1
Infaunal Species																										
101896	Arthropoda	*Ampelisca diadema*	(Costa, 1853)			1												1		1						
101933	Arthropoda	*Ampelisca typica*	(Spence Bate, 1856)							2				1							1					
102012	Arthropoda	*Aora gracilis*	(Spence Bate, 1857)																							
101368	Arthropoda	Aoridae	Stebbing, 1899															1								
102139	Arthropoda	*Nototropis falcatus*	(Metzger, 1871)																							
488966	Arthropoda	*Nototropis swammerdamei*	(H. Milne Edwards, 1830)						3															1		
101742	Arthropoda	*Bathyporeia*	Lindström, 1855																							
103058	Arthropoda	*Bathyporeia elegans*	Watkin, 1938	1	1							2			2	1		1				5				
103060	Arthropoda	*Bathyporeia guilliamsoniana*	(Spence Bate, 1857)																			1			1	
103066	Arthropoda	*Bathyporeia pelagica*	(Spence Bate, 1857)																							
101839	Arthropoda	*Caprella linearis*	(Linnaeus, 1767)																							
101857	Arthropoda	*Pariambus typicus*	(Krøyer, 1845)						4	1																
237004	Arthropoda	*Crassicorophium bonellii*	(H. Milne Edwards, 1830)															2								
397383	Arthropoda	*Crassicorophium crassicorne*	(Bruzelius, 1859)			1												1								
102036	Arthropoda	*Leptocheirus hirsutimanus*	(Spence Bate, 1862)									1				1						1		4		
102141	Arthropoda	*Tritaeta gibbosa*	(Spence Bate, 1862)						2			17						2								
102345	Arthropoda	*Iphimedia minuta*	G.O. Sars, 1883															1								
101567	Arthropoda	*Ericthonius*	H. Milne Edwards, 1830															1								
102408	Arthropoda	*Ericthonius punctatus*	(Spence Bate, 1857)																							
102439	Arthropoda	*Microjassa cumbrensis*	(Stebbing & Robertson, 1891)						1																	
102460	Arthropoda	*Leucothoe incisa*	Robertson, 1892											1							1					
102466	Arthropoda	*Leucothoe procera*	Spence Bate, 1857															1								
102788	Arthropoda	*Abludomelita obtusata*	(Montagu, 1813)						3	9	3	1				3		5			1					
102364	Arthropoda	*Gammaropsis maculata*	(Johnston, 1828)						1	1																
102383	Arthropoda	*Photis longicaudata*	(Spence Bate & Westwood, 1862)											1						3						
102387	Arthropoda	*Photis reinhardi*	Krøyer, 1842						2							2										
102989	Arthropoda	*Phoxocephalus holbolli*	(Krøyer, 1842)																							
103008	Arthropoda	*Parapleustes bicuspis*	(Krøyer, 1838)						1																	
103132	Arthropoda	*Metopa pusilla*	Sars, 1892						2																	
103166	Arthropoda	*Stenothoe marina*	(Spence Bate, 1857)			2			2									1								
102057	Arthropoda	*Unciola crenatipalma*	(Spence Bate, 1862)																							
101658	Arthropoda	*Tmetonyx*	Stebbing, 1906																	1						
101789	Arthropoda	*Urothoe*	Dana, 1852							5																
103226	Arthropoda	*Urothoe brevicornis*	Spence Bate, 1862																							
103228	Arthropoda	*Urothoe elegans*	Spence Bate, 1857			47				18				15		1		31		10		1				
103235	Arthropoda	*Urothoe poseidonis*	Reibish, 1905																							
110488	Arthropoda	*Diastylis rugosa*	Sars, 1865																1							
107729	Arthropoda	*Callianassa subterranea*	(Montagu, 1808)																							
107150	Arthropoda	*Galathea intermedia*	Lilljeborg, 1851															1								
107333	Arthropoda	*Inachus phalangium*	(J. C. Fabricius, 1775)																							
107301	Arthropoda	*Ebalia tuberosa*	(Pennant, 1777)															1								
107188	Arthropoda	*Pisidia longicornis*	(Linnaeus, 1767)							2		1														1
107742	Arthropoda	*Upogebia stellata*	(Montagu, 1808)																							
148637	Arthropoda	*Eurydice spinigera*	Hansen, 1890																				1			
118995	Arthropoda	*Gnathia oxyuraea*	(Lilljeborg, 1855)																							
459311	Arthropoda	*Nebalia reboredae*	Moreira & Urgorri, 2009							7																
120020	Arthropoda	*Gastrosaccus spinifer*	(Goës, 1864)																							
136458	Arthropoda	*Tanaopsis graciloides*	(Lilljeborg, 1864)			2												1			1					
134599	Arthropoda	*Achelia echinata*	Hodge, 1864													1		3								
134723	Arthropoda	*Anoplodactylus petiolatus*	(Krøyer, 1844)							2				2				1								
106213	Arthropoda	*Balanus balanus*	(Linnaeus, 1758)																					1		
106215	Arthropoda	*Balanus crenatus*	Bruguière, 1789					25		10																
106257	Arthropoda	*Verruca stroemia*	(O.F. Müller, 1776)											1												
126751	Chordata	*Ammodytes marinus*	Raitt, 1934														3									
126754	Chordata	*Gymnammodytes semisquamatus*	(Jourdain, 1879)																			1				
150630	Chordata	*Echiichthys vipera*	(Cuvier, 1829)																							
104906	Chordata	*Branchiostoma lanceolatum*	(Pallas, 1774)										1													

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Aphia ID	Phylum	Taxa	Authority	OWF_26_F1	OWF_27_F1	OWF_29_F1	OWF_30_F1	OWF_31_F1	OWF_32_F1	OWF_33_F1	OWF_34_F1	OWF_36_F1	OWF_37_F1	OWF_39_F1	OWF_40_F1	OWF_41_F1	OWF_42_F1	OWF_43_F1	OWF_44_F1	OWF_45_F1	OWF_46_F1	OWF_47_F1	OWF_48_F1	OWF_49_F1	OWF_51_F1	OWF_52_F1
Infaunal Species																										
283798	Cnidaria	*Cerianthus lloydii*	Gosse, 1859			1								1												
100665	Cnidaria	Edwardsiidae	Andres, 1881							1				1		1		1								
1360	Cnidaria	Actiniaria	Hertwig, 1882			2				1								5								
123776	Echinodermata	*Asterias rubens*	Linnaeus, 1758																							
124273	Echinodermata	*Echinocyamus pusillus*	(O.F. Müller, 1776)			1	1							1											1	
124392	Echinodermata	*Echinocardium cordatum*	(Pennant, 1777)																							
124462	Echinodermata	*Leptosynapta bergensis*	(Östergren, 1905)															1								
125064	Echinodermata	*Amphipholis squamata*	(Delle Chiaje, 1828)			5				3								4			1					
125131	Echinodermata	*Ophiothrix fragilis*	(Abildgaard in O.F. Müller, 1789)			1																				
124913	Echinodermata	*Ophiura albida*	Forbes, 1839																							
112299	Foraminifera	*Astrorhiza*	Sandahl, 1858			1																				
1818	Hemichordata	Hemichordata	Bateson, 1885																							
140103	Mollusca	*Hiatella arctica*	(Linnaeus, 1767)			1												4								
160539	Mollusca	*Ensis magnus*	Schumacher, 1817																							
141433	Mollusca	*Abra alba*	(W. Wood, 1802)			13				8								5								
141436	Mollusca	*Abra prismatica*	(Montagu, 1808)																							
141577	Mollusca	*Arcopagia crassa*	(Pennant, 1777)									1										1				
879714	Mollusca	*Asbjornsenia pygmaea*	(Lovén, 1846)																			1				
146907	Mollusca	*Fabulina fabula*	(Gmelin, 1791)																							
138831	Mollusca	*Goodallia triangularis*	(Montagu, 1803)				12				2		12						16			74	12			
345281	Mollusca	*Kurtiella bidentata*	(Montagu, 1803)			4			1					3		1		4								
140218	Mollusca	*Lepton squamosum*	(Montagu, 1803)													1										
146952	Mollusca	*Tellimya ferruginosa*	(Montagu, 1808)																							
140283	Mollusca	*Lucinoma borealis*	(Linnaeus, 1767)																							
140431	Mollusca	*Mya truncata*	Linnaeus, 1758							2										1	1					
140300	Mollusca	*Spisula elliptica*	(T. Brown, 1827)					1	1																	
140301	Mollusca	*Spisula solida*	(Linnaeus, 1758)																							
141911	Mollusca	*Dosinia exoleta*	(Linnaeus, 1758)									1														
141912	Mollusca	*Dosinia lupinus*	(Linnaeus, 1758)																		1					
745846	Mollusca	*Polititapes rhomboides*	(Pennant, 1777)					1												1						
141929	Mollusca	*Timoclea ovata*	(Pennant, 1777)	1								1		3		1		2				2				
181364	Mollusca	*Venerupis corrugata*	(Gmelin, 1791)			1										1										
141651	Mollusca	*Thracia villosiuscula*	(MacGillivray, 1827)																							
141134	Mollusca	*Retusa obtusa*	(Montagu, 1803)																							
138952	Mollusca	*Caecum glabrum*	(Montagu, 1803)																							
138963	Mollusca	*Crepidula fornicata*	(Linnaeus, 1758)																							
140129	Mollusca	*Hyala vitrea*	(Montagu, 1803)																							
151894	Mollusca	*Euspira nitida*	(Donovan, 1803)	1												1										
141365	Mollusca	*Rissoa parva*	(da Costa, 1778)																							
138878	Mollusca	*Buccinum undatum*	Linnaeus, 1758					1																		
876825	Mollusca	*Tritia incrassata*	(Strøm, 1768)																							
1389226	Mollusca	*Cyrillia linearis*	(Montagu, 1803)																							
1473658	Mollusca	*Duvaucelia plebeia*	(G. Johnston, 1828)															1								
1762	Mollusca	Nudibranchia	Cuvier, 1817						4	1			1			1				1						
1477356	Mollusca	*Steromphala tumida*	(Montagu, 1803)																	1						
1039839	Mollusca	*Steromphala cineraria*	(Linnaeus, 1758)																							
140199	Mollusca	*Leptochiton asellus*	(Gmelin, 1791)			1														1						
799	Nematoda	Nematoda			4	2		18	6	1	1	7	9	2		3				1		2			9	2
152391	Nemertea	Nemertea				4			11	1	2	1	5			2	2	2	1						5	
128545	Phoronida	Phoronis	Wright, 1856			4		1						2		5		1		11						
793	Platyhelminthes	Platyhelminthes	Minot, 1876																							
			S	13	11	46	11	22	26	30	8	26	14	36	4	33	9	48	8	25	21	16	9	14	11	16
			N	25	20	185	41	73	82	126	29	86	54	93	13	55	23	147	30	71	33	104	26	23	30	31
			D	3.73	3.34	8.62	2.69	4.89	5.67	6.00	2.08	5.61	3.26	7.72	1.17	7.99	2.55	9.42	2.06	5.63	5.72	3.23	2.46	4.15	2.94	4.37
			J'	0.84	0.91	0.80	0.73	0.73	0.86	0.82	0.83	0.83	0.83	0.89	0.68	0.94	0.79	0.81	0.73	0.83	0.94	0.45	0.77	0.93	0.86	0.88
			H'(log2)	3.12	3.14	4.40	2.53	3.26	4.03	4.04	2.50	3.90	3.17	4.61	1.35	4.74	2.49	4.50	2.19	3.87	4.12	1.81	2.45	3.53	2.97	3.53
			1-Lambda'	0.86	0.91	0.91	0.77	0.82	0.92	0.92	0.80	0.91	0.87	0.95	0.53	0.97	0.76	0.92	0.69	0.91	0.96	0.49	0.76	0.94	0.86	0.90
			ITI	33.3	35.2	66.7	45.0	53.9	45.7	75.4	49.4	39.4	46.3	68.1	25.6	56.6	23.2	76.4	81.1	83.8	50.5	84.8	62.7	55.1	34.5	25.6

2210 Outer Dousing Offshore Wind Farm - Macrofauna Infaunal Matrix																												
Aphia ID	Phylum	Taxa	Authority	OWF_53_F1	OWF_54_F1	OWF_55_F1	OWF_56_F1	OWF_57_F1	OWF_58_F1	OWF_60_F1	OWF_63_F1	OWF_64_F1	OWF_65_F1	OWF_66_F1	OWF_67_F1	OWF_68_F1	OWF_69_F1	OWF_70_F1	OWF_71_F1	OWF_72_F1	OWF_73_F1	OWF_74_F1	OWF_75_F1	OWF_76_F1	OWF_77_F1	OWF_78_F1	OWF_79_F1	OWF_80_F1
Infaunal Species																												
175026	Annelida	*Golfingia (Golfingia) elongata*	(Keferstein, 1862)																									
136060	Annelida	*Nephasoma (Nephasoma) minutum*	(Keferstein, 1862)																									
137582	Annelida	*Tubificoides pseudogaster*	(Dahl, 1960)																									
137349	Annelida	*Grania*	Southern, 1913						1																1			
129781	Annelida	*Ampharete lindstroemi*	Malmgren, 1867 sensu Hessle, 1917																			1		1	1			
129156	Annelida	*Amphicteis*	Grube, 1850																									
129789	Annelida	*Anobothrus gracilis*	(Malmgren, 1866)																									
129211	Annelida	*Capitella*	Blainville, 1828																									
129892	Annelida	*Mediomastus fragilis*	Rasmussen, 1973					1												1			2	12	2			
129220	Annelida	*Notomastus*	M. Sars, 1851																					4				
129911	Annelida	*Pseudonotomastus southerni*	Warren & Parker, 1994		1																							
129943	Annelida	*Caulleriella alata*	(Southern, 1914)																					5	1		2	
152217	Annelida	*Chaetozone christiei*	Chambers, 2000						1			1																
129955	Annelida	*Chaetozone setosa*	Malmgren, 1867																						1			
336485	Annelida	*Chaetozone zetlandica*	McIntosh, 1911																			1						
129964	Annelida	*Cirriformia tentaculata*	(Montagu, 1808)																									
152269	Annelida	*Tharyx killariensis*	(Southern, 1914)																									
130041	Annelida	*Protodorvillea kefersteini*	(McIntosh, 1869)																			1	1					
130044	Annelida	*Schistomeringos neglecta*	(Fauvel, 1923)																									
130116	Annelida	*Glycera alba*	(O.F. Müller, 1776)																	1								
130123	Annelida	*Glycera lapidum*	Quatrefages, 1866					1	2																2			
130126	Annelida	*Glycera oxycephala*	Ehlers, 1887																							1		
130136	Annelida	*Glycinde nordmanni*	(Malmgren, 1866)																			1	1				1	
130140	Annelida	*Goniada maculata*	Örsted, 1843																									
130145	Annelida	*Goniadella gracilis*	(Verrill, 1873)																									
130195	Annelida	*Podarkeopsis capensis*	(Day, 1963)																	1								
152249	Annelida	*Psamathe fusca*	Johnston, 1836																									
130240	Annelida	*Lumbrineris cingulata*	Ehlers, 1897																				1	1				
130266	Annelida	*Magelona alleni*	Wilson, 1958																									
130268	Annelida	*Magelona filiformis*	Wilson, 1959													1												
130269	Annelida	*Magelona johnstoni*	Fiege, Licher & Mackie, 2000										1					1	1									
146991	Annelida	*Leiochone*	Grube, 1868																									
130322	Annelida	*Praxillella affinis*	(M. Sars in G.O. Sars, 1872)																									
129313	Annelida	*Microphthalmus*	Mecznikow, 1865															1										
130355	Annelida	*Nephtys caeca*	(Fabricius, 1780)															1		1			1	1				
130357	Annelida	*Nephtys cirrosa*	Ehlers, 1868	1	1	1	3		1	6		2	3	4	1	7	4	3	4		1					1		
130364	Annelida	*Nephtys longosetosa*	Örsted, 1842							2			1						1									2
130375	Annelida	*Eunereis longissima*	(Johnston, 1840)																			1		1				
492034	Annelida	*Rullierinereis ancornunezi*	Núñez & Brito, 2006																									
130491	Annelida	*Ophelia borealis*	Quatrefages, 1866	12	15	3	2		30	2	2	8	7	1	11	9	8	14	21	10	3	19	11	2	3	3	12	3
130537	Annelida	*Scoloplos armiger*	(Müller, 1776)	2					2				4		6	6	8	14	6	10	2	4	1	10	1		5	2
146951	Annelida	*Galathowenia fragilis*	(Nilsen & Holthe, 1985)																									
146950	Annelida	*Galathowenia oculata*	(Zachs, 1923)																					1	1			
129427	Annelida	Owenia	Delle Chiaje, 1844																									
152367	Annelida	*Lagis koreni*	Malmgren, 1866					1																				
130616	Annelida	*Eteone longa*	(Fabricius, 1780)			1																						
130631	Annelida	*Eulalia mustela*	Pleijel, 1987						1			1																
130632	Annelida	*Eulalia ornata*	Saint-Joseph, 1888																					3				
130639	Annelida	*Eulalia viridis*	(Linnaeus, 1767)					1																				
129446	Annelida	*Eumida*	Malmgren, 1865																					10				
130641	Annelida	*Eumida bahusiensis*	Bergstrom, 1914																					2				
130644	Annelida	*Eumida sanguinea*	(Örsted, 1843)																									
130649	Annelida	*Hesionura elongata*	(Southern, 1914)																									
152250	Annelida	*Hypereteone foliosa*	(Quatrefages, 1865)													1										1		
147026	Annelida	*Mysta picta*	(Quatrefages, 1866)																									
334506	Annelida	*Phyllodoce groenlandica*	Örsted, 1842																		1							
334508	Annelida	*Phyllodoce lineata*	(Claparède, 1870)																	1		1						
130673	Annelida	*Phyllodoce longipes*	Kinberg, 1866																									
334510	Annelida	*Phyllodoce maculata*	(Linnaeus, 1767)																					19	1		1	
334514	Annelida	*Phyllodoce rosea*	(McIntosh, 1877)	1																								

