benthic solutions limited

MOWI®

Environmental Baseline Study and Habitat Investigation – Stulaigh South Proposed Fish Farm Site, South Uist

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Table of Contents

Tables

Figures

Table of Abbreviations

Acronym	Description	Acronym	Description
BSL	Benthic Solutions Limited	MC42	Atlantic Circalittoral Mixed Sediment
CLUSTER	Hierarchical Agglomerative Clustering	MOD4	BSL MOD4 Camera System
CM	Central Meridian	MOWI	MOWI Limited
COG	Couse Over Ground	MP	Megapixel
CR.LCR	Clow Energy Circalittoral Rock	nMDS	Non-Metric Multi-Dimensional Scaling
CR.LCR.BrAs	Brachiopod and Ascidian Communities	OSGB36	Ordnance Survey Great Britain 1936
DG	Day Grab	OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
EBS	Environmental Baseline Survey	PCA	Principal Components Analysis
EOL	End of Line	PMF	Priority Marine Feature Scotland
EUNIS	European Nature Information System	PRIMER	Plymouth Routines in Multivariate Ecological Research
F1, F2	Fauna grab samples 1 and 2	SACFOR	Superabundant, Abundant, Common, Frequent, Occasional, Rare and Less Than Rare
FAS	Fisheries Assessment Survey	SD	Standard Definition
GPS	Geographical Positioning System	SIMPROF	Similarity Profile Analysis
HAS	Habitat Assessment Survey	SOG	Speed Over Ground
HD	High Definition	SOL	Start of Line
ITI	Infaunal Trophic Index	SS.SMx.CMx	Circalittoral Mixed Sediment
JNCC	Joint Nature Conservation Committee		
LAT	Lowest Astronomical Tide	SS.SMx.CMx.ClloMx	*Cerianthus lloydii* and other Burrowing Anemones in Circalittoral Muddy Mixed Sediment
LED	Light-emitting Diode	SS.SMx.CMx.KurThyMx	*Kurtiella bidentata* and *Thyasira* spp. in Circalittoral Muddy Mixed Sediment'
LOI	Loss on Ignition	SS.SMP.Mrl	Maerl Beds
MBES	Multi Beam Echo Sounder	SSS	Side Scan Sonar
MC12	Atlantic Circalittoral Rock	TOC	Total Organic Carbon

Executive Summary

Under contract to MOWI Ltd, an environmental assessment was conducted around the proposed Stulaigh South fish farm located to the southeast of the Isle of South Uist, Outer Hebrides. The aim of the survey was to assess the habitat type and health of the seabed to determine the possibility of a new fish farm in the area. This report details the habitat investigation and environmental operations at the proposed Stulaigh South fish farm site.

Environmental sampling at the Stulaigh South site involved acquisition of seabed samples for sedimentary particle size, total organic carbon and macrofaunal analysis using a day grab, and underwater video footage and still photographs using a BSL MOD4 camera system at a total of eight transects, positioned in a grid formation across the proposed cage locations. One further transect was surveyed approximately 300m east of the proposed cage locations to investigate the presence of maerl in the surrounding areas of the site.

The water depth across the proposed Stulaigh South fish farm site ranged between 6m to 44m LAT with the deepest water depth recorded at the centre of the proposed site. The seabed shoaled upon approach to landfall, most notably at the outcropping rocks of Stulaigh and Glas-Eilean Mor. The seabed sediments within the survey area were characterised by mixed reflectivity sonar data interspersed by high reflectivity bedrock throughout.

Sediment within the survey area was dominated by sands with a lower proportion of fines and a minimal proportion of gravel at most stations. Higher proportions of gravels were encountered at stations close to outcropping bedrock features. The samples collected in the survey area represented three Folk classifications with most assigned ‘Slightly gravelly muddy sand’ or ‘Gravelly muddy sand’. Total organic carbon (TOC) levels were moderate across much of the survey area with the exception of one station sampled approximately 80m north of the proposed cage locations, where TOC was over five times the concentration at all other stations.

A total of 3,068 individuals were recorded across 282 taxa in the survey area. Species richness and faunal abundance varied within the Stulaigh South survey area but were In line with eh consistent muddy sand sediment and lack of point source contamination. While multivariate analysis split the survey dataset into five separate cluster groups, the separation appeared to be caused mainly by variation in the abundance of dominant taxa and was not therefore deemed to be of ecologically significant for most clusters. The colonial epifauna community was relatively diverse with 33 species recorded, where Bryozoa were the most frequently observed.

The proposed Stulaigh South fish farm site was assigned to two level four EUNIS habitats, predominantly MC42 ‘Circalittoral mixes sediment (SS.SMx.CMx) with patches of MC12 ‘Low Energy Circalittoral Rock’ (CR.LCR) where outcropping bedrock was present.

Bedrock was common in the survey area with larger extents mapped in the east of the proposed fish cage locations with these areas supporting a diverse epifaunal community and given the elevation and extent these areas would classify as JNCC Annex I reefs.

Dead and occasionally live maerl were also constituents of the mixed sediment habitat, most abundant in the north-eastern and south-western extent of the survey area. However, due to all live maerl coverage recorded being <5%, these areas would not be classified as a maerl bed under current NatureScot guidelines.

The burrow density assessment for both burrow sizes revealed that burrows were present in areas of 'Circalittoral mixed sediment' at SACFOR abundances of 'rare' to 'occasional'. However, no burrowing sea pens or crustaceans were identified in the video footage across the Stulaigh South survey area. Therefore, given no burrowing seapens or crustaceans were identified and the presence of burrows at a maximum SACFOR density of 'occasional', according to JNCC and NatureScot guidance this area of the seabed is not considered a 'Seapen and Burrowing Megafauna community' nor a 'Burrowed mud' habitat, respectively.

No live individuals of *Arctica islandica* were observed during analysis of seabed video footage and still photographs from the Stulaigh South survey area. However, one adult and one juvenile specimen were recorded in the macrofauna samples at two stations.

1 Introduction

1.1 Project Information

Client:	MOWI Limited (MOWI)
Project:	Stulaigh South Environmental Baseline and Habitat Assessment Survey
Contractor:	Benthic Solutions Limited (BSL)
Contractor Reference:	2205
Survey Areas:	South Uist, South of Stulaigh Island area
Survey Type:	Visual and sediment sampling for fisheries/habitat assessment
Survey Period:	March 2022
Survey Vessel:	*Vega de Lyra*
Survey Equipment:	BSL MOD4.4 camera, Starfish 452f Side Scan Sonar, Day Grab
Client Project Manager:	[redacted]
BSL Project Manager:	[redacted]

1.2 Project Description

MOWI Limited (MOWI) commissioned Benthic Solutions Limited (BSL) to carry out an environmental baseline (EBS), habitat assessment survey (HAS) and a fisheries assessment survey (FAS) within the proposed Stulaigh South fish farm area. The scope required particular emphasis on the assessment of the sensitive habitats within the area, including 'Burrowed Mud' and 'Maerl' (*Phymatolithon calcareum*), as well as a fisheries assessment of king scallops (*Pecten maximus*), queen scallops (*Aequipecten opercularis*) and the Norwegian Lobster (*Nephrops norvegicus*). Burrowed muds and maerl beds are listed as a Scottish Priority Marine Feature (PMF; Howson et al., 2012).

This report is focussed on the habitat investigation and environmental survey operations conducted at the proposed Stulaigh South fish farm site with the fisheries assessment survey for the site presented in the previous Fisheries Assessment Survey Report (BSL, 2022).

The proposed Stulaigh South fish farm is located to the south of the Isle of Stulaigh, Outer Hebrides in water depths of approximately 13m to 28m. (Figure 1.1). Survey operations were carried out by BSL aboard the *Vega de Lyra*, between 22nd and 25th March 2022. A geophysical survey using towed side scan sonar (SSS) was conducted over the camera transects locations with a 100m range. Environmental seabed sampling and video assessment was carried out at the proposed Stulaigh South fish farm to provide an understanding of the different habitats encountered. Data was acquired through the sampling of the seabed using a Day grab (DG) at 10 stations. Seabed video footage was acquired using a BSL MOD4.4 camera system mounted within a bespoke subsea frame. High definition (HD) and standard definition (SD) video footage and high-quality underwater stills were obtained along each transect surveyed (Appendix I).

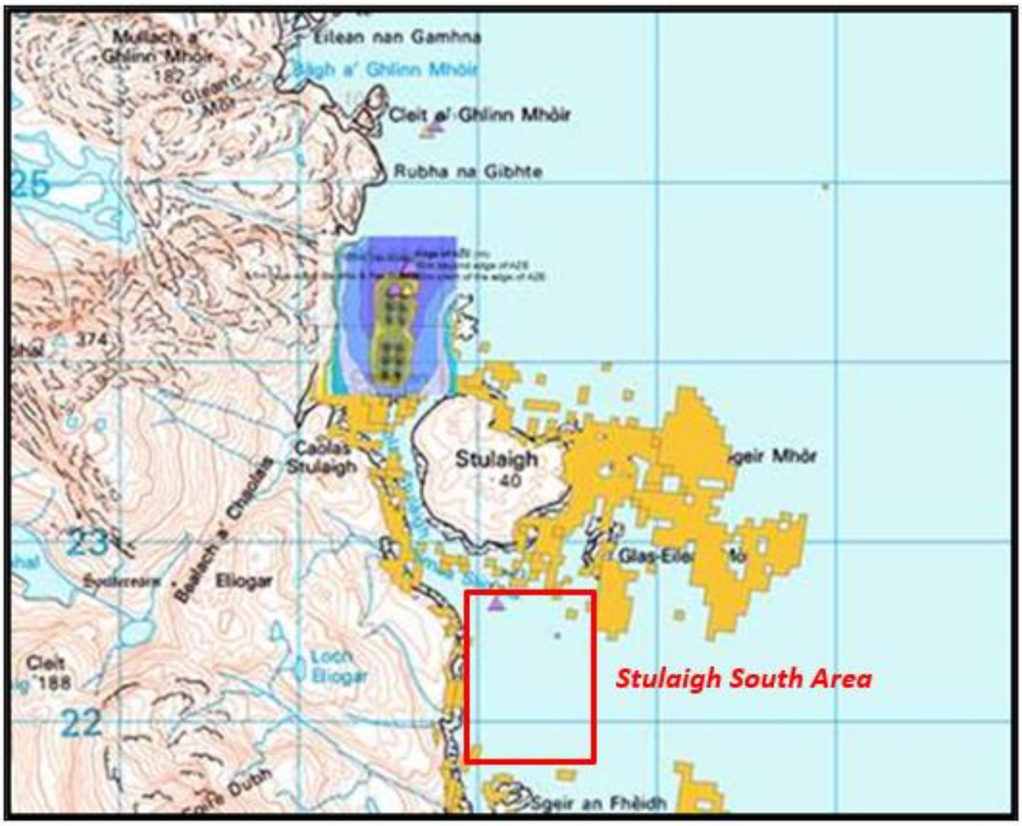


Figure 1.1 Location of the Stulaigh South Survey area and Potential Maerl Beds

1.3 Scope of Work

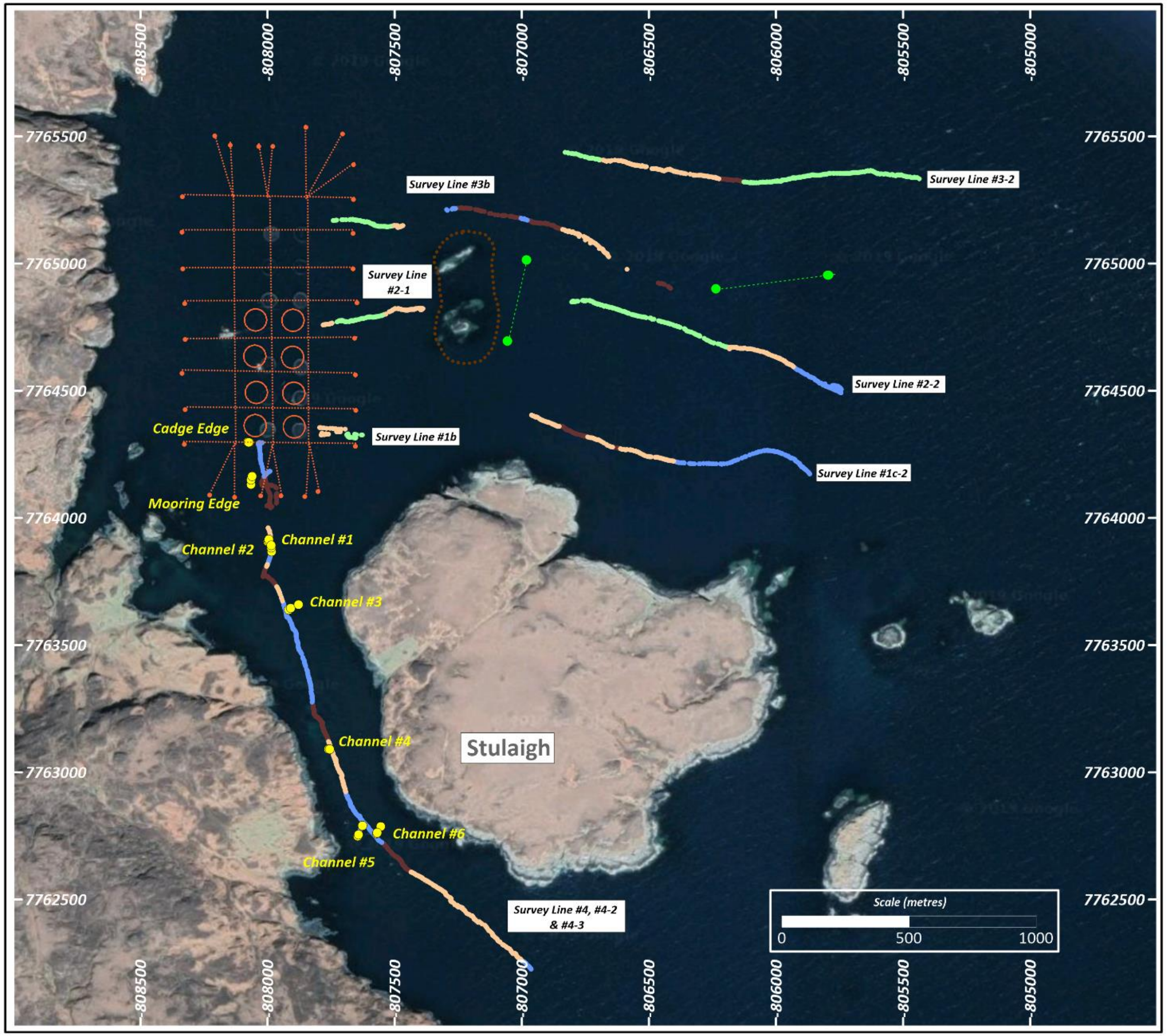
The main objectives of the habitat and fisheries assessment survey were:

- To provide video footage surrounding the proposed Stulaigh South fish farm and to assess the identity and distribution of seabed habitats in the surrounding area;
- To assess the maerl coverage and health at the proposed Stulaigh South fish farm;
- To assess the burrow density of *Nephrops norvegicus* at the proposed Stulaigh South fish farm;
- To assess the density of *Pecten maximus* and *Aequipecten opercularis* at the proposed Stulaigh South fish farm To assess the potential fisheries at the proposed Stulaigh South fish farm, focusing on the king scallop, queen scallop and the Norwegian lobster.

1.4 Background and Existing Information

Existing information considered as part of this assessment includes the two HAS conducted by BSL at the proposed Stulaigh South fish farm both in 2019 (BSL, 2019 and 2020). These surveys consisted of several camera transects orientated east to west east and south of the Stulaigh fish farm as well as a survey line within the channel between Stulaigh Island and South Uist (Figure 1.2 to Figure 1.5).

The previous survey highlighted the distribution of four main habitats: bedrock, mixed sandy gravel, coarse sand, and fine-medium sand within the surrounding areas of the Stulaigh fish farm. Maerl was sporadically distributed east of the Stulaigh fish farm at a density of <20% (Figure 1.4) with higher coverage and density recorded in the channel between the two islands where the percentage of live maerl was >50% (Figure 1.5). However, no maerl was identified in the four transects south of the channel which are closest to the proposed Stulaigh South fish farm (Figure 1.5).



Summary of Habitats at each Seabed Image Location around the Stulaigh Fish Farm

Four habitat types recorded along the three video transects east and one video transect south of the Stulaigh fish farm. Additional drop-down video at eight locations within the channel separating Stulaigh Island and South Uist.

Projection: Mercator. Datum: WGS84 (EPSG code 3395).
Not to be used for navigation

Legend:

- Approximate Creel Positions
- Reported Mooring Lines
- Cage Positions
- Rocky Outcrop
- Drop Down Video (Image)
- Bedrock Video Track
- Mixed Sandy Gravel Video Track
- Coarse Sand Video Track
- Fine to Medium Sand Video Track

Client: MOWI

Contractor: benthic solutions limited

Figure 1.2 Summary of Environmental Habitat Investigation at the Proposed Stulaigh South Fish Farm (BSL, 2019)

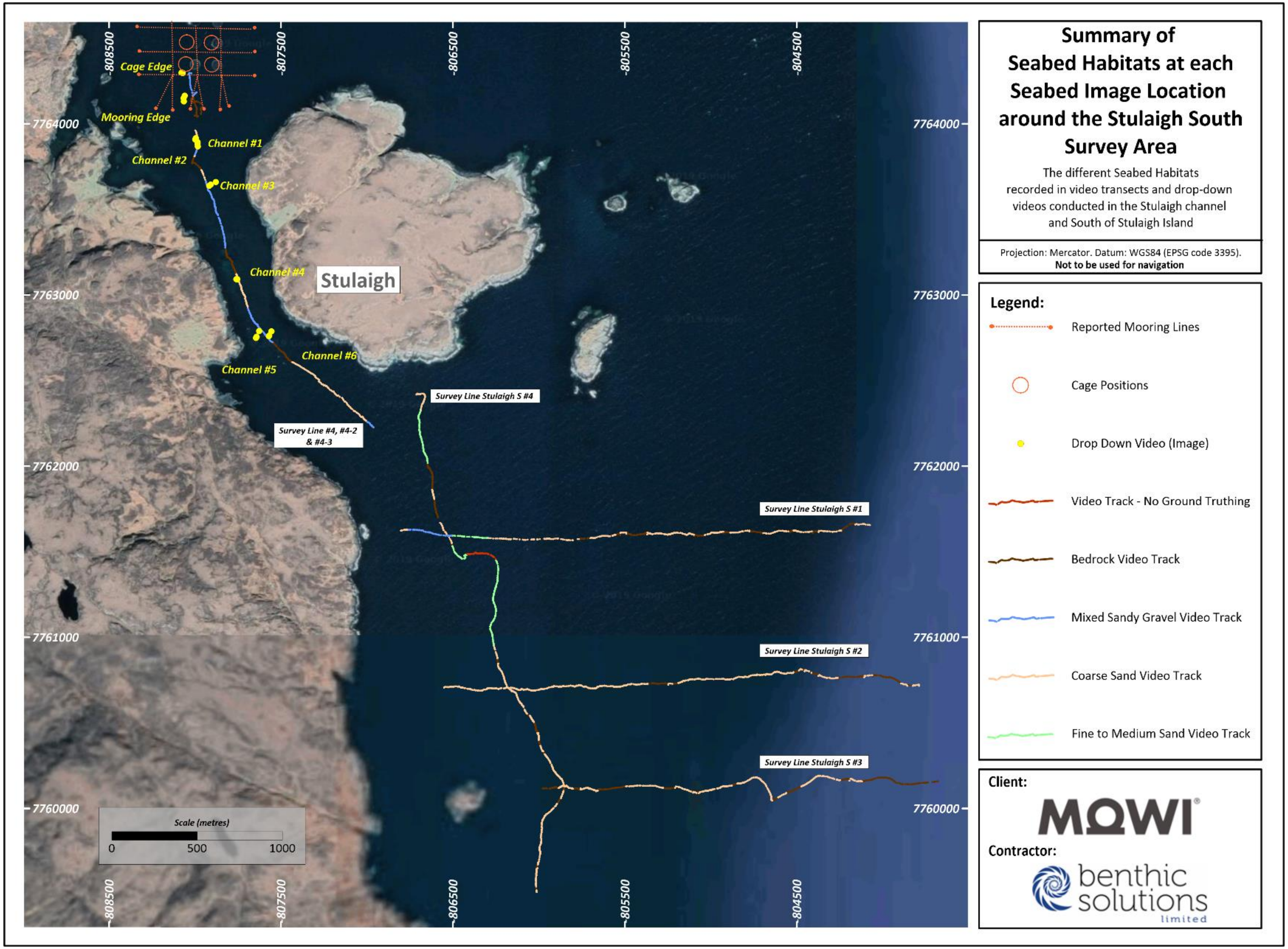


Figure 1.3 Summary of Environmental Habitat Investigation at the Proposed Stulaigh South Fish Farm (BSL, 2020)

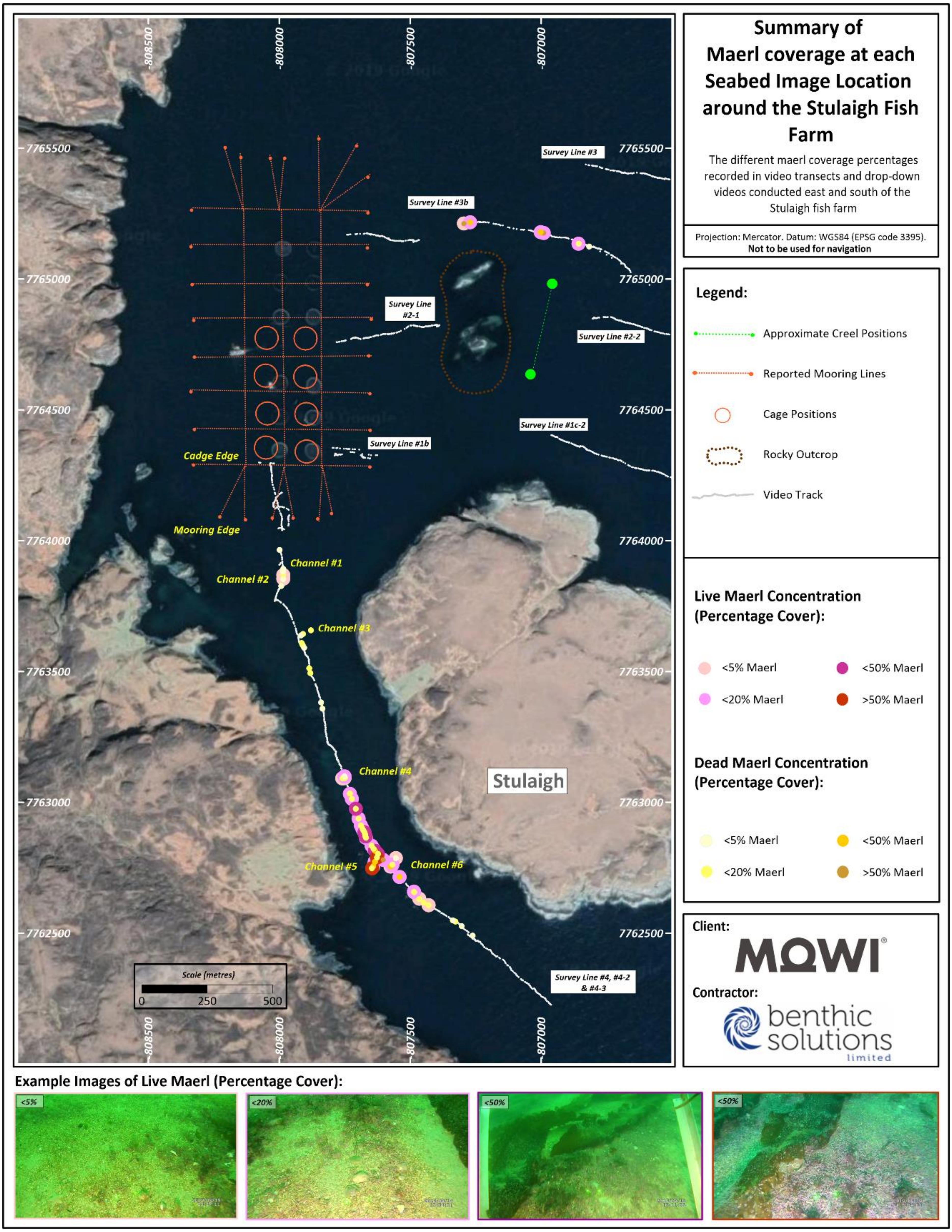


Figure 1.4 Summary of Maerl Coverage at the Proposed Stulaigh South Fish Farm (BSL, 2019)

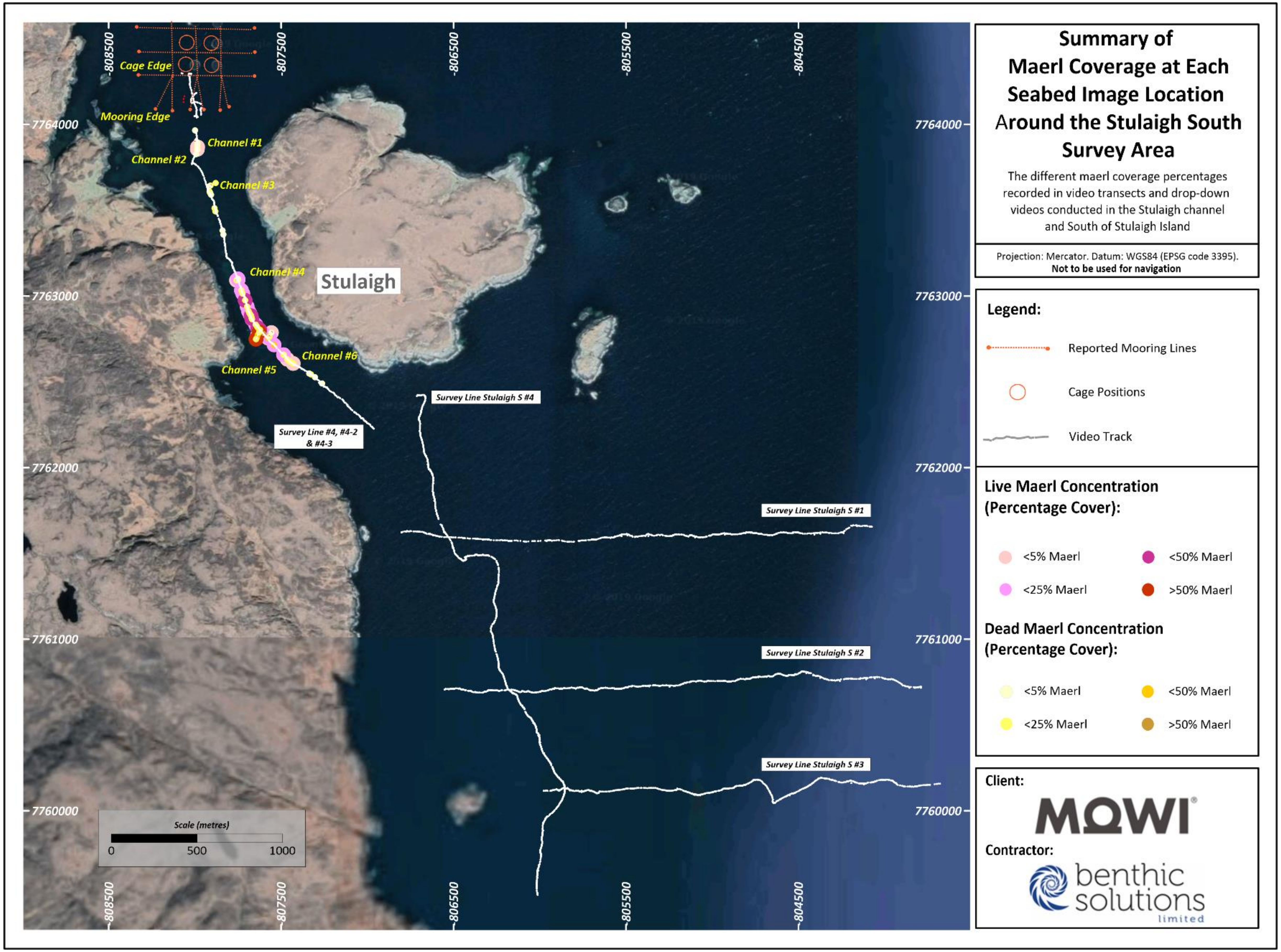


Figure 1.5 Summary of Maerl Coverage at the Proposed Stulaigh South Fish Farm (BSL, 2020)

2 Field Survey and Analytical Methods

2.1 Geodetic Parameters

The geodetic parameters used are provided below in Table 2.1.

Table 2.1 Geodetic Parameters

Required Datum	
Reference Spheroid	OSGB36
Projection Parameters	
Projection	Transverse Mercator
Central Meridian	-2.0000
Scale Factor	0.9996
Latitude of Natural Origin	49.0000
False Easting	400,000m
False Northing	-100,000m
Scale Factor at Origin	0.9996 at CM

2.2 Logistics

The work scope was completed by BSL aboard the *Vega De Lyra*. The vessel was mobilised for the environmental survey while on site. Throughout the survey the weather was good, with no impacts to operations.

Environmental survey equipment was deployed using the Hiab crane situated at the stern of the vessel. During surveying, the deckhand controlled the ascent and descent of equipment with the assistance of the vessel capstan located on the central stern. An overview of the survey operations is outlined in Table 2.2 below.

Table 2.2 Survey Operational Timings

Date	Activity	Details of Activity
21/03/2022	Personnel travel	2 x BSL Personnel travel from Norwich to Mallaig
22/03/2022	Mobilisation and Transit	Personnel begin the mobilisation of the vessel before and during the transit to Loch Boisdale, South Uist.
23/03/2022	Mobilisation and Geophysical operations	Finalisation of the mobilisation. Vessel arrives at the Proposed Stulaigh South fish farm. Vessel conducts reconnaissance line. Geophysical operations attempted.
24/03/2022	Environmental operations	Camera operations started at Stulaigh South .
25/03/2022	Environmental Operations	Camera operations completed and grab sampling of 10 stations started.
25/03/2022	Environmental and Geophysical operations	Remaining grab sampling locations completed. Geophysical acquisition completed. Transit to Barra for Hellisay survey.

2.3 Data Acquisition

The environmental sampling strategy was developed by the client prior to sampling. The camera transects were pre-defined by the client before the survey and were used to select the sampling locations in the field using the intelligent sampling design strategy based on the video data. Field sampling was carried out during 12 hours of daylight hours in accordance with BSL's approved standard operating procedures and client project specifications.

2.3.1 Geophysical Data

Analogue geophysical data acquired by MOWI and BSL during the survey was used for the purpose of habitat mapping. Bathymetric data was acquired by MOWI using a R2sonic 2024 multibeam echo sounder (MBES) with a Trimble RTK GPS system and a motion reference unit (MRU). The multibeam sensor was pole mounted onto the side of the vessel with the resulting bathymetric data and processed at a 1m spaced horizontal grid and reduced to LAT.

Side scan sonar (SSS) data was acquired by BSL using the Blueprint Subsea Starfish 452F lowered from the central stern of the vessel (Figure 2.1). Surface positioning was acquired using a differential GPS system with an external antenna located behind the wheelhouse, near the stern, close to the deployment location on the seabed frame. The data string was continuously recorded and monitored using a computer, whilst a further string was overlaid directly onto the video recording system for annotation on the standard definition targeting video file. The overlay string also indicated time, date, speed over ground (SOG) and course over ground (COG). During the geophysical surveying, the survey lines covered an approximate area of 1.5 km x 1 km. The range was set to 100m either side of the tow fish which enabled data acquisition below the fish farm cages. In total, three lines were run with five running in an east to west orientation, three in a south to north orientation and one running northeast to southwest. The extent of the SSS survey area is illustrated in Figure 2.3

Figure 2.1 Blueprint Subsea StarFish 452F Side Scan Sonar

2.3.2 Seabed Photography and Video

Seabed photography was acquired to ground-truth the seabed features of the proposed Stulaigh South fish farm survey area and to facilitate a habitat and fisheries assessment. A total of nine camera transects were carried out with the BSL MOD4.4 camera systems which was mounted within a BSL camera frame complete with a separate strobe, and LED lamps (Figure 2.2). The camera system was fitted with accurate GPS positioning, the video footage was overlaid with date, time, station number and GPS position information. Each photograph was logged with a corresponding latitude and longitude to allow for plotting into Global Mapper.

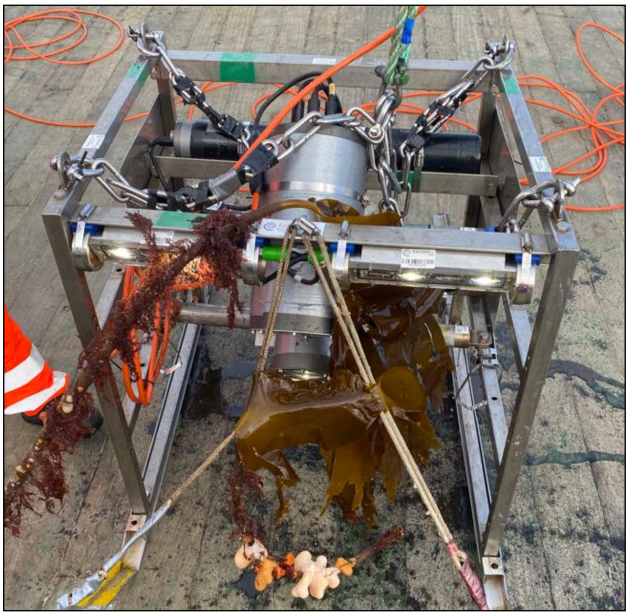


Figure 2.2 MOD4 Camera and Sled After Deployment

Once at the seabed, the camera was moved along the length of the transect at a speed of no more than 2 knots (optimised at approximately 1 knot). Still photographs were captured remotely using a surface control unit via an umbilical to the camera system. An internal time lapse was set so the stills were acquired every 15 seconds. Live video footage, overlaid with date, time, position and site details were viewed in real time. The live video stream was used to assist with the targeting of the still's camera. HD footage was saved internally by the video camera for all MOD4.4 transects; data was downloaded at the end of each shift of environmental operations and backed-up onto a hard drive. Details of the camera system and full specifications are outlined in Appendix I.

A total of nine SD and HD video camera transects were carried out, capturing a total of 883 high quality images. Three of the nine transect stations were re-run due to minor issues relating to snagging of equipment on subsurface rocks and data quality. The camera station planned at SS_CAM_08_Maerl was not ran due to the risk of the vessel colliding with the rocks of Stulaigh and Glas-Eilean Mor. Transect SS_CAM_09_Maerl was initially attempted but aborted due to a significant shoaling of the seabed during the transect, as a result the transect was shifted away from the Island of Glas-Eilean Mor and split in two so not to collide with the shoaling area of seabed. The camera transect data acquired including the start of line (SOL) and end of line (EOL) locations is tabulated below in Table 2.3 and illustrated in Figure 2.3.

Table 2.3 Summary of Environmental Camera Transect Acquisition

Geodetics: British Grid: OSGB36								
Transect		Date	Time	Length (m)	Easting (m)	Northing (m)	No. Stills	Video footage (minutes)
SS_CAM_01_A	SOL	24/03/2022	15:31:08	861	838 59	82 23 76	97	25
	EOL	24/03/2022	15:57:30		830 21	82 21 77		
SS_CAM_02	SOL	24/03/2022	16:31:10	926	838 94	82 22 81	84	24
	EOL	24/03/2022	16:56:36		829 91	82 20 78		
SS_CAM_03	SOL	24/03/2022	17:12:04	977	839 71	82 21 73	97	33
	EOL	24/03/2022	17:45:04		830 19	82 19 53		
SS_CAM_04	SOL	24/03/2022	13:56:18	1.337	835 09	82 13 94	133	35
	EOL	24/03/2022	14:33:06		831 17	82 26 72		
SS_CAM_05	SOL	24/03/2022	12:25:56	1,376	834 04	82 27 10	146	40
	EOL	24/03/2022	13:05:56		838 96	82 14 25		
SS_CAM_06_A	SOL	25/03/2022	10:04:30	1,005	837 49	82 17 06	126	34
	EOL	25/03/2022	10:37:56		830 14	82 23 92		
SS_CAM_07_A	SOL	24/03/2022	11:20:00	773	832 07	82 18 04	99	27
	EOL	24/03/2022	11:46:34		834 95	82 25 21		
SS_CAM_09_Maerl_B	SOL	25/03/2022	09:06:00	531	840 94	82 31 83	73	20
	EOL	25/03/2022	09:25:10		839 03	82 26 88		
SS_CAM_09_Maerl_C	SOL	25/03/2022	09:41:32	240	836 52	82 24 71	28	9
	EOL	25/03/2022	09:48:58		838 32	82 26 29		

2.3.3 Grab Sampling

Grab sampling locations were selected using an intelligent sampling design in the field based on the video data. As a result, 10 grab sampling locations were selected to ground-truth the sediment changes across the survey area, whilst focussing on the area under the proposed pens. A summary of the grab sampling locations is located in Table 2.4. A full suite of samples was collected, however, the macrofaunal F2 samples at SS_CAM_01 and SS_CAM_08 were below the acceptance criteria but were retained due to multiple failed attempts.

Table 2.4 Summary of Grab Sample Acquisition

Geodetics: British Grid: OSGB36										
Station	**Date**	**Time (UTC)**	**Easting (m)**	**Northing (m)**	**PSA**	**TOC**	**F1**	**F2**	**eDNA**	**Rationale**
SS_Grab_01	25/03/2022	17:16	833 91	82 21 30	Y	Y	Y	N*	Y	Slightly gravelly muddy sand appearance to habitat under the pens
SS_Grab_02	25/03/2022	18:14	833 60	82 20 14	Y	Y	Y	Y	Y	Gravelly/muddy sand appearance to habitat under the pens
SS_Grab_03	25/03/2022	16:20	832 67	82 22 10	Y	Y	Y	Y	Y	Slightly gravelly muddy appearance to habitat under the pens
SS_Grab_04	25/03/2022	18:43	834 77	82 20 38	Y	Y	Y	Y	Y	Gravelly/muddy sand appearance to habitat under the pens
SS_Grab_05	25/03/2022	15:28	834 11	82 22 72	Y	Y	Y	Y	Y	Gravelly/muddy sand appearance to habitat under the pens
SS_Grab_06	25/03/2022	17:59	832 00	82 20 94	Y	Y	Y	Y	Y	Coarser material in muddy sand slightly to the west of the pens
SS_Grab_07	26/03/2022	19:11	837 13	82 22 14	Y	Y	Y	Y	Y	Slightly gravelly muddy sand appearance far to the east of the pens
SS_Grab_08	26/03/2022	09:10	836 75	82 25 26	Y	Y	Y	N*	Y	Ground truthing a potential area of Maerl
SS_Grab_09	26/03/2022	10:18	834 31	82 16 55	Y	Y	Y	Y	Y	Gravelly muddy sand habitat to the south of the pens
SS_Grab_10	26/03/2022	10:05	832 20	82 23 72	Y	Y	Y	Y	Y	Gravelly muddy sand habitat to the north of the pens

Notes:
Sampling locations given are F1
** = Sample retained but below acceptance criteria*

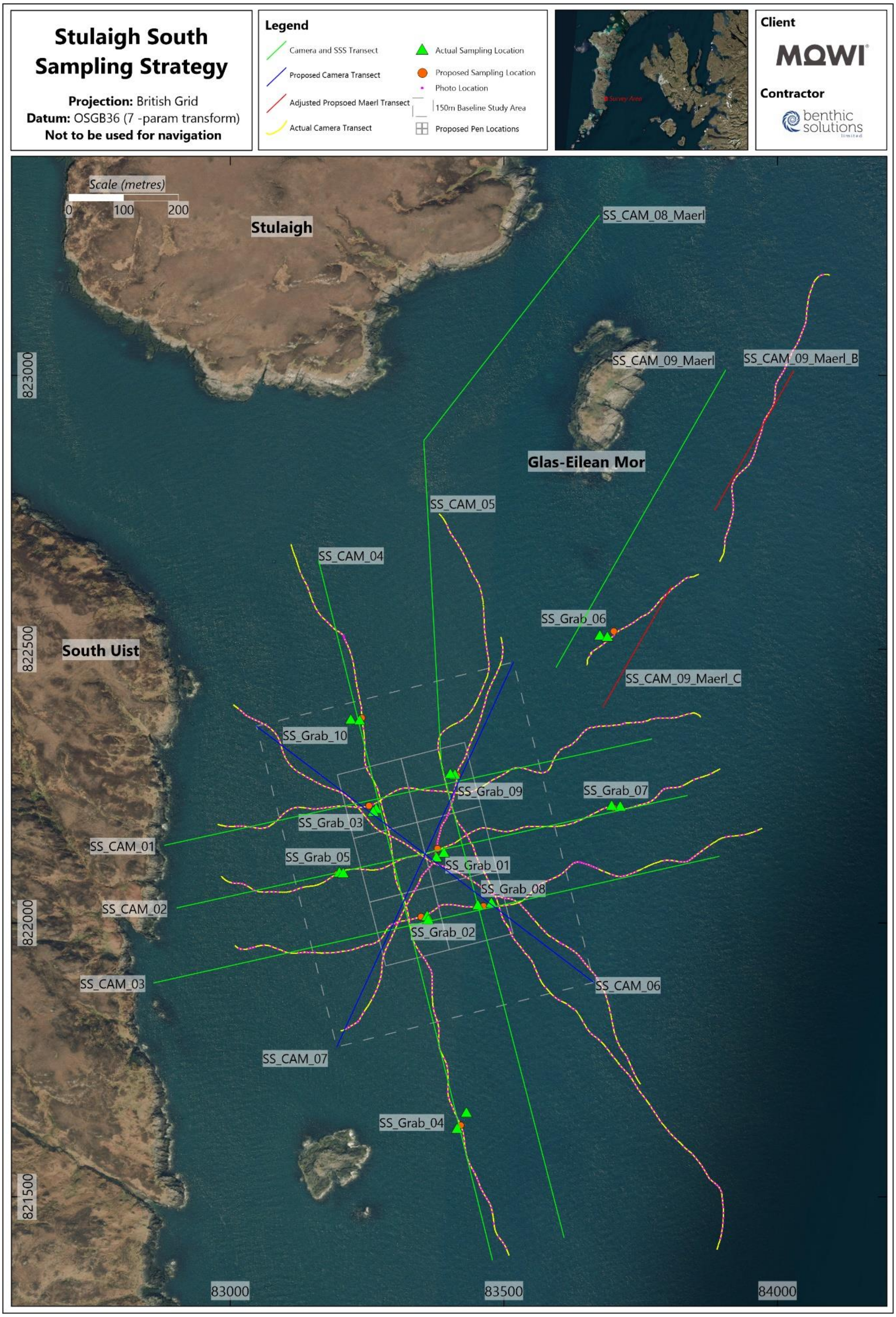


Figure 2.3 Environmental Sampling Strategy for the Proposed Stulaigh South Fish Farm

3 Habitat Investigation Methods

3.1 Environmental Habitat Assessment

The habitat assessment was based on review of high resolution still images as well as the recorded HD video footage and the interpreted SSS mosaic (Table 2.3). The sediment type in each screenshot was used in conjunction with the HD video footage as a basis for habitat determination, while the conspicuous species composition was used to define suspected variation (biotopes) within the general habitat (Appendix VI). Once the data was collected and georeferenced the habitat types were compared to the data from the previous survey conducted south of the Stulaigh fish farm (BSL, 2020) in order to identify any potential temporal shifts in the habitat distribution.

3.2 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 identifies any species that are afforded protection under several legislative conventions/directives implemented in the UK, including the Scottish Priority Marine Feature and UK Post-2010 Biodiversity Framework.

3.3 Maerl Coverage Assessment

Current NatureScot guidance defines a maerl bed as "*Accumulations of maerl where there is at least 20% coverage of dead or live maerl thalli. The 20% cover of maerl substrates has to extend over an area of at least 5 m x 5 m (whether continuous or in discrete patches / rows). Areas of the seabed where the substrate is made up of broken maerl gravel may also be considered maerl beds, albeit degraded ones, when there is at least 5% cover of live maerl material >1 cm in size*" (NatureScot, 2022b). In line with this guidance, each screenshot of the seabed obtained was assigned to one of five categories describing the percentage cover of live maerl a class of percentage of coverage (no maerl, <5%, <20%, <50% and >50%).Example screenshots for each maerl coverage percentage with accompanying category descriptions are provided in Table 3.1.

Table 3.1 Maerl Coverage Categories

Screenshot	Live Maerl Coverage	Description
	No maerl	Where rare dead maerl debris/ gravel is recorded
	<5%	Very rare branches recorded
	<25%	Maerl aggregations are noted as distinct patches, usually associated with sediment hallows, ripple troughs or sheltered parts of the seabed
	<50%	Maerl recorded in foliose form and covering a larger area
	>50%	Significant coverage by foliose form sometimes in multiple layers with notable low level relief above the natural sediment level

Note:
Example screenshots presented from current (2021) survey at the proposed Stulaigh South fish farm and the previous BSL, 2019 and BSL, 2020 survey at the Stulaigh fish farm.

3.4 Burrowing Megafauna Communities

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

According to JNCC (2014) guidance, the key determinant for classification of 'Seapen and burrowing megafauna communities' is the presence of burrowing species or burrows at a SACFOR (superabundant, abundant, common, frequent, occasional, rare and less than rare) density of at least 'frequent' (Table 3.2). Seapens (e.g. *V. mirabilis*, *P. phosphorea* and *F. quadrangularis*) may, and by extension may not, be present to classify as a 'Seapen and burrowing megafauna communities' habitat. 'Seapen and burrowing megafauna communities' are also contained within the Scottish PMF and Search Feature 'Burrowed mud', the latter with a slightly broader definition which also includes the fireworks anemone *Pachycerianthus multiplicatus* as a specific component of the habitat (JNCC, 2014, Howson et al., 2012).

The BSL protocol is listed below:

- Subsequent sediment changes along the survey lines were treated as separate counting intervals to mitigate counter fatigue, especially during sections with high burrow abundance.
- Counting areas of high burrow density was aided by slowing the video playback speed. Sections of unsuitable seabed quality for burrow counting was excluded from burrow density analysis.
- Using the scale on the video footage the visible seabed area was estimated in order to calculate the number of burrows per m^2.
- Burrows were divided into two size groups and assessed independently, with smaller burrows likely to be inhabited by burrowing fauna of 1 to 3cm length and larger burrows, likely to be inhabited by *N. Norvegicus* which have a typical size class of 5 to 20cm length (Sabatini and Hill, 2008).
- All visible burrow holes were counted as it is not possible to differentiate the burrows of non-*Nephrops* burrowing fauna which may overestimate the total number of burrowing megafauna by including other small body-sized burrowing fauna, such as polychaetes.
- *N. norvegicus* burrows can form complexes with multiple openings, so care was taken when counting to only count these complexes as one burrows.

Table 3.2 SACFOR Abundance Scale

Cover (%)	Crust/ Meadow	Massive/ Turf	<1cm	1-3cm	3-15cm	>15cm	Density	
>80%	S		S				>1/0.001m² (1x1 cm)	>10,000/m²
40-79%	A	S	A	S			1-9/0.001m²	1000-9999/m²
20-39%	C	A	C	A	S		1-9 / 0.01m² (10 x 10 cm)	100-999/m²
10-19%	F	C	F	C	A	S	1-9 / 0.1m²	10-99/m²
5-9%	O	F	O	F	C	A	1-9/m²	
1-5% or density	R	O	R	O	F	C	1-9 / 10m² (3.16 x 3.16m)	0.1 to 0.9
<1% or density	L	R	L	R	O	F	1-9 / 100m² (10 x 10m)	0.01 to 0.09
		L		L	R	O	1-9 / 1000m² (31.6 x 31.6m)	0.001 to 0.009
					L	R	<1 / 1000m² (100 x 100m)	
						L	<1 / 10000m² (1km²)	

Key						
Superabundant	**A**bundant	**C**ommon	**F**requent	**O**ccasional	**R**are	**L**ess than Rare

4 Results and Interpretation

4.1 Bathymetry and Seabed Features

Water depths across the Stulaigh South site ranged between 6m to 44m LAT with the deepest water depth recorded at the centre of the proposed fish farm location. The majority of stations sampled as part of the environmental and habitat assessment survey were located in a water depth of approximately 35m below LAT.

Based on side scan sonar reflectivity and background reference material seabed sediments are expected to comprise of muddy sand interspersed between exposed bedrock across the survey area. The highest elevation of bedrock was present in depths of approximately 10m below LAT.

4.2 Particle Size Distribution

The particle size interpretation of sediments from the environmental baseline survey conducted at the proposed Stulaigh South fish farm 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 10 stations (Table 4.1). 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 II for the laboratory methods employed.

The sediment characteristics for each station are listed in Table 4.1 and individual particle size distribution plots are presented in Appendix III.

4.2.1 General Description

The results of particle size analyses indicated a consistent sediment type across the survey area which was sand dominated (mean 67.6%±6.1SD) with a lower proportion of fines (mean 27.0%±6.8D) and minimal proportion of gravel (mean 5.42%±4.12SD; Table 4.1).

Proportions of sands were relatively consistent across the site ranging between 57.8% at SS_Grab_06 to 75.2% at SS_Grab_03 and SS_Grab_04 (Figure 4.1). Sand content showed no general pattern of distribution in the survey area and no significant Spearman's correlation was apparent between the proportion of sands and water depth ($p>0.05$; Appendix VII).

Fines were relatively moderate across the site but more variable than the proportion of sands as evidenced by a higher coefficient of variance of 25.0% (Table 4.1). There was no apparent sedimentary relationship between the highest proportion of fines and increasing water depth ($p>0.05$) with the shallowest station (SS_Grab_08) recording the second highest proportion of fines (32.5%; Figure 4.2). The lack of relationship between water depth and the increased settlement of fines likely relates to the turbulent water currents within the survey area created by numerous occurrences of outcropping bedrock which can act as a barrier to predominant currents resulting in finer grained particles being removed while the coarser grains, which are less mobile, remained in the deepest areas of the seabed.

Gravel content was fairly consistent throughout the proposed fish farm site ranging from 0.85% (SS_Grab_03) to 12.16% (SS_Grab_06), however the proportion of gravel varied greatly as demonstrated by a high coefficient of variation (75.8%; Table 4.1) with no general pattern of distribution across the site. The peak gravel content was observed at SS_Grab_06 (12.16%) located 37m west of the proposed cage edge and close to an area of outcropping bedrock visible on the MBES data, while the lowest gravel content was observed at stations sampled in the deepest part of the survey area and in between areas of bedrock outcrops (SS_Grab_01, SS_Grab_03, SS_Grab_10; <2% gravel) (Figure 4.3).

The Folk (1954) and Wentworth (1922) classifications for each station are listed in Table 4.1. 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 4.1 to Figure 4.3). 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 three Folk classifications with 50% of stations assigned 'Gravelly muddy sand', 40% of stations assigned 'Slightly gravelly muddy sand' and one station (SS_Grab_03) assigned 'Muddy sand' (Table 4.1). The Wentworth classification scale identified two different sediment classifications with the majority of stations assigned as 'Medium sand' and one station (SS_Grab_10) as 'Fine sand'. The relatively consistent sediment within the samples was reflected in the sorting coefficient (Table 4.1), with all stations falling under four classifications of 'Poorly sorted', 'Moderately sorted', 'Moderately well sorted' and 'Very poorly sorted' (mean 0.48±2.43SD).