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Aphia ID	Phylum	Taxa	Authority	OWF_53_F1	OWF_54_F1	OWF_55_F1	OWF_56_F1	OWF_57_F1	OWF_58_F1	OWF_60_F1	OWF_63_F1	OWF_64_F1	OWF_65_F1	OWF_66_F1	OWF_67_F1	OWF_68_F1	OWF_69_F1	OWF_70_F1	OWF_71_F1	OWF_72_F1	OWF_73_F1	OWF_74_F1	OWF_75_F1	OWF_76_F1	OWF_77_F1	OWF_78_F1	OWF_79_F1	OWF_80_F1
Infaunal Species																												
130683	Annelida	*Pseudomystides limbata*	(Saint-Joseph, 1888)																									
130711	Annelida	*Poecilochaetus serpens*	Allen, 1904													1												
129472	Annelida	*Polygordius*	Schneider, 1868			1													1									
130754	Annelida	*Harmothoe antilopes*	McIntosh, 1876					1																				
130770	Annelida	*Harmothoe impar*	(Johnston, 1839)																									
130801	Annelida	*Lepidonotus squamatus*	(Linnaeus, 1758)																					1				
152276	Annelida	*Malmgrenia arenicolae*	(Saint-Joseph, 1888)																									
863197	Annelida	*Malmgrenia darbouxi*	(Pettibone, 1993)					1																6				
236678	Annelida	*Pettibonesia furcosetosa*	(Loshamn, 1981)																									
130867	Annelida	*Sabellaria spinulosa*	(Leuckart, 1849)					4									1					1		317	2		42	
130889	Annelida	*Chone fauveli*	McIntosh, 1916																									
325958	Annelida	*Parasabella*	Bush, 1905																									
530920	Annelida	*Parasabella cambrensis*	(Knight-Jones & Walker, 1985)																									
530926	Annelida	*Parasabella langerhansi*	(Knight-Jones, 1983)																									
130967	Annelida	*Sabella pavonina*	Savigny, 1822																					1				
130979	Annelida	*Scalibregma celticum*	Mackie, 1991																									
130980	Annelida	*Scalibregma inflatum*	Rathke, 1843																	1				1				
131009	Annelida	*Hydroides norvegica*	Gunnerus, 1768																					1				
560033	Annelida	*Spirobranchus lamarcki*	(Quatrefages, 1866)																					21				
555935	Annelida	*Spirobranchus triqueter*	(Linnaeus, 1758)					1																				
130599	Annelida	*Pholoe baltica*	Örsted, 1843					5												1				5				
130601	Annelida	*Pholoe inornata*	Johnston, 1839										1							1			1	12			1	
130707	Annelida	*Pisione remota*	(Southern, 1914)			2			3					1														
131074	Annelida	*Sthenelais boa*	(Johnston, 1833)					2																7			1	
131077	Annelida	*Sthenelais limicola*	(Ehlers, 1864)											1														
131106	Annelida	*Aonides oxycephala*	(Sars, 1862)																									
131107	Annelida	*Aonides paucibranchiata*	Southern, 1914			1			2																3			
478336	Annelida	*Atherospio guillei*	(Laubier & Ramos, 1974)																					2				
131116	Annelida	*Dipolydora caulleryi*	(Mesnil, 1897)																									
131118	Annelida	*Dipolydora flava*	(Claparède, 1870)																					2			1	
131123	Annelida	*Dipolydora saintjosephi*	(Eliason, 1920)																									
131127	Annelida	*Laonice bahusiensis*	Söderström, 1920																			1						
129620	Annelida	*Prionospio*	Malmgren, 1867																									
129623	Annelida	*Scolelepis*	Blainville, 1828																				1					
131171	Annelida	*Scolelepis bonnieri*	(Mesnil, 1896)				1			1	1	1																1
129625	Annelida	*Spio*	Fabricius, 1785																									
131180	Annelida	*Spio armata*	(Thulin, 1957)						1									1										
131184	Annelida	*Spio goniocephala*	Thulin, 1957								1																	
596189	Annelida	*Spio symphyta*	Meißner, Bick & Bastrop, 2011																									
131187	Annelida	*Spiophanes bombyx*	(Claparède, 1870)							1		1	1		1			1		2							1	
131290	Annelida	*Eusyllis blomstrandi*	Malmgren, 1867					1																	1			
327985	Annelida	*Exogone naidina*	Örsted, 1845																									
129659	Annelida	*Myrianida*	Milne Edwards, 1845																								2	
757970	Annelida	*Parexogone hebes*	(Webster & Benedict, 1884)																	1								
129671	Annelida	*Proceraea*	Ehlers, 1864																									
131379	Annelida	*Sphaerosyllis bulbosa*	Southern, 1914																									
131394	Annelida	*Sphaerosyllis taylori*	Perkins, 1981																									
238207	Annelida	*Streptodonta pterochaeta*	(Southern, 1914)																									
238248	Annelida	*Streptosyllis campoyi*	Brito, Núñez & San Martín, 2000																									
129679	Annelida	*Syllides*	Örsted, 1845																									
129680	Annelida	*Syllis*	Lamarck, 1818																					1				
131431	Annelida	*Syllis garciai*	(Campoy, 1982)																									
131435	Annelida	*Syllis gracilis*	Grube, 1840															1										
712175	Annelida	*Syllis mercedesae*	Lucas, San Martín & Parapar, 2012																									
131495	Annelida	*Lanice conchilega*	(Pallas, 1766)																					2				
131501	Annelida	*Lysilla nivea*	Langerhans, 1884																									
131508	Annelida	*Nicolea zostericola*	Örsted, 1844																									
129710	Annelida	*Polycirrus*	Grube, 1850	12				1										1		1				19			4	
131543	Annelida	*Thelepus cincinnatus*	(Fabricius, 1780)					1																1				
130512	Annelida	*Travisia forbesii*	Johnston, 1840												1			2										

2210 Outer Dousing Offshore Wind Farm - Macrofauna Infaunal Matrix																												
Aphia ID	**Phylum**	**Taxa**	**Authority**	**OWF_53_F1**	**OWF_54_F1**	**OWF_55_F1**	**OWF_56_F1**	**OWF_57_F1**	**OWF_58_F1**	**OWF_60_F1**	**OWF_63_F1**	**OWF_64_F1**	**OWF_65_F1**	**OWF_66_F1**	**OWF_67_F1**	**OWF_68_F1**	**OWF_69_F1**	**OWF_70_F1**	**OWF_71_F1**	**OWF_72_F1**	**OWF_73_F1**	**OWF_74_F1**	**OWF_75_F1**	**OWF_76_F1**	**OWF_77_F1**	**OWF_78_F1**	**OWF_79_F1**	**OWF_80_F1**
Infaunal Species																												
101896	Arthropoda	*Ampelisca diadema*	(Costa, 1853)																					2				
101933	Arthropoda	*Ampelisca typica*	(Spence Bate, 1856)																									
102012	Arthropoda	*Aora gracilis*	(Spence Bate, 1857)																					1				
101368	Arthropoda	Aoridae	Stebbing, 1899																					1				
102139	Arthropoda	*Nototropis falcatus*	(Metzger, 1871)	1	1																							
488966	Arthropoda	*Nototropis swammerdamei*	(H. Milne Edwards, 1830)																									
101742	Arthropoda	*Bathyporeia*	Lindström, 1855									1					1							1				
103058	Arthropoda	*Bathyporeia elegans*	Watkin, 1938	4	2			1		1	1	4	1	2	1	2	18	6	52		27			5			1	89
103060	Arthropoda	*Bathyporeia guilliamsoniana*	(Spence Bate, 1857)						1			2	3															2
103066	Arthropoda	*Bathyporeia pelagica*	(Spence Bate, 1857)																									
101839	Arthropoda	*Caprella linearis*	(Linnaeus, 1767)																					1				
101857	Arthropoda	*Pariambus typicus*	(Krøyer, 1845)																					1				
237004	Arthropoda	*Crassicorophium bonellii*	(H. Milne Edwards, 1830)																									
397383	Arthropoda	*Crassicorophium crassicorne*	(Bruzelius, 1859)																									
102036	Arthropoda	*Leptocheirus hirsutimanus*	(Spence Bate, 1862)																									
102141	Arthropoda	*Tritaeta gibbosa*	(Spence Bate, 1862)																									
102345	Arthropoda	*Iphimedia minuta*	G.O. Sars, 1883					1																1				
101567	Arthropoda	*Ericthonius*	H. Milne Edwards, 1830					1																				
102408	Arthropoda	*Ericthonius punctatus*	(Spence Bate, 1857)					1																				
102439	Arthropoda	*Microjassa cumbrensis*	(Stebbing & Robertson, 1891)																									
102460	Arthropoda	*Leucothoe incisa*	Robertson, 1892																									
102466	Arthropoda	*Leucothoe procera*	Spence Bate, 1857																									
102788	Arthropoda	*Abludomelita obtusata*	(Montagu, 1813)					4																				
102364	Arthropoda	*Gammaropsis maculata*	(Johnston, 1828)					1																				
102383	Arthropoda	*Photis longicaudata*	(Spence Bate & Westwood, 1862)																									
102387	Arthropoda	*Photis reinhardi*	Krøyer, 1842					1																				
102989	Arthropoda	*Phoxocephalus holbolli*	(Krøyer, 1842)																									
103008	Arthropoda	*Parapleustes bicuspis*	(Krøyer, 1838)																									
103132	Arthropoda	*Metopa pusilla*	Sars, 1892																									
103166	Arthropoda	*Stenothoe marina*	(Spence Bate, 1857)																					1				
102057	Arthropoda	*Unciola crenatipalma*	(Spence Bate, 1862)																									
101658	Arthropoda	*Tmetonyx*	Stebbing, 1906																									
101789	Arthropoda	*Urothoe*	Dana, 1852																									
103226	Arthropoda	*Urothoe brevicornis*	Spence Bate, 1862							1	1	1	1			1			2		1							
103228	Arthropoda	*Urothoe elegans*	Spence Bate, 1857																5	1			2	2				1
103235	Arthropoda	*Urothoe poseidonis*	Reibish, 1905												1													
110488	Arthropoda	*Diastylis rugosa*	Sars, 1865																									
107729	Arthropoda	*Callianassa subterranea*	(Montagu, 1808)																								1	
107150	Arthropoda	*Galathea intermedia*	Lilljeborg, 1851																								1	
107333	Arthropoda	*Inachus phalangium*	(J. C. Fabricius, 1775)																									
107301	Arthropoda	*Ebalia tuberosa*	(Pennant, 1777)																									
107188	Arthropoda	*Pisidia longicornis*	(Linnaeus, 1767)					2												1		1		53	2			
107742	Arthropoda	*Upogebia stellata*	(Montagu, 1808)																					1				
148637	Arthropoda	*Eurydice spinigera*	Hansen, 1890																									
118995	Arthropoda	*Gnathia oxyuraea*	(Lilljeborg, 1855)																					1				
459311	Arthropoda	*Nebalia reboredae*	Moreira & Urgorri, 2009																							1		
120020	Arthropoda	*Gastrosaccus spinifer*	(Goës, 1864)																									
136458	Arthropoda	*Tanaopsis graciloides*	(Lilljeborg, 1864)																					1			1	
134599	Arthropoda	*Achelia echinata*	Hodge, 1864																					1				
134723	Arthropoda	*Anoplodactylus petiolatus*	(Krøyer, 1844)					1												1				2				
106213	Arthropoda	*Balanus balanus*	(Linnaeus, 1758)																									
106215	Arthropoda	*Balanus crenatus*	Bruguière, 1789																									
106257	Arthropoda	*Verruca stroemia*	(O.F. Müller, 1776)																									
126751	Chordata	*Ammodytes marinus*	Raitt, 1934																									
126754	Chordata	*Gymnammodytes semisquamatus*	(Jourdain, 1879)			1																						
150630	Chordata	*Echiichthys vipera*	(Cuvier, 1829)								1																	
104906	Chordata	*Branchiostoma lanceolatum*	(Pallas, 1774)																									

2210 Outer Dousing Offshore Wind Farm - Macrofauna Infaunal Matrix																												
Aphia ID	Phylum	Taxa	Authority	OWF_53_F1	OWF_54_F1	OWF_55_F1	OWF_56_F1	OWF_57_F1	OWF_58_F1	OWF_60_F1	OWF_63_F1	OWF_64_F1	OWF_65_F1	OWF_66_F1	OWF_67_F1	OWF_68_F1	OWF_69_F1	OWF_70_F1	OWF_71_F1	OWF_72_F1	OWF_73_F1	OWF_74_F1	OWF_75_F1	OWF_76_F1	OWF_77_F1	OWF_78_F1	OWF_79_F1	OWF_80_F1
Infaunal Species																												
283798	Cnidaria	*Cerianthus lloydii*	Gosse, 1859					1																				
100665	Cnidaria	Edwardsiidae	Andres, 1881					1																		1		
1360	Cnidaria	Actiniaria	Hertwig, 1882					5																50			3	
123776	Echinodermata	*Asterias rubens*	Linnaeus, 1758																					3				
124273	Echinodermata	*Echinocyamus pusillus*	(O.F. Müller, 1776)									1																
124392	Echinodermata	*Echinocardium cordatum*	(Pennant, 1777)																									
124462	Echinodermata	*Leptosynapta bergensis*	(Östergren, 1905)																									
125064	Echinodermata	*Amphipholis squamata*	(Delle Chiaje, 1828)																		1			11	1		2	
125131	Echinodermata	*Ophiothrix fragilis*	(Abildgaard in O.F. Müller, 1789)																									
124913	Echinodermata	*Ophiura albida*	Forbes, 1839												1	1												
112299	Foraminifera	*Astrorhiza*	Sandahl, 1858																									
1818	Hemichordata	Hemichordata	Bateson, 1885																									
140103	Mollusca	*Hiatella arctica*	(Linnaeus, 1767)					1																				
160539	Mollusca	*Ensis magnus*	Schumacher, 1817																				1					
141433	Mollusca	*Abra alba*	(W. Wood, 1802)																				1	5			1	
141436	Mollusca	*Abra prismatica*	(Montagu, 1808)									2						1										1
141577	Mollusca	*Arcopagia crassa*	(Pennant, 1777)																									
879714	Mollusca	*Asbjornsenia pygmaea*	(Lovén, 1846)		1							3																
146907	Mollusca	*Fabulina fabula*	(Gmelin, 1791)							1																		
138831	Mollusca	*Goodallia triangularis*	(Montagu, 1803)			1			2			29																
345281	Mollusca	*Kurtiella bidentata*	(Montagu, 1803)																					61			2	
140218	Mollusca	*Lepton squamosum*	(Montagu, 1803)																									
146952	Mollusca	*Tellimya ferruginosa*	(Montagu, 1808)																									
140283	Mollusca	*Lucinoma borealis*	(Linnaeus, 1767)																									
140431	Mollusca	*Mya truncata*	Linnaeus, 1758																									
140300	Mollusca	*Spisula elliptica*	(T. Brown, 1827)																									
140301	Mollusca	*Spisula solida*	(Linnaeus, 1758)																									
141911	Mollusca	*Dosinia exoleta*	(Linnaeus, 1758)																									
141912	Mollusca	*Dosinia lupinus*	(Linnaeus, 1758)																	1								
745846	Mollusca	*Polititapes rhomboides*	(Pennant, 1777)																									
141929	Mollusca	*Timoclea ovata*	(Pennant, 1777)					2									1											
181364	Mollusca	*Venerupis corrugata*	(Gmelin, 1791)																									
141651	Mollusca	*Thracia villosiuscula*	(MacGillivray, 1827)																	1								
141134	Mollusca	*Retusa obtusa*	(Montagu, 1803)																									
138952	Mollusca	*Caecum glabrum*	(Montagu, 1803)																									
138963	Mollusca	*Crepidula fornicata*	(Linnaeus, 1758)																									
140129	Mollusca	*Hyala vitrea*	(Montagu, 1803)																	1								
151894	Mollusca	*Euspira nitida*	(Donovan, 1803)									1		1													1	
141365	Mollusca	*Rissoa parva*	(da Costa, 1778)					6																1				
138878	Mollusca	*Buccinum undatum*	Linnaeus, 1758																						1			
876825	Mollusca	*Tritia incrassata*	(Strøm, 1768)																									
1389226	Mollusca	*Cyrillia linearis*	(Montagu, 1803)																					2				
1473658	Mollusca	*Duvaucelia plebeia*	(G. Johnston, 1828)																									
1762	Mollusca	Nudibranchia	Cuvier, 1817																									
1477356	Mollusca	*Steromphala tumida*	(Montagu, 1803)																									
1039839	Mollusca	*Steromphala cineraria*	(Linnaeus, 1758)					1																				
140199	Mollusca	*Leptochiton asellus*	(Gmelin, 1791)																									
799	Nematoda	Nematoda						5												1		1			4		1	
152391	Nemertea	Nemertea			1			6	1			1						2		1		4	1	2	2		5	
128545	Phoronida	Phoronis	Wright, 1856																					1				
793	Platyhelminthes	Platyhelminthes	Minot, 1876																					1				
			S	7	7	8	3	31	13	8	6	16	10	6	8	9	7	14	9	21	7	13	13	56	18	6	23	8
			N	33	22	11	6	62	48	15	7	59	23	10	23	29	41	49	93	40	36	37	25	683	30	8	92	101
			D	1.72	1.94	2.92	1.12	7.27	3.10	2.58	2.57	3.68	2.87	2.17	2.23	2.38	1.62	3.34	1.76	5.42	1.67	3.32	3.73	8.43	5.00	2.40	4.87	1.52
			J'	0.76	0.61	0.95	0.92	0.92	0.61	0.87	0.98	0.69	0.88	0.90	0.73	0.82	0.77	0.77	0.62	0.82	0.50	0.70	0.80	0.58	0.96	0.93	0.69	0.28
			H'(log2)	2.13	1.70	2.85	1.46	4.54	2.25	2.61	2.52	2.77	2.91	2.32	2.19	2.59	2.16	2.94	1.96	3.61	1.42	2.60	2.96	3.35	3.99	2.41	3.12	0.85
			1-Lambda'	0.74	0.54	0.93	0.73	0.96	0.61	0.84	0.95	0.74	0.87	0.84	0.72	0.82	0.74	0.83	0.63	0.88	0.44	0.73	0.81	0.76	0.96	0.89	0.77	0.22
			ITI	41.4	17.5	33.3	27.8	57.0	20.1	48.9	61.1	75.1	37.7	43.3	27.5	33.3	61.0	38.1	68.8	39.3	83.3	20.7	28.0	79.1	45.6	20.8	66.3	93.1