Table 4.1 Summary of Surface Particle Characteristics

Station	Depth (m)	Mean Sediment Size		Wentworth Classification	Sorting Coefficient	Sorting Classification	Fines (%)	Sands (%)	Gravel (%)	Modified Folk Scale
		mm	Phi							
SS_Grab_01	42	0.32	1.66	Medium Sand	1.28	Poorly Sorted	39.1	59.5	1.38	Slightly Gravelly Muddy Sand
SS_Grab_02	37	0.33	1.60	Medium Sand	1.34	Poorly Sorted	28.7	64.9	6.39	Gravelly Muddy Sand
SS_Grab_03	43	0.40	1.33	Medium Sand	0.76	Moderately Sorted	23.9	75.2	0.85	Muddy Sand
SS_Grab_04	44	0.47	1.09	Medium Sand	0.76	Moderately Sorted	16.2	75.2	8.55	Gravelly Muddy Sand
SS_Grab_05	40	0.34	1.56	Medium Sand	1.43	Poorly Sorted	23.3	73.4	3.27	Slightly Gravelly Muddy Sand
SS_Grab_06	38	0.31	1.70	Medium Sand	0.58	Moderately Well Sorted	30.1	57.8	12.16	Gravelly Muddy Sand
SS_Grab_07	37	0.26	1.95	Medium Sand	0.96	Moderately Sorted	25.6	69.0	5.44	Gravelly Muddy Sand
SS_Grab_08	35	0.27	1.90	Medium Sand	1.83	Poorly Sorted	32.5	64.0	3.45	Slightly Gravelly Muddy Sand
SS_Grab_09	38	0.39	1.38	Medium Sand	2.43	Very Poorly Sorted	19.2	69.5	11.27	Gravelly Muddy Sand
SS_Grab_10	40	0.21	2.26	Fine Sand	0.48	Well Sorted	31.5	67.1	1.43	Slightly Gravelly Muddy Sand
Minimum		**0.21**	**1.09**	-	**0.48**	-	**16.2**	**57.8**	**0.85**	-
Maximum		**0.47**	**2.26**	-	**2.43**	-	**39.1**	**75.2**	**12.20**	-
Mean		**0.33**	**1.64**	-	**1.18**	-	**27.0**	**67.6**	**5.42**	-
Standard Deviation		**0.08**	**0.34**	-	**0.61**	-	**6.8**	**6.1**	**4.12**	-
Variance (%)		**0.23**	**0.20**	-	**0.51**	-	**25.0**	**9.1**	**75.8**	-

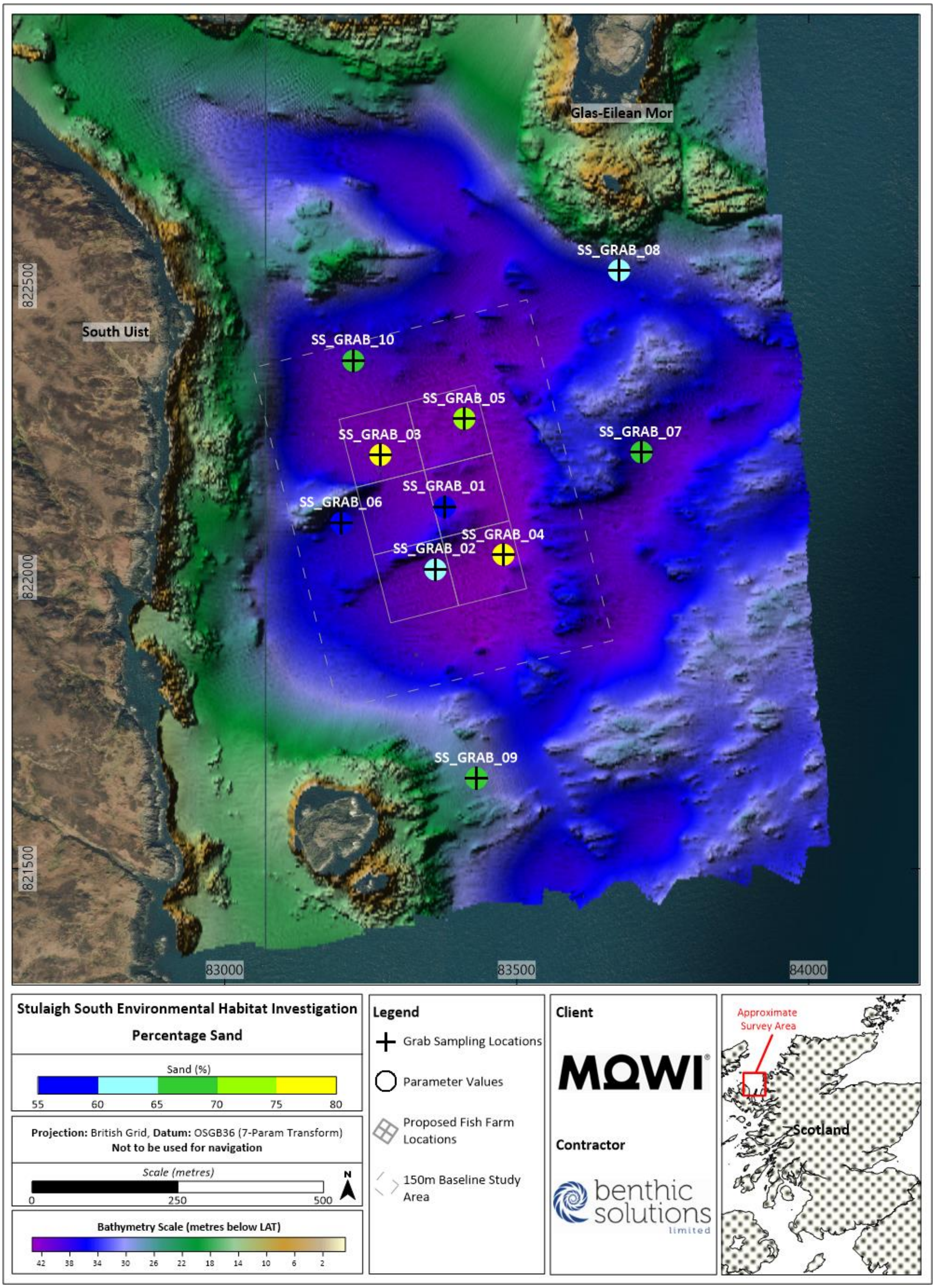


Figure 4.1 Percentage Sands

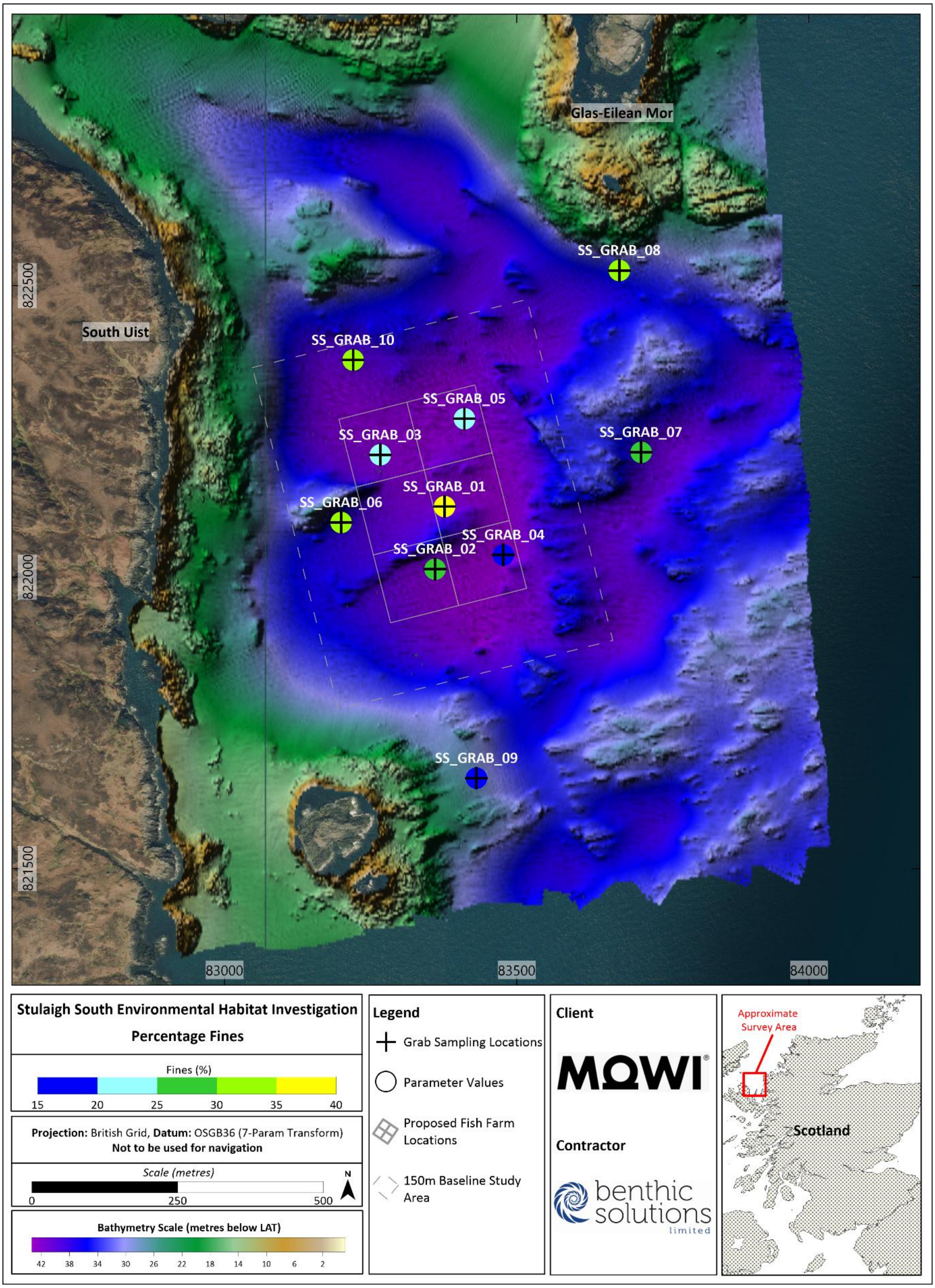


Figure 4.2 Percentage Fines

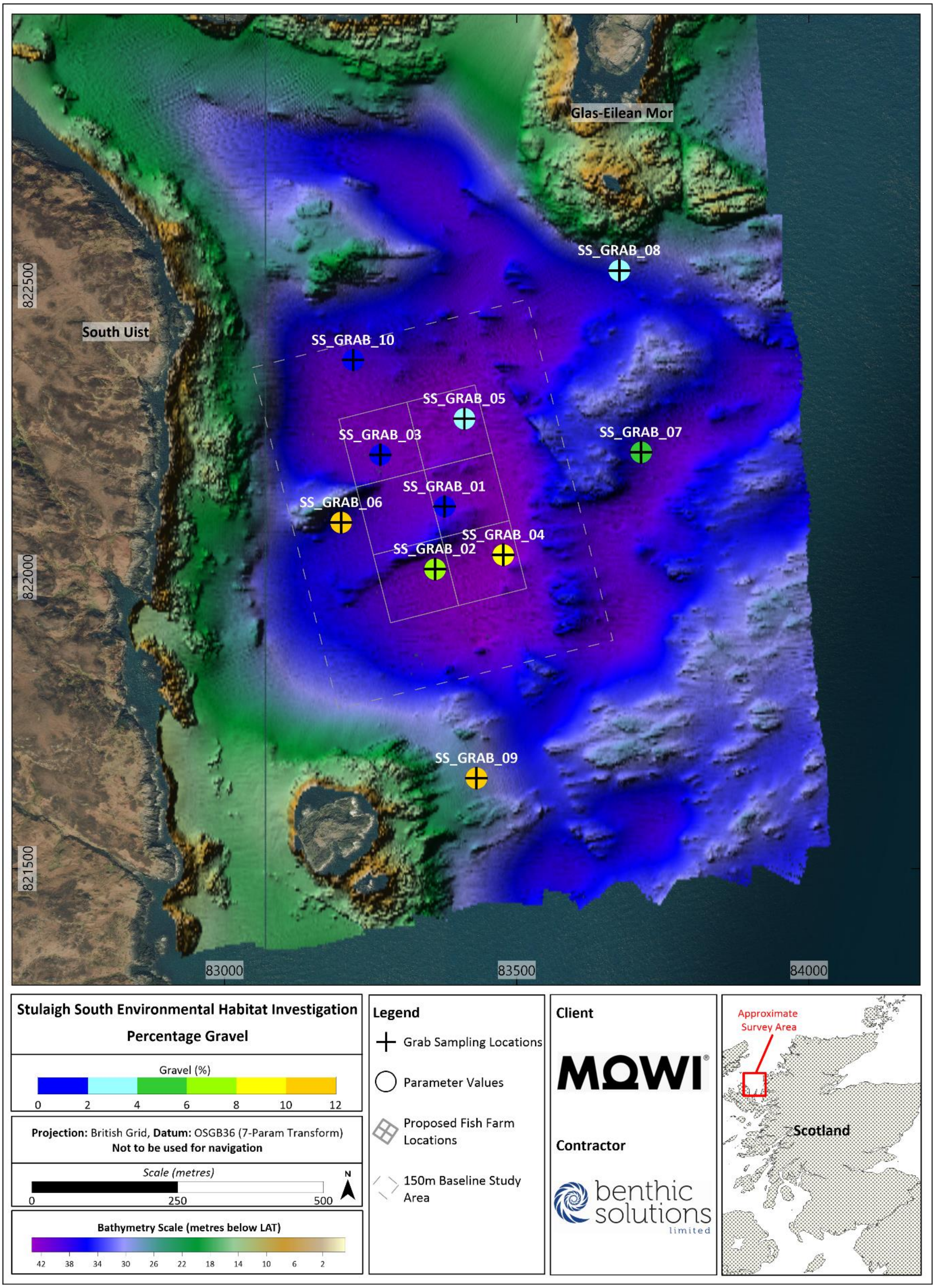


Figure 4.3 Percentage Gravel

4.2.2 Multivariate Analysis

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 4.4 with red lines denoting statistically similar stations and black lines revealing significant differences. Similarity profiling analysis (SIMPROF) indicated the presence of two significantly different (p<0.05) clusters at a Euclidean distance of 21 which are described as follows:

- Cluster '*a*': The first cluster included seven out of the 10 stations which were sand dominated (>59%) with a lower proportion of gravel (<8%) compared to other stations. Due to the slightly variable proportions of sediments to the seabed these stations conformed to several Folk categories ranging from 'Muddy sand' to 'Gravelly muddy sand'.

- Cluster '*b*': The second cluster of three stations (SS_Grab_04, SS_Grab_06 and SS_Grab_09) displayed higher proportions of gravel (8.55% to 12.16%) and all conformed to a single Folk classification of 'Gravelly muddy sand'.

A principal component analysis (PCA) was carried out on the proportional whole phi sieve fraction data for each survey station (Figure 4.5). 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 driving variability in the sediment was the proportion of the very coarse sand and the coarse sand fractions within the samples as evidenced by the length of the eigenvectors labelled with phi fractions 0 and 1 (Figure 4.5). The PCA plot also illustrates the lack of variability in the proportion of fines across the survey area with all silt/clay labelled eigenvectors short in length. The spread of cluster '*a*' and '*b*' across several eigenvectors but predominantly those labelled phi 2 and 3 reflected the subtle variation in sediment across the survey site. Cluster '*b*' had a greater intra-cluster variability with samples plotting in association to the granule (phi -1), medium sand (phi 2) and pebble to fine sand (phi -3 and 3) labelled eigenvectors.

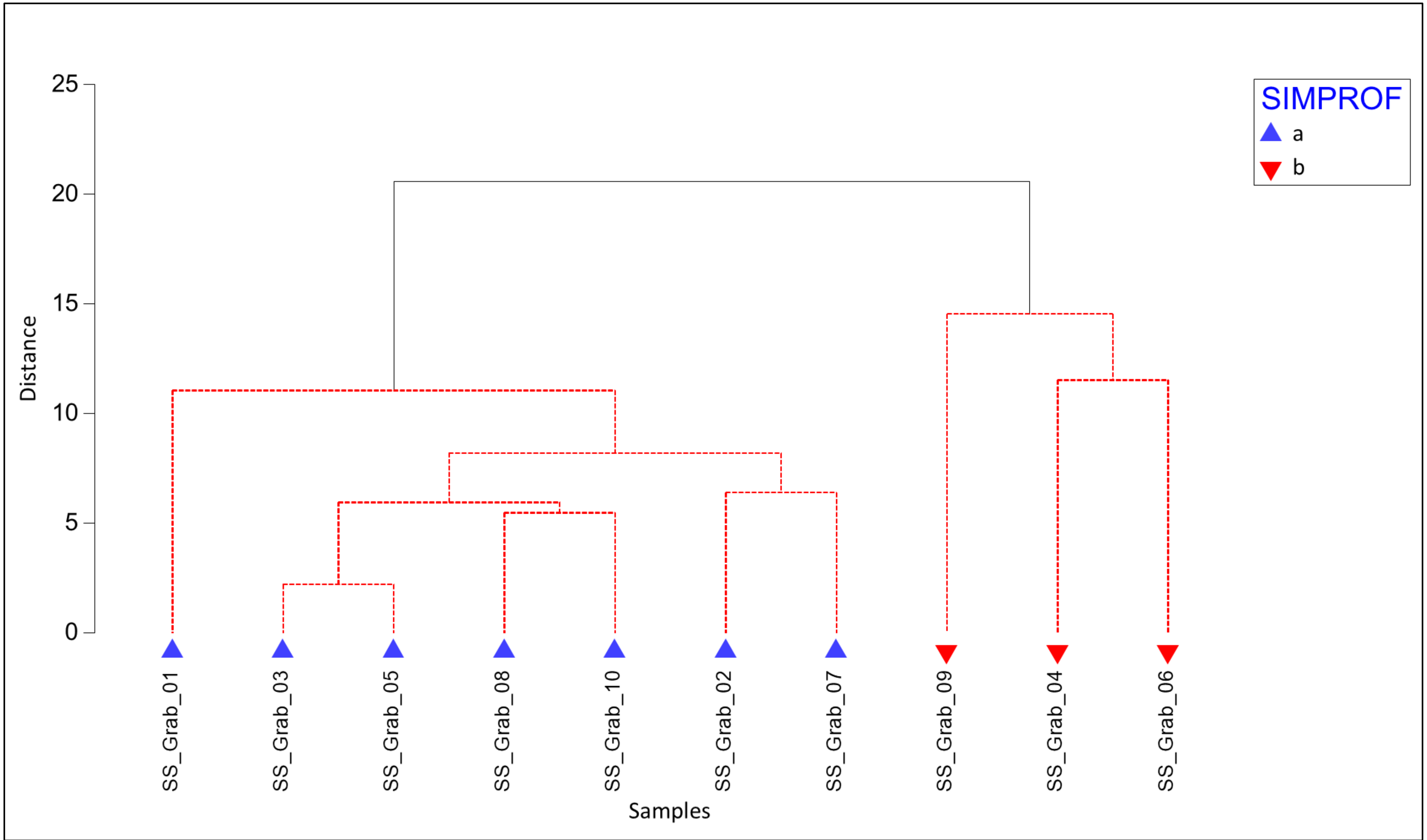


Figure 4.4 Particle Size Analysis Similarity Dendrogram

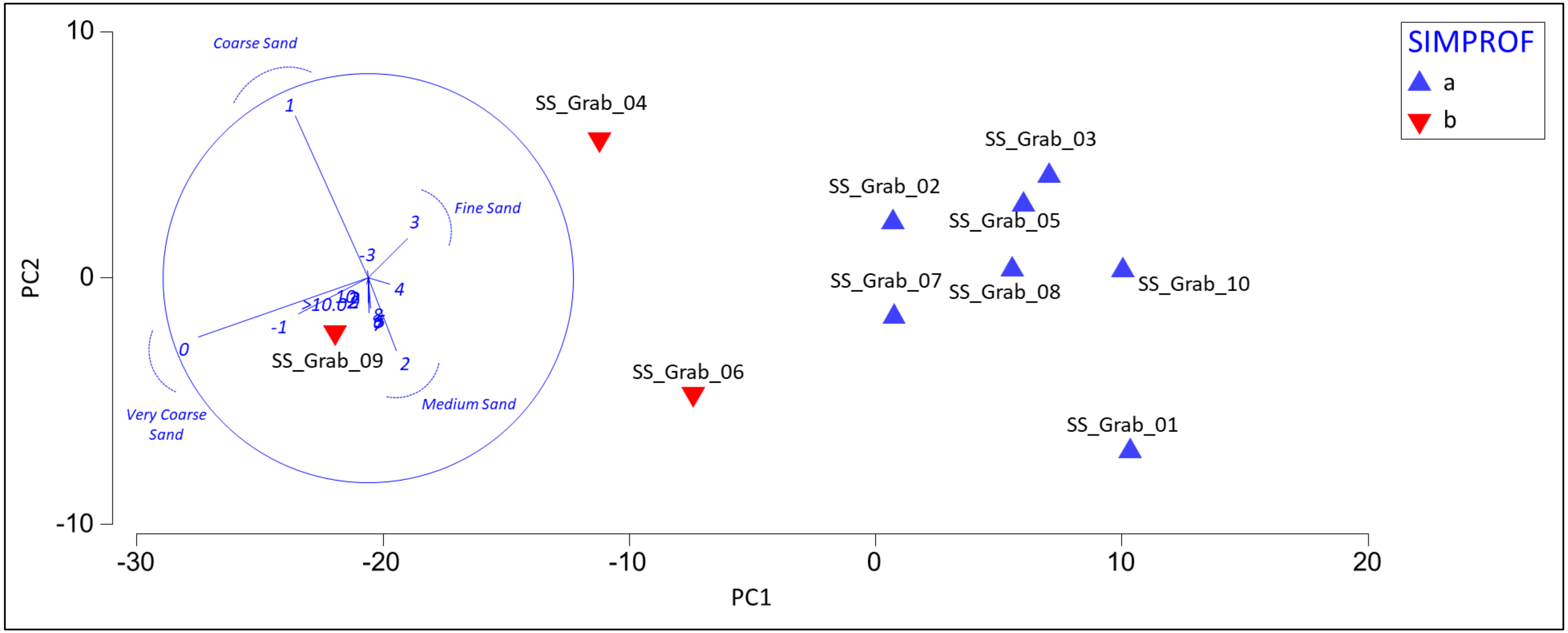


Figure 4.5 Particle Size Analysis Principal Component Analysis

A comparison of the full particle size distribution dataset using Wentworth (1922) size categories split into the two clusters described above is shown in Figure 4.6 along with example seabed and sieve sample photographs. The plot illustrates the general homogeneity of the seabed sampled with both clusters demonstrating a trimodal distribution across the three broad sediment categories (i.e. gravel, sands, fines). Cluster '*a*' demonstrated a highly variable distribution in the very fine sand to coarse sand range (phi 0.5 to 6) compared to cluster '*b*'. In contrast, cluster '*b*' showed a large peak within the very coarse sand to pebble range (phi -3 to 0.5) showing higher percentages of gravel compared to cluster '*a*'. The geographical distribution of clusters is displayed over MBES in Figure 4.7.

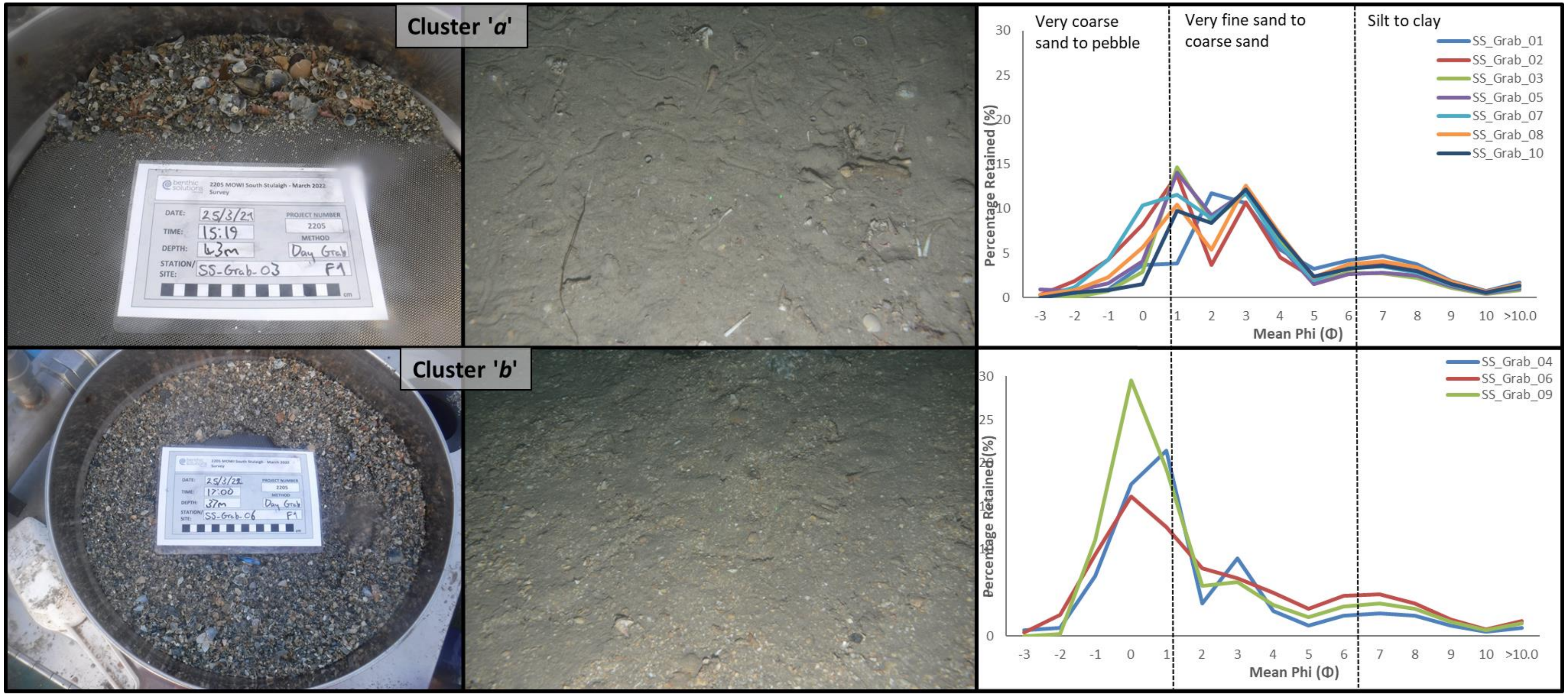


Figure 4.6 Particle Size Distribution for the Different Clusters

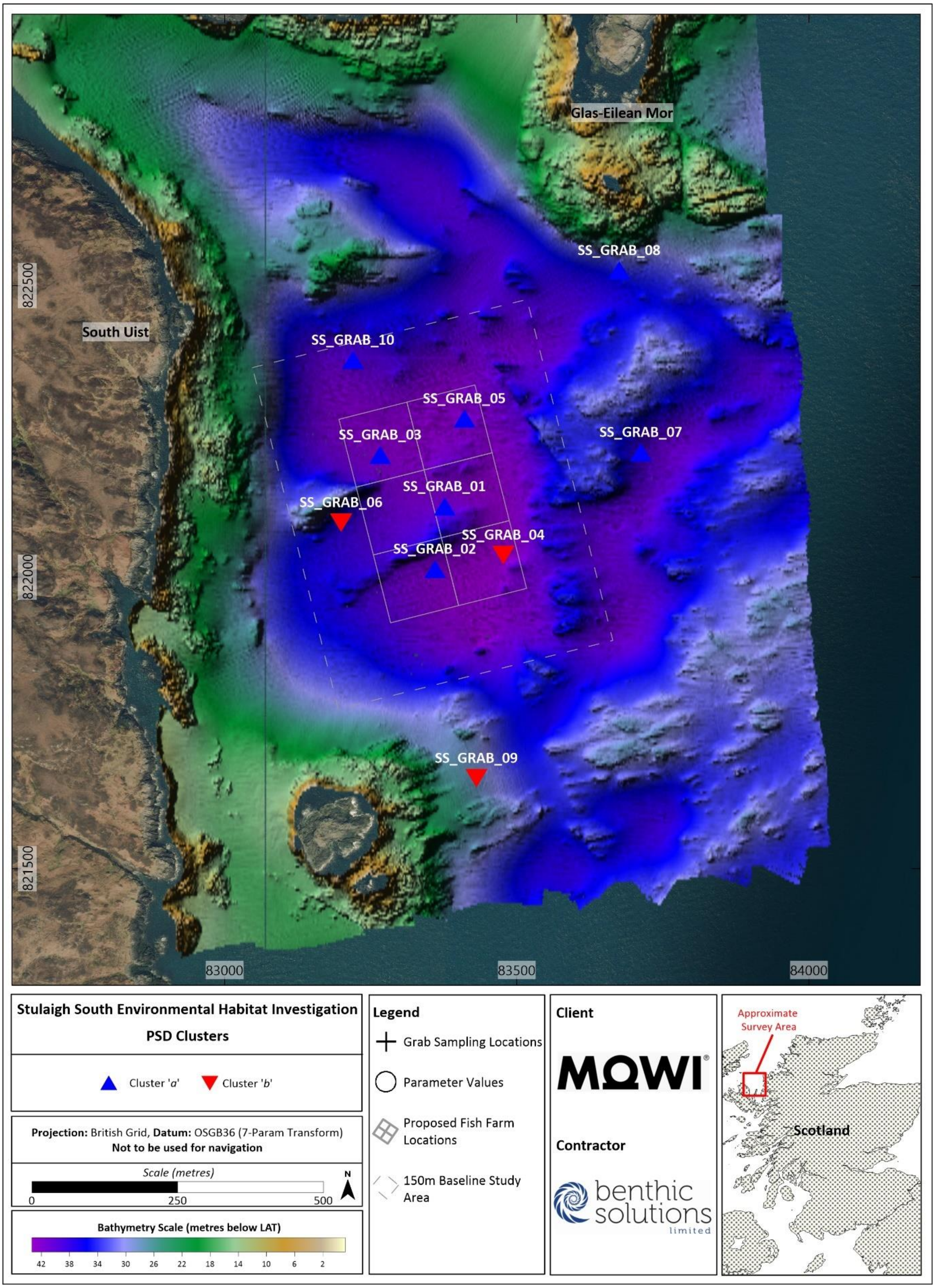


Figure 4.7 Spatial Distribution of PSD Clusters

4.3 Total Organic Carbon

The sediment samples were analysed for total organic carbon (TOC); the results of which are presented in Table 4.2 and illustrated in Figure 4.8. TOC represents the proportion of biological material and organic detritus within the substrates. This method is less susceptible to the interference sometimes recorded using crude combustion techniques, such as analysing total organic matter by loss on ignition (LOI).