2210 Outer Dowsing Offshore Wind Farm - Beam Trawl biomass Matrix (Wet Weight (20g - 1g/500m))											
AphiaID	**Phylum**	**Taxa**	**Authority**	**OWF_T1**	**OWF_T2_A**	**OWF_T3**	**OWF_T4**	**OWF_T5**	**OWF_T6_A**	**OWF_T7**	**OWF_T9**
Epifaunal Species											
130355	Annelida	*Nephtys caeca*	(Fabricius, 1780)			31	213				5
130491	Annelida	*Ophelia borealis*	Quatrefages, 1866			1					
130749	Annelida	*Gattyana cirrhosa*	(Pallas, 1766)						4		
130760	Annelida	*Harmothoe clavigera*	(M. Sars, 1863)					1			1
130801	Annelida	*Lepidonotus squamatus*	(Linnaeus, 1758)					1			
130867	Annelida	*Sabellaria spinulosa*	(Leuckart, 1849)					n/a	n/a		n/a
988	Annelida	Serpulidae	Rafinesque, 1815			n/a				n/a	
239867	Arthropoda	*Pycnogonum litorale*	(Strøm, 1762)								1
106213	Arthropoda	*Balanus balanus*	(Linnaeus, 1758)								n/a
106215	Arthropoda	*Balanus crenatus*	Bruguière, 1789		n/a	n/a	n/a	n/a			n/a
119046	Arthropoda	*Idotea linearis*	(Linnaeus, 1767)				4				
107276	Arthropoda	*Cancer pagurus*	Linnaeus, 1758					1602	280		898
107552	Arthropoda	*Crangon crangon*	(Linnaeus, 1758)	105	231	111	20	88	75	89	153
107559	Arthropoda	*Philocheras fasciatus*	(Risso, 1816)						2		
107562	Arthropoda	*Philocheras trispinosus*	(Hailstone in Hailstone & Westwood, 1835)				4				
107150	Arthropoda	*Galathea intermedia*	Lilljeborg, 1851	3				1			24
107327	Arthropoda	*Inachus dorsettensis*	(Pennant, 1777)			1					2
107333	Arthropoda	*Inachus phalangium*	(JC Fabricius, 1775)					3	4		2
107341	Arthropoda	*Macropodia linaresi*	Forest & Zariquiey Álvarez, 1964						4		5
107345	Arthropoda	*Macropodia rostrata*	(Linnaeus, 1761)					10			19
107302	Arthropoda	*Ebalia tumefacta*	(Montagu, 1808)			1					1
107322	Arthropoda	*Hyas araneus*	(Linnaeus, 1758)					4	36	111	202
107323	Arthropoda	*Hyas coarctatus*	Leach, 1815 [in Leach, 1815-1875]								4
107232	Arthropoda	*Pagurus bernhardus*	(Linnaeus, 1758)			159	265	5			5
107647	Arthropoda	*Pandalina brevirostris*	(Rathke, 1843)				0	49	14		53
107651	Arthropoda	*Pandalus montagui*	Leach, 1814 [in Leach, 1813-1815]	3		17	0	197	135	18	97
107387	Arthropoda	*Liocarcinus depurator*	(Linnaeus, 1758)		67	249	24	128	107		145
107388	Arthropoda	*Liocarcinus holsatus*	(JC Fabricius, 1798)	15	82	83	40			15	63
107398	Arthropoda	*Necora puber*	(Linnaeus, 1767)					3012	1440		348
107188	Arthropoda	*Pisidia longicornis*	(Linnaeus, 1767)	9				5		1	10
111597	Bryozoa	*Alcyonidium diaphanum*	(Hudson, 1778)	1268	693	1908	22942	17510	8896	2996	5873
111604	Bryozoa	*Alcyonidium parasiticum*	(Fleming, 1828)	0	0	1	24	5	8	15	43
111367	Bryozoa	*Flustra foliacea*	(Linnaeus, 1758)	505	119	283	1721	943	989	243	1835
104906	Chordata	*Branchiostoma lanceolatum*	(Pallas, 1774)			17	4				
103718	Chordata	*Ascidiella aspersa*	(Müller, 1776)	9				103	21	7	159
126792	Chordata	*Callionymus lyra*	Linnaeus, 1758			111	88		46		179
126438	Chordata	*Merlangius merlangus*	(Linnaeus, 1758)		127			44			
125537	Chordata	Gobiidae	Cuvier, 1816							1	
126930	Chordata	*Pomatoschistus pictus*	(Malm, 1865)	3	1	3	12	10	11		14
126461	Chordata	*Molva molva*	(Linnaeus, 1758)					103	11		
127190	Chordata	*Agonus cataphractus*	(Linnaeus, 1758)	9		270	56	88	18	11	63
126751	Chordata	*Ammodytes marinus*	Raitt, 1934	102	47		14	5			
126752	Chordata	*Ammodytes tobianus*	Linnaeus, 1758		1						
126754	Chordata	*Gymnammodytes semisquamatus*	(Jourdain, 1879)			21	59				
126756	Chordata	*Hyperoplus lanceolatus*	(Le Sauvage, 1824)	31		318	105				
127203	Chordata	*Myoxocephalus scorpius*	(Linnaeus, 1758)					29	11		14
127204	Chordata	*Taurulus bubalis*	(Euphrasen, 1786)					570	210		280
126996	Chordata	*Pholis gunnellus*	(Linnaeus, 1758)		22			49	82		24
150630	Chordata	*Echiichthys vipera*	(Cuvier, 1829)	529	752					465	
150637	Chordata	*Eutrigla gurnardus*	(Linnaeus, 1758)			21				0	
127126	Chordata	*Arnoglossus laterna*	(Walbaum, 1792)			0				66	
127143	Chordata	*Pleuronectes platessa*	Linnaeus, 1758	68	82	62	88		203	140	348
127139	Chordata	*Limanda limanda*	(Linnaeus, 1758)	418	242	636	322	1042	242	74	1217
127140	Chordata	*Microstomus kitt*	(Walbaum, 1792)	18	63	35		88	18		68
127153	Chordata	*Buglossidium luteum*	(Risso, 1810)		19	145				22	53
127160	Chordata	*Solea solea*	(Linnaeus, 1758)			138			78		
125333	Cnidaria	*Alcyonium digitatum*	Linnaeus, 1758					21047	16774	74	22525
100665	Cnidaria	Edwardsiidae	Andres, 1881				4				
1360	Cnidaria	Actiniaria	Hertwig, 1882			59		5	46		82
106386	Ctenophora	*Pleurobrachia pileus*	(O. F. Müller, 1776)		4					3	
123776	Echinodermata	*Asterias rubens*	Linnaeus, 1758		246	594	563	6603	2249	63	4946
124273	Echinodermata	*Echinocyamus pusillus*	(O.F. Müller, 1776)			1					
124319	Echinodermata	*Psammechinus miliaris*	(P.L.S. Müller, 1771)								2
125131	Echinodermata	*Ophiothrix fragilis*	(Abildgaard in O.F. Müller, 1789)					5	1		5
124850	Echinodermata	*Ophiocten affinis*	(Lütken, 1858)							1	1
124913	Echinodermata	*Ophiura albida*	Forbes, 1839			1					
123449	Echinodermata	*Leptosynapta*	Verrill, 1867			1					
124462	Echinodermata	*Leptosynapta bergensis*	(Östergren, 1905)			1					
138963	Mollusca	*Crepidula fornicata*	(Linnaeus, 1758)			1		5			
140167	Mollusca	*Lacuna crassior*	(Montagu, 1803)					5			
140529	Mollusca	*Euspira fusca*	(Blainville, 1825)				4				
151894	Mollusca	*Euspira nitida*	(Donovan, 1803)				4				
140669	Mollusca	*Simnia patula*	(Pennant, 1777)					5	2		5
181228	Mollusca	*Doris pseudoargus*	Rapp, 1827						36		
140033	Mollusca	*Goniodoris nodosa*	(Montagu, 1808)						1		
1473658	Mollusca	*Duvaucelia plebeia*	(G. Johnston, 1828)						4		
416648	Mollusca	*Tritonia hombergii*	Cuvier, 1803						1		
1762	Mollusca	Nudibranchia	Cuvier, 1817			1		25			29
140103	Mollusca	*Hiatella arctica*	(Linnaeus, 1767)					5	4		14
160539	Mollusca	*Ensis magnus*	Schumacher, 1817				378				
140734	Mollusca	*Ensis minor*	(Chenu, 1843)			24					
140873	Mollusca	*Gari tellinella*	(Lamarck, 1818)			1	12				
141433	Mollusca	*Abra alba*	(W. Wood, 1802)								5
141436	Mollusca	*Abra prismatica*	(Montagu, 1808)			1					
141577	Mollusca	*Arcopagia crassa*	(Pennant, 1777)				282				
138823	Mollusca	*Astarte montagui*	(Dillwyn, 1817)				4				
140467	Mollusca	*Modiolus modiolus*	(Linnaeus, 1758)					1			
140480	Mollusca	*Mytilus edulis*	Linnaeus, 1758					5			
140687	Mollusca	*Aequipecten opercularis*	(Linnaeus, 1758)								24
140301	Mollusca	*Spisula solida*	(Linnaeus, 1758)			35	571			1	
141909	Mollusca	*Clausinella fasciata*	(da Costa, 1778)			1	12				
141912	Mollusca	*Dosinia lupinus*	(Linnaeus, 1758)				12				
181364	Mollusca	*Venerupis corrugata*	(Gmelin, 1791)					5	1		1
141934	Mollusca	*Venus casina*	Linnaeus, 1758				28				
141454	Mollusca	*Sepiola atlantica*	d'Orbigny, 1842	9	19	17	12	5	4	18	24
793	Platyhelminthes	Platyhelminthes	Minot, 1876				12				
132833	Porifera	*Haliclona (Haliclona) oculata*	(Linnaeus, 1759)			45			93		
558	Porifera	Porifera	Grant, 1836				84	2270	875		2280
-		Hydrozoa and Bryozoa assemblages		381	37	145	2043	255	249	89	1304
Juvenile Species											
2		Animalia					n/a	n/a	n/a	n/a	n/a
205077	Arthropoda	Macropodia	Leach, 1814 [in Leach, 1813-1815]	3	4		12			1	5
106903	Arthropoda	*Hyas*	Leach, 1814 [in Leach, 1813-1815]	3			4	8	2		7
106738	Arthropoda	Paguridae	Latreille, 1802				64				
106925	Arthropoda	*Liocarcinus*	Stimpson, 1871			17					5
138333	Mollusca	*Ensis*	Schumacher, 1817			17	72				
211	Mollusca	Mytilidae	Rafinesque, 1815					5			
1839	Chordata	Ascidiacea	Blainville, 1824				4				
10194	Chordata	Actinopterygii									n/a

2210 Outer Dousing Offshore Wind Farm - Epibenthic Trawl Matrix			BSL Project 2210 - OWF Area								
AphiaID	**Phylum**	**Taxa**	**Authority**	**OWF_T1**	**OWF_T2_A**	**OWF_T3**	**OWF_T4**	**OWF_T5**	**OWF_T6_A**	**OWF_T7**	**OWF_T9**
Infaunal Species											
100665	Cnidaria	Edwardsiidae	Andres, 1881				1				
1360	Cnidaria	Actiniaria	Hertwig, 1882			5		2	10		32
793	Platyhelminthes	Platyhelminthes	Minot, 1876				1				
130355	Annelida	*Nephtys caeca*	(Fabricius, 1780)			13	83				1
130491	Annelida	*Ophelia borealis*	Quatrefages, 1866			2					
130749	Annelida	*Gattyana cirrhosa*	(Pallas, 1766)						1		
130760	Annelida	*Harmothoe clavigera*	(M. Sars, 1863)					2			1
130801	Annelida	*Lepidonotus squamatus*	(Linnaeus, 1758)					1			
130867	Annelida	*Sabellaria spinulosa*	(Leuckart, 1849)					Hundreds	Tens		Tens
988	Annelida	Serpulidae	Rafinesque, 1815			7				Tens	
239867	Arthropoda	*Pycnogonum litorale*	(Strøm, 1762)								2
106213	Arthropoda	*Balanus balanus*	(Linnaeus, 1758)								Tens
106215	Arthropoda	*Balanus crenatus*	Bruguière, 1789		4	Hundreds	Tens	Tens			Tens
119046	Arthropoda	*Idotea linearis*	(Linnaeus, 1767)				2				
107276	Arthropoda	*Cancer pagurus*	Linnaeus, 1758					8	3		9
107552	Arthropoda	*Crangon crangon*	(Linnaeus, 1758)	138	202	85	39	87	97	70	116
107559	Arthropoda	*Philocheras fasciatus*	(Risso, 1816)						1		
107562	Arthropoda	*Philocheras trispinosus*	(Hailstone in Hailstone & Westwood, 1835)				8				
107150	Arthropoda	*Galathea intermedia*	Lilljeborg, 1851	3				1			44
107327	Arthropoda	*Inachus dorsettensis*	(Pennant, 1777)			1					1
107333	Arthropoda	*Inachus phalangium*	(JC Fabricius, 1775)					1	1		1
107341	Arthropoda	*Macropodia linaresi*	Forest & Zariquiey Álvarez, 1964						5		2
107345	Arthropoda	*Macropodia rostrata*	(Linnaeus, 1761)					5			9
107302	Arthropoda	*Ebalia tumefacta*	(Montagu, 1808)			3					1
107322	Arthropoda	*Hyas araneus*	(Linnaeus, 1758)					2	1	2	5
107323	Arthropoda	*Hyas coarctatus*	Leach, 1815 [in Leach, 1815-1875]								1
107232	Arthropoda	*Pagurus bernhardus*	(Linnaeus, 1758)			25	14	1			1
107647	Arthropoda	*Pandalina brevirostris*	(Rathke, 1843)					32	25		43
107651	Arthropoda	*Pandalus montagui*	Leach, 1814 [in Leach, 1813-1815]	2		9		140	109	3	181
107387	Arthropoda	*Liocarcinus depurator*	(Linnaeus, 1758)		3	31	5	8	6		10
107388	Arthropoda	*Liocarcinus holsatus*	(JC Fabricius, 1798)	1	6	14	7			3	7
107398	Arthropoda	*Necora puber*	(Linnaeus, 1767)					17	30		7
107188	Arthropoda	*Pisidia longicornis*	(Linnaeus, 1767)	4				4		2	38