The TOC results were moderate for most stations sampled at the proposed Stulaigh South fish farm site (mean 1.11%±1.26SD). Peak TOC concentration was recorded at SS_Grab_10 (4.70%) which was over 5 times the concentration of the next highest TOC concentration at SS_Grab_01 (0.80%). It is not entirely clear the reason for the significantly higher TOC at SS_Grab_10 given both stations were sampled in a similar water depth (40 to 42m below LAT) and had a similar proportion of fines (30-39%). However, review of the deck logs did indicate a slightly different sediment colour sampled from grey/green at SS_Grab_01 to olive grey and dark yellow at SS_Grab_10 with a notably increased shell debris within the latter grab sample (Appendix IV); the combination of which may have contributed to the higher concentration in organic material at this site.

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 with both allochthonous and autochthonous sources likely present throughout the proposed fish farm site.

TOC in surface sediments is an important source of food for benthic fauna (Snelgrove & Butman, 1994), although an overabundance may lead to reductions in species richness and abundance due to oxygen depletion. 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 sedimentary relationship was apparent in the survey area with the higher concentration of TOC noted at stations with higher proportions of fines (>30%) and was supported by a positive correlation between the two parameters ($\rho(10)=0.774$, p=<0.05).

Table 4.2 Total Organic Carbon

Station	Depth (m)	Total Organic Carbon (% w/w)
SS_Grab_01	42	0.80
SS_Grab_02	37	0.76
SS_Grab_03	43	0.74
SS_Grab_04	44	0.66
SS_Grab_05	40	0.71
SS_Grab_06	38	0.74
SS_Grab_07	37	0.70
SS_Grab_08	35	0.73
SS_Grab_09	38	0.54
SS_Grab_10	40	4.70
Minimum		**0.54**
Maximum		**4.70**
Mean		**1.11**
Standard Deviation		**1.26**
Variance (%)		**1.1**

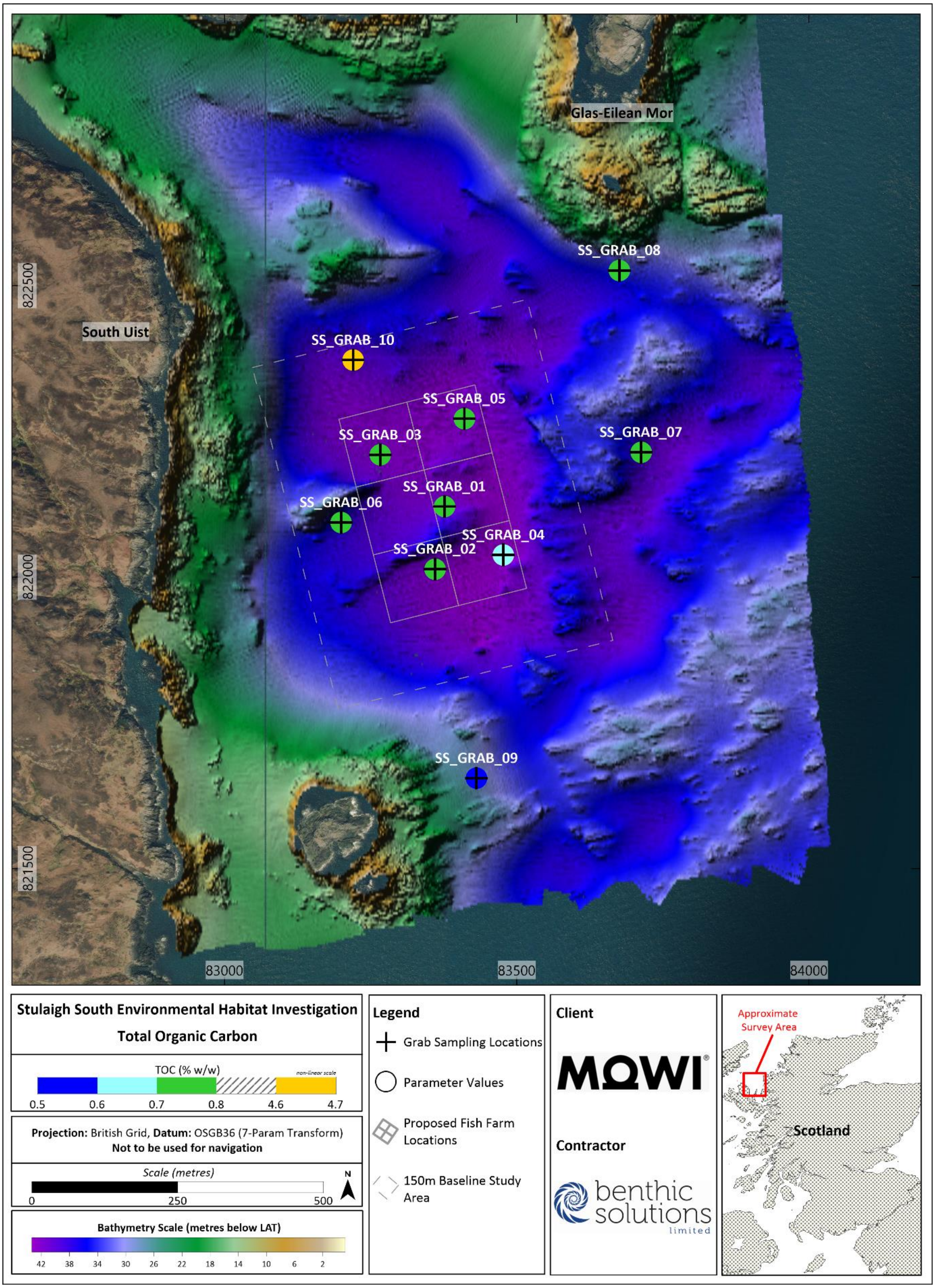


Figure 4.8 Total Organic Carbon

4.4 Macrofauna Analysis

Macrofaunal analysis was carried out on 20 grab sample replicates obtained at 10 baseline stations sampled at the proposed Stulaigh South fish farm site. The sediment was mostly homogonous throughout the survey area with most stations conforming to 'Slightly gravelly muddy sand' or 'Gravelly muddy sand'. Macrofaunal samples were processed in the field over a 1mm mesh sieve.

For this assessment epifaunal species have been separated into two categories: solitary epifauna and colonial epifauna. Solitary epifauna include 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 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, Entoprocta and Bryozoa. 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 4.4.3.

Subsequent macrofaunal taxonomy of all recovered fauna identified a total of 3,068 individuals (infauna and solitary epifauna) from the 20 samples analysed. Faunal data for each sample are listed in Appendix V, whilst univariate analyses are summarised in Table 4.3 by replicate and

Table 4.4 by station. Of the 282 taxa recorded, 33 were colonial epifauna, 5 were solitary epifauna and 249 were infaunal. The infaunal taxa consisted of 122 annelid species accounting for 46.9% of the total individuals. The molluscs were represented by 58 species (24.8% of the total individuals), the crustaceans by 45 species (6.2% of the total individuals) and the echinoderms by 12 species (9.9% of total individuals). Solitary epifauna was represented by one Cnidaria (*Caryophyllia (Caryophyllia) smithii*) and four barnacle species (*Balanus balanus, Balanus crenatus, Scalpellum scalpellum* and *Verruca stroemia*), accounting for 5.3% of the total individuals. All other groups (Edwardsiidae, *Cerianthus lloydii*, Nemertea, Nematoda, *Phoronis*, Platyhelminthes and Hemichordata) were represented by seven species, accounting for 6.9% of the total individuals. Two specimens of the bivalve, *Devonia perrieri*, was identified at stations SS_Grab_04 and SS_Grab_10. The species is listed under the Scottish Biodiversity List which is a list of flora, fauna and habitats considered by the Scottish Ministers to be of principal importance for biodiversity conservation. In addition, a single specimen of the ocean quahog, *Arctica islandica*, was identified at station SS_Grab_05 which is listed as a Priority Marine Feature and are considered especially vulnerable due to the development age length to maturity (see Section 4.5.2.4 for further details).

Theoretical species richness was calculated by the Chao-1 formula, which determines the number of additional species required to reach the asymptotic richness of the region based on the samples recovered (see Appendix II). This analysis estimated the maximum species accumulation for the survey area to be 348 species, compared to the actual 249 infaunal species recorded during the survey. The consistent accumulation of taxa with each new sample was demonstrated by a species accumulation curve (Figure 4.9). The as sample curve shows a slow but steady increase of new taxa across the site suggesting a diverse population was found throughout. By interpolation, between 14 and 17 sample replicates would be required to recover a representative proportion (i.e. 67% or 233 species) of the overall population. The current survey discovered 249 infaunal species, over two-thirds (72%) of population representation. If colonial epifauna were considered (33 species), roughly 81% of the interpolated population would have been sampled.

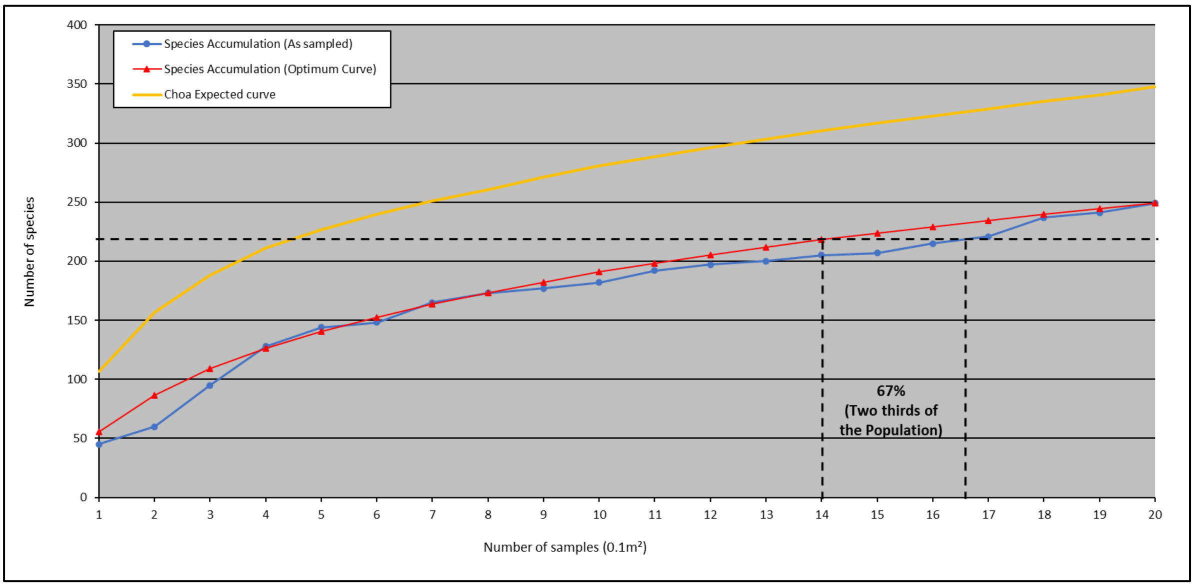


Figure 4.9 Species Accumulation Curve of the Stulaigh South Survey Area

With the exception of species that have been intentionally grouped into higher taxonomic levels (e.g., Nemertea), the majority of adult specimens were identified to genus level or lower (~95%). A total of 34 juvenile taxa were recorded during the current survey area, of which Echinodermata (245 individuals, represented by four taxa) were the most abundant. Mollusca was represented by more taxa (16) but fewer individuals (194 individuals), Annelida by 60 individuals (eight taxa) and Arthropoda was represented by 10 individuals from five taxa. 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. These specimens have therefore been excluded from univariate and multivariate analyses but have been listed separately in Appendix V.

Nematoda have been included in the 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.

4.4.1 Primary and Univariate Parameters

The primary and univariate parameters for all stations are listed in Table 4.3 by replicate and in

Table 4.4 by station and represented in Figure 4.10 and Figure 4.11.

Numbers of individuals per 0.1m^2 were variable across the proposed Stulaigh South fish farm site, ranging between 56 per 0.1m^2 for sample replicate SS_Grab_01_F2 to 270 per 0.1m^2 for sample replicate SS_Grab_10_F2 (Table 4.3). The variation in number of individuals was further evidenced by a moderately high overall coefficient of variation (39.9%). The number of species per 0.1m^2 was less variable than the number of individuals, ranging from 33 species per 0.1m^2 for SS_Grab_01_F2 to 87 per 0.1m^2 at SS_Grab_02_F2. By station, faunal abundance followed a slightly different pattern with the lowest number of individuals (161 per 0.2m^2) recorded at station SS_Grab_07 and a maximum number (462 per 0.2m^2) at SS_Grab_02 (Figure 4.11). By station, the number of species ranged from 60 per 0.2m^2 at SS_Grab_01 to 115 per 0.2m^2 at SS_Grab_02 (Figure 4.10).

The variation in number of individuals and species within the proposed Stulaigh South fish farm site was likely influenced by slight variations in sediment, however no significant Spearman's correlations were observed between the numbers of species or individuals and the water depth and the proportions of fines and gravels (Appendix VIII).

Margalef's Index, a measure of species richness, was variable and ranged from 7.95 per 0.1m^2 at SS_Grab_01_F2 to a maximum of 15.44 per 0.1m^2 at SS_Grab_02_F2 (Table 4.3). At a station level, the maximum Margalef's index of 18.58 was identified at station SS_Grab_02 with a minimum of 11.20 at station SS_Gab_01 (Table 4.4). Pielou's Equitability was also variable with stations ranging between 0.843 SS_Grab_02 to 0.926 at SS_Grab_08 (Table 4.4).

The Shannon-Wiener Diversity index for each replicate indicated a diverse community, ranging from 4.30 for sample replicate SS_Grab_09_F1 to 5.46 for sample replicate SS_Grab_06_F1 (Table 4.3). At a station level, the Shannon-Wiener Diversity index was above 5 at every site (mean 5.58±0.17SD) indicative of a diverse community present throughout the site.

Simpson's Diversity Index was high throughout the survey area but showed some variation ranging from a minimum of 0.890 for replicate sample SS_Grab_09_F1 to 0.982 at SS_Grab_07_F2 (mean 0.966±0.019SD; Table 4.3). At station level, the results were similar between stations as indicated by a low coefficient of variation (0.6%) with a mean of 0.970 (±0.006SD) and results ranging from 0.962 at SS_Grab_03 to 0.980 at SS_Grab_08, reflecting a diverse community (Figure 4.12). Simpson's Diversity is considered to have sensible sampling properties and is insensitive to differences in sample size, unlike other indices such as the Shannon-Weiner Index (Magurran, 1988).

Table 4.3 Univariate Faunal Parameters by Replicate (0.1m²)

Sample	Depth (m)	Number of Species (S)	Number of Individuals (N)	Richness (Margalef)	Evenness (Pielou's Evenness)	Simpsons Diversity (1-Lambda')	Shannon-Wiener Diversity
SS_Grab_01_F1	42	45	138	8.93	0.902	0.960	4.95
SS_Grab_01_F2		33	56	7.95	0.954	0.975	4.81
SS_Grab_02_F1	37	71	200	13.21	0.879	0.967	5.40
SS_Grab_02_F2		87	262	15.44	0.858	0.967	5.53
SS_Grab_03_F1	43	65	192	12.17	0.897	0.972	5.40
SS_Grab_03_F2		49	195	9.10	0.866	0.947	4.86
SS_Grab_04_F1	44	68	163	13.15	0.911	0.971	5.54
SS_Grab_04_F2		60	157	11.67	0.903	0.969	5.34
SS_Grab_05_F1	40	56	199	10.39	0.916	0.973	5.32
SS_Grab_05_F2		57	201	10.56	0.905	0.970	5.28
SS_Grab_06_F1	38	65	169	12.48	0.907	0.970	5.46
SS_Grab_06_F2		58	143	11.49	0.920	0.975	5.39
SS_Grab_07_F1	37	46	85	10.13	0.933	0.974	5.16
SS_Grab_07_F2		45	76	10.16	0.959	0.982	5.26
SS_Grab_08_F1	35	45	98	9.60	0.934	0.973	5.13
SS_Grab_08_F2		41	74	9.29	0.940	0.975	5.04
SS_Grab_09_F1	38	39	91	8.42	0.814	0.890	4.30
SS_Grab_09_F2		57	119	11.72	0.931	0.978	5.43
SS_Grab_10_F1	40	51	180	9.63	0.913	0.969	5.18
SS_Grab_10_F2		75	270	13.22	0.852	0.960	5.30
Minimum		**33**	**56**	**7.95**	**0.814**	**0.890**	**4.30**
Maximum		**87**	**270**	**15.44**	**0.959**	**0.982**	**5.46**
Mean		**56**	**153**	**10.94**	**0.905**	**0.966**	**5.20**
SD		**14**	**61**	**1.94**	**0.036**	**0.019**	**0.30**
Variance (%)		**24.2**	**39.9**	**17.7**	**4.0**	**2.0**	**5.7**

Table 4.4 Univariate Faunal Parameters by Station (0.2m²)

Sample	Depth (m)	Number of Species (S)	Number of Individuals (N)	Richness (Margalef)	Evenness (Pielou's Evenness)	Simpsons Diversity (1-Lambda')	Shannon-Wiener Diversity
SS_Grab_01	42	60	194	11.20	0.894	0.965	5.28
SS_Grab_02	37	115	462	18.58	0.843	0.969	5.77
SS_Grab_03	43	79	387	13.09	0.849	0.962	5.35
SS_Grab_04	44	96	320	16.47	0.878	0.970	5.78
SS_Grab_05	40	78	400	12.85	0.878	0.972	5.52
SS_Grab_06	38	89	312	15.32	0.888	0.972	5.75
SS_Grab_07	37	70	161	13.58	0.921	0.978	5.65
SS_Grab_08	35	70	172	13.40	0.926	0.980	5.68
SS_Grab_09	38	81	210	14.96	0.876	0.965	5.55
SS_Grab_10	40	88	450	14.24	0.854	0.967	5.52
Minimum		**60**	**161**	**11.20**	**0.843**	**0.962**	**5.28**
Maximum		**115**	**462**	**18.58**	**0.926**	**0.980**	**5.78**
Mean		**83**	**307**	**14.37**	**0.881**	**0.970**	**5.58**
SD		**16**	**116**	**2.08**	**0.028**	**0.006**	**0.17**
Variance (%)		**18.8**	**37.9**	**14.5**	**3.2**	**0.6**	**3.1**

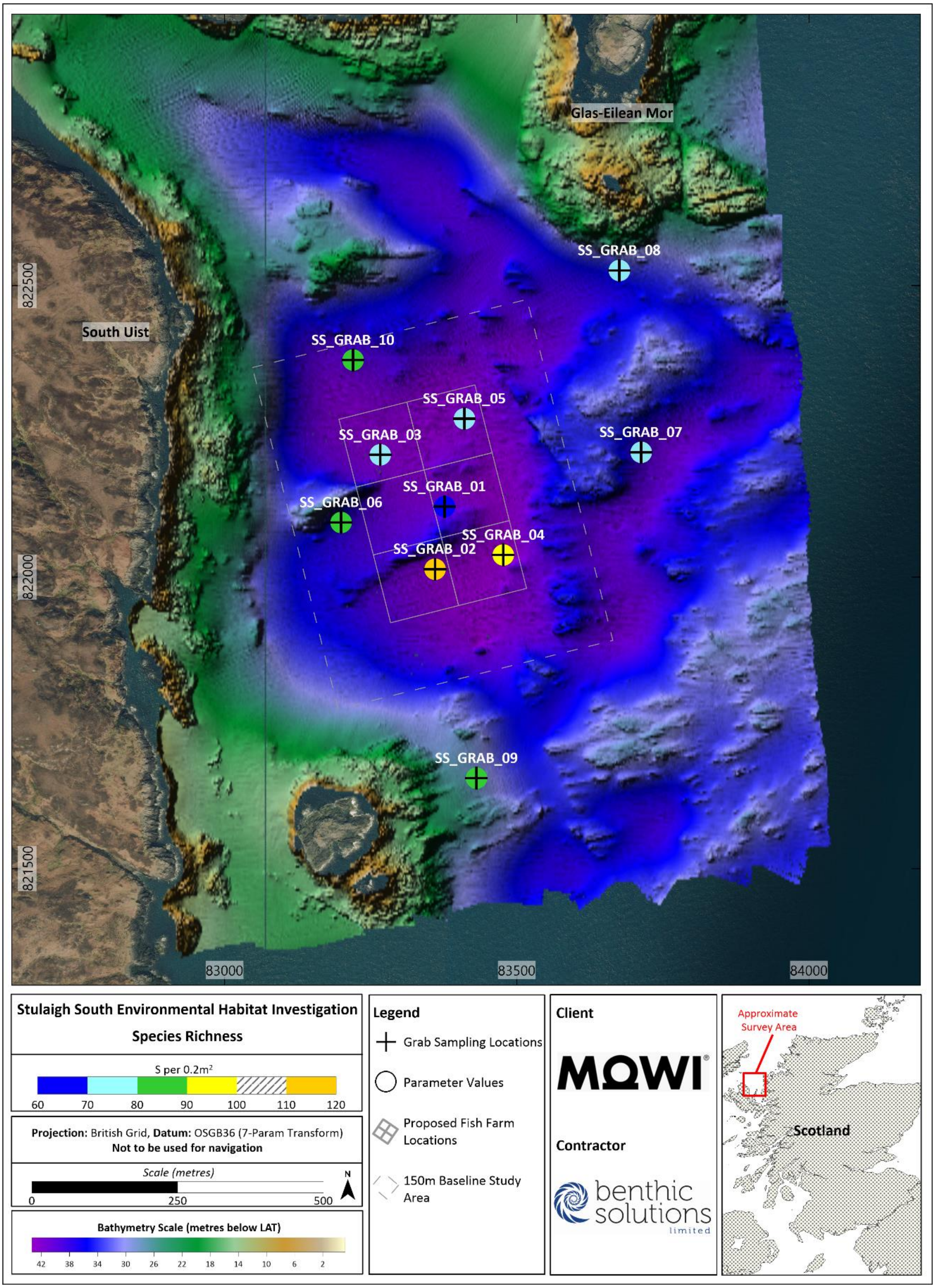


Figure 4.10 Macrofauna Species Richness per 0.2m²

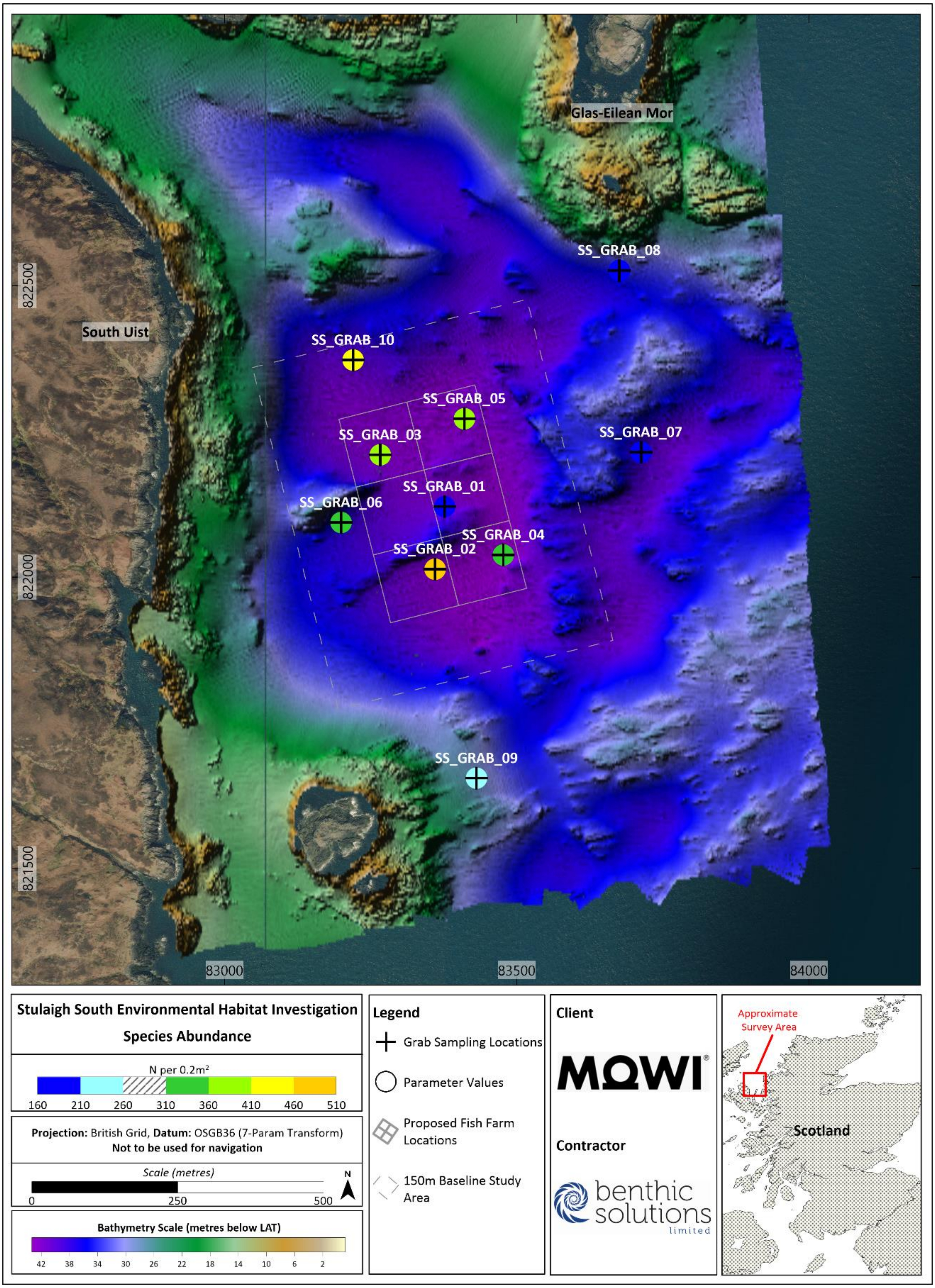


Figure 4.11 Macrofauna Faunal Abundance per 0.2m²

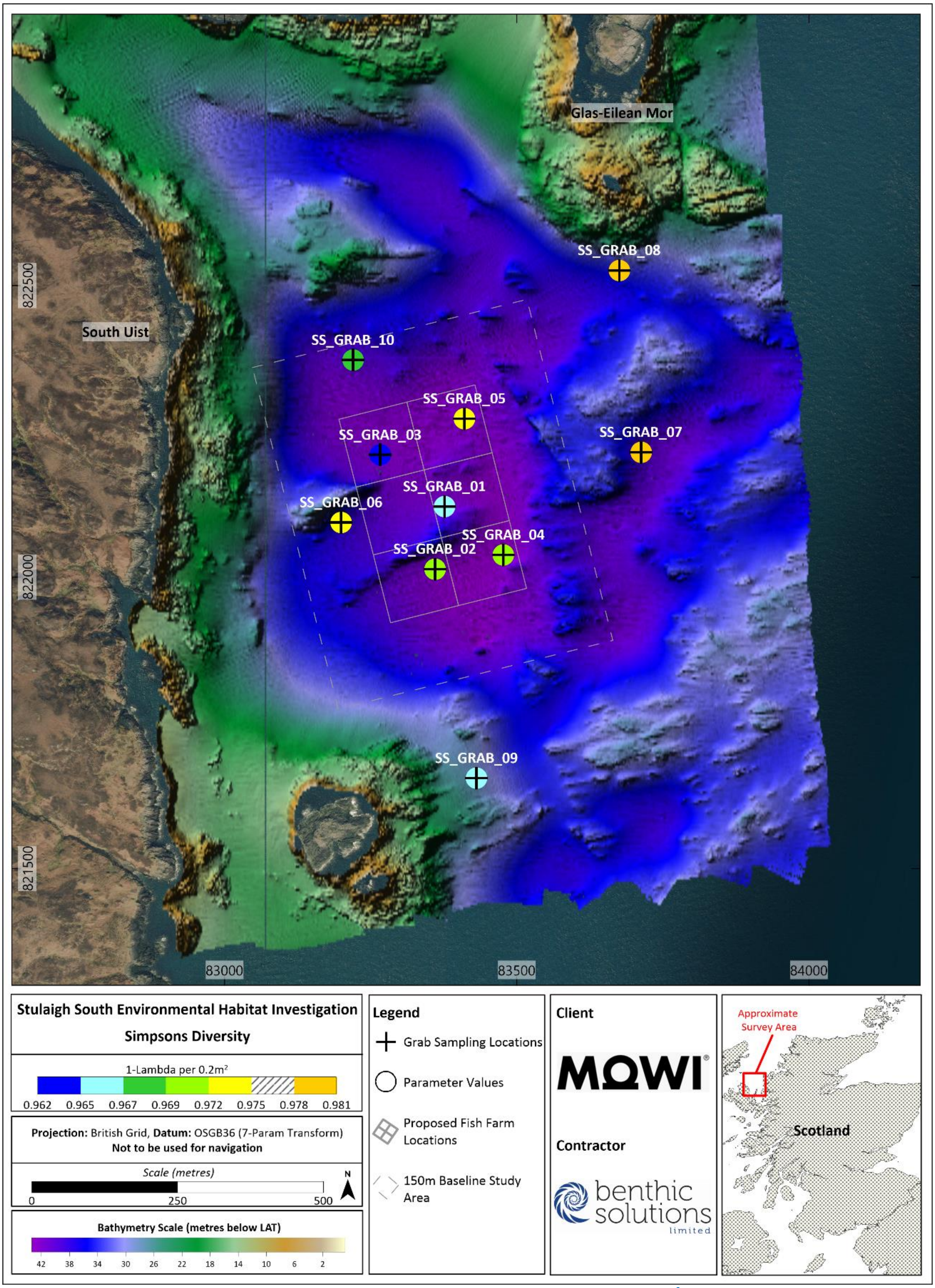


Figure 4.12 Macrofauna Simpsons Diversity by Station (1-Lambda') per 0.2m²

4.4.2 Multivariate Analyses

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 V7 software (PRIMER; Clarke *et al.,* 2104) 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 square-root transformed prior to analysis to down-weight the influence of any overriding species dominance between sample similarities/dissimilarities.

4.4.2.1 Hierarchical Agglomerative Clustering – Group Average Method

A similarity dendrogram was created using hierarchical agglomerative clustering (CLUSTER) and is presented for all replicates in Figure 4.13. SIMPROF analysis highlighted the presence of seven significantly different (p<0.05) clusters comprising one or more sample replicate (0.1m^2) and differentiated by black branches on the dendrogram. Sample replicates displayed sample Bray Curtis similarities of between approximately 18 to 50%. Most sample replicates from the same stations grouped together with the same clusters, however some inter-station relationships were noted between samples, indicating more small-scale variability in macrofauna communities in this area.

The macrofauna dataset was pooled to station level (0.2m^2) to better characterise broad-scale spatial variation in species assemblages within the survey area. A further similarity dendrogram was produced (Figure 4.11) following hierarchical agglomerative clustering. At a station level the SIMPROF test revealed five significantly different structural groupings which are interpretated below in Table 4.5.

Table 4.5 Summary of SIMPROF Station Groupings

SIMPROF Group	Similarity (%)	Stations	Interpretation
‘a’	68.07	SS_Grab_03, SS_Grab_05, SS_Grab_10	The first cluster contained the three stations to the north and northwest of the proposed fish farm where some of the highest abundances were observed. Stations within this cluster had the lowest proportion of gravel across the survey area (<4%)
‘b’	54.74	SS_Grab_02, SS_Grab_04, SS_Grab_06	The second cluster contained the stations in the southern part of the proposed fish farm location where the number of species were highest.
‘c’	53.55	SS_Grab_01, SS_Grab_08	The third cluster contained two stations where low numbers of individuals were observed in combination with a moderate species richness.
‘d’	-	SS_Grab_07	This cluster consisted exclusively of station SS_Grab_07, sampled to the east of the survey area where the lowest faunal abundances were observed.
‘e’	-	SS_Grab_09	The final cluster comprised station SS_Grab_09, the southernmost sampling point where a low number of individuals but moderate richness was observed.

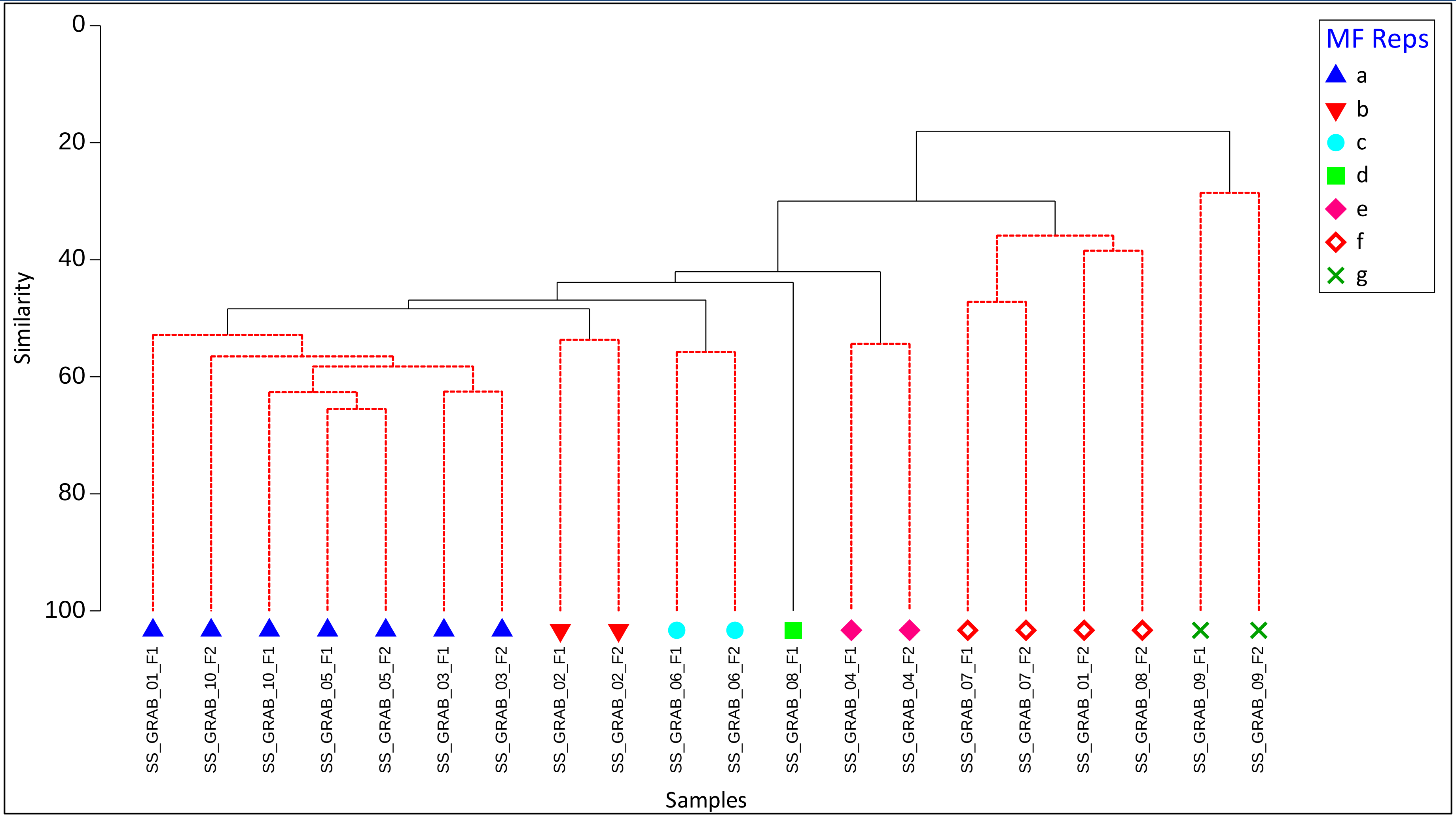


Figure 4.13 Dendrogram of Macrofaunal Replicates (0.1m^2)

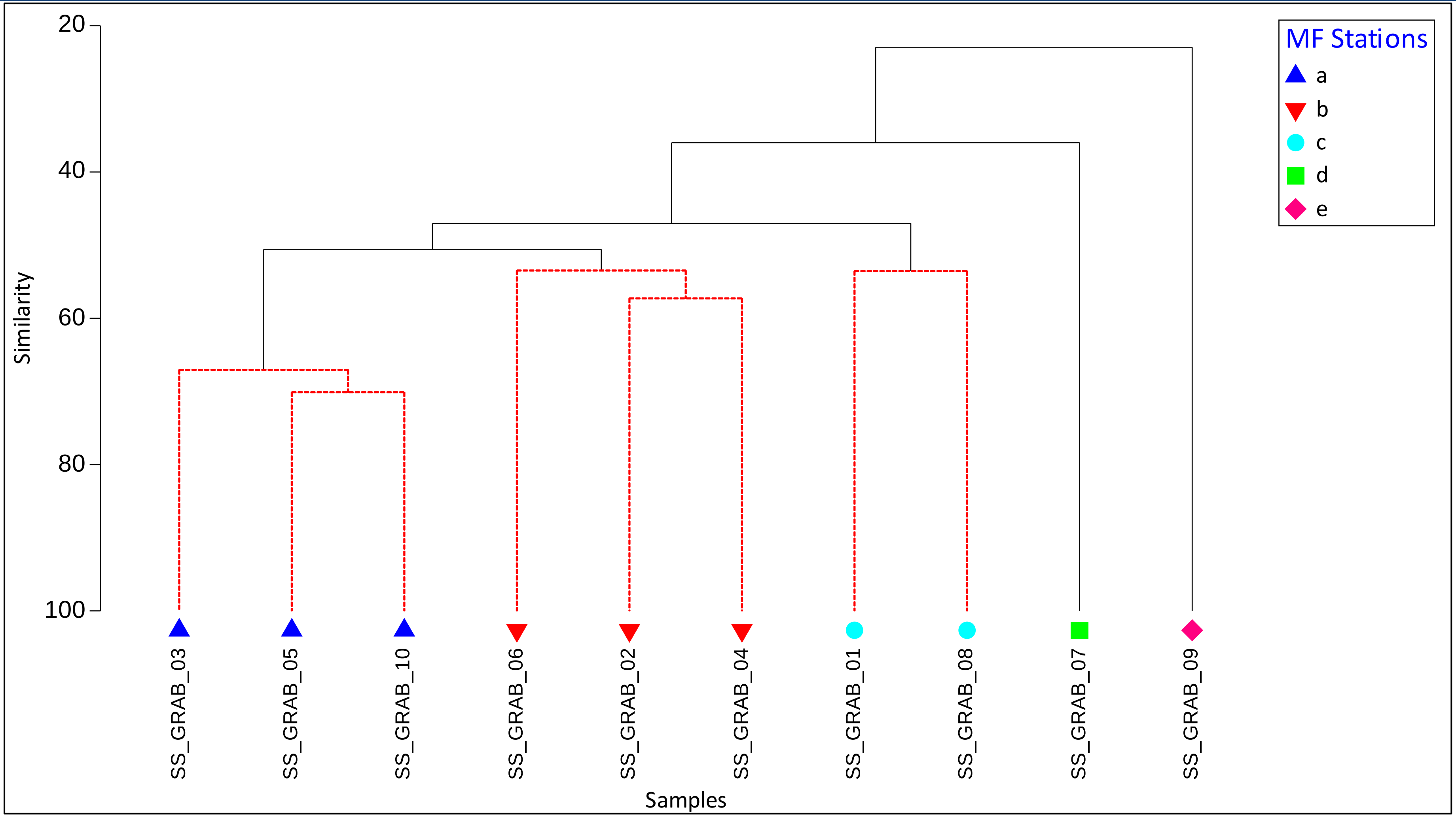


Figure 4.14 Dendrogram of Macrofaunal Stations (0.2m^2)

4.4.2.2 Non-metric Multi-dimensional Scaling (nMDS) Ordination

Similarities in the macrofaunal communities recorded across the survey area are presented in Figure 4.15 by replicate and in Figure 4.16 by station, as 2-dimensional non-metric multi-dimensional scaling (nMDS) ordinations. The nMDS plot in Figure 4.15 presents all 20 replicates from the survey area, revealing a good ordination of the data due to a low stress level of 0.107. The plotted replicates were consistent to the clusters identified in the dendrogram (Figure 4.13), but their relative positions on the nMDS plot provided evidence for a gradient of change in community composition with '*a*', '*b*', '*c*' and *'d'* located fairly closely together whereas cluster '*e'* through to *'g'* appeared more separated from the main groups.

At station level, the nMDS plot revealed five different SIMPROF groupings with an even lower stress value of 0.035 (Figure 4.16). The plotted stations were consistent to the clusters identified in the dendrogram (Figure 4.14), with the main grouping consisting of the stations to the north of the proposed fish farm location. Clusters '*a*', *'b'* and *'c'* are grouped more closely together than clusters *'d'* and *'e'* but still show clear separation between the groups, indicative of subtle difference in the macrofauna community across the survey area. Stations within clusters *'b'* and *'c'* appear loosely grouped, while those within cluster *'a'* group more tightly. Despite the identification of five separate cluster groups, most stations were considered to reflect typical background communities, with the differences thought to reflect the natural patchiness in the distribution of benthic communities, as opposed to any notable physical or chemical gradient. The geographical distribution of multivariate clusters is provided in Figure 4.17.

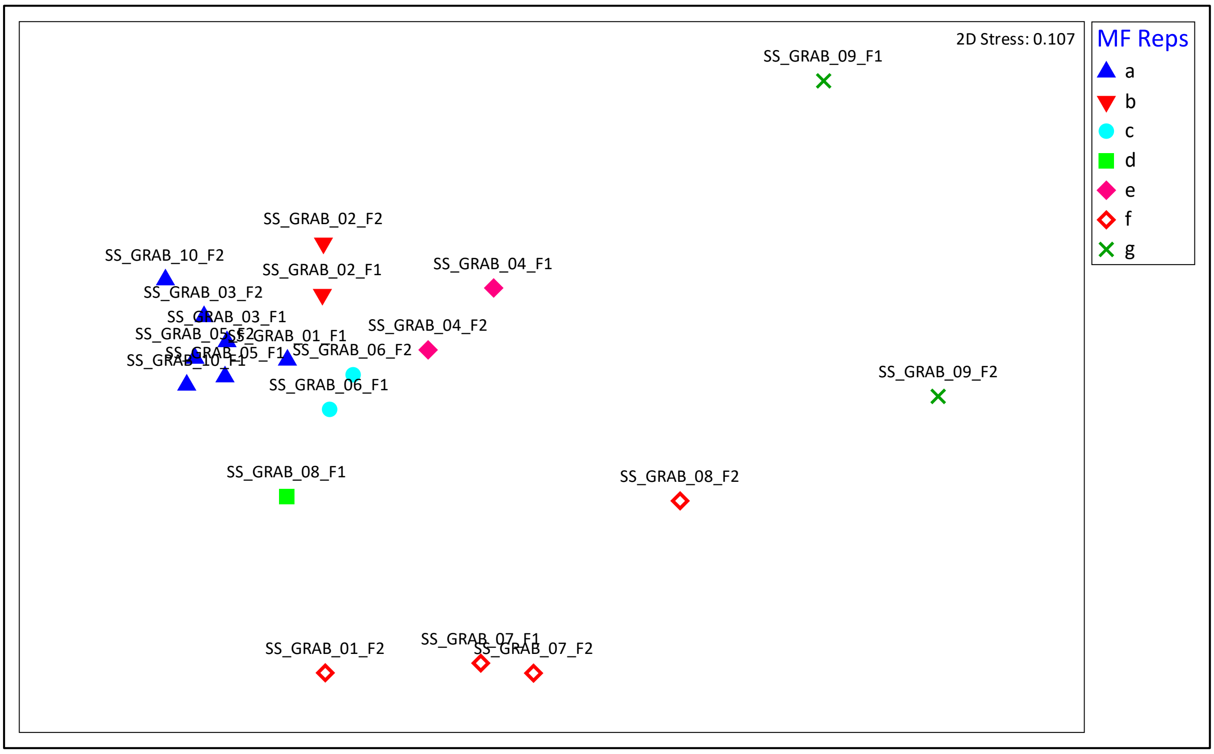


Figure 4.15 nMDS Ordination Plot of Macrofaunal Replicates (0.1m²)

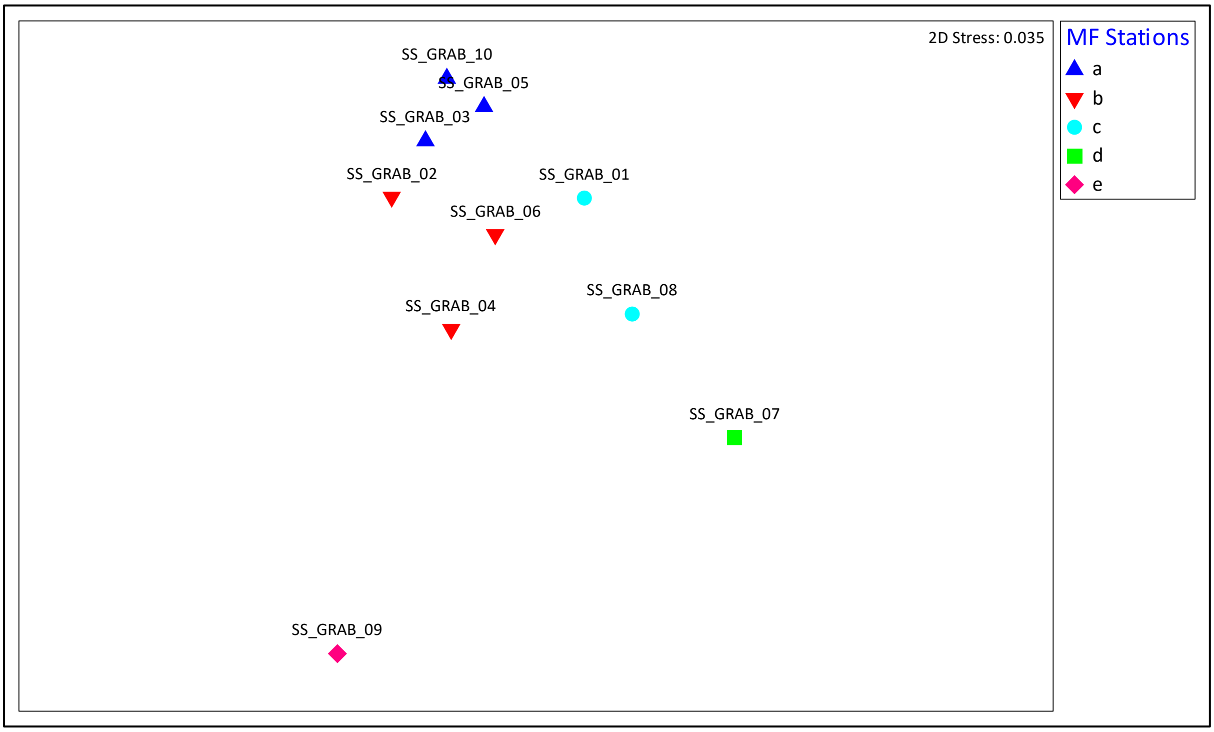


Figure 4.16 nMDS Ordination Plot of Macrofaunal Stations (0.2m²)

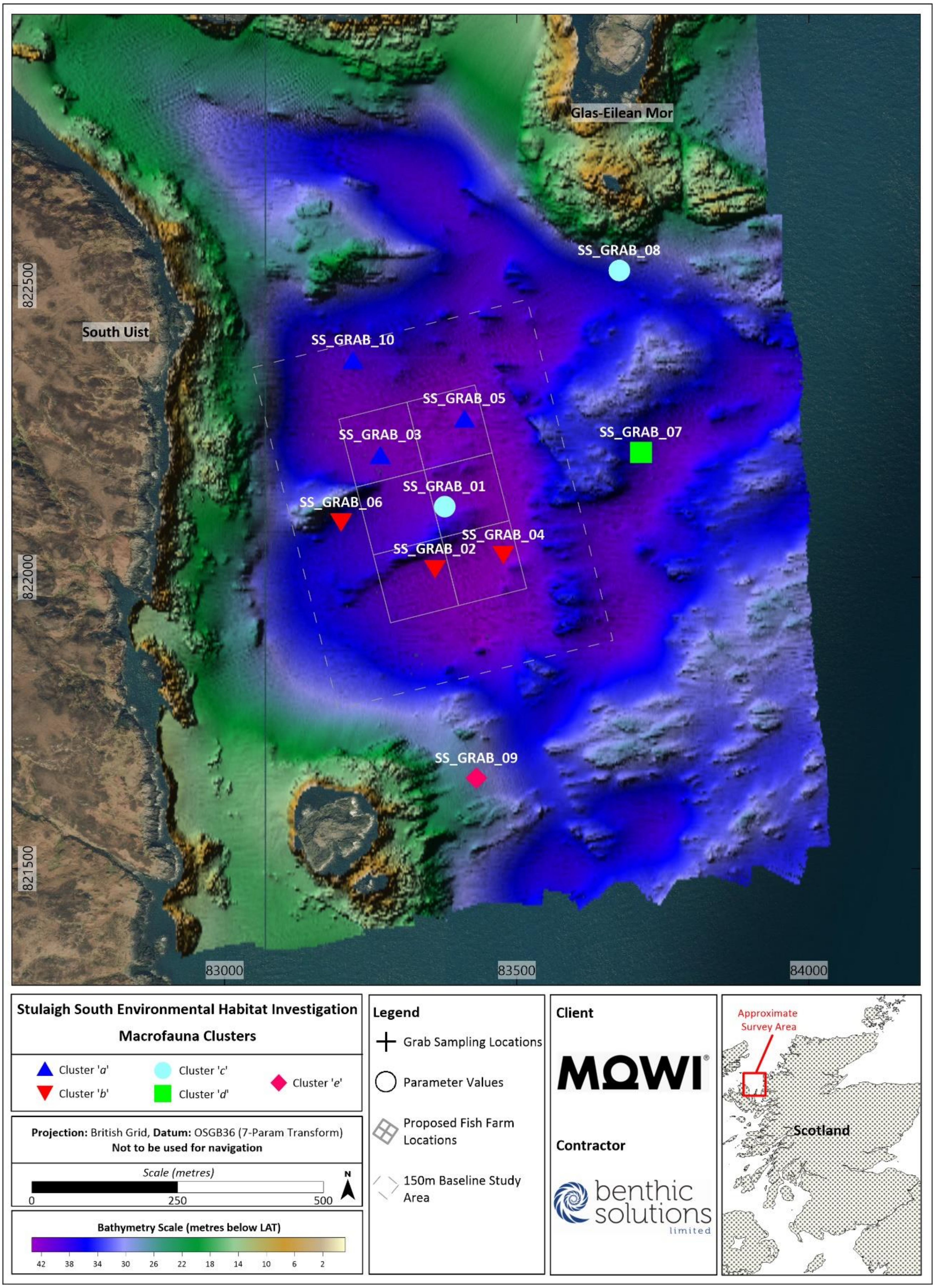


Figure 4.17 Macrofauna SIMPROF Groupings

4.4.2.3 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 organic carbon, a series of RELATE tests (correlation tests) were performed.