2210 Outer Dousing Offshore Wind Farm - Epibenthic Trawl Matrix			BSL Project 2210 - OWF Area								
AphiaID	**Phylum**	**Taxa**	**Authority**	**OWF_T1**	**OWF_T2_A**	**OWF_T3**	**OWF_T4**	**OWF_T5**	**OWF_T6_A**	**OWF_T7**	**OWF_T9**
140167	Mollusca	*Lacuna crassior*	(Montagu, 1803)					1			
140529	Mollusca	*Euspira fusca*	(Blainville, 1825)				1				
151894	Mollusca	*Euspira nitida*	(Donovan, 1803)				4				
140669	Mollusca	*Simnia patula*	(Pennant, 1777)					2	1		6
181228	Mollusca	*Doris pseudoargus*	Rapp, 1827						2		
140033	Mollusca	*Goniodoris nodosa*	(Montagu, 1808)						1		
1473658	Mollusca	*Duvaucelia plebeia*	(G. Johnston, 1828)						2		
416648	Mollusca	*Tritonia hombergii*	Cuvier, 1803						1		
1762	Mollusca	*Nudibranchia*	Cuvier, 1817			1		28			17
140103	Mollusca	*Hiatella arctica*	(Linnaeus, 1767)					8	4		11
160539	Mollusca	*Ensis magnus*	Schumacher, 1817				18				
140734	Mollusca	*Ensis minor*	(Chenu, 1843)			1					
140873	Mollusca	*Gari tellinella*	(Lamarck, 1818)			2	12				
141433	Mollusca	*Abra alba*	(W. Wood, 1802)								2
141436	Mollusca	*Abra prismatica*	(Montagu, 1808)			2					
141577	Mollusca	*Arcopagia crassa*	(Pennant, 1777)				16				
138823	Mollusca	*Astarte montagui*	(Dillwyn, 1817)				1				
140467	Mollusca	*Modiolus modiolus*	(Linnaeus, 1758)					1			
140480	Mollusca	*Mytilus edulis*	Linnaeus, 1758					1			
140687	Mollusca	*Aequipecten opercularis*	(Linnaeus, 1758)								1
140301	Mollusca	*Spisula solida*	(Linnaeus, 1758)			57	222			1	
141909	Mollusca	*Clausinella fasciata*	(da Costa, 1778)			1	9				
141912	Mollusca	*Dosinia lupinus*	(Linnaeus, 1758)				2				
181364	Mollusca	*Venerupis corrugata*	(Gmelin, 1791)					4	1		1
141934	Mollusca	*Venus casina*	Linnaeus, 1758				1				
123776	Echinodermata	*Asterias rubens*	Linnaeus, 1758		7	19	22	190	114	3	365
124273	Echinodermata	*Echinocyamus pusillus*	(O.F. Müller, 1776)			3					
124319	Echinodermata	*Psammechinus miliaris*	(P.L.S. Müller, 1771)								1
125131	Echinodermata	*Ophiothrix fragilis*	(Abildgaard in O.F. Müller, 1789)					2	1		10
124850	Echinodermata	*Ophiocten affinis*	(Lütken, 1858)							1	1
124913	Echinodermata	*Ophiura albida*	Forbes, 1839			1					
123449	Echinodermata	*Leptosynapta*	Verrill, 1867			2					
124462	Echinodermata	*Leptosynapta bergensis*	(Östergren, 1905)			1					
104906	Chordata	*Branchiostoma lanceolatum*	(Pallas, 1774)			4	3				
103718	Chordata	*Ascidiella aspersa*	(Müller, 1776)	5				13	6	1	27
126751	Chordata	*Ammodytes marinus*	Raitt, 1934	49	34		3	1			
126752	Chordata	*Ammodytes tobianus*	Linnaeus, 1758		1						
126754	Chordata	*Gymnammodytes semisquamatus*	(Jourdain, 1879)			2	5				
126756	Chordata	*Hyperoplus lanceolatus*	(Le Sauvage, 1824)	1		13	2				
150630	Chordata	*Echiichthys vipera*	(Cuvier, 1829)	414	305					109	

2210 Outer Dousing Offshore Wind Farm - Epibenthic Trawl Matrix			BSL Project 2210 - OWF Area								
AphiaID	**Phylum**	**Taxa**	**Authority**	**OWF_T1**	**OWF_T2_A**	**OWF_T3**	**OWF_T4**	**OWF_T5**	**OWF_T6_A**	**OWF_T7**	**OWF_T9**
Epifaunal Species											
125333	Cnidaria	*Alcyonium digitatum*	Linnaeus, 1758					P	P	P	P
132833	Porifera	*Haliclona (Haliclona) oculata*	(Linnaeus, 1759)			P			P		
558	Porifera	Porifera	Grant, 1836				P	P	P		P
111597	Bryozoa	*Alcyonidium diaphanum*	(Hudson, 1778)	P	P	P	P	P	P	P	P
111604	Bryozoa	*Alcyonidium parasiticum*	(Fleming, 1828)			P	P	P	P	P	P
111367	Bryozoa	*Flustra foliacea*	(Linnaeus, 1758)	P	P	P	P	P	P	P	P
-		Hydrozoa and Bryozoa assemblages		P	P	P	P	P	P	P	P
Demersal Species											
141454	Mollusca	*Sepiola atlantica*	d'Orbigny, 1842	7	7	8	4	4	4	8	6
126792	Chordata	*Callionymus lyra*	Linnaeus, 1758			7	10		2		14
126438	Chordata	*Merlangius merlangus*	(Linnaeus, 1758)		1			1			
125537	Chordata	Gobiidae	Cuvier, 1816							1	
126930	Chordata	*Pomatoschistus pictus*	(Malm, 1865)	2	4	2	7	2	5		4
126461	Chordata	*Molva molva*	(Linnaeus, 1758)					1	1		
127190	Chordata	*Agonus cataphractus*	(Linnaeus, 1758)	1		36	2	6	1	1	4
127203	Chordata	*Myoxocephalus scorpius*	(Linnaeus, 1758)					2	1		1
127204	Chordata	*Taurulus bubalis*	(Euphrasen, 1786)					22	15		11
126996	Chordata	*Pholis gunnellus*	(Linnaeus, 1758)		1			4	7		1
150637	Chordata	*Eutrigla gurnardus*	(Linnaeus, 1758)			1					
127126	Chordata	*Arnoglossus laterna*	(Walbaum, 1792)							4	
127143	Chordata	*Pleuronectes platessa*	Linnaeus, 1758	10	4	1	4		9	4	9
127139	Chordata	*Limanda limanda*	(Linnaeus, 1758)	20	59	19	14	30	10	7	29
127140	Chordata	*Microstomus kitt*	(Walbaum, 1792)	1	3	1		1	1		1
127153	Chordata	*Buglossidium luteum*	(Risso, 1810)		4	7				2	5
127160	Chordata	*Solea solea*	(Linnaeus, 1758)			6			1		
Non-Native Species											
138963	Mollusca	*Crepidula fornicata*	(Linnaeus, 1758)			3		1			
Other Species											
106386	Ctenophora	*Pleurobrachia pileus*	(O. F. Müller, 1776)		2					4	
Juvenile Species											
2		Animalia					P	P	P	P	P
205077	Arthropoda	*Macropodia*	Leach, 1814 [in Leach, 1813-1815]	5	1		3			1	3
106903	Arthropoda	*Hyas*	Leach, 1814 [in Leach, 1813-1815]	2			2	5	1		2
106738	Arthropoda	Paguridae	Latreille, 1802				3				
106925	Arthropoda	*Liocarcinus*	Stimpson, 1871			27					4
138333	Mollusca	*Ensis*	Schumacher, 1817			6	99				
211	Mollusca	Mytilidae	Rafinesque, 1815					2			
1839	Chordata	Ascidiacea	Blainville, 1824				1				
10194	Chordata	Actinopterygii									P

APPENDIX J – FISH MEASUREMENT DATA

Station Name				OWF_T1			
Geodetics: WGS84 UTM31N 3°E							
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	15:36	1	368 472.2	5 933 352.6
Vessel Speed		Photographed?	Y	Lock	15:43	3	368 460.1	5 933 585.0
Trawl Length (m)	812.59	Sieve Mesh Size	5mm	Haul	16:10	4	368 150.2	5 934 336.2
Log method	Distance	Sample Volume	40L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	9.8 – 10.4
Notes								
Storage Equipment Weights								

Fish Length Data

Taxon	Kept (Y/N)	Length (cm)	Count
Echiichthys vipera	N	10	9
Echiichthys vipera	N	12	4
Echiichthys vipera	N	14	2
Echiichthys vipera	N	9	3
Echiichthys vipera	N	7	40
Echiichthys vipera	N	8	12
Echiichthys vipera	N	13	2
Echiichthys vipera	N	15	1
Echiichthys vipera	N	11	4
Echiichthys vipera	N	6	35
Echiichthys vipera	N	4	297
Echiichthys vipera	N	3	2
Echiichthys vipera	N	5	3
Agonus cataphractus	N	9	1
Pomatoschistus pictus	N	5	1
Pomatoschistus pictus	N	3	1
Hyperoplus lanceolatus	N	24	1
Ammodytes marinus	Y	11	4
Ammodytes marinus	Y	12	7
Ammodytes marinus	Y	6	2
Ammodytes marinus	Y	9	10
Ammodytes marinus	Y	10	10
Ammodytes marinus	Y	8	6
Ammodytes marinus	Y	7	2
Ammodytes marinus	Y	13	1
Ammodytes marinus	Y	16	1
Ammodytes marinus	Y	15	1
Ammodytes marinus	Y	10	3
Ammodytes marinus	Y	7	2
Pleuronectes platessa	N	12	1

Station Name				OWF_T1				
Geodetics: WGS84 UTM31N 3°E								
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	15:36	1	368 472.2	5 933 352.6
Vessel Speed		Photographed?	Y	Lock	15:43	3	368 460.1	5 933 585.0
Trawl Length (m)	812.59	Sieve Mesh Size	5mm	Haul	16:10	4	368 150.2	5 934 336.2
Log method	Distance	Sample Volume	40L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	9.8 – 10.4
Notes								
Storage Equipment Weights								

Fish Length Data				
Taxon	Kept (Y/N)	Length (cm)	Count	
Pleuronectes platessa	N	8	4	
Pleuronectes platessa	N	9	1	
Pleuronectes platessa	N	7	3	
Pleuronectes platessa	N	11	1	
Microstomus kitt	N	14	1	
Limanda limanda	Y	17	2	
Limanda limanda	Y	14	1	
Limanda limanda	Y	15	2	
Limanda limanda	Y	18	2	
Limanda limanda	Y	19	1	
Limanda limanda	Y	17	1	
Limanda limanda	Y	20	2	
Limanda limanda	Y	16	1	
Limanda limanda	Y	15	2	
Limanda limanda	Y	21	1	
Limanda limanda	Y	8	1	
Limanda limanda	Y	7	2	
Limanda limanda	Y	6	2	
Echiichthys vipera	N	10	9	

Station Name				OWF_T2_A			
Geodetics: WGS84 UTM31N 3°E							
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	17:21	1	376 724.5	5 940 437.8
Vessel Speed		Photographed?	Y	Lock	17:27	3	376 725.2	5 940 395.8
Trawl Length (m)	671.45	Sieve Mesh Size	5mm	Haul	17:49	4	376 705.9	5 939 724.6
Log method	Distance	Sample Volume	5.5L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl	Water Depth (m)	13.8 - 15.8
Notes							
Storage Equipment Weights							

Fish Length Data				
Taxon	Kept (Y/N)	Length (cm)	Count	
Ammodytes marinus	Y	10	6	
Ammodytes marinus	Y	9	11	
Ammodytes marinus	Y	7	4	
Ammodytes marinus	Y	8	6	
Ammodytes marinus	Y	11	6	
Ammodytes marinus	Y	12	2	
Buglossidium luteum	N	9	1	
Buglossidium luteum	N	7	2	
Buglossidium luteum	N	4	1	
Echiichthys vipera	N	17	1	
Echiichthys vipera	N	7	39	
Echiichthys vipera	N	11	11	
Echiichthys vipera	N	13	5	
Echiichthys vipera	N	8	11	
Echiichthys vipera	N	4	160	
Echiichthys vipera	N	6	15	
Echiichthys vipera	N	10	12	
Echiichthys vipera	N	5	35	
Echiichthys vipera	N	9	6	
Echiichthys vipera	N	3	5	
Echiichthys vipera	N	12	2	
Echiichthys vipera	N	15	1	
Echiichthys vipera	N	14	2	
Limanda limanda	N	15	2	
Limanda limanda	N	16	2	
Limanda limanda	N	18	1	
Limanda limanda	N	21	2	
Limanda limanda	N	7	2	
Limanda limanda	Y	5	9	
Limanda limanda	Y	6	11	
Limanda limanda	Y	7	11	
Limanda limanda	Y	4	4	

Station Name				OWF_T2_A			
Geodetics: WGS84 UTM31N 3°E							
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	17:21	1	376 724.5	5 940 437.8
Vessel Speed		Photographed?	Y	Lock	17:27	3	376 725.2	5 940 395.8
Trawl Length (m)	671.45	Sieve Mesh Size	5mm	Haul	17:49	4	376 705.9	5 939 724.6
Log method	Distance	Sample Volume	5.5L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	13.8 - 15.8
Notes								
Storage Equipment Weights								

Fish Length Data

Taxon	Kept (Y/N)	Length (cm)	Count
Limanda limanda	Y	8	2
Limanda limanda	N	11	2
Limanda limanda	N	7	4
Limanda limanda	N	8	4
Limanda limanda	N	9	1
Limanda limanda	N	14	1
Limanda limanda	N	12	1
Merlangius merlangus	Y	28	1
Microstomus kitt	N	7	2
Microstomus kitt	N	23	1
Pholis gunellus	N	8	1
Pleuronectes platessa	N	17	1
Pleuronectes platessa	N	15	1
Pleuronectes platessa	N	12	1
Pleuronectes platessa	N	11	1
Pomatoschistus pictus	N	3	1
Pomatoschistus pictus	N	3	1
Pomatoschistus pictus	N	6	2

Station Name				OWF_T3				
Geodetics: WGS84 UTM31N 3°E								
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	07:14	1	377 899.0	5 934 181.8
Vessel Speed		Photographed?	Y	Lock	07:18	3	377 917.3	5 934 078.0
Trawl Length (m)	723.33	Sieve Mesh Size	5mm	Haul	07:38	4	378 073.7	5 933 371.8
Log method	Distance	Sample Volume	320L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	38-40
Notes								
Storage Equipment Weights								

Fish Length Data

Taxon	Kept (Y/N)	Length (cm)	Count	
Agonus cataphractus	N	5	1	
Agonus cataphractus	N	10	1	
Agonus cataphractus	N	11	2	
Agonus cataphractus	N	12	2	
Agonus cataphractus	N	6	6	
Agonus cataphractus	N	8	6	
Agonus cataphractus	N	7	6	
Agonus cataphractus	Y	9	12	
Branchiostoma lanceolata	Y	5	1	
Branchiostoma lanceolata	N	6	3	
Callionymus lyra	N	22	1	
Callionymus lyra	N	14	2	
Callionymus lyra	N	13	3	
Callionymus lyra	N	6	1	
Eutrigla gurnardus	Y	11	1	
Gymnammodytes semisquamatus	Y	19	1	
Gymnammodytes semisquamatus	Y	18	1	
Hyperoplus lanceolatus	Y	24	3	
Hyperoplus lanceolatus	Y	22	5	
Hyperoplus lanceolatus	Y	28	2	
Hyperoplus lanceolatus	Y	19	2	
Hyperoplus lanceolatus	Y	26	1	
Limanda limanda	N	18	3	
Limanda limanda	Y	15	1	
Limanda limanda	Y	14	1	
Limanda limanda	Y	22	1	
Limanda limanda	Y	13	1	
Limanda limanda	Y	17	1	
Limanda limanda	Y	14	1	
Limanda limanda	Y	15	1	
Limanda limanda	Y	18	1	
Limanda limanda	Y	12	1	
Limanda limanda	Y	20	1	

Station Name				OWF_T3				
Geodetics: WGS84 UTM31N 3°E								
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	07:14	1	377 899.0	5 934 181.8
Vessel Speed		Photographed?	Y	Lock	07:18	3	377 917.3	5 934 078.0
Trawl Length (m)	723.33	Sieve Mesh Size	5mm	Haul	07:38	4	378 073.7	5 933 371.8
Log method	Distance	Sample Volume	320L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	38-40
Notes								
Storage Equipment Weights								

Fish Length Data				
Taxon	Kept (Y/N)	Length (cm)	Count	
Limanda limanda	Y	15	1	
Limanda limanda	Y	16	1	
Limanda limanda	Y	22	1	
Limanda limanda	Y	15	1	
Limanda limanda	Y	18	1	
Microstomus kitt	N	15	1	
Pleuronectes platessa	N	21	1	
Pomatoschistus pictus	Y	3	1	
Pomatoschistus pictus	Y	4	1	
Solea solea	N	22	1	
Solea solea	N	14	1	
Solea solea	N	11	2	
Solea solea	N	19	1	
Solea solea	N	7	1	
Solea solea	N	9	1	

Station Name				OWF_T4			
Geodetics: WGS84 UTM31N 3°E							
Station Name	OWF_T4	Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Fix Name		Ref sp. Kept?	Y	Shoot	12:42	1	384 558.1	5 935 982.1
Distance		Photographed?	Y	Lock	12:46	3	384 544.8	5 936 017.4
Vessel Speed		Sieve Mesh Size	5mm	Haul	13:09	4	384 349.2	5 936 607.4
Trawl Length (m)	621.57	Sample Volume	100L					
Log method	Distance	Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	16.9-17.5
Notes								
Storage Equipment Weights								

Fish Length Data

Taxon	Kept (Y/N)	Length (cm)	Count
Ammodytes marinus	N	5	2
Ammodytes marinus	N	7	1
Agonus cataphractus	N	16	1
Agonus cataphractus	N	10	1
Callionymus lyra	N	8	1
Callionymus lyra	N	21	1
Callionymus lyra	N	10	1
Callionymus lyra	N	9	3
Callionymus lyra	N	13	1
Callionymus lyra	N	11	2
Callionymus lyra	N	6	1
Hyperopluis lanceolatus	N	27	1
Hyperopluis lanceolatus	N	24	1
Gymnammodytes semisquamatus	Y	15	2
Gymnammodytes semisquamatus	Y	14	3
Pomatoschistus pictus	N	4	6
Pomatoschistus pictus	N	5	1
Limanda limanda	Y	16	2
Limanda limanda	Y	6	1
Limanda limanda	Y	21	1
Limanda limanda	Y	18	3
Pleuronectes platessa	Y	14	4
Limanda limanda	Y	15	1
Limanda limanda	Y	13	3
Limanda limanda	Y	8	1
Limanda limanda	Y	22	1
Limanda limanda	Y	17	1

Station Name				OWF_T5				
Geodetics: WGS84 UTM31N 3°E								
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	07:29	1	387 965.0	5 942 333.5
Vessel Speed		Photographed?	Y	Lock	07:33	3	387 954.3	5 942 500.6
Trawl Length (m)	508.85	Sieve Mesh Size	5mm	Haul	07:47	4	387 930.7	5 943 008.9
Log method	Distance	*Sample Volume*	100L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl	Water Depth (m)	18.6-19.2	
Notes								
Storage Equipment Weights								

Fish Length Data				
Taxon	Kept (Y/N)	Length (cm)	Count	
Agonus cataphractus	N	9	1	
Agonus cataphractus	N	12	1	
Agonus cataphractus	N	8	1	
Agonus cataphractus	N	14	1	
Agonus cataphractus	N	11	1	
Agonus cataphractus	N	15	1	
Ammodytes marinus	Y	14	1	
Limanda limanda	Y	23	1	
Limanda limanda	Y	17	5	
Limanda limanda	Y	14	5	
Limanda limanda	Y	21	2	
Limanda limanda	Y	18	4	
Limanda limanda	Y	16	2	
Limanda limanda	Y	15	6	
Limanda limanda	Y	13	1	
Limanda limanda	Y	19	2	
Limanda limanda	Y	12	1	
Limanda limanda	Y	17	1	
Merlangius merlangus	N	18	1	
Microstomus kitt	N	19	1	
Molva molva	Y	17	1	
Myoxocephalus scorpius	N	14	2	
Pholis gunnellus	N	17	1	
Pholis gunnellus	N	14	1	
Pholis gunnellus	N	16	1	
Pholis gunnellus	N	15	1	
Pomatoschistus pictus	N	4	1	
Pomatoschistus pictus	N	5	1	
Taurulus bubalis	N	10	8	
Taurulus bubalis	N	12	6	
Taurulus bubalis	N	11	3	
Taurulus bubalis	N	16	1	

Station Name				OWF_T5				
Geodetics: WGS84 UTM31N 3°E								
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	07:29	1	387 965.0	5 942 333.5
Vessel Speed		Photographed?	Y	Lock	07:33	3	387 954.3	5 942 500.6
Trawl Length (m)	508.85	Sieve Mesh Size	5mm	Haul	07:47	4	387 930.7	5 943 008.9
Log method	Distance	*Sample Volume*	100L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	18.6-19.2
Notes								
Storage Equipment Weights								

Fish Length Data				
Taxon	Kept (Y/N)	Length (cm)	Count	
Taurulus bubalis	N	13	1	
Taurulus bubalis	N	15	3	

Station Name				OWF_T6_A				
Geodetics: WGS84 UTM31N 3°E								
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	18:44	1	390 563.2	5 933 272.7
Vessel Speed		Photographed ?	Y	Lock	18:46	3	390 589.3	5 933 290.0
Trawl Length (m)	702.59	Sieve Mesh Size	5mm	Haul	19:10	4	390 800.0	5 932 619.8
Log method	Distance	Sample Volume	80L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	19.4-19.1
Notes	Second trawl attempt at this station due to a no sample of 4L. Wider variety of fish than at first location (T7), lots of scorpionfish and flatfish.							
Storage Equipment Weights								

Fish Length Data

Taxon	Kept (Y/N)	Length (cm)	Count
Agonus cataphractus	Y	130	1
Callionymus lyra	Y	180	1
Callionymus lyra	Y	140	1
Limanda limanda	Y	200	1
Limanda limanda	Y	190	1
Limanda limanda	Y	185	1
Limanda limanda	Y	175	1
Limanda limanda	Y	140	1
Limanda limanda	Y	150	3
Limanda limanda	Y	75	1
Limanda limanda	Y	70	1
Microstomus kitt	Y	110	1
Molva molva	Y	120	1
Myoxocephalus scorpius	Y	60	1
Pholis gunnellus	Y	45	3
Pholis gunnellus	Y	40	1
Pholis gunnellus	Y	35	1
Pholis gunnellus	Y	90	1
Pholis gunnellus	Y	60	1
Pleuronectes platessa	N	150	3
Pleuronectes platessa	N	160	2
Pleuronectes platessa	N	180	2
Pleuronectes platessa	N	140	2
Pomatoschistus pictus	Y	130	1
Pomatoschistus pictus	Y	155	1
Pomatoschistus pictus	Y	150	1
Pomatoschistus pictus	Y	140	1
Pomatoschistus pictus	Y	145	1
Solea solea	N	220	1
Taurulus bubalis	Y	70	4
Taurulus bubalis	Y	80	1
Taurulus bubalis	Y	95	1

Station Name				OWF_T6_A				
Geodetics: WGS84 UTM31N 3°E								
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	18:44	1	390 563.2	5 933 272.7
Vessel Speed		Photographed ?	Y	Lock	18:46	3	390 589.3	5 933 290.0
Trawl Length (m)	702.59	Sieve Mesh Size	5mm	Haul	19:10	4	390 800.0	5 932 619.8
Log method	Distance	Sample Volume	80L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	19.4-19.1
Notes	Second trawl attempt at this station due to a no sample of 4L. Wider variety of fish than at first location (T7), lots of scorpionfish and flatfish.							
Storage Equipment Weights								

Fish Length Data				
Taxon	Kept (Y/N)	Length (cm)	Count	
Taurulus bubalis	Y	100	1	
Taurulus bubalis	Y	105	1	
Taurulus bubalis	Y	125	5	
Taurulus bubalis	Y	110	1	
Taurulus bubalis	Y	90	1	

Station Name				OWF_T7			
Geodetics: WGS84 UTM31N 3°E							
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	11:49	1	397 234.8	5 940 639.5
Vessel Speed		Photographed?	Y	Lock	11:51	3	397 296.7	5 940 733.0
Trawl Length (m)	677.67	Sieve Mesh Size	5mm	Haul	12:10	4	397 189.9	5 941 402.2
Log method	Distance	Sample Volume	15L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl	Water Depth (m)	22.2
Notes								
Storage Equipment Weights								

Fish Length Data

Taxon	Kept (Y/N)	Length (cm)	Count
Agonus cataphractus	Y	10	1
Arnoglossus laterna	Y	14	1
Arnoglossus laterna	Y	13.5	1
Arnoglossus laterna	Y	13	1
Arnoglossus laterna	Y	6.5	1
Buglossidium luteum	Y	9.5	1
Buglossidium luteum	Y	9	1
Echiichthys vipera	Y	10	10
Echiichthys vipera	N	12	11
Echiichthys vipera	N	13.5	1
Echiichthys vipera	N	9	12
Echiichthys vipera	N	13	2
Echiichthys vipera	N	12.5	6
Echiichthys vipera	N	11	3
Echiichthys vipera	N	10.5	1
Echiichthys vipera	N	2.5	2
Echiichthys vipera	N	9.5	8
Echiichthys vipera	N	11.5	1
Echiichthys vipera	N	8	3
Echiichthys vipera	N	7	5
Echiichthys vipera	N	3	11
Echiichthys vipera	N	4	25
Echiichthys vipera	N	6.5	1
Echiichthys vipera	N	3.5	5
Echiichthys vipera	N	5	1
Echiichthys vipera	N	4.5	1
Gobiidae	Y	3	1
Limanda limanda	Y	7	1
Limanda limanda	Y	6	1
Limanda limanda	Y	4	1
Limanda limanda	Y	8	1
Platichthys plesus	Y	19	1

Station Name				OWF_T7				
Geodetics: WGS84 UTM31N 3°E								
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	11:49	1	397 234.8	5 940 639.5
Vessel Speed		Photographed?	Y	Lock	11:51	3	397 296.7	5 940 733.0
Trawl Length (m)	677.67	Sieve Mesh Size	5mm	Haul	12:10	4	397 189.9	5 941 402.2
Log method	Distance	Sample Volume	15L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	22.2
Notes								
Storage Equipment Weights								

Fish Length Data

Taxon	Kept (Y/N)	Length (cm)	Count
Platichthys plesus	Y	7.5	1
Platichthys plesus	Y	8	1
Pleuronectes platessa	Y	19.5	1
Pleuronectes platessa	Y	20	1
Pleuronectes platessa	Y	11	1
Pleuronectes platessa	Y	9	1

Station Name				OWF_T9			
Geodetics: WGS84 UTM31N 3°E							
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	07:40	1	401 226.2	5 936 615.8
Vessel Speed		Photographed?	Y	Lock	07:44	3	401 256.1	5 936 524.9
Trawl Length (m)	517.64	Sieve Mesh Size	5mm	Haul	08:00	4	401 451.7	5 936 045.6
Log method	Distance	Sample Volume	140L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl	Water Depth (m)	22.4-22.2
Notes								
Storage Equipment Weights								

Fish Length Data

Taxon	Kept (Y/N)	Length (cm)	Count
Agonus cataphractus	N	11	3
Agonus cataphractus	N	12	1
Buglossidium luteum	N	8	1
Buglossidium luteum	N	14	1
Buglossidium luteum	N	10	2
Buglossidium luteum	N	4	1
Callionymus lyra	N	3	1
Callionymus lyra	N	15	1
Callionymus lyra	N	17	1
Callionymus lyra	N	14	5
Callionymus lyra	N	8	1
Callionymus lyra	N	5	4
Callionymus lyra	N	12	1
Limanda limanda	Y	18	3
Limanda limanda	Y	17	4
Limanda limanda	Y	13	6
Limanda limanda	Y	19	4
Limanda limanda	Y	15	2
Limanda limanda	Y	20	3
Limanda limanda	Y	16	4
Limanda limanda	Y	14	3
Microstomus kitt	N	15	1
Myoxoxephalus scorpius	N	9	1
Pholis gunnellus	N	15	1
Pleuronectes platessa	N	17	2
Pleuronectes platessa	N	15	2
Pleuronectes platessa	N	20	1
Pleuronectes platessa	N	16	1
Pleuronectes platessa	N	13	1
Pleuronectes platessa	N	12	1
Pleuronectes platessa	Y	9	1
Pomatoschistus pictus	N	3	3
Pomatoschistus pictus	N	4	1

Station Name				OWF_T9			
Geodetics: WGS84 UTM31N 3°E							
Fix Name		Processed?	Y		Time (UTC; hh:mm)	Fix #	Easting (m)	Northing (m)
Distance		Ref sp. Kept?	Y	Shoot	07:40	1	401 226.2	5 936 615.8
Vessel Speed		Photographed?	Y	Lock	07:44	3	401 256.1	5 936 524.9
Trawl Length (m)	517.64	Sieve Mesh Size	5mm	Haul	08:00	4	401 451.7	5 936 045.6
Log method	Distance	Sample Volume	140L					
		Log frequency	1 Second	Sampling Device	2m Beam Trawl		Water Depth (m)	22.4-22.2
Notes								
Storage Equipment Weights								

Fish Length Data

Taxon	Kept (Y/N)	Length (cm)	Count	
Taurulus bubalis	N	13	2	
Taurulus bubalis	N	11	2	
Taurulus bubalis	N	8	1	
Taurulus bubalis	N	10	4	
Taurulus bubalis	N	12	1	
Taurulus bubalis	N	16	1	

APPENDIX K – SPEARMAN'S CORRELATIONS

Hamon Grab Spearman's Correlation (PSA and TOC)

Spearman's Correlation Coefficient (Two-tailed)	
Number of Data Points	80
p=0.05, 95% Significant	0.220
p=0.01, 99% Significant	0.287
p=0.001, 99.9% Significant	0.363

	Water Depth (m)	Distance to Nearest Well (Km)	Mean (mm)	Sorting	Skewness	Kurtosis	% Fines	% Sands	% Gravel	Total Organic Matter (%M/M)	Number of Species (per $0.1m^2$)	Number of Individuals (per $0.1m^2$)	Margalef Richness (per $0.1m^2$)	Pielou's Evenness (per $0.1m^2$)	Simpsons Diversity (per $0.1m^2$)	Shannon-Wiener Diversity (per $0.1m^2$)
Water Depth (m)		0.131	0.155	0.312	-0.236	0.014	0.295	-0.222	0.212	0.371	0.377	0.446	0.259	-0.331	-0.112	0.085
Distance to Nearest Well (Km)			-0.201	-0.146	-0.147	0.094	-0.086	0.214	-0.225	-0.301	-0.098	-0.006	-0.130	-0.172	-0.234	-0.199
Mean (mm)				0.797	0.546	-0.659	0.622	-0.952	0.953	0.667	0.626	0.287	0.622	0.152	0.411	0.551
Sorting					0.137	-0.595	0.767	-0.862	0.847	0.784	0.763	0.424	0.765	0.097	0.475	0.689
Skewness						-0.420	0.157	-0.469	0.478	0.077	0.111	-0.039	0.123	0.196	0.154	0.143
Kurtosis							-0.460	0.615	-0.616	-0.458	-0.382	-0.191	-0.361	-0.094	-0.178	-0.300
% Fines								-0.656	0.627	0.641	0.645	0.332	0.645	0.117	0.418	0.596
% Sands									-0.998	-0.761	-0.727	-0.380	-0.723	-0.155	-0.494	-0.663
% Gravel										0.756	0.717	0.374	0.711	0.156	0.487	0.651
Total Organic Matter (%M/M)											0.762	0.528	0.711	-0.017	0.367	0.583
Number of Species (per $0.1m^2$)												0.705	0.933	0.009	0.523	0.795
Number of Individuals (per $0.1m^2$)													0.446	-0.546	-0.060	0.243
Margalef Richness (per $0.1m^2$)														0.274	0.740	0.929
Pielou's Evenness (per $0.1m^2$)															0.792	0.507
Simpsons Diversity (per $0.1m^2$)																0.893
Shannon-Wiener Diversity (per $0.1m^2$)																

Shipek Grab Spearman's Correlation (Contaminants)

Spearman's Correlation Coefficient (Two-tailed)	
Number of Data Points	30
p=0.05, 95% Significant	0.362
p=0.01, 99% Significant	0.467
p=0.001, 99.9% Significant	0.580