A RELATE test between the macrofauna and full particle size distribution (PSD) similarity matrices recorded a sample statistic of (ϱ=-0.184 *p*=>0.5), indicating no correlation between the datasets. This is likely due to the relatively homogenous slightly to gravelly muddy sand observed across the survey area resulting in a similar habitat throughout the grab sample locations. Despite no significant correlation, stations within cluster *'a'* and *'c'* had the highest proportion of fines (23.3% to 39.1%) and the lowest proportions of gravel (0.9 to 3.5%) across the survey area, indicating a slight influence of particle size on the community.

Further RELATE tests were carried out between the different groups of macrofaunal dataset and separate subsets of TOC and depth to further investigate any potential relationships between the benthic macrofauna and physico-chemical characteristics. These found no significance between the parameters (p>0.05) suggesting that the differences seen within the macrofaunal communities are not linked to the physical environment but instead represent the natural patchiness in benthic communities.

4.4.2.4 Intra-cluster Variation in Species 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 4.6.

Stations within cluster '*a'* and '*b*' had some of the highest numbers of individuals in the survey area (387 to 450 individuals and 312 to 462 individuals respectively), coupled with a moderate number of species (78 to 88 species and 89 to 115 species respectively), resulting in a relatively high species richness (Margalef richness: 12.85 to 14.24 and 15.32 to 18.58 respectively). Cluster '*c*' included stations with a low number of individuals and, despite also having the lowest number of species across the survey area, included stations with the highest Simpsons diversity (0.965 to 0.980) and evenness (0.894 and 0.926). Cluster '*d'* had the lowest number of individuals, but a moderate number of species resulting in a fairly high richness (Margalef: 13.58). Cluster '*e*' was similar to *'d'* where intermediate numbers of individuals and species were recorded.

Table 4.6 Overview of Univariate Parameters per SIMPROF Cluster

SIMPROF Cluster	Number of Individuals (N)		Number of Species (S)		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	387	450	78	88	12.85	14.24	0.849	0.878	0.962	0.972	5.35	5.52
b	312	462	89	115	15.32	18.58	0.843	0.888	0.969	0.972	5.75	5.78
c	172	194	60	70	11.20	13.40	0.894	0.926	0.965	0.980	5.28	5.68
d	-	161	-	70	-	13.58	-	0.921	-	0.978	-	5.65
e	-	210	-	81	-	14.96	-	0.876	-	0.965	-	5.55

Differences in the macrofaunal communities at a phyla level were explored by plotting of the average percentage contribution of major phyla to the overall number of individuals and number of species within each cluster (Figure 4.18 and Figure 4.19). The results showed that all clusters were dominated by Annelida, which is expected for habitats composed of mud and muddy sands. Clusters *'a'* and *'c'* were represented by the most similar proportional abundances of phyla, where Mollusca and Echinodermata represented the largest proportions of the total average abundances. Clusters *'b', 'd'* and *'e'* were similar to each other with a higher abundance of solitary epifauna and Crustacea coupled with a lower contribution of Mollusca. The high abundances of the barnacle *Balanus crenatus* resulted in the highest contribution of solitary epifauna to cluster *'e'.*

In terms of the contribution of phyla to numbers of species, the clusters were fairly similar, suggesting that the differing abundances of phyla were more important for the separation of clusters (Figure 4.18 and Figure 4.19). All clusters were characterised by similar compositions of phyla, with Annelida accounting for the greatest proportion of the overall species richness, followed by Mollusca and Crustacea. An increase in colonial epifauna at cluster *'b'* may have caused a separation of this cluster. The community within cluster '*d'* was dominated by a relatively rich range of colonial epifauna and solitary epifauna species, but the lowest proportional richness of molluscs. Interestingly, cluster *'d'* also had the lowest proportional contribution of annelids, despite this phylum representing one of the largest proportional abundances of all clusters. This suggests that the annelids were represented by numerous individuals of the same species as opposed to a highly diverse community. All clusters had a low proportion of echinoderms.

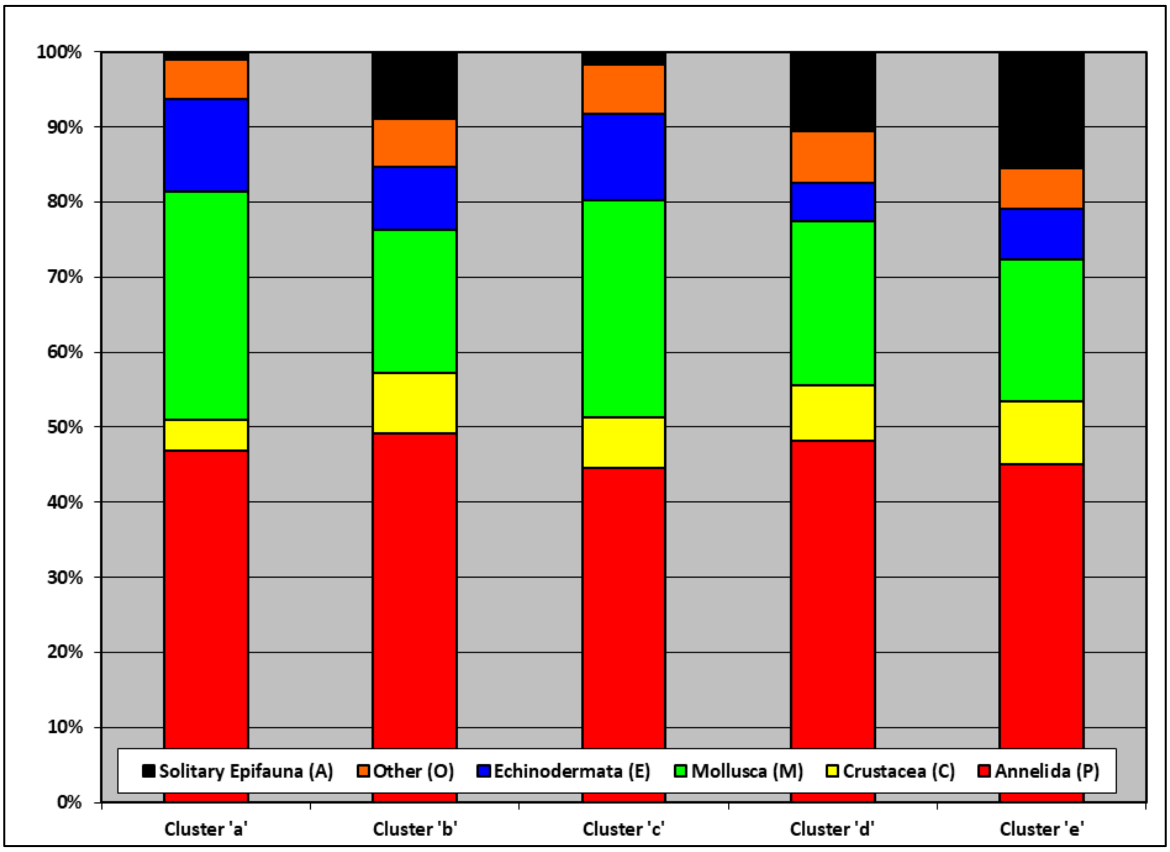


Figure 4.18 Average Contribution of Each Phyla to Total Faunal Abundance for Each Cluster

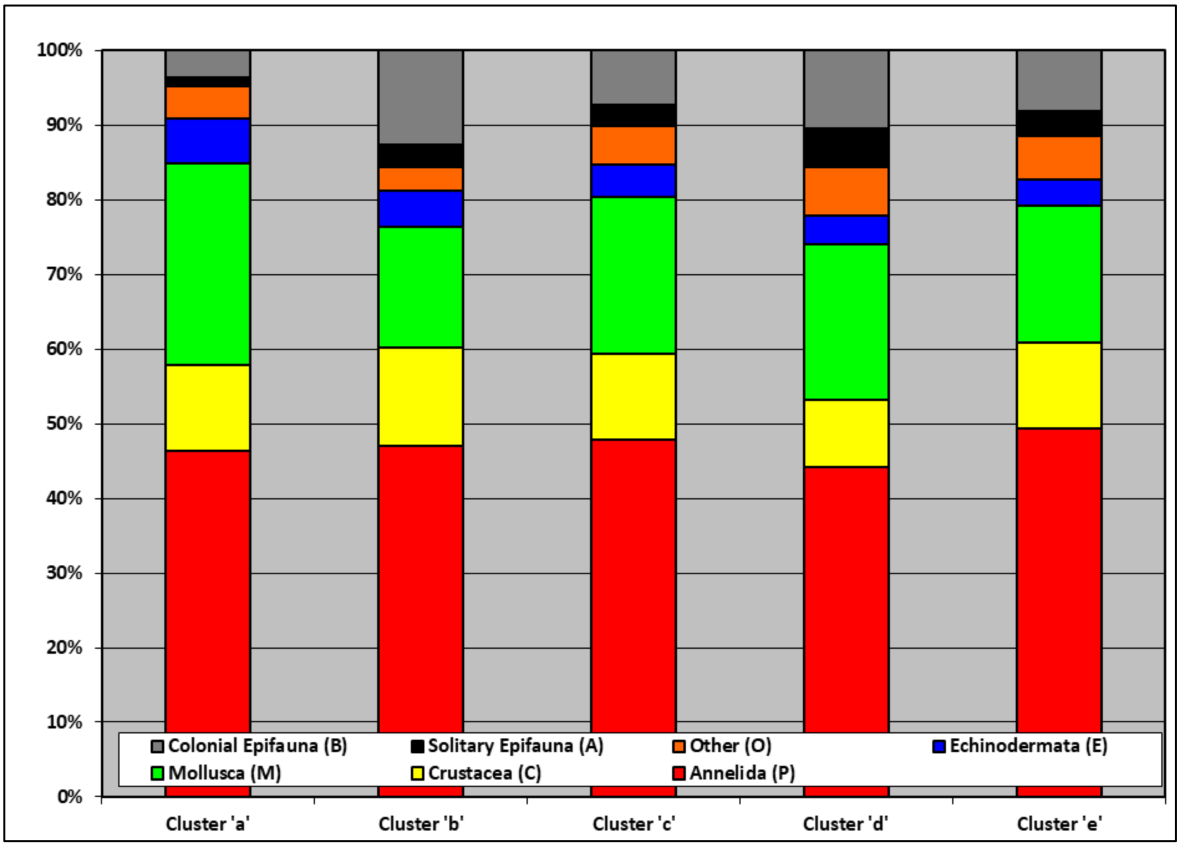


Figure 4.19 Average Contribution of Each Phyla to Total Number of Species for Each Cluster

Table 4.7 provides further information on the ecological parameters driving separation of macrofaunal clusters within the Stulaigh South survey area. The contribution of different feeding groups was calculated using the Infaunal Trophic Index (ITI), developed by Codling and Ashley (1992). This revealed the dominance of surface detritus feeders (ITI 2) and subsurface deposit feeders (ITI 3) across the majority of stations (Figure 4.20), with the exception of cluster '*e*' where suspension feeders (ITI 1) dominated. The most prominent differences were observed within cluster '*e',* where the proportion of ITI 1 and ITI 4 feeders was on average highest, due to the relatively high abundance of *Balanus crenatus* and *Timoclea ovata*, and ITI 2 feeders were lowest. Despite this, the proportion of ITI feeding group was relatively consistent between the stations, as expected for a baseline environment with no anthropogenic activity.

A comparison of the infaunal versus epifaunal richness within each cluster is provided in Table 4.7. Within the Stulaigh South survey area the macrofaunal community, across all clusters, was dominated by infaunal taxa (all stations had >85% infaunal species). Stations within cluster '*a*' had the highest maximum infaunal richness at 98.7% (station SS_Grab_03). Epifaunal richness was generally highest within clusters '*b*' and *'e'*, evidenced by the low infauna/epifauna ratios (4.49 to 11.0). The infauna/epifauna ratio for all other clusters was higher, with the maximum ratio at station SS_Grab_03 within cluster '*a'* (78).

Table 4.7 Overview of Faunal Assemblage Parameters per SIMPROF Cluster

SIMPROF Cluster	ITI 1 Contribution (%)		ITI 2 Contribution (%)		ITI 3 Contribution (%)		ITI 4 Contribution (%)		ITI Score		Infauna Richness (%)		Epifauna Richness (%)		Infauna / Epifauna Ratio	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
a	25.7	28.4	34.4	39.5	33.8	38.9	0.57	2.81	62.1	63.3	94.0	98.7	1.27	6.02	15.6	78
b	17.6	32.0	32.0	40.1	29.0	37.9	2.76	4.55	57.0	64.5	84.8	91.7	8.33	15.2	5.59	11.0
c	21.9	29.9	30.6	35.6	32.2	43.1	2.26	4.38	56.7	64.4	90.8	95.2	4.84	9.21	9.86	19.7
d	-	30.6	-	40.1	-	28.6	-	0.68	-	66.9	-	89.6	-	10.4	-	8.63
e	-	40.2	-	24.0	-	31.4	-	4.41	-	66.7	-	92.0	-	8.05	-	11.4

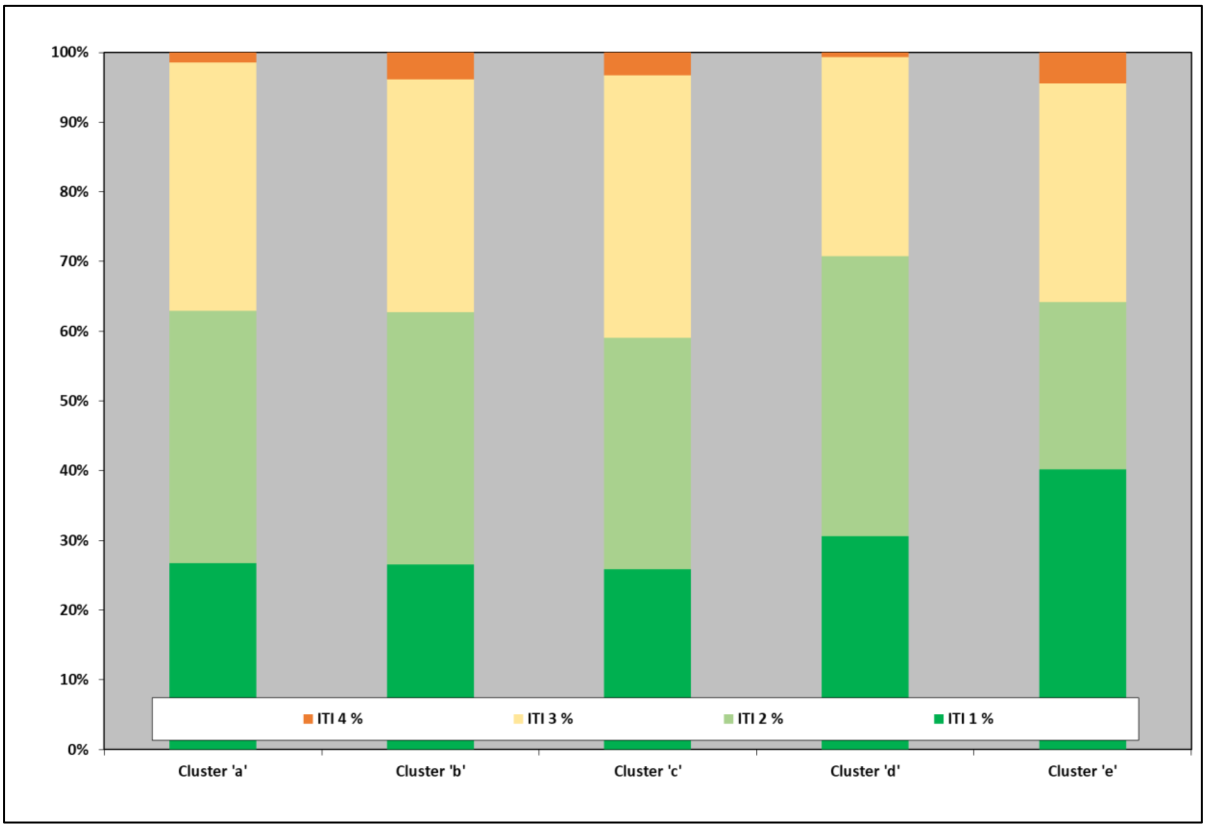


Figure 4.20 ITI Feeding Groups 1-4 Percentage Contribution per Cluster

To determine the species driving the differences between the five SIMPROF clusters, Table 4.8 presents the top ten species in each cluster together with their percentage contribution to the overall similarity within the cluster. Table 4.9 shows the top five species responsible for differences between clusters.

Table 4.8 highlights the variability in the species assemblages represented by clusters *'a'* to *'e'* with all characterised by different species. Similarities between clusters *'a'* and *'c'* were most pronounced and are evidenced by the clusters sharing eight of the same species within the top ten characterising taxa (*Myrtea spinifera, Kurtiella bidentata, Amphiura filiformis, Lumbrineris cingulata, Euclymene oerstedii* agg., *Dosinia lupinus, Turritellinella tricarinata* and *Chaetozone*). Cluster *'b'* was also similar and shared six species with cluster *'a'* and six species with cluster *'c',* although average abundances of such species between the clusters was variable. For example, *Euclymene oerstedii* agg. was represented by on average 29 individuals per $0.2m^2$ in cluster *'a'* contributing 10.10% to the total average abundances in comparison to 11 individuals contributing 3.16% to cluster *'b'* and 6.5 individuals contributing 5.1% to the community within cluster *'c'*. Clusters *'d'* and *'e'* were more dissimilar to the three major clusters and included many species not listed in the top ten taxa of other clusters. High abundances of the barnacle *Verruca stroemia* and the annelid *Syllis parapari* were responsible for the separation of cluster *'d'* while the barnacle *Balanus crenatus* and the sea urchin *Echinocyamus pusillus* were responsible for the separation of cluster *'e'.*

Review of the taxa most responsible for differentiating the five clusters (Table 4.9) included several taxa previously highlighted as characteristic for some clusters, suggesting that some differentiation was due to variability in the abundance of consistently dominant taxa. The high abundances of *Euclymene oerstedii* agg., *Amphiura filiformis* and *Kurtiella bidentata* within cluster *'a'* were responsible for the separation of this cluster from all other clusters, representing combined dissimilarities of between 6.55% (cluster *'b')* and 14.77% (cluster *'e'*) where the three species were within the top three dissimilar taxa of all clusters. Cluster *'b'* was the most similar to cluster *'a'* (49.43% dissimilarity) although the presence of *Chaetozone* and *Balanus crenatus* within cluster *'b'* may have caused separation of these stations. The separation of cluster *'c'* appears to have been a result of low abundances within this cluster as opposed to different dominant taxa. Conversely, the separation of cluster *'d'* appears to have been driven somewhat by the presence of *Phascolion (Phascolion) Strombus strombus* and *Verruca stroemia,* with the species individually representing between 2.62% and 3.23% of the dissimilarity between cluster *'d'* and clusters *'a'* and *'e'*. The high abundances of *Balanus crenatus* were responsible for the separation of cluster *'e'* from *'a'* and *'b',* and this species, combined with the presence of *Timoclea ovata* also caused the separation of cluster *'e'* from clusters *'c'* and *'d'* (Figure 4.21).

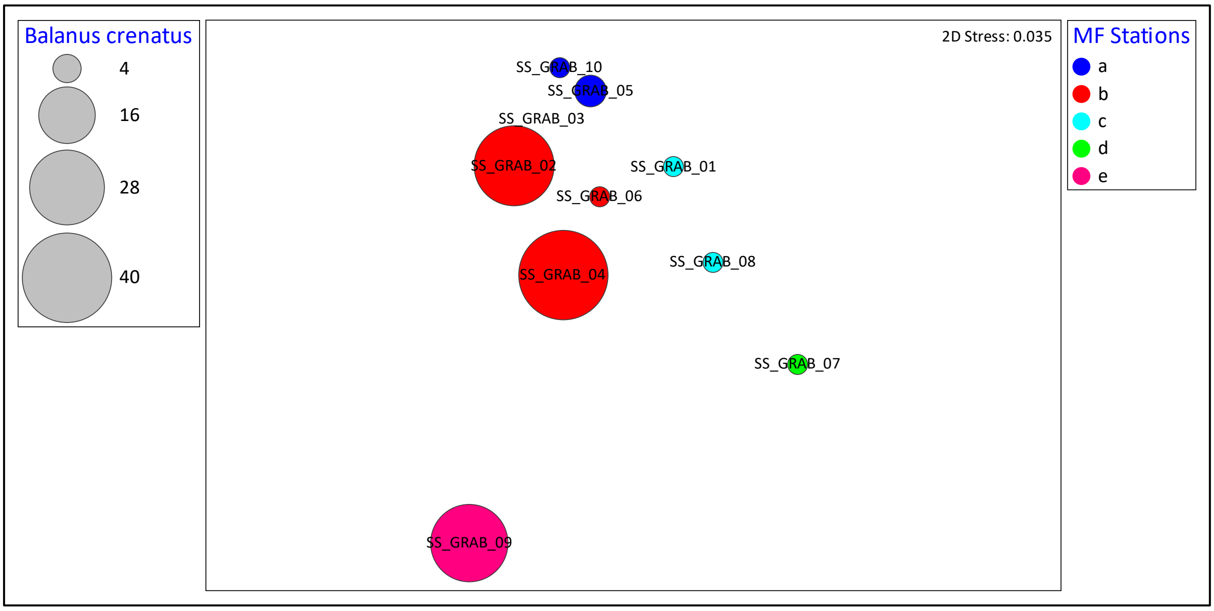


Figure 4.21 **Bubble Plot showing the Abundance of *Balanus crenatus* within the Survey Area**

Table 4.8 Top 10 Species Abundances for Clusters 'a', 'b', 'c', 'd' and 'e'

Top 10 Species	Cluster 'a'			Cluster 'b'			Cluster 'c'			Cluster 'd'*		Cluster 'e'*	
	Species	Av. Abundance	Contribution (%)	Species	Av. Abundance	Contribution (%)	Species	Av. Abundance	Contribution (%)	Species	Abundance	Species	Abundance
1	*Euclymene oerstedii* agg.	29.0	10.10	*Lumbrineris cingulata*	20.7	8.37	*Myrtea spinifera*	11.5	11.2	*Verruca stroemia*	12	*Balanus crenatus*	30
2	*Amphiura filiformis*	35.7	10.10	*Chaetozone*	22.3	6.91	*Kurtiella bidentata*	11.5	8.16	*Phascolion (Phascolion) strombus strombus*	12	*Echinocyamus pusillus*	12
3	*Kurtiella bidentata*	30.3	8.65	*Amphiura filiformis*	22.3	6.22	*Amphiura filiformis*	15.5	7.14	*Syllis parapari*	10	*Aponuphis bilineata*	11
4	*Myrtea spinifera*	17.7	4.86	*Kurtiella bidentata*	20.0	6.13	*Lumbrineris cingulata*	8	6.12	*Kurtiella bidentata*	7	*Timoclea ovata*	11
5	*Chaetozone*	14.7	4.76	*Balanus crenatus*	24.7	5.68	*Euclymene oerstedii* agg.	6.5	5.10	*Amphiura filiformis*	6	*Lumbrineris cingulata*	7
6	*Lumbrineris cingulata*	14.0	4.51	*Peresiella clymenoides*	10.0	4.51	*Dosinia lupinus*	6	5.10	*Thyasira flexuosa*	5	Nemertea	6
7	*Praxillella affinis*	14.3	4.28	Nematoda	7.67	3.7	*Turritellinella tricarinata*	5	5.10	*Polycirrus*	4	*Laonice bahusiensis*	6
8	*Turritellinella tricarinata*	13.7	4.03	*Myrtea spinifera*	9.67	3.28	Nematoda	4.5	4.08	*Antalis entalis*	4	*Dialychone dunerificta*	6
9	*Thyasira flexuosa*	12.0	3.68	*Euclymene oerstedii* agg.	11.0	3.16	*Phascolion (Phascolion) strombus strombus*	3	3.06	Nemertea	4	*Clausinella fasciata*	6
10	*Dosinia lupinus*	11.3	3.68	Nemertea	9	2.97	*Chaetozone*	3	3.06	*Goniada maculata*	4	*Grania*	6

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

Table 4.9 Dissimilarity Percentages (SIMPER) for Macrofauna Dataset

	Cluster *a*		**Cluster *b***		**Cluster *c***		**Cluster *d***	
Cluster *e*	Average dissimilarity 85.96%		Average dissimilarity 70.60%		Average dissimilarity 73.94%		Average dissimilarity 75.74%	
	Amphiura filiformis	5.58	*Chaetozone*	3.57	*Balanus crenatus*	7.13	*Balanus crenatus*	7.55
	Euclymene oerstedii agg.	4.66	*Amphiura filiformis*	3.49	*Amphiura filiformis*	3.63	*Phascolion (Phascolion) strombus strombus*	3.23
	Kurtiella bidentata	4.53	*Kurtiella bidentata*	3.01	*Myrtea spinifera*	2.93	*Verruca stroemia*	2.96
	Balanus crenatus	4.46	*Balanus crenatus*	2.52	*Timoclea ovata*	2.67	*Timoclea ovata*	2.96
	Myrtea spinifera	2.84	*Lumbrineris cingulata*	2.32	*Kurtiella bidentata*	2.39	*Echinocyamus pusillus*	2.96
Cluster *a*			Average dissimilarity 49.43%		Average dissimilarity 54.13%		Average dissimilarity 70.19%	
			Balanus crenatus	2.93	*Euclymene oerstedii* agg.	3.79	*Amphiura filiformis*	5.18
			Amphiura filiformis	2.44	*Amphiura filiformis*	3.48	*Euclymene oerstedii* agg.	5.06
			Euclymene oerstedii agg.	2.39	*Kurtiella bidentata*	3.15	*Kurtiella bidentata*	4.05
			Kurtiella bidentata	1.72	*Praxillella affinis*	2.14	*Myrtea spinifera*	2.91
			Chaetozone	1.50	*Chaetozone*	1.97	*Chaetozone*	2.40
Cluster *b*					Average dissimilarity 51.80%		Average dissimilarity 62.48%	
					Balanus crenatus	4.07	*Balanus crenatus*	4.24
					Chaetozone	3.57	*Chaetozone*	4.11
					Amphiura filiformis	2.50	*Lumbrineris cingulata*	3.11
					Lumbrineris cingulata	2.24	*Amphiura filiformis*	2.83
					Kurtiella bidentata	1.8	*Kurtiella bidentata*	2.32
Cluster *c*							Average dissimilarity 56.93%	
							Verruca stroemia	3.20
							Myrtea spinifera	3.06
							Amphiura filiformis	2.69
							Phascolion (Phascolion) strombus strombus	2.62
							Syllis parapari	2.34

4.4.3 Epifauna and Other Biological Groups

All macrofaunal replicates obtained within the Stulaigh South 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 4.22 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 V.