	Water Depth (m)	Distance to Nearest Historic well (Km)	Mean (mm)	Sorting	Skewness	Kurtosis	% Fines	% Sands	% Gravel	Total Organic Carbon (%M/M)	Total 16 PAH (µg.Kg⁻¹)	Total 22 PAH (µg.Kg⁻¹)	Low moleculaweight PAH (µg.Kg⁻¹)	High molecular weight PAH (µg.Kg⁻¹)	Arsenic (mg.kg⁻¹)	Cadmium (mg.kg⁻¹)	Chromium (mg.kg⁻¹)	Copper (mg.kg⁻¹)	Lead (mg.kg⁻¹)	Mercury (mg.kg⁻¹)	Nickel (mg.kg⁻¹)	Zinc (mg.kg⁻¹)	Number of Species (per 0.1m²)	Number of Individuals (per 0.1m²)	Margalef Richness (per 0.1m²)	Pielou's Evenness (per 0.1m²)	Simpsons Diversity (per 0.1m²)	Shannon-Wiener Diversity (per 0.1m²)
Water Depth (m)		0.111	0.194	0.328	-0.125	-0.193	0.419	-0.221	0.195	0.410	0.122	0.294	0.329	0.107	0.001	-0.260	-0.085	-0.151	0.167	-0.635	-0.082	-0.002	0.381	0.468	0.237	-0.282	-0.159	0.002
Distance to Nearest Historic well (Km)			-0.175	-0.156	-0.315	0.242	-0.042	0.233	-0.275	-0.241	-0.360	-0.377	-0.240	-0.326	0.148	-0.013	-0.010	-0.084	0.222	0.223	0.001	0.044	-0.358	-0.217	-0.364	-0.277	-0.424	-0.402
Mean (mm)				0.814	0.629	-0.660	0.531	-0.944	0.943	0.564	0.515	0.493	0.431	0.465	0.506	0.559	0.617	0.586	0.558	-0.046	0.646	0.650	0.743	0.576	0.659	-0.054	0.268	0.486
Sorting					0.238	-0.723	0.599	-0.872	0.859	0.579	0.441	0.524	0.422	0.429	0.228	0.360	0.595	0.577	0.344	-0.091	0.551	0.454	0.775	0.486	0.736	0.134	0.436	0.660
Skewness						-0.386	0.111	-0.521	0.534	0.040	0.360	0.294	0.389	0.273	0.228	0.363	0.273	0.288	0.193	-0.078	0.335	0.423	0.236	0.225	0.180	-0.092	0.045	0.110
Kurtosis							-0.476	0.652	-0.650	-0.423	-0.433	-0.460	-0.583	-0.409	-0.234	-0.313	-0.502	-0.457	-0.313	-0.148	-0.492	-0.409	-0.587	-0.479	-0.548	-0.019	-0.257	-0.405
% Fines								-0.528	0.474	0.426	0.242	0.291	0.140	0.254	0.164	0.048	0.348	0.366	0.311	-0.076	0.368	0.297	0.641	0.346	0.636	0.101	0.341	0.521
% Sands									-0.993	-0.666	-0.531	-0.568	-0.520	-0.483	-0.469	-0.560	-0.651	-0.640	-0.530	-0.004	-0.669	-0.660	-0.819	-0.590	-0.740	-0.054	-0.398	-0.623
% Gravel										0.672	0.563	0.607	0.553	0.507	0.478	0.574	0.635	0.623	0.512	0.023	0.655	0.654	0.812	0.592	0.731	0.073	0.407	0.610
Total Organic Carbon (% M/M)											0.503	0.605	0.565	0.509	0.450	0.340	0.443	0.447	0.508	-0.011	0.461	0.485	0.788	0.611	0.724	0.120	0.370	0.517
Total 16 PAH (µg.Kg⁻¹)												0.942	0.829	0.985	0.395	0.489	0.404	0.384	0.478	-0.069	0.475	0.459	0.612	0.588	0.470	0.006	0.231	0.275
Total 22 PAH (µg.Kg⁻¹)													0.905	0.899	0.307	0.349	0.369	0.414	0.333	0.076	0.392	0.432	0.683	0.485	0.618	0.235	0.449	0.448
Low moleculaweight PAH (µg.kg⁻¹)														0.752	0.359	0.269	0.263	0.256	0.236	0.099	0.333	0.412	0.478	0.457	0.353	0.018	0.169	0.230
High molecular weight PAH (µg.kg⁻¹)															0.360	0.434	0.382	0.356	0.460	-0.107	0.444	0.408	0.572	0.559	0.444	0.009	0.222	0.253
Arsenic (mg.kg⁻¹)																0.748	0.670	0.564	0.752	0.365	0.737	0.855	0.397	0.293	0.409	0.066	0.208	0.264
Cadmium (mg.kg⁻¹)																	0.831	0.765	0.734	0.380	0.866	0.886	0.526	0.414	0.498	0.004	0.256	0.366
Chromium (mg.kg⁻¹)																		0.925	0.615	0.312	0.973	0.890	0.634	0.397	0.637	0.134	0.398	0.575
Copper (mg.kg⁻¹)																			0.543	0.366	0.889	0.828	0.636	0.292	0.660	0.221	0.487	0.668
Lead (mg.kg⁻¹)																				0.088	0.684	0.741	0.549	0.562	0.447	-0.265	-0.033	0.162
Mercury (mg.kg⁻¹)																					0.327	0.301	0.038	-0.210	0.280	0.512	0.508	0.373
Nickel (mg.kg⁻¹)																						0.934	0.660	0.455	0.644	0.086	0.377	0.551
Zinc (mg.kg⁻¹)																							0.610	0.439	0.581	0.048	0.307	0.454
Number of Species (per 0.1m²)																								0.737	0.924	0.149	0.538	0.736
Number of Individuals (per 0.1m²)																									0.454	-0.443	-0.083	0.134
Margalef Richness (per 0.1m²)																										0.456	0.757	0.892
Pielou's Evenness (per 0.1m²)																											0.872	0.681
Simpsons Diversity (per 0.1m²)																												0.912
Shannon-Wiener Diversity (per 0.1m²)																												

APPENDIX L – CONVERSION OF EUNIS CLASSIFICATIONS

2012 EUNIS Code	2012 EUNIS Name	2019 EUNIS Code	2019 EUNIS Name	Variation
A5.61	Sublittoral polychaete worm reefs on sediment	**MB221**	Worm reefs in the Atlantic infralittoral zone	Narrower
A5.13	Infralittoral Coarse Sediment	**MB3**	Infralittoral coarse sediment	Equal
A5.13; **A5.1;** **A5.5;** **A5**	Infralittoral coarse sediment; Sublittoral coarse sediment; Sublittoral macrophyte-dominated sediment; Sublittoral sediment	**MB32**	Atlantic infralittoral coarse sediment	Wider
A5.13	Infralittoral Coarse Sediment	**MB323**	Faunal communities in full salinity Atlantic infralittoral coarse sediment	Narrower
A5.131	Sparse fauna on highly mobile sublittoral shingle (cobbles and pebbles)	**MB3231**	Sparse fauna on highly mobile Atlantic infralittoral shingle (cobbles and pebbles)	Equal
A5.135	Glycera lapidum in impoverished infralittoral mobile gravel and sand	**MB3235**	*Glycera lapidum* in impoverished Atlantic infralittoral mobile gravel and sand	Equal
A5.43	Infralittoral Mixed Sediments	**MB4**	Infralittoral Mixed Sediments	Equal
A5.4; **A5.43;** **A5.41;** **A5.5;** **A5**	Sublittoral mixed sediment; Infralittoral mixed sediments; Sublittoral mixed sediment in low or reduced salinity; Sublittoral macrophyte-dominated sediment; Sublittoral sediment	**MB42**	Atlantic infralittoral mixed sediment	Wider
A5.23	Infralittoral Fine Sand	**MB5**	Infralittoral Sand	Wider
A5.23	Infralittoral Fine Sand	**MB52**	Atlantic Infralittoral Sand	Overlap
A5.23	Infralittoral Fine Sand	**MB523**	Faunal Communities of Full Salinity Atlantic Infralittoral Sand	Equal
A5.231	Infralittoral mobile clean sand with sparse fauna	**MB5231**	Sparse fauna in Atlantic infralittoral mobile clean sand	Equal
A5.233	*Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand	**MB5233**	*Nephtys cirrosa* and *Bathyporeia* spp. in Atlantic infralittoral sand	Equal
A5.33; **A5.34;** **A5.3;** **A5.5;** **A5**	Infralittoral sandy mud; Infralittoral fine mud; Sublittoral mud; Sublittoral macrophyte-dominated sediment; Sublittoral sediment	**MB62**	Atlantic infralittoral mud	Wider
A5.6	Sublittoral biogenic reefs	**MC2**	Circalittoral biogenic habitat	Wider
A5.61	Sublittoral polychaete worm reefs on sediment	**MC221**	Worm reefs in the Atlantic circalittoral zone	Narrower
A5.611	*Sabellaria spinulosa* on stable circalittoral mixed sediment	**MC2211**	*Sabellaria spinulosa* on stable Atlantic circalittoral mixed sediment	Equal
A5	Sublittoral Sediments	**MC3**	Circalittoral Coarse Sediment	Overlap
A5.14; **A5.1;** **A5**	Circalittoral coarse sediment; Sublittoral coarse sediment; Sublittoral sediment	**MC32**	Atlantic circalittoral coarse sediment	Wider

2012 EUNIS Code	2012 EUNIS Name	2019 EUNIS Code	2019 EUNIS Name	Variation
A5.14	Circalittoral coarse sediment	**MC321**	Faunal communities of Atlantic circalittoral coarse sediment	Narrower
A5.141	*Pomatoceros triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles	**MC3211**	*Pomatoceros triqueter* with barnacles and bryozoan crusts on Atlantic circalittoral unstable cobbles and pebbles	Equal
A5.142	*Mediomastus fragilis, Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel	**MC3212**	*Mediomastus fragilis, Lumbrineris* spp. and venerid bivalves in Atlantic circalittoral coarse sand or gravel	Equal
A5.143	Protodorvillea kefersteini and other polychaetes in impoverished circalittoral mixed gravelly sand	**MC3213**	Protodorvillea kefersteini and other polychaetes in impoverished Atlantic circalittoral mixed gravelly sand	Equal
A5.44	Circalittoral Mixed Sediments	**MC42**	Atlantic Circalittoral Mixed Sediment	Narrower
A5.44	Circalittoral Mixed Sediments	**MC421**	Faunal communities of Atlantic circalittoral mixed sediment or coarse sediment depending on PSA	Narrower
A5.25	Circalittoral Fine Sand	**MC512**	Faunal Communities of Atlantic Circalittoral Sand	Overlap with A5.26
A5.25; A5.26; A5.2; A5	Circalittoral fine sand; Circalittoral muddy sand; Sublittoral sand; Sublittoral sediment	**MC52**	Atlantic circalittoral sand	Wider
A5.25	Circalittoral Fine Sand	**MC521**	Faunal communities of Atlantic circalittoral sand	Overlap with A5.26
A5.251	*Echinocyamus pusillus, Ophelia borealis* and *Abra prismatica* in circalittoral fine sand	**MC5211**	*Echinocyamus pusillus*, *Ophelia borealis and Abra prismatica* in circalittoral fine sand	Equal
A5.252	*Abra prismatica, Bathyporeia elegans* and polychaetes in circalittoral fine sand	**MC5212**	*Abra prismatica, Bathyporeia elegans* and polychaetes in circalittoral fine sand	Equal
A5.15; A5.1; A5	Deep circalittoral coarse sediment; Sublittoral coarse sediment; Sublittoral sediment	**MD32**	Atlantic offshore circalittoral coarse sediment	Wider
A5.45; A5; A5.4	Deep circalittoral mixed sediments; Sublittoral sediment; Sublittoral mixed sediment	**MD42**	Atlantic offshore circalittoral mixed sediment	Wider
A5.27; A5.2; A5	Deep circalittoral sand; Sublittoral sand; Sublittoral sediment	**MD52**	Atlantic offshore circalittoral sand	Wider
A5.37; A5; A5.3	Deep circalittoral mud; Sublittoral sediment; Sublittoral mud	**MD62**	Atlantic offshore circalittoral mud	Wider

APPENDIX M – SACFOR ABUNDANCE

Stills Data

SACFOR- Stills.xlsx

Video Data

SACFOR- Stills.xlsx

APPENDIX N – STONY REEF ASSESSMENT

Transect Name	Picture	Picture No.*	Date	Time	Easting (m)	Northing (m)	Composition (% Cover)	% Cover Category	Elevation (Average Boulder And Cobble Height In Mm)	Elevation Category	Reef Structure	Reefiness Value
OWF_VID_23	OWF_VID_23_00001	Additional1	09/04/2022	09:55:12	379006.29	5943336.22	9	<10%	50	<64mm	1	Not a Reef
	OWF_VID_23_00002	Additional2	09/04/2022	09:55:22	379005.74	5943338.42	6	<10%	10	<64mm	1	Not a Reef
	OWF_VID_23_00003	Additional3	09/04/2022	09:55:33	379005.19	5943339.81	0		0	Flat	0	Not a Reef
	OWF_VID_23_00004	Additional4	09/04/2022	09:55:43	379004.78	5943340.71	0		0	Flat	0	Not a Reef
	OWF_VID_23_00005	Additional5	09/04/2022	09:55:57	379003.97	5943342.73	0		0	Flat	0	Not a Reef
	OWF_VID_23_00006	Additional6	09/04/2022	09:56:10	379003.26	5943343.14	0		0	Flat	0	Not a Reef
	OWF_VID_23_00007	Additional7	09/04/2022	09:56:16	379003.05	5943343.14	0		0	Flat	0	Not a Reef
OWF_VID_31	OWF_VID_31_001	1	12/04/2022	14:26:58	No Nav	No Nav	2	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_31_002	2	12/04/2022	14:27:49	No Nav	No Nav	3		50	<64mm	1	Not a Reef
	OWF_VID_31_003	3	12/04/2022	14:28:33	No Nav	No Nav	0		0	Flat	0	Not a Reef
	OWF_VID_31_004	4	12/04/2022	14:28:42	No Nav	No Nav	0		0	Flat	0	Not a Reef
	OWF_VID_31_005	5	12/04/2022	14:30:24	No Nav	No Nav	0		0	Flat	0	Not a Reef
	OWF_VID_31_006	6	12/04/2022	14:31:19	382462.84	5928303.88	2		50	<64mm	1	Not a Reef
	OWF_VID_31_007	7	12/04/2022	14:32:22	382462.63	5928304.43	0		0	Flat	0	Not a Reef
	OWF_VID_31_008	8	12/04/2022	14:32:37	382458.34	5928315.23	0		0	Flat	0	Not a Reef
	OWF_VID_31_009	9	12/04/2022	14:34:27	382454.31	5928329.64	0		0	Flat	0	Not a Reef
	OWF_VID_31_010	10	12/04/2022	14:34:36	382454.05	5928332.27	0		0	Flat	0	Not a Reef
	OWF_VID_31_011	11	12/04/2022	14:34:49	382453.18	5928334.77	0		0	Flat	0	Not a Reef
	OWF_VID_31_012	12	12/04/2022	14:34:58	382452.6	5928336.06	0		0	Flat	0	Not a Reef
	OWF_VID_31_013	13	12/04/2022	14:35:05	382451.87	5928337.46	0		0	Flat	0	Not a Reef
	OWF_VID_31_014	14	12/04/2022	14:35:27	382450.05	5928340.20	0		0	Flat	0	Not a Reef
	OWF_VID_31_015	15	12/04/2022	14:35:30	382449.94	5928340.50	0		0	Flat	0	Not a Reef
	OWF_VID_31_016	16	12/04/2022	14:35:38	382449.3	5928341.99	0		0	Flat	0	Not a Reef
	OWF_VID_31_017	17	12/04/2022	14:36:04	382448.70	5928345.20	4	<10%	10	<64mm	1	Not a Reef
	OWF_VID_31_018	18	12/04/2022	14:36:17	382448.51	5928347.15	2	<10%	50	<64mm	1	Not a Reef
	OWF_VID_31_019	19	12/04/2022	14:36:41	382448.31	5928349.53	8	<10%	20	<64mm	1	Not a Reef
	OWF_VID_31_020	20	12/04/2022	14:37:10	382445.89	5928354.52	0		0	Flat	0	Not a Reef
OWF_VID_32	OWF_VID_32_001	1	11/04/2022	15:45:55	No Nav	No Nav	7	<10%	50	<64mm	1	Not a Reef
	OWF_VID_32_002	2	11/04/2022	15:50:20	382677.91	5933648.75	0		0	Flat	0	Not a Reef
	OWF_VID_32_003	3	11/04/2022	15:50:23	382677.85	5933649.28	0		0	Flat	0	Not a Reef

Transect Name	Picture	Picture No.*	Date	Time	Easting (m)	Northing (m)	Composition (% Cover)	% Cover Category	Elevation (Average Boulder And Cobble Height In Mm)	Elevation Category	Reef Structure	Reefiness Value
	OWF_VID_32_004	4	11/04/2022	15:51:26	382672.43	5933657.04	9	<10%	50	<64mm	1	Not a Reef
	OWF_VID_32_005	5	11/04/2022	15:52:20	382669.78	5933663.62	0		0	Flat	0	Not a Reef
	OWF_VID_32_006	6	11/04/2022	15:53:08	382668.57	5933672.34	0		0	Flat	0	Not a Reef
	OWF_VID_32_007	7	11/04/2022	15:53:26	382667.83	5933674.14	0		0	Flat	0	Not a Reef
	OWF_VID_32_008	8	11/04/2022	15:53:47	382666.84	5933676.45	0		0	Flat	0	Not a Reef
	OWF_VID_32_00001	Additional1	11/04/2022	15:55:37	382660.96	5933692.17	11	10-40%	200	64mm-5m	2	Low Reef
	OWF_VID_32_009	9	11/04/2022	15:55:50	382659.53	5933694.89	2	<10%	20	<64mm	1	Not a Reef
	OWF_VID_32_010	10	11/04/2022	15:55:58	382658.91	5933696.18	0		0	Flat	0	Not a Reef
OWF_VID_45	OWF_VID_45_001	1	12/04/2022	08:58:34	No Nav	No Nav	3	<10%	20	<64mm	1	Not a Reef
	OWF_VID_45_002	2	12/04/2022	08:59:05	No Nav	No Nav	0		0	Flat	0	Not a Reef
	OWF_VID_45_003	3	12/04/2022	08:59:35	No Nav	No Nav	3	<10%	20	<64mm	1	Not a Reef
	OWF_VID_45_004	4	12/04/2022	09:00:08	No Nav	No Nav	0		0	Flat	0	Not a Reef
	OWF_VID_45_005	5	12/04/2022	09:02:22	385833.22	5929702.53	0		0	Flat	0	Not a Reef
	OWF_VID_45_006	6	12/04/2022	09:02:53	385835.18	5929698.71	0		0	Flat	0	Not a Reef
	OWF_VID_45_007	7	12/04/2022	09:03:13	385836.28	5929696.67	2	<10%	20	<64mm	1	Not a Reef
	OWF_VID_45_008	8	12/04/2022	09:03:35	385837.24	5929693.78	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_45_009	9	12/04/2022	09:03:46	385837.85	5929692.01	2	<10%	20	<64mm	1	Not a Reef
	OWF_VID_45_010	10	12/04/2022	09:04:03	385838.22	5929689.93	0		0	Flat	0	Not a Reef
	OWF_VID_45_011	11	12/04/2022	09:04:41	385839.62	5929684.81	4	<10%	10	<64mm	1	Not a Reef
	OWF_VID_45_012	12	12/04/2022	09:05:14	385839.93	5929679.86	2	<10%	10	<64mm	1	Not a Reef
	OWF_VID_45_013	13	12/04/2022	09:05:44	385841.27	5929675.86	0		0	Flat	0	Not a Reef
	OWF_VID_45_014	14	12/04/2022	09:05:57	385842.03	5929673.68	0		0	Flat	0	Not a Reef
	OWF_VID_45_015	15	12/04/2022	09:06:20	385843.21	5929670.73	0		0	Flat	0	Not a Reef
	OWF_VID_45_016	16	12/04/2022	09:06:44	385844.67	5929667.16	0		0	Flat	0	Not a Reef
	OWF_VID_45_017	17	12/04/2022	09:07:24	385847.02	5929661.56	0		0	Flat	0	Not a Reef
	OWF_VID_45_018	18	12/04/2022	09:07:59	385849.08	5929656.57	0		0	Flat	0	Not a Reef
	OWF_VID_45_019	19	12/04/2022	09:08:10	385849.84	5929654.69	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_45_020	20	12/04/2022	09:08:25	385850.42	5929653.06	0		0	Flat	0	Not a Reef
	OWF_VID_45_021	21	12/04/2022	09:08:36	385850.72	5929651.95	0		0	Flat	0	Not a Reef
OWF_VID_50	OWF_VID_50_00001	Additional1	08/04/2022	14:49:32	387947.43	5942679.77	5	<10%	50	<64mm	1	Not a Reef
	OWF_VID_50_00002	Additional2	08/04/2022	14:49:40	387947.49	5942681.59	18	10-40%	50	<64mm	2	Low Reef
	OWF_VID_50_00003	Additional3	08/04/2022	14:49:54	387947.35	5942684.09	0		0	Flat	0	Not a Reef
	OWF_VID_50_00004	Additional4	08/04/2022	14:50:04	387947.27	5942685.86	1	<10%	10	<64mm	1	Not a Reef

Transect Name	Picture	Picture No.*	Date	Time	Easting (m)	Northing (m)	Composition (% Cover)	% Cover Category	Elevation (Average Boulder And Cobble Height In Mm)	Elevation Category	Reef Structure	Reefiness Value
	OWF_VID_50_00005	Additional5	08/04/2022	14:50:19	387947.02	5942687.11	0		0	Flat	0	Not a Reef
	OWF_VID_50_00006	Additional6	08/04/2022	14:50:28	387946.80	5942688.41	0		0	Flat	0	Not a Reef
	OWF_VID_50_00007	Additional7	08/04/2022	14:50:57	387946.37	5942690.98	28	10-40%	64	64mm-5m	2	Low Reef
	OWF_VID_50_00008	Additional8	08/04/2022	14:51:10	387946.32	5942692.14	0		0	Flat	0	Not a Reef
	OWF_VID_50_00009	Additional9	08/04/2022	14:51:19	387946.16	5942694.38	0		0	Flat	0	Not a Reef
	OWF_VID_50_00010	Additional10	08/04/2022	14:51:31	387945.87	5942695.19	0		0	Flat	0	Not a Reef
	OWF_VID_50_00011	Additional11	08/04/2022	14:51:41	387945.67	5942695.62	8	<10%	50	<64mm	1	Not a Reef
	OWF_VID_50_00012	Additional12	08/04/2022	14:51:52	387945.51	5942695.70	6	<10%	50	<64mm	1	Not a Reef
	OWF_VID_50_00013	Additional13	08/04/2022	14:52:01	387945.34	5942695.95	11	10-40%	64	64mm-5m	2	Low Reef
	OWF_VID_50_00014	Additional14	08/04/2022	14:52:14	387945.1	5942697.07	0		0	Flat	0	Not a Reef
	OWF_VID_50_00015	Additional15	08/04/2022	14:52:27	387945.59	5942698.89	0		0	Flat	0	Not a Reef
	OWF_VID_50_00016	Additional16	08/04/2022	14:52:39	387945.68	5942700.54	10	10-40%	50	<64mm	2	Low Reef
	OWF_VID_50_00017	Additional17	08/04/2022	14:52:51	387945.17	5942701.26	3	<10%	50	<64mm	1	Not a Reef
	OWF_VID_50_00018	Additional18	08/04/2022	14:53:04	387944.71	5942702.41	0		0	Flat	0	Not a Reef
	OWF_VID_50_00019	Additional19	08/04/2022	14:53:20	387944.2	5942703.29	0		0	Flat	0	Not a Reef
	OWF_VID_50_00020	Additional20	08/04/2022	14:53:39	387943.84	5942705.09	8	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_50_00021	Additional21	08/04/2022	14:53:54	387944.28	5942705.95	7	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_50_00022	Additional22	08/04/2022	14:54:04	387944.54	5942706.39	2	<10%	50	<64mm	1	Not a Reef
	OWF_VID_50_00023	Additional23	08/04/2022	14:54:16	387944.76	5942707.32	20	10-40%	50	<64mm	2	Low Reef
	OWF_VID_50_00024	Additional24	08/04/2022	14:54:30	387944.81	5942708.92	12	10-40%	64	64mm-5m	2	Low Reef
	OWF_VID_50_00025	Additional25	08/04/2022	14:54:40	387944.71	5942710.48	4	<10%	40	<64mm	1	Not a Reef
	OWF_VID_50_00026	Additional26	08/04/2022	14:55:07	387944.14	5942713.12	2	<10%	10	<64mm	1	Not a Reef
	OWF_VID_50_00027	Additional27	08/04/2022	14:55:17	387944.34	5942713.46	2	<10%	20	<64mm	1	Not a Reef
	OWF_VID_50_00028	Additional28	08/04/2022	14:55:31	387944.55	5942715.81	3	<10%	20	<64mm	1	Not a Reef
	OWF_VID_50_00029	Additional29	08/04/2022	14:55:40	387944.83	5942716.59	13	10-40%	90	64mm-5m	2	Low Reef
	OWF_VID_50_00030	Additional30	08/04/2022	14:55:57	387945.04	5942718.49	10	10-40%	50	<64mm	2	Low Reef
	OWF_VID_50_00031	Additional31	08/04/2022	14:56:07	387944.87	5942719.00	0		0	Flat	0	Not a Reef
	OWF_VID_50_00032	Additional32	08/04/2022	14:56:19	387944.73	5942719.29	0		0	Flat	0	Not a Reef
	OWF_VID_50_00033	Additional33	08/04/2022	14:56:29	387944.68	5942721.06	0		0	Flat	0	Not a Reef
	OWF_VID_50_00034	Additional34	08/04/2022	14:56:36	387944.68	5942721.63	1	<10%	50	<64mm	1	Not a Reef
	OWF_VID_50_00035	Additional35	08/04/2022	14:56:46	387944.83	5942722.65	4	<10%	30	<64mm	1	Not a Reef
	OWF_VID_50_00036	Additional36	08/04/2022	14:56:55	387944.89	5942723.98	5	<10%	50	<64mm	1	Not a Reef
	OWF_VID_50_00037	Additional37	08/04/2022	14:57:08	387945.07	5942726.00	3	<10%	30	<64mm	1	Not a Reef

Transect Name	Picture	Picture No.*	Date	Time	Easting (m)	Northing (m)	Composition (% Cover)	% Cover Category	Elevation (Average Boulder And Cobble Height In Mm)	Elevation Category	Reef Structure	Reefiness Value
	OWF_VID_50_00038	Additional38	08/04/2022	14:57:18	387944.89	5942727.00	0		0	Flat	0	Not a Reef
	OWF_VID_50_00039	Additional39	08/04/2022	14:57:27	387944.75	5942727.77	7	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_50_00040	Additional40	08/04/2022	14:57:45	387944.37	5942729.19	0		0	Flat	0	Not a Reef
	OWF_VID_50_00041	Additional41	08/04/2022	14:57:55	387944.23	5942729.87	12	10-40%	64	64mm-5m	2	Low Reef
	OWF_VID_50_00042	Additional42	08/04/2022	14:58:05	387944.15	5942730.47	4	<10%	30	<64mm	1	Not a Reef
	OWF_VID_50_00043	Additional43	08/04/2022	14:58:15	387944.03	5942731.75	0		0	Flat	0	Not a Reef
	OWF_VID_50_00044	Additional44	08/04/2022	14:58:24	387943.89	5942732.90	4	<10%	20	<64mm	1	Not a Reef
	OWF_VID_50_00045	Additional45	08/04/2022	14:58:32	387943.8	5942733.69	3	<10%	30	<64mm	1	Not a Reef
	OWF_VID_50_00046	Additional46	08/04/2022	14:58:40	387943.74	5942734.75	4	<10%	40	<64mm	1	Not a Reef
	OWF_VID_50_00047	Additional47	08/04/2022	14:58:51	387943.47	5942735.72	3	<10%	30	<64mm	1	Not a Reef
	OWF_VID_50_00048	Additional48	08/04/2022	14:59:02	387943.20	5942736.93	23	10-40%	64	64mm-5m	2	Low Reef
OWF_VID_57	OWF_VID_57_001	1	06/04/2022	14:51:20	No Nav	No Nav	4	<10%	50	<64mm	1	Not a Reef
	OWF_VID_57_002	2	06/04/2022	14:55:23	390616.64	5932925.28	2	<10%	10	<64mm	1	Not a Reef
	OWF_VID_57_003	3	06/04/2022	14:55:37	390617.60	5932923.20	14	10-40%	50	<64mm	2	Low Reef
	OWF_VID_57_004	4	06/04/2022	14:55:59	390618.38	5932919.72	8	<10%	40	<64mm	1	Not a Reef
	OWF_VID_57_005	5	06/04/2022	14:56:15	390619.16	5932917.88	17	10-40%	64	64mm-5m	2	Low Reef
	OWF_VID_57_006	6	06/04/2022	14:56:31	390620.20	5932915.08	3	<10%	10	<64mm	1	Not a Reef
	OWF_VID_57_007	7	06/04/2022	14:56:48	390621.48	5932912.99	13	10-40%	50	<64mm	2	Low Reef
	OWF_VID_57_008	8	06/04/2022	14:57:05	390622.67	5932911.00	17	10-40%	64	64mm-5m	2	Low Reef
	OWF_VID_57_009	9	06/04/2022	14:57:27	390623.96	5932907.97	20	10-40%	64	64mm-5m	2	Low Reef
	OWF_VID_57_010	10	06/04/2022	14:57:41	390624.8	5932905.78	2	<10%	20	<64mm	1	Not a Reef
	OWF_VID_57_011	11	06/04/2022	14:58:01	390625.39	5932903.32	11	10-40%	50	<64mm	2	Low Reef
	OWF_VID_57_012	12	06/04/2022	14:58:15	390625.89	5932901.68	6	<10%	30	<64mm	1	Not a Reef
	OWF_VID_57_013	13	06/04/2022	14:58:31	390626.78	5932899.79	0		0	Flat	0	Not a Reef
	OWF_VID_57_014	14	06/04/2022	14:58:49	390627.49	5932898.38	22	10-40%	64	64mm-5m	2	Low Reef
	OWF_VID_57_015	15	06/04/2022	14:59:15	390629	5932895.54	14	10-40%	50	<64mm	2	Low Reef
	OWF_VID_57_016	16	06/04/2022	14:59:34	390630.09	5932893.08	7	<10%	50	<64mm	1	Not a Reef
	OWF_VID_57_017	17	06/04/2022	14:59:46	390630.6	5932892.06	3	<10%	20	<64mm	1	Not a Reef
	OWF_VID_57_018	18	06/04/2022	15:00:03	390631.2	5932890.24	8	<10%	30	<64mm	1	Not a Reef
	OWF_VID_57_019	19	06/04/2022	15:00:22	390632.17	5932887.93	5	<10%	30	<64mm	1	Not a Reef
	OWF_VID_57_020	20	06/04/2022	15:00:46	390633.43	5932884.19	7	<10%	30	<64mm	1	Not a Reef
	OWF_VID_57_021	21	06/04/2022	15:01:01	390633.71	5932882.55	2	<10%	20	<64mm	1	Not a Reef
	OWF_VID_57_022	22	06/04/2022	15:01:23	390634.77	5932880.00	6	<10%	20	<64mm	1	Not a Reef

Transect Name	Picture	Picture No.*	Date	Time	Easting (m)	Northing (m)	Composition (% Cover)	% Cover Category	Elevation (Average Boulder And Cobble Height In Mm)	Elevation Category	Reef Structure	Reefiness Value
	OWF_VID_57_023	23	06/04/2022	15:01:46	390635.19	5932878.35	12	10-40%	100	64mm-5m	2	Low Reef
OWF_VID_65	OWF_VID_65_00001	Additional1	06/04/2022	09:28:22	394855.84	5939296.24	5	<10%	65	64mm-5m	1	Not a Reef
	OWF_VID_65_00002	Additional2	06/04/2022	09:28:32	394854.83	5939294.80	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00003	Additional3	06/04/2022	09:28:42	394853.66	5939293.33	2	<10%	20	<64mm	0	Not a Reef
	OWF_VID_65_00004	Additional4	06/04/2022	09:28:52	394852.87	5939291.73	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00005	Additional5	06/04/2022	09:29:02	394852.33	5939290.05	1	<10%	20	<64mm	1	Not a Reef
	OWF_VID_65_00006	Additional6	06/04/2022	09:29:12	394851.82	5939288.08	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00007	Additional7	06/04/2022	09:29:22	394850.61	5939286.81	2	<10%	30	<64mm	1	Not a Reef
	OWF_VID_65_00008	Additional8	06/04/2022	09:29:32	394849.52	5939285.68	8	<10%	50	<64mm	1	Not a Reef
	OWF_VID_65_00009	Additional9	06/04/2022	09:29:42	394848.67	5939284.75	10	10-40%	50	<64mm	2	Low Reef
	OWF_VID_65_00010	Additional10	06/04/2022	09:29:55	394848.73	5939281.87	5	<10%	30	<64mm	1	Not a Reef
	OWF_VID_65_00011	Additional11	06/04/2022	09:30:05	394847.65	5939280.03	8	<10%	40	<64mm	1	Not a Reef
	OWF_VID_65_00012	Additional12	06/04/2022	09:30:15	394846.83	5939278.93	2	<10%	20	<64mm	1	Not a Reef
	OWF_VID_65_00013	Additional13	06/04/2022	09:30:25	394845.72	5939276.97	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00014	Additional14	06/04/2022	09:30:35	394846.01	5939276.06	5	<10%	50	<64mm	1	Not a Reef
	OWF_VID_65_00015	Additional15	06/04/2022	09:30:45	394845.38	5939274.60	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_65_00016	Additional16	06/04/2022	09:30:55	394844.11	5939273.30	6	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_65_00017	Additional17	06/04/2022	09:31:05	394843.34	5939271.50	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00018	Additional18	06/04/2022	09:31:15	394842.61	5939269.88	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00019	Additional19	06/04/2022	09:31:25	394841.79	5939268.28	2	<10%	30	<64mm	1	Not a Reef
	OWF_VID_65_00020	Additional20	06/04/2022	09:31:35	394841.27	5939267.00	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00021	Additional21	06/04/2022	09:31:45	394840.27	5939265.84	0		0	Flat	0	Not a Reef
	OWF_VID_65_00022	Additional22	06/04/2022	09:31:55	394839.53	5939264.87	2	<10%	20	<64mm	1	Not a Reef
	OWF_VID_65_00023	Additional23	06/04/2022	09:32:05	394839.05	5939263.7	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00024	Additional24	06/04/2022	09:32:15	394838.36	5939261.72	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00025	Additional25	06/04/2022	09:32:25	394837.72	5939260.42	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_65_00026	Additional26	06/04/2022	09:32:35	394837.06	5939259.40	4	<10%	20	<64mm	1	Not a Reef
	OWF_VID_65_00027	Additional27	06/04/2022	09:32:45	394836.72	5939257.81	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00028	Additional28	06/04/2022	09:32:55	394835.82	5939256.53	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00029	Additional29	06/04/2022	09:33:05	394835.25	5939254.95	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00030	Additional30	06/04/2022	09:33:15	394834.84	5939253.6	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00031	Additional31	06/04/2022	09:33:25	394834.09	5939252.36	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00032	Additional32	06/04/2022	09:33:38	394833.23	5939250.21	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00033	Additional33	06/04/2022	09:33:48	394832.69	5939249.2	9	<10%	64	64mm-5m	1	Not a Reef