A total of 33 taxa were considered to be epifaunal which belonged to the phyla Porifera, Cnidaria, Entoprocta and Bryozoa, most of which were Bryozoa. Bryozoa was represented by 24 taxa with *Eucratea loricata* being the most prevalent recorded at 70% of stations. Porifera was represented by two taxa and included *Cliona* recorded at three stations and four unidentified individuals recorded SS_Grab_02, SS_Grab_04, SS_Grab_07 and SS_Grab_09. Cnidaria was represented by six taxa with Epizoanthidae being the most prevalent recorded at 60% of stations.

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, circalittoral rock were seen as extensive outcropping bedrock reefs in the survey area; however, were not targeted by grab sampling operations.

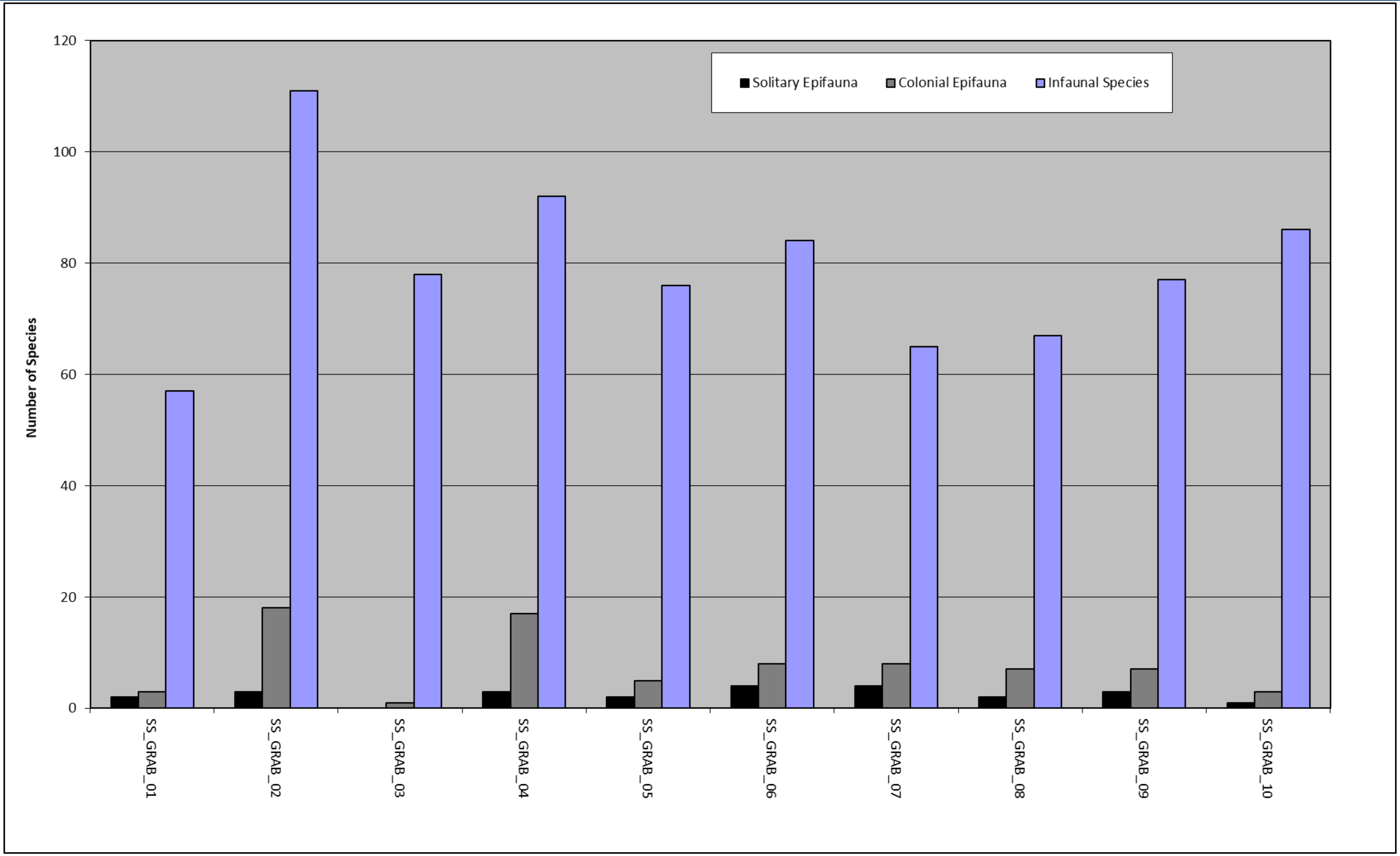


Figure 4.22 Epifaunal Versus Infaunal Richness

4.5 Environmental Habitats

4.5.1 Habitat Classification

Habitats were identified using a combination of field observations, detailed review of the SSS, bathymetry video footage and stills images. Based on the ground-truthing fata obtained from the Stulaigh South proposed fish farm survey area, the seabed was prominently comprised of gravelly muddy sand (JNNC/EUNIS habitat: SS.SMx.CMx/MC42) with patches of sub cropping and outcropping bedrock (JNNC/EUNIS habitat: CR.LCR /MC12). The two assigned habitats within the survey area are tabulated in Table 4.10 and illustrated in Figure 4.23. The matrix of photographs and ascribed categories is given in full in Appendix VI.

The seabed habitats assigned in Figure 4.23 corresponded to the biotopes given in the previous Stulaigh fish farm environmental campaigns by BSL. However, the current (2022) survey provides a greater resolution of the seabed around the proposed Stulaigh South fish farm through the acquisition of SSS, which enabled accurate mapping of bedrock areas, and grab sampling was used to further ground-truth sediment changes in the survey area. Building upon the substrate classification process, the photographs were further examined to identify the species and biotopes corresponding to each of the two main substrate types.

Table 4.10 Seabed Substrate Categories Identified

Substrate Category	EUNIS Habitat	JNCC Habitat	Description
Bedrock	MC12	Low Energy Circalittoral Rock (CR.LCR)	This exists as extensive reefs showing relief of up to several metres above that of the surrounding sediments and localised outcrops of small to large boulders. Mostly covered hornwrack (*Flustra foliacea*), with other species occurring such as Hydrozoa (Sertulariidae), kelp (*Laminaria* sp.), edible sea urchin (*Echinus esculentus*), turret shells (*Turritella* sp.), red encrusting algae (Corallinaceae) and anemones (Actiniaria).
Gravelly Muddy Sand	MC42	Circalittoral Mixed Sediment (SS.SMx.CMx)	This substrate was present across the whole survey area. The seabed was composed of mobile sands overlying the underlying mixed gravels and shells in shallow areas. Coarser material was present in shallow areas and finer sediment with shell material was present in deeper areas.

Figure 4.23 Summary of Habitats Across the Survey Area

4.5.1.1 Bedrock – Low Energy Circalittoral Rock (CR.LCR)

Bedrock was common in the survey area with large extents mapped in the north and east of the proposed fish cage locations and present in patches along all but one camera transect (SS_CAM_09_Mearl_B) undertaken.

This substrate type was generally recorded as a continuous structure with numerous fractures and elevated several metres above the surrounding seabed (Figure 4.24). In small sections the bedrock exposure consisted of boulders that had broken away from the main structure. Rocky faces were colonised by dense epifauna assemblages suggesting a relatively diverse habitat. The combination of the habitat and faunal community is best described by the level 5 biotope 'Solitary ascidians, including *Ascidia mentula* and *Ciona intestinalis*, on wave-sheltered circalittoral rock' CR.LCR.BrAs.AmenCio due to the presence of numerous charactering species. However, some important characterising species were absent and level 5 biotopes will be further investigated in the following habitat assessment report.

Conspicuous epifauna included the Devonshire cup coral *(Caryophyllia (Caryophyllia) smithii*) and North Sea tube anemone *(Cerianthus lloydii),* hydrozoan and bryozoan turf, kelp (*Laminaria* sp.), hornwrack (*Flustra foliacea*), encrusting red calcareous algae, and sponge communities including common sponge (*Polymastia* sp.) and encrusting sponge (Porifera). Mobile fauna were common on the exposed bedrock and included the molluscs king scallop (*Pecten maximus*), queen scallop (*Aequipecten opercularis*), turret shell (*Turritella* sp.), whelk (Buccinidae), crustaceans squat lobster (*Munida rugosa*), hermit crab (*Pagurus* sp.), spider crab (*Macropodia*) and swimming crab (Portunidae), fishes including dragonet species (Callionymidae) and grey gurnard (*Eutrigla gurnardus*) and echinoderms including seven armed starfish (*Luidia ciliaris*), spiny starfish (*Marthasterias glacialis*), brittle star (Ophiuridae), red cushion star (*Porania (Porania) pulvillus*) and common sea urchin (*Echinus esculentus*).

The habitat type shows conformance towards the level three EUNIS habitat classification MC12 describing 'Atlantic Circalittoral Rock', corresponding with the JNCC classification CR.LCR. The combination of the habitat and faunal community was assessed and no further biotopes have been assigned. The level 4 biotope 'Brachiopod and ascidian communities' CR.LCR.BrAs could not be assigned due to the low number of important characterising species (only 5 out of 23 species present across the survey area). Therefore, due to the insufficient similarity to confidently assign the CR.LCR.BrAs biotope, the overarching habitat classification was kept at CR.LCR (Figure 4.23).

Given the elevation and extent of the bedrock formations, the areas delineated would classify as JNCC Annex I reefs, which are described as: "*Rocky reefs occur where bedrock or stable boulders and cobbles arise from the surrounding seabed creating a habitat that is colonised by many different marine animals and plants. Rocky reefs can be very variable in terms of both their structure and the communities they support. They provide a home to many species such as corals, sponges and sea squirts as well as giving shelter to fish and crustaceans such as lobsters and crabs*" (JNCC, 2016). As illustrated in Figure 4.24, the bedrock exposures are colonised by an epifaunal community which as per the Golding *et al.,* (2020) criteria would qualify the structures as 'possible reef'.

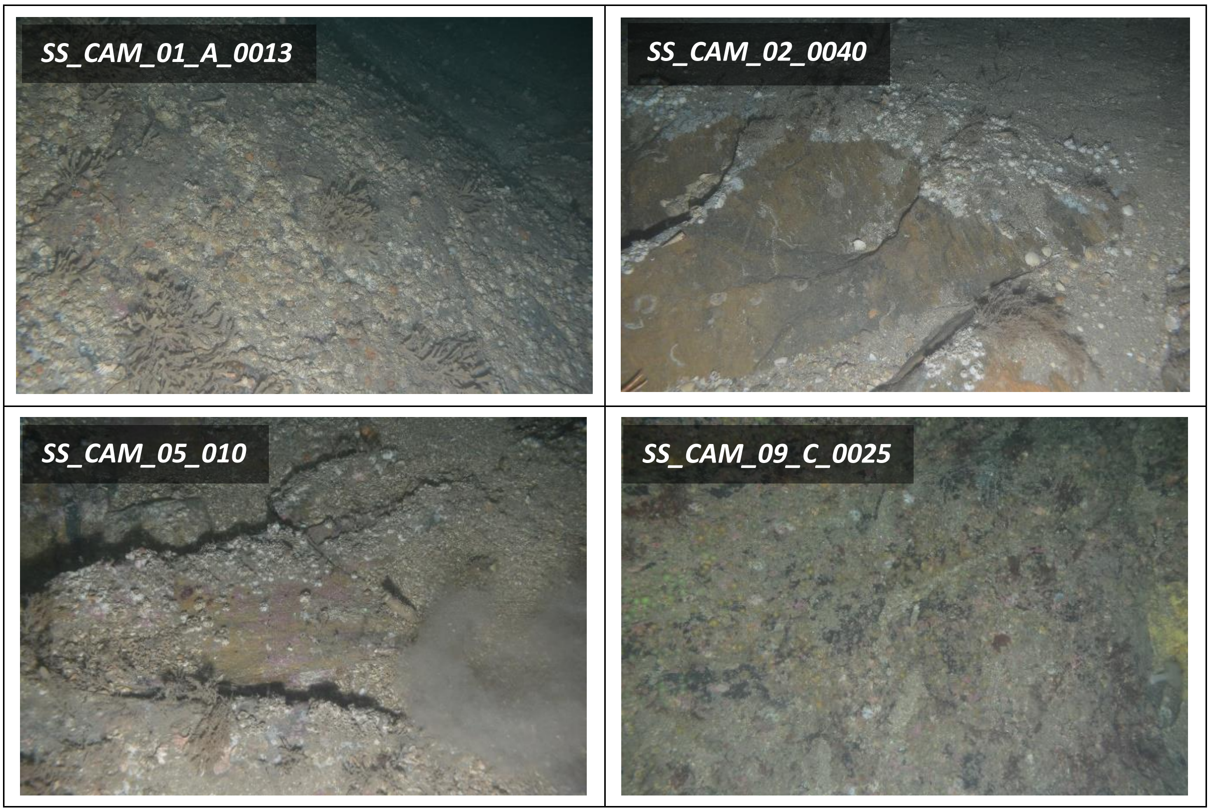


Figure 4.24 Example Images of Bedrock Habitat

4.5.1.2 Gravelly Muddy Sand - Circalittoral Mixed Sediment (SS.SMx.CMx)

Mixed sediment composed of gravelly muddy sand was the predominant seabed sediment across the survey area (Figure 4.25). Coarser grain sizes were often noted in higher quantities close to the bedrock exposures, representing a scour footprint, and finer sediment with small amounts of gravel in deeper areas. Conspicuous fauna associated with mixed sediments included but was not limited to grey gurnard (*Eutrigla gurnardus*), tusk shell (Scaphopoda), hermit crab (*Pagurus* sp.), queen scallop (*Aequipecten opercularis*), sand mason worm (*Lanice conchilega*), hydroids (Hydrozoa), Devonshire cup coral (*Caryophyllia (Caryophyllia) smithii*), North Sea tube anemone (*Cerianthus lloydii*), crab (Brachyura), king scallop (*Pecten maximus*), turret shell (*Turritella* sp.), common dab (*Limanda limanda*), whelk (Buccinidae), brittle star (*Ophiura* sp.), barnacles (Cirripedia), dragonet (Callionymidae), common dragonet (*Callionymus lyra*), red cushion star (*Porania (Porania) pulvillus*), squat lobster (*Munida rugosa*), flat fish (Pleuronectiformes), spider crab (Macropodia), kelp (Laminariales), dead man's fingers (*Alcyonium digitatum*), slender seapen (*Virgularia mirabilis*), starfish (Asteroidea), fan-head worm (Canalipalpata), swimming crab (Portunidae), sea lily (Crinoidea), maerl (*Phymatolithon calcareum*), sea mouse (*Aphrodita* sp.) seven armed starfish (*Luidia ciliaris*) and bloody Henry starfish (*Henricia oculata*).

The habitat type and presence of these faunal assemblages indicates a conformance towards the level four EUNIS habitat classification MC42 describing 'Atlantic Circalittoral Mixed Sediment', corresponding with the JNCC classification SS.SMx.CMx, which was also present in nearby areas during the previous 2019 survey. The combination of the habitat and faunal community was assessed and the gravelly muddy sand and consistent epifaunal community across all camera transects showed conformance to the level 5 biotope '*Cerianthus lloydii* and other burrowing anemones in circalittoral muddy mixed sediment' SS.SMx.CMx.ClloMx. Additionally, the macrofauna data revealed conformance to '*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment' SS.SMx.CMx.KurThyMx due to the presence of 36 of 43 characterising infaunal species for the biotope across the survey area, with the lowest number of characterising species (15 species) occurring at SS_Grab_08 and the highest (27 species) occurring at SS_Grab_02. Due to the uncertainty in mapping the extent of these two level five biotopes, the area mapped remained to a level 4 habitat classification of 'Circalittoral Mixed Sediment' (Figure 4.23). Furthermore, pocket elements of 'maerl beds' (SS.SMP.Mrl) were present along sections of transects SS_CAM_01, SS_CAM_02, SS_CAM_03, SS_CAM_04, SS_CAM_05, SS_CAM_07, SS_CAM_09_Maerl B and SS_CAM_09_Maerl C with these areas assessed in further detail in Section 4.5.2.2.

Example images of the mixed sediment habitat are displayed below in Figure 4.25 and are mapped in Figure 4.23.

Figure 4.25 Example Images of Circalittoral Mixed Sediment Habitat

4.5.2 Potential Sensitive Habitats and Species

4.5.2.1 Legislative Species Protection

In order to assess if any species which are afforded legislative protection in the UK were present within the survey area, the epifauna and infauna were run through a listed species database developed by BSL staff.

Species recorded in the survey area which have designated legislative protection included:

- Common maerl (*Phymatolithon calcareum*) (Species FOCI, UK Post-2010 Biodiversity, Scottish Biodiversity List);
- Ocean quahog (*Arctica islandica*) (Species FOCI, OSPAR List of Threatened and/or Declining Species, Scottish Priority Marine Feature);
- *Devonia perrieri* (Scottish Biodiversity List).

The presence of maerl and the occurrence of ocean quahog in the survey area are discussed in detail in Sections 4.5.2.2 and 4.5.2.4 respectively. A single individual of the mollusc, *Devonia perrieri,* was recorded at two grab stations (SS_Grab_04 and SS_grab_10). The mollusc is an ectosymbiotic bivalve which lives attached to the holothurian *Leptosynapta* and is considered a rare mobile species in Scottish waters (NatureScot, 2022a). The species is listed on the Scottish Biodiversity List implemented to list flora, fauna and habitats considered to be of principal importance for biodiversity conservation but conservation action is not required (NatureScot, 2022a).

4.5.2.2 Maerl Coverage

The screenshots from the survey area were further examined to estimate the distribution of dead maerl thalli and the coverage of live thalli. For the most part this was limited to very occasional dead and live maerl within sandy sediments recorded in patches of the circalittoral mixed sediment type present throughout the survey area. In order to assess the coverage and health of maerl, seabed screenshots were assigned to two categories as detailed in Section 3.3, but also summarised below:

- Nil - maerl absent;
- <5% - occasional branches recorded;
- <25% - maerl aggregations are noted as distinct patches, usually associated with sediment hollows, ripple troughs or sheltered parts of the seabed;
- <50% - maerl recorded in foliose form and covering a larger area, and;
- >50% - significant coverage by foliose form sometimes in multiple layers with notable low-level relief above the natural sediment level.

Live maerl coverage was present within the proposed Stulaigh South pen area but had a low coverage of <5% (Figure 4.26). The distribution of maerl thalli appeared to be related to the sediment type and depth with greater aggregations occurring in shallower areas of coarser sediment, when compared to deeper areas with less gravel content where maerl was rare or completely absent. SS_CAM_03, SS_CAM_07 and SS_CAM_09_Maerl_B showed the largest coverage of live maerl, with live maerl aggregations in the northeast (SS_CAM_09_Maerl_B) covering a length of approximately 250m and aggregations in the southwest (SS_CAM_03 and SS_CAM_07) covering lengths of approximately 300m. Camera transect SS_CAM_01 showed a slight variability in maerl coverage, alternating between no maerl and <5% coverage with this pattern explained by the sediment changes along the transects with the seabed transitioning between mixed sediment and areas of rocky reef (Figure 4.23). Maerl was completely absent along transect SS_CAM_06, although this is not thought to be related to sediment type or depth as there was no notable difference to other transects. Areas of dead maerl were observed in transects SS_CAM_03 to SS_CAM_05, SS_CAM_07, SS_CAM_09_Maerl_B and SS_CAM_09_Maerl_C. However, as per NatureScot guidance (Section 3.3), due to all live maerl coverage recorded being <5% within the survey area, no areas would be classified as maerl beds (NatureScot, 2022b).

As stated in Section 1.4, the datasets from the current (2022) survey and the previous 2019 survey (BSL, 2019) were compared to detect any temporal shifts. The previous survey (2019) identified no maerl present along any transect lines outside of the channel between Stulaigh Island and South Uist, however, maerl was present within the current (2022) dataset (Figure 4.26). The distribution of live maerl thalli in the current campaign was limited to small patches along transect lines SS_CAM_01 to SS_CAM_05, SS_CAM_07 and SS_CAM_09_Maerl_B which were not direct reruns of 2019 survey camera transects. As such, the maerl identified during the current survey campaign may have also been present within the wider region during the previous 2019 survey campaign also.

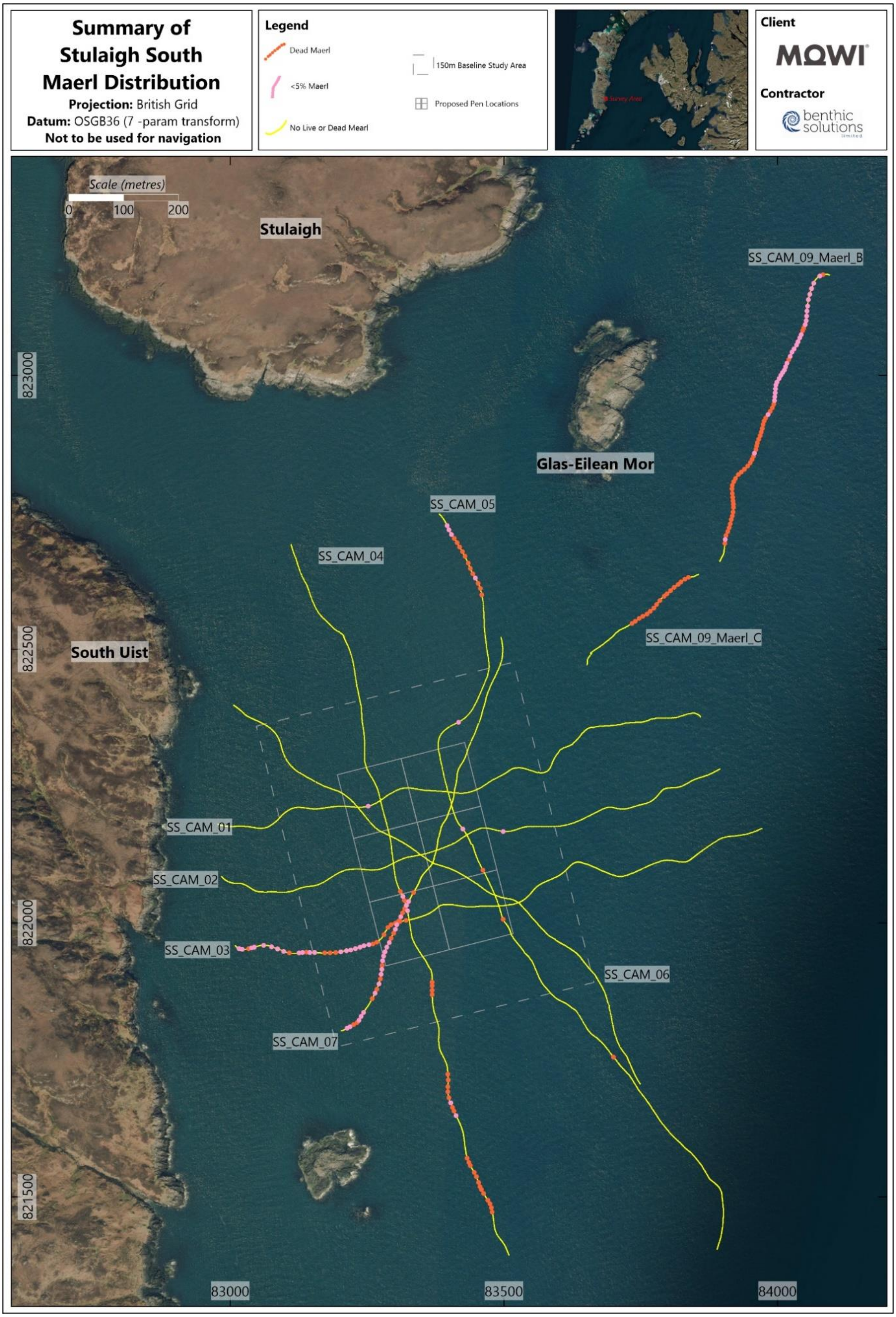


Figure 4.26 Summary of Maerl Coverage Across the Stulaigh South Survey Area

4.5.2.3 Burrowing Megafauna Communities

In order to determine whether the gravelly muddy sand 'Circalittoral mixed sediment (SS.SSa.CMuSa/MC52) habitat recorded across the survey area should be classified as the OSPAR 'Seapen and burrowing megafauna communities' (also a Scottish priority marine feature (PMF), listed as 'Burrowed Mud'), a combination of environmental factors and faunal information were considered, as outlined in JNCC (2014). As mentioned in Section 3.4, for a habitat to be classified as 'Seapen and burrowing megafauna communities' the presence of burrowing macrofauna is an essential element while the presence of seapens is not a critical qualifying factor. Within the Stulaigh South survey area no seapen individuals or burrowing crustaceans were observed on the video footage across the whole survey area. However, burrow openings of various sizes were observed. In order to apply the SACFOR scale (Table 3.2), the burrows were divided into two size groups and assessed independently, with smaller burrows likely to be inhabited by burrowing fauna of 1 to 3cm length and larger burrows, as observed on the underwater video were inhabited by *N. Norvegicus* (3 to 15cm length).

The results of the burrow density assessment for both burrow sizes showed that burrows were present in 'Circalittoral mixed sediment' ranging from a SACFOR scales of 'less than rare' to 'occasional' (Table 4.11). The density of small burrows was 'rare' or 'occasional' on the SACFOR scale for the nine transects assessed. Large burrows were also identified at five of the nine transects and classified as 'rare' or 'occasional' (Table 4.11). Given the presence of burrows at a maximum SACFOR density of 'occasional' and lack of confirmed sightings of burrowing crustaceans, this area would not be considered a 'Seapen and Burrowing Megafauna community', according to JNCC (2014) guidance. The combination of particle size data, underwater images and the lack of characteristic species recorded within the Stulaigh South area, the Scottish PMF habitat of 'Burrowed mud' can also be ruled out (Howson et al., 2012).