Transect Name	Picture	Picture No.*	Date	Time	Easting (m)	Northing (m)	Composition (% Cover)	% Cover Category	Elevation (Average Boulder And Cobble Height In Mm)	Elevation Category	Reef Structure	Reefiness Value
	OWF_VID_65_00034	Additional34	06/04/2022	09:33:58	394831.85	5939247.88	0	0	0	Flat	0	Not a Reef
	OWF_VID_65_00035	Additional35	06/04/2022	09:34:08	394830.71	5939246.83	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_65_00036	Additional36	06/04/2022	09:34:22	394830.68	5939244.21	8	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_65_00037	Additional37	06/04/2022	09:34:35	394830.34	5939242.93	1	<10%	20	<64mm	1	Not a Reef
OWF_VID_76	OWF_VID_76_00001	Additional1	04/04/2022	22:17:51	399987.77	5935227.56	3	<10%	30	<64mm	1	Not a Reef
	OWF_VID_76_00002	Additional2	04/04/2022	22:18:02	399987.76	5935228.58	4	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_76_00003	Additional3	04/04/2022	22:18:12	399988.51	5935230.32	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00004	Additional4	04/04/2022	22:18:22	399989.1	5935232.12	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00005	Additional5	04/04/2022	22:18:32	399989.42	5935233.36	9	<10%	30	<64mm	1	Not a Reef
	OWF_VID_76_00006	Additional6	04/04/2022	22:18:42	399990.04	5935234.92	2	<10%	30	<64mm	1	Not a Reef
	OWF_VID_76_00007	Additional7	04/04/2022	22:18:52	399990.4	5935235.66	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00008	Additional8	04/04/2022	22:19:02	399991.07	5935237.13	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00009	Additional9	04/04/2022	22:19:12	399991.26	5935238.35	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00010	Additional10	04/04/2022	22:19:22	399991.91	5935239.54	2	<10%	40	<64mm	1	Not a Reef
	OWF_VID_76_00011	Additional11	04/04/2022	22:19:32	399992.5	5935240.66	9	<10%	50	<64mm	1	Not a Reef
	OWF_VID_76_00012	Additional12	04/04/2022	22:19:42	399993.15	5935241.68	7	<10%	40	<64mm	1	Not a Reef
	OWF_VID_76_00013	Additional13	04/04/2022	22:19:52	399993.59	5935243.47	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00014	Additional14	04/04/2022	22:20:02	399994.04	5935245.42	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00015	Additional15	04/04/2022	22:20:12	399994.56	5935247.61	2	<10%	40	<64mm	1	Not a Reef
	OWF_VID_76_00016	Additional16	04/04/2022	22:20:22	399995.18	5935249.54	2	<10%	50	<64mm	1	Not a Reef
	OWF_VID_76_00017	Additional17	04/04/2022	22:20:32	399995.38	5935251.34	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00018	Additional18	04/04/2022	22:20:42	399995.53	5935253.05	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00019	Additional19	04/04/2022	22:20:52	399995.79	5935254.52	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00020	Additional20	04/04/2022	22:21:02	399996.09	5935256.32	3	<10%	30	<64mm	1	Not a Reef
	OWF_VID_76_00021	Additional21	04/04/2022	22:21:12	399996.12	5935257.04	3	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_76_00022	Additional22	04/04/2022	22:21:22	399996.33	5935258.41	8	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_76_00023	Additional23	04/04/2022	22:21:32	399996.53	5935260.22	2	<10%	20	<64mm	1	Not a Reef
	OWF_VID_76_00024	Additional24	04/04/2022	22:21:42	399996.17	5935262.17	3	<10%	50	<64mm	1	Not a Reef
	OWF_VID_76_00025	Additional25	04/04/2022	22:21:52	399996.31	5935263.90	3	<10%	40	<64mm	1	Not a Reef
	OWF_VID_76_00026	Additional26	04/04/2022	22:22:02	399996.67	5935265.80	2	<10%	40	<64mm	1	Not a Reef
	OWF_VID_76_00027	Additional27	04/04/2022	22:22:12	399997.05	5935267.02	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00028	Additional28	04/04/2022	22:22:22	399997.27	5935267.59	11	10-40%	50	<64mm	2	Low Reef
	OWF_VID_76_00029	Additional29	04/04/2022	22:22:32	399997.85	5935268.58	8	<10%	50	<64mm	1	Not a Reef

Transect Name	Picture	Picture No.*	Date	Time	Easting (m)	Northing (m)	Composition (% Cover)	% Cover Category	Elevation (Average Boulder And Cobble Height In Mm)	Elevation Category	Reef Structure	Reefiness Value
	OWF_VID_76_00030	Additional30	04/04/2022	22:22:42	399998.70	5935270.15	10	10-40%	50	<64mm	2	Low Reef
	OWF_VID_76_00031	Additional31	04/04/2022	22:22:52	399999.56	5935271.79	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_76_00032	Additional32	04/04/2022	22:23:02	399999.61	5935273.24	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00033	Additional33	04/04/2022	22:23:12	400000.18	5935274.86	5	<10%	50	<64mm	1	Not a Reef
	OWF_VID_76_00034	Additional34	04/04/2022	22:23:22	400000.55	5935276.57	8	<10%	50	<64mm	1	Not a Reef
	OWF_VID_76_00035	Additional35	04/04/2022	22:23:32	400000.58	5935278.12	7	<10%	40	<64mm	1	Not a Reef
	OWF_VID_76_00036	Additional36	04/04/2022	22:23:42	400000.74	5935279.59	2	<10%	20	<64mm	1	Not a Reef
	OWF_VID_76_00037	Additional37	04/04/2022	22:23:52	400001.07	5935280.62	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_76_00038	Additional38	04/04/2022	22:24:02	400001.60	5935281.85	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_76_00039	Additional39	04/04/2022	22:24:12	400002.02	5935283.22	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00040	Additional40	04/04/2022	22:24:22	400002.72	5935284.85	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00041	Additional41	04/04/2022	22:24:32	400002.90	5935286.50	1	<10%	50	<64mm	1	Not a Reef
	OWF_VID_76_00042	Additional42	04/04/2022	22:24:42	400003.36	5935287.77	0	0	0	Flat	0	Not a Reef
	OWF_VID_76_00043	Additional43	04/04/2022	22:24:52	400003.97	5935288.54	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_76_00044	Additional44	04/04/2022	22:25:02	400004.81	5935290.38	2	<10%	30	<64mm	1	Not a Reef
	OWF_VID_76_00045	Additional45	04/04/2022	22:25:12	400004.91	5935292.09	1	<10%	20	<64mm	1	Not a Reef
	OWF_VID_76_00046	Additional46	04/04/2022	22:25:22	400005.47	5935294.02	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_76_00047	Additional47	04/04/2022	22:25:32	400005.78	5935295.42	1	<10%	10	<64mm	1	Not a Reef
OWF_VID_79_A	OWF_VID_79_A_1	1	08/04/2022	09:09:47	No Nav	No Nav	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_2	2	08/04/2022	09:09:59	No Nav	No Nav	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_3	3	08/04/2022	09:10:12	No Nav	No Nav	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_79_A_4	4	08/04/2022	09:11:25	No Nav	No Nav	4	<10%	50	<64mm	1	Not a Reef
	OWF_VID_79_A_5	5	08/04/2022	09:12:49	No Nav	No Nav	3	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_79_A_6	6	08/04/2022	09:13:31	No Nav	No Nav	2	<10%	50	<64mm	1	Not a Reef
	OWF_VID_79_A_7	7	08/04/2022	09:13:54	401359.45	5936262.04	2	<10%	30	<64mm	1	Not a Reef
	OWF_VID_79_A_8	8	08/04/2022	09:14:26	401357.89	5936266.91	3	<10%	20	<64mm	1	Not a Reef
	OWF_VID_79_A_9	9	08/04/2022	09:14:40	401357.4	5936269.37	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_10	10	08/04/2022	09:14:48	401357.01	5936270.15	3	<10%	30	<64mm	1	Not a Reef
	OWF_VID_79_A_11	11	08/04/2022	09:14:57	401356.62	5936271.04	3	<10%	30	<64mm	1	Not a Reef
	OWF_VID_79_A_12	12	08/04/2022	09:15:13	401355.41	5936272.70	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_13	13	08/04/2022	09:15:28	401354.36	5936275.02	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_14	14	08/04/2022	09:15:45	401353.71	5936277.01	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_15	15	08/04/2022	09:15:54	401353.42	5936277.78	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_79_A_16	16	08/04/2022	09:16:09	401352.70	5936279.86	1	<10%	20	<64mm	1	Not a Reef

Transect Name	Picture	Picture No.*	Date	Time	Easting (m)	Northing (m)	Composition (% Cover)	% Cover Category	Elevation (Average Boulder And Cobble Height In Mm)	Elevation Category	Reef Structure	Reefiness Value
	OWF_VID_79_A_17	17	08/04/2022	09:16:14	401352.38	5936280.38	1	<10%	30	<64mm	1	Not a Reef
	OWF_VID_79_A_18	18	08/04/2022	09:16:23	401351.79	5936281.38	7	<10%	64	64mm-5m	1	Not a Reef
	OWF_VID_79_A_19	19	08/04/2022	09:16:41	401350.64	5936284.60	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_20	20	08/04/2022	09:16:52	401350.1	5936285.96	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_21	21	08/04/2022	09:17:14	401349.11	5936288.69	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_22	22	08/04/2022	09:17:34	401347.82	5936292.33	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_23	23	08/04/2022	09:17:45	401347.15	5936294.42	1	<10%	20	<64mm	1	Not a Reef
	OWF_VID_79_A_24	24	08/04/2022	09:17:53	401347	5936295.18	1	<10%	20	<64mm	1	Not a Reef
	OWF_VID_79_A_25	25	08/04/2022	09:18:06	401346.55	5936297.05	3	<10%	50	<64mm	1	Not a Reef
	OWF_VID_79_A_26	26	08/04/2022	09:18:14	401345.94	5936298.06	3	<10%	30	<64mm	1	Not a Reef
	OWF_VID_79_A_27	27	08/04/2022	09:18:22	401345.32	5936299.34	9	<10%	50	<64mm	1	Not a Reef
	OWF_VID_79_A_28	28	08/04/2022	09:18:30	401344.5	5936301.03	4	<10%	40	<64mm	1	Not a Reef
	OWF_VID_79_A_29	29	08/04/2022	09:18:39	401343.99	5936301.9	9	<10%	50	<64mm	1	Not a Reef
	OWF_VID_79_A_30	30	08/04/2022	09:18:57	401342.63	5936305.21	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_31	31	08/04/2022	09:19:15	401341.8	5936306.34	0	0	0	Flat	0	Not a Reef
	OWF_VID_79_A_32	32	08/04/2022	09:19:26	401341.05	5936308.34	13	10-40%	50	<64mm	2	Low Reef
	OWF_VID_79_A_33	33	08/04/2022	09:19:36	401340.79	5936309.36	9	<10%	50	<64mm	1	Not a Reef
	OWF_VID_79_A_34	34	08/04/2022	09:19:45	401340.51	5936310.43	1	<10%	10	<64mm	1	Not a Reef
	OWF_VID_79_A_35	35	08/04/2022	09:19:57	401339.90	5936312.40	5	<10%	30	<64mm	1	Not a Reef
	OWF_VID_79_A_36	36	08/04/2022	09:20:09	No Nav	No Nav	7	<10%	20	<64mm	1	Not a Reef
	OWF_VID_79_A_37	37	08/04/2022	09:20:18	No Nav	No Nav	1	<10%	40	<64mm	1	Not a Reef

**Additional screenshots were captured from the HD video approximately every 10 seconds if the underwater stills captured in the field underrepresented the spatial variability in cobbles and boulders*

APPENDIX O – SABELLARIA REEF ASSESSMENT

Transect Name	Picture	Picture no.*	Date	Time	Easting	Northing	Composition (% cover)	Elevation (Average tube height in cm)	Reefiness value
OWF_VID_76	OWF_VID_76_00001	Additional1	04/04/2022	*22:17:51*	*399987.77*	*5935227.6*	0	0	Not a Reef
	OWF_VID_76_00002	Additional2	04/04/2022	*22:18:02*	399987.76	5935228.6	0	0	Not a Reef
	OWF_VID_76_00003	Additional3	04/04/2022	*22:18:12*	399988.51	5935230.3	45	7	Medium Reef
	OWF_VID_76_00004	Additional4	04/04/2022	*22:18:22*	399989.1	5935232.1	47	7	Medium Reef
	OWF_VID_76_00005	Additional5	04/04/2022	*22:18:32*	399989.42	5935233.4	3	1	Not a Reef
	OWF_VID_76_00006	Additional6	04/04/2022	*22:18:42*	399990.04	5935234.9	35	4	Low Reef
	OWF_VID_76_00007	Additional7	04/04/2022	*22:18:52*	399990.4	5935235.7	2	1	Not a Reef
	OWF_VID_76_00008	Additional8	04/04/2022	*22:19:02*	399991.07	5935237.1	36	7	Medium Reef
	OWF_VID_76_00009	Additional9	04/04/2022	*22:19:12*	399991.26	5935238.4	7	5	Not a Reef
	OWF_VID_76_00010	Additional10	04/04/2022	*22:19:22*	399991.91	5935239.5	1	1	Not a Reef
	OWF_VID_76_00011	Additional11	04/04/2022	*22:19:32*	399992.5	5935240.7	11	5	Low Reef
	OWF_VID_76_00012	Additional12	04/04/2022	*22:19:42*	399993.15	5935241.7	2	1	Not a Reef
	OWF_VID_76_00013	Additional13	04/04/2022	*22:19:52*	399993.59	5935243.5	7	4	Not a Reef
	OWF_VID_76_00014	Additional14	04/04/2022	*22:20:02*	399994.04	5935245.4	3	4	Not a Reef
	OWF_VID_76_00015	Additional15	04/04/2022	*22:20:12*	399994.56	5935247.6	0	0	Not a Reef
	OWF_VID_76_00016	Additional16	04/04/2022	*22:20:22*	399995.18	5935249.5	17	4	Low Reef
	OWF_VID_76_00017	Additional17	04/04/2022	*22:20:32*	399995.38	5935251.3	2	1	Not a Reef
	OWF_VID_76_00018	Additional18	04/04/2022	*22:20:42*	399995.53	5935253.1	15	4	Low Reef
	OWF_VID_76_00019	Additional19	04/04/2022	*22:20:52*	399995.79	5935254.5	3	2	Not a Reef
	OWF_VID_76_00020	Additional20	04/04/2022	*22:21:02*	399996.09	5935256.3	1	1	Not a Reef
	OWF_VID_76_00021	Additional21	04/04/2022	*22:21:12*	399996.12	5935257	2	3	Not a Reef
	OWF_VID_76_00022	Additional22	04/04/2022	*22:21:22*	399996.33	5935258.4	12	7	Low Reef
	OWF_VID_76_00023	Additional23	04/04/2022	*22:21:32*	399996.53	5935260.2	25	7	Medium Reef

Transect Name	Picture	Picture no.*	Date	Time	Easting	Northing	Composition (% cover)	Elevation (Average tube height in cm)	Reefiness value
	OWF_VID_76_00024	Additional24	04/04/2022	*22:21:42*	399996.17	5935262.2	25	10	Medium Reef
	OWF_VID_76_00025	Additional25	04/04/2022	*22:21:52*	399996.31	5935263.9	20	7	Medium Reef
OWF_VID_76	OWF_VID_76_00026	Additional26	04/04/2022	*22:22:02*	399996.67	5935265.8	0	0	Not a Reef
	OWF_VID_76_00027	Additional27	04/04/2022	*22:22:12*	399997.05	5935267	3	2	Not a Reef
	OWF_VID_76_00028	Additional28	04/04/2022	*22:22:22*	399997.27	5935267.6	3	5	Not a Reef
	OWF_VID_76_00029	Additional29	04/04/2022	*22:22:32*	399997.85	5935268.6	6	3	Not a Reef
	OWF_VID_76_00030	Additional30	04/04/2022	*22:22:42*	399998.7	5935270.2	3	1	Not a Reef
	OWF_VID_76_00031	Additional31	04/04/2022	*22:22:52*	399999.56	5935271.8	19	5	Low Reef
	OWF_VID_76_00032	Additional32	04/04/2022	*22:23:02*	399999.61	5935273.2	23	5	Medium Reef
	OWF_VID_76_00033	Additional33	04/04/2022	*22:23:12*	400000.18	5935274.9	2	1	Not a Reef
	OWF_VID_76_00034	Additional34	04/04/2022	*22:23:22*	400000.55	5935276.6	3	1	Not a Reef
	OWF_VID_76_00035	Additional35	04/04/2022	*22:23:32*	400000.58	5935278.1	4	1	Not a Reef
	OWF_VID_76_00036	Additional36	04/04/2022	*22:23:42*	400000.74	5935279.6	0	0	Not a Reef
	OWF_VID_76_00037	Additional37	04/04/2022	*22:23:52*	400001.07	5935280.6	0	0	Not a Reef
	OWF_VID_76_00038	Additional38	04/04/2022	*22:24:02*	400001.6	5935281.9	0	0	Not a Reef
	OWF_VID_76_00039	Additional39	04/04/2022	*22:24:12*	400002.02	5935283.2	1	1	Not a Reef
	OWF_VID_76_00040	Additional40	04/04/2022	*22:24:22*	400002.72	5935284.9	0	0	Not a Reef
	OWF_VID_76_00041	Additional41	04/04/2022	*22:24:32*	400002.9	5935286.5	0	0	Not a Reef
	OWF_VID_76_00042	Additional42	04/04/2022	*22:24:42*	400003.36	5935287.8	0	0	Not a Reef
	OWF_VID_76_00043	Additional43	04/04/2022	*22:24:52*	400003.97	5935288.5	0	0	Not a Reef
	OWF_VID_76_00044	Additional44	04/04/2022	*22:25:02*	400004.81	5935290.4	0	0	Not a Reef
	OWF_VID_76_00045	Additional45	04/04/2022	*22:25:12*	400004.91	5935292.1	0	0	Not a Reef
	OWF_VID_76_00046	Additional46	04/04/2022	*22:25:22*	400005.47	5935294	0	0	Not a Reef
	OWF_VID_76_00047	Additional47	04/04/2022	*22:25:32*	400005.78	5935295.4	0	0	Not a Reef

**Additional screenshots were captured from the HD video approximately every 10 seconds if the underwater stills captured in the field underrepresented the spatial variability in Sabellaria spinulosa*

APPENDIX P – SAMPLE AND SEABED PHOTOGRAPHS

Sample And Seabed Photographs.pdf

APPENDIX Q – 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 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.