Table 4.11 Burrow Density Estimations for Small and Large Burrows Across the Stulaigh South Survey Area

Station	Number of small burrows present (1 to 3cm) per m^2	Number of large burrows present (3 to 15cm) per m^2
SS_CAM_01	0.067	0.011
SS_CAM_02	0.019	0
SS_CAM_03	0.141	0
SS_CAM_04	0.044	0.006
SS_CAM_05	0.523	0
SS_CAM_06	0.247	0
SS_CAM_07	0.242	0.012
SS_CAM_09_Maerl_B	0.693	0.026
SS_CAM_09_Maerl_C	0.324	0.025

Colour code for SACFOR abundance classification						
Superabundant	**A**bundant	**C**ommon	**F**requent	**O**ccasional	**R**are	**L**ess than Rare

4.5.2.4 Ocean Quahog (Arctica islandica)

The ocean quahog (*Arctica islandica*) bivalve species is afforded protected status under the OSPAR Commission due to its inclusion on the OSPAR list of threatened and/or declining species in the Greater North Sea area as a priority species (OSPAR, 2008; 2009). Ocean quahog grow very slowly, and are at particular risk from bottom fishing gear, and, like other slow-growing fauna, once their numbers have been reduced their populations can take a long time to recover.

No live individuals of *A. islandica* were observed during analysis of seabed video footage and still photographs from the Stulaigh South survey area. However, one adult and one juvenile *A. islandica* individuals were found in the macrofauna at stations SS_Grab_05 and SS_Grab_10.

5 Conclusion

This survey was conducted at the request of MOWI to provide visual footage and grab sampling of the seabed at the proposed Stulaigh South fish farm to investigate the habitats surrounding this area. The water depth across the proposed Stulaigh South fish farm site ranged between 6m to 44m LAT with the deepest water depth recorded at the centre of the proposed site. The seabed shoaled upon approach to landfall, most notably at the outcropping rocks of Stulaigh and Glas-Eilean Mor.

The seabed sediments within the survey area were characterised by mixed reflectivity sonar data interspersed by high reflectivity bedrock throughout. The results of particle size analysis indicated a homogenous muddy sand sediment type across the Stulaigh South survey area, dominated by sands (>57%) with a slightly lower proportion of fines and a minimal proportion of gravel. Higher proportions of gravels were observed at locations close to areas of outcropping bedrock, for example at SS_Grab_06 (12.16%). The samples collected in the survey area represented three Folk classifications with most assigned 'Slightly gravelly muddy sand' or 'Gravelly muddy sand'. The homogeneity of the sediment within the survey area indicates a natural distribution of sediments, unimpacted by anthropogenic activities.

Total organic carbon was moderate (<1%) across much of the survey area with the exception of station SS_GRAB_10 where TOC was significantly higher than all other stations at 4.70%. It was not entirely clear the reason for the significantly higher TOC at SS_Grab_10 but may relate to the notably increased shell debris within the grab sample.

Species richness and faunal abundance varied within the Stulaigh South survey area reflecting the slight variation in sediment and the natural patchiness of benthic macrofaunal communities. A total of 3,068 individuals were recorded, of which 122 annelid species represented 46.9% of the total number of individuals. Diversity indices, in richness and equitability, for the macrofauna were high throughout with all stations having a Simpson's Diversity indices of >0.960 suggesting the presence of a similar community structure throughout the site.

Further analysis using multivariate statistics identified five significantly different macrofaunal groupings within the survey area, the first, second and third comprising the main infaunal communities at the proposed Stulaigh South site, while the remaining contained outlier stations that showed the least similarity to other clusters; likely related to these stations having more abundant solitary epifaunal communities. Variation in the macrofauna community composition was not significantly related to any environmental variables including particle size, suggesting that the changes in community composition across the survey area reflects the natural patchiness of seabed habitats.

Two main habitat/sediment types were identified within the survey area relating to: bedrock and mixed sediment which conformed to two JNCC/EUNIS habitat types (CR.LCR/MC12 and SS.SMx.CMx/MC42). Bedrock was common in the survey area with larger extents mapped in the east of the proposed fish cage locations with these areas supporting a diverse epifaunal community and given the elevation and extent these areas would classify as JNCC Annex I reefs. Mixed sediment habitat was present throughout the whole survey area, consisting of muddy sand with coarser material including shells and pebble sized stones in shallower areas primarily towards the east of the survey area and muddy sand with shell material and a lower gravel content in deeper areas towards the northwest of the proposed fish farm location. Dead and occasionally live maerl were also constituents of the mixed sediment habitat, most abundant in the north-eastern and south-western extent of the survey area.

The similarity of the observed maerl distributions in the current and historical survey indicated minimal temporal change between 2019 and 2022. The current survey showed <5% maerl coverage in all areas where live maerl was present but the maerl identified in this survey showed a wider distribution and was present within the proposed fish farm location where it was previously absent. In the previous 2019 survey, live maerl coverage was generally higher where maerl was present, ranging from <5% to >50% coverage. The distribution of maerl thalli appeared to be driven by sediment type and depth, with greater aggregations occurring in shallower areas of coarser sediment when compared to deeper areas with less gravel content where maerl was rare or completely absent. Due to all live maerl coverage recorded being <5%, these areas would not be classified as a maerl bed under current NatureScot guidelines.

The burrow density assessment for both burrow sizes revealed that burrows were present in areas of 'Circalittoral mixed sediment' at SACFOR abundances of 'rare' to 'occasional'. The density of small burrows was classified as 'rare' or 'occasional' on the SACFOR scale for the nine transects assessed. Large burrows were also identified along five of the nine transects and classified as 'occasional' in four of these transects. However, no burrowing sea pens or crustaceans were identified in the video footage across the Stulaigh South survey area. Therefore, given no burrowing seapens or crustaceans were identified and the presence of burrows at a maximum SACFOR density of 'occasional', according to JNCC guidance this area of the seabed is not considered a 'Seapen and Burrowing Megafauna community'. Based upon review of the particle size data, underwater footage and the absence of distinct characteristic species that would be expected within this habitat, the Scottish PMF habitat of 'Burrowed mud' can also be ruled out for the area surveyed.

No live individuals of *A. islandica* were observed during analysis of seabed video footage and still photographs from the Stulaigh South survey area. However, one adult and one juvenile specimen were recorded in the macrofauna samples at stations SS_Grab_05 and SS_Grab_10.

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Appendix I – Environmental Survey Operations

Geophysical Side Scan Sonar

Side scan sonar data was obtained by BSL during the survey using the Blueprint Subsea Starfish 452F with the key acquisition parameters of the system detailed in the brochure manual.

Seabed Photography and Video

Seabed video acquisition was performed using the BSL MOD4.4 camera systems mounted within a BSL camera frame complete with a separate strobe and LED lamps.

HD video footage was recorded and stored within the camera system until recovery, when the footage could be downloaded. Live video stream was available during the operations with the BSL Video footage was recorded continuously throughout each transect in both high definition and a lower streaming quality. Screenshots from the HD video were captured remotely using a surface control unit via an umbilical to the camera system.

The key acquisition parameters of the system used are presented in the table below and in the brochure manual.

Standard Features	Comment
Image Resolution	Up to 24 megapixel (13.5 megapixel standard)
Standard Lens	f 2.8 – f 22 / 20mm Nikon Prime lens
Sensor Type	DX-format CMOS
Light source	2 x 1500 lumens LED array lamps Stills strobe TTL controller
Typical settings	Aperture priority at F8, Shutter speed typically 1/100 second
Framing Video Used	720 x 540 resolution video camera
High Definition Video used	1920 x 1080
Manufacturer	Benthic Solutions Limited
Laser scale distance	10cm

Seabed Grab Sampling

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

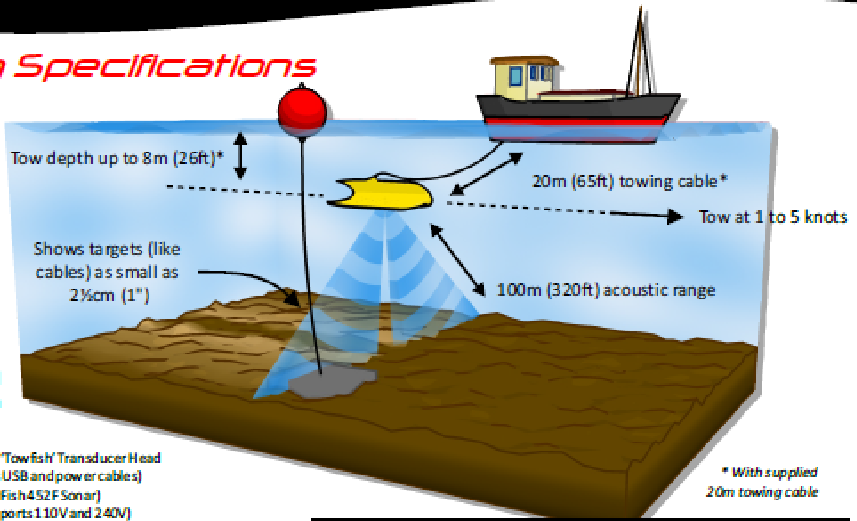
- Water above sample was undisturbed;
- Bucket closure complete allowing no sediment washout;
- Sampler access doors had closed properly enclosing the sample;
- No disruption of the sample through striking the side of the vessel;
- Sample was taken within the acceptable target range <10m;
- Sample represented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

Upon recovery, each sample was inspected, described and photographed prior to processing. The macrofaunal replicates were processed on-board over a 500µm aperture mesh by BSL scientists using a *Wilson* Auto-siever.

Blueprint Subsea StarFish 452F

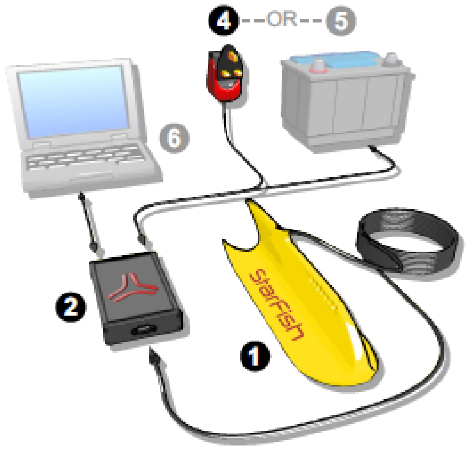
StarFish 452F TOWED SIDESCAN SYSTEM

Operating Specifications



The Sonar connects to the Top Box. The Top Box then connects to the power source and any Windows based PC or Laptop via a USB connection to display, record and playback digital sonar images using StarFish Scanline software.

1. Starfish 452F Side Scan Sonar 'Towfish' Transducer Head
2. Starfish 450 Top Box (includes USB and power cables)
3. 20m cable (included with StarFish 452F Sonar)
4. AC Mains power adapter (supports 110V and 240V)
5. Customer supplied DC power supply 9V-28V (i.e. battery)
6. Customer supplied PC or Laptop (with at least 1 free USB port and Windows XP, Windows Vista or Windows 7)



TOP BOX SPECIFICATIONS

Dimensions	Length	166mm (6.54").
	Width	106mm (4.17").
	Height	34mm (1.34").
Weight	In Air	Approx 0.4kg (0.88lb).
Power	Supply Voltage	90-264V AC, 47-63Hz with Mains adaptor. 9-28V DC supply.
	Consumption	2.4W (200mA @ 12V) approx when idle. 6W (500mA @ 12V) approx when scanning.
Interfaces	Power	2.1mm DC jack socket.
	Data	USB B-Type connector.
	Acoustic	9-Way Female D-Type socket.
Environmental	Temperature Range	-5°C to +40°C (23°F to 104°F).
	IP Rating	IP50 (Protected against ingress of dust, no protection against ingress of liquids).

SONAR HEAD SPECIFICATIONS

Dimensions	Length	378mm (14.88").
	Width	110mm (4.33").
	Height	97mm (3.81").
Weight	In Air	Approx 2.0kg (4.4lb).
	In Fresh Water	Approx 1.0kg (2.2lb).
Body	Costruction	Reinforced yellow polyurethane rubber.
	Depth Rating	50m (164ft).
Towing Cable	Length	20m (65.6ft) supplied - 50m (164ft) available.
	Breaking Strain	>150kg (330.7lb).
	Construction	Black polyurethane jacketed with internal Kevlar reinforcing (strain) member.
	Min Bend Radius	30mm (1.2").
Transducer	Arrangement	Dual fin mounted transducers, with 30° down angle from the horizontal.
	Vertical Beam	60° nominal width (@ -3dB signal level).
	Horizontal Beam	0.8° nominal width (@ -3dB signal level).
Acoustic	Frequency	450kHz nominal.
	Range	1m up to 100m (3ft to 320ft) on each channel providing max 200m (640ft) total coverage.
	Mode	CHIRP pulse compression.
	Pulse Length	400µs typical.
	Transmit Source Power Level	<210dB re 1Pa @ 1m.

SYSTEM SPECIFICATIONS

System Parts	Sonar	StarFish 452F Sonar Head (with 20m tow cable). StarFish 450 Top-Box (with USB interface cable).
	Power Supplies	Universal AC mains to DC power-supply (with international AC adaptors). 2m cigar-plug DC power lead. Crocodile-clip to cigar-socket DC adaptor.
	Software	StarFish Scanline interface software CD and drivers.
	Documentation	User manual, Scanline Manual, Quick start guide.
	Included Accessories	Rugged Peli™ Transport & Storage Case StarFish GPS (SiRF III) StarFish pole mounting bracket
Available Accessories		50m towing cable
Compliances	RoHS	Full compliance to the 2002/95/EC directives
	WEEE	Full EN50419 compliance

Please Note: All specifications are subject to change in line with Tritech's policy of continual product development.
For the latest news, details, mechanical drawings, applications information and evaluation software, visit www.starfishsonar.com

www.starfishsonar.com

BSL MOD4 Camera System

benthic solutions limited

UNDERWATER CAMERA – MOD4
Seabed Monitoring & Underwater Real-time Footage

- General Specifications
  - Flexible deployment scenarios
  - Depth rated to 3500m
  - Superior stills and streaming video quality
  - Near zero-delay shutter release
  - Unattended time lapse photography
  - Solutions for very low visibility environments

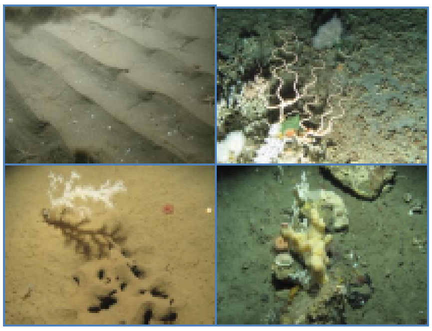
- 4 Camera Configurations
  1. Deepwater real time
  2. Shallow water real time
  3. Ultra deepwater timelapse
  4. Remote timelapse

- 4 Deployment Configurations
  1. Towed system (deep to shallow)
  2. Bed-hop ultra deep water
  3. Remote mooring timelapse
  4. Poor visibility freshwater lens

- Services

Benthic Solutions Ltd have an array of underwater cameras for various deployment scenarious. Our latest development (MOD4) is the most flexible camera to date. For water depths of less than 400m it is capable of communicating with the surface via a multicore umbilical cable, which provides a very high quality live view of the seabed. Zero-delay still images of 24 megapixels can be captured and transmitted to the surface for instant review.

For deeper waters the camera can be controlled via an armoured coax cable, of the type commonly used for towing sidescan sonar. A theoretical maximum cable length of 12km can be used. In this setup, the live feed quality is slightly reduced. To compensate for this an additional 1080p 30fps camera can be added if very high quality seabed video footage is desired.



High output lighting has been developed using the latest LED technology. 2x 2200 lumen lamps provide flood lighting ahead of the camera for video streaming, whilst a multi-head strobe system (up to three heads) can be utilised in TTL configuration to give perfectly exposed under water still images.

Benthic Solutions can also provide different camera frames suitable for seabed towing or 'drop down' use. These can be small and lightweight, or larger with increased ballast for deep water scenarios.

Shipping weight	200kg *
Shipping dimension	2 x 1 x 0.2m *
Specifications	2 x 1 x 1m *

*as multiple configurations are available, values shown indicate the maximum

www.benthicsolutions.com

BSL Day Grab

BSL MODIFIED DAY GRAB

- General Specifications
    - $0.1m^2$ Sample Area
    - Total Stainless Steel Construction
    - Adjustable weight
    - Compact Design
    - Proven performance in 1000m depth
    - Modified for One Man Operation

- Services

Day grabs comprise of two stainless bucket sections which are mounted within a stainless-steel frame. On contact with the seabed, a trigger bar is pushed upwards via pressure plates allowing the buckets to close under the gravity of the unit through a pulley system forcing the buckets closed. This controlled contact and closure once on the seabed helps ensure sample disturbance is minimised. The top of the grab is covered by two catch-closed inspection doors also made of stainless steel. The doors allow direct access to the sample inside the grab when closed, and protect the sample from the grab movement through the water column during recovery.

Our Day grab sampler (offset design) was originally modified by BSL's principle scientist in the early 1990s to improve penetration and reduce sample disturbance and contamination. These grabs are fitted with additional but removable stainless steel coated lead weights which can provide better penetration in more compacted substrates, but can also be removed to prevent over-penetration of the sampler in softer sediments.

A further extended bucket lip reduces sediment washout during retrieval. The unit can be supplied with a stand allowing for easy sample access and handling. A further modification that was made provided an efficient closure system to allow arming by a single person. This modified Day grab has become the standard operating tool for the North Sea.

The grab is relatively simple to operate in almost any water depth. The $(0.1m^2)$ grabs have been constructed with stainless steel throughout making this grab ideal for accurate assessment of the chemical properties of sea floor sediments.

Shipping weight	250 kg
Shipping dimension	1.5m x 1m x 1m
Specifications	800 x 800 x 850mm

QMS ISO 9001 REGISTERED FIRM

Benthic Solutions, Unit A Greengates Way, Hoveton, Norwich, NR12 8ED, UK
Tel : [redacted] www.benthicsolutions.com

***Wilson* Auto-Siever**

WILSON AUTOSIEVER

***Best practice** for benthic samples**

- **General Specifications**

The *Wilson* Autosiever is a semi-automated sieving table for reducing benthic sediment samples offshore in a routine and controlled manner.

- Reduces time consuming and laborious sample handling in the field
- Reduces personnel numbers required for benthic processing
- Reduces damage to biological material during processing
- Well proven field performance on benthic surveys worldwide
- Standardises sample processing
- Robust stainless-steel construction that dismantles for storage or freighting
- New design with adjustable height

- **Services**

The *Wilson* Autosiever (WAS) was initially designed in the late 1980s by Ian Wilson (BSL Director), but was implemented from the early 1990s as the preferred benthic processing tool for all sampling operations by a major UK based environmental survey contractor. The system was subsequently commercialised and made available for purchase to other operators and users following the success of the trial at an NMBAQC workshop in 1997*.

The WAS system was designed to standardise all sieving operations between surveys and personnel, increasing the efficiency of the sample handling and processing without compromising the quality of the biology recovered.

Its simple yet unique and revolutionary design enables its employment from small vessels and large ships alike and in a variety of different sediment conditions, ranging from coarse heterogenic substrates down to soft clays and silts.

Cited as *best practice* for biological processing*, the WAS system has become the preferred tool for a large number of organisations that routinely carry out benthic surveys. Systems are currently being employed around the world (including UK, Ireland, Norway, Netherlands, Germany, France, Australia, Africa and South America) by a multitude of different users including survey companies, fish farms, government institutes and agencies, laboratories, universities and environmental consultancies.

* Proudfoot, R.K., Elliott, M, Dyer, M.F., Barnett, B.E, Allen, J.H., Proctor, N.L, Cutts, N.D., Nikitik, C., Turner, G. Breen, J. Hemmingway, K.L.and Mackie, T., 1997. Collection and Processing of macrobenthic samples from soft sediments; a best practice review. Proceedings of the Humber Benthic Field Methods Workshop, Hull University.

ISO 9001 REGISTERED FIRM

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Appendix II – Data Presentation, Laboratory and Statistical Analyses

Environmental Data Presentation

To aid in the interpretation and presentation of the environmental information acquired for this report, both hydrographic and environmental variables were processed using contouring and 3D surface mapping software (Surfer v19). This software allows a digital terrain model (DTM), or grid, to be interpolated from irregularly spaced geographical information (XYZ data) using a kriging interpolation algorithm. When large quantities of data are used (such as in swathe bathymetry), the level of interpolation is limited only to small spaces in between the data points. However, when processing environmental variables, a diagrammatic circle has been used to colour illustrate the parameter level at each relevant site. It should be remembered that this is done for presentation purposes only and that these data values are "not representative" for the whole of the geographical area covered by the circle. No interpolation is required in this instance except where these circles overlap due to the scaling of the figure.

Particle Size Distribution

The samples recovered from each site were analysed by BSL which is accredited under the National Marine Biological Association 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. 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 II.I. 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).

$$M = \frac{\text{ø}16 + \text{ø}50 + \text{ø}84}{3}$$

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**	**Wentworth**	**Folk**
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 II.II).

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

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 < 1.00	Moderately sorted
1.00 < 2.00	Poorly sorted
2.00 < 4.00	Very poorly sorted
4.00 +	Extremely poorly sorted

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

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

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 II.IV).

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

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

Table II.IV - Kurtosis Classifications

<table>
<tr><th>Kurtosis Coefficient</th><th>Kurtosis Classification</th><th>Graphical meaning</th></tr>
<tr><td>0.41 < 0.67</td><td>Very Platykurtic</td><td rowspan="2">Flat-peaked; the ends are better sorted than the centre</td></tr>
<tr><td>0.67 < 0.90</td><td>Platykurtic</td></tr>
<tr><td>0.90 < 1.10</td><td>Mesokurtic</td><td>Normal; bell shaped curve</td></tr>
<tr><td>1.11 < 1.50</td><td>Leptokurtic</td><td rowspan="3">Curves are excessively peaked; the centre is better sorted than the ends.</td></tr>
<tr><td>1.50 < 3</td><td>Very Leptokurtic</td></tr>
<tr><td>3 +</td><td>Extremely Leptokurtic</td></tr>
</table>

Sediment Analyses

Similarity Matrices and Hierarchical Agglomerative Clustering (CLUSTER)

A similarity matrix is used to compare every individual sample station with each other. The coefficient used in this process is based upon Euclidean distance considered to be the most suitable for environmental data. These are subsequently assigned into groups according to their level of similarity and clustered together based upon a Group Average Method into a dendrogram of similarity.

Similarity Profiling (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. The test works by comparing samples which have been ranked and ordered by resemblance against an expected profile which is obtained by permuting random 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 & Gorley, 2006).

Principle Component Analyses (PCA)

This analysis is used to reduce the number of variables of larger data sets to smaller ones while still preserving as much information as possible. The PCA looks for patterns in the data and detects similarities or correlations between variables and brings out the strongest pattern in the data set which can then be further explored.

Sediment TOC

Organic and carbon sediments are analysed using a combination of tests. These include Total Carbon (TC), analysed using a known weight of dried soil and combusted at 1,300°C and the amount of carbon determined by Infra-Red detection, and TOC (see below). In addition to the standard accreditation as outlined below, additional analytical quality control (AQC), is carried out with every batch where a soil of known value is determined (every batch of 15 samples or part thereof). Blank determinations are also carried out routinely where required.

Total Inorganic Carbon (TIC) is determined by calculation: TC –TOC = TIC

TOC was analysed using an Eltra combustion method. This method is used for total carbon analysis of dried, crushed rock powder and environmental soil samples. The samples are previously treated with

10% HCl to remove inorganic carbon (Carbonates) before washing to remove residual acids and further dried. The Carbon Analyser heats the sample in a flow of oxygen and any carbon present is converted to carbon dioxide which is measured by infra-red absorption. The percentage carbon is then calculated with respect to the original sample weight. The range for the method is 0.01% - 100%.

Macro-invertebrate Analysis

Methodology

All macrofaunal determination was carried by BSL or BSL contracted specialist taxonomist with extensive experience in the identification of macrofaunal samples undertaken in shallow and deep-water environments (such as Southern North Sea, Channel Island, Ireland, Scotland, Faroes, and sub-Antarctic waters) and the survey region. Benthic sediment samples were thoroughly washed with freshwater on a 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 by species but identified to at least family level where possible. 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 is discussed further within the text of Section 2.9). 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 each 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

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 Multi-dimensional 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 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 Estimates using Chao-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 Profiling (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).

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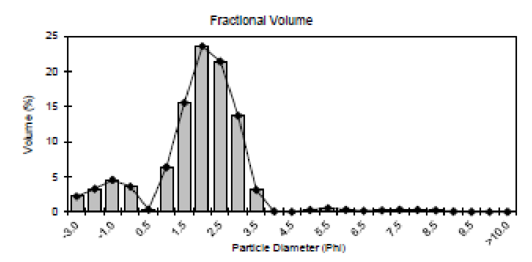
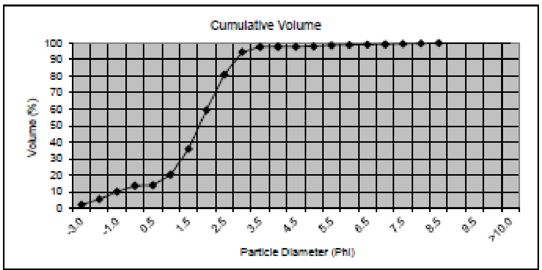
Appendix III – Particle Size Distribution

Sample No.:	SS_Grab_01	Operator	AW
Source Data:	MOWI Stulaigh South	Date & Time:	20/05/2022 09:35





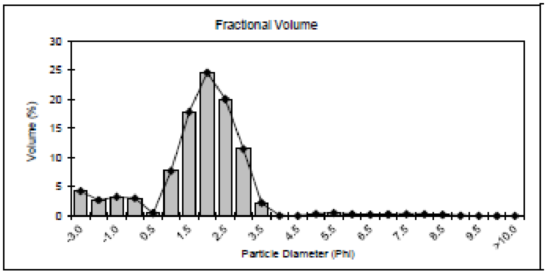
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	2.19	2.19	Pebble
4.0000	-2.0	3.30	5.49	
2.0000	-1.0	4.55	10.04	Granule
1.0000	0.0	3.61	13.65	V.Coarse Sand
0.7100	0.5	0.33	13.98	Coarse Sand
0.5000	1.0	6.37	20.35	
0.3550	1.5	15.52	35.87	Medium Sand
0.2500	2.0	23.58	59.45	
0.1800	2.5	21.41	80.86	Fine Sand
0.1250	3.0	13.69	94.55	
0.0900	3.5	3.13	97.67	V.Fine Sand
0.0630	4.0	0.07	97.75	
0.0440	4.5	0.00	97.75	Coarse Silt
0.0315	5.0	0.26	98.01	
0.0220	5.5	0.53	98.54	Medium Silt
0.0156	6.0	0.28	98.82	
0.0110	6.5	0.15	98.96	Fine silt
0.0078	7.0	0.21	99.18	
0.0055	7.5	0.30	99.48	V.Fine Silt
0.0039	8.0	0.29	99.76	
0.0028	8.5	0.20	99.97	
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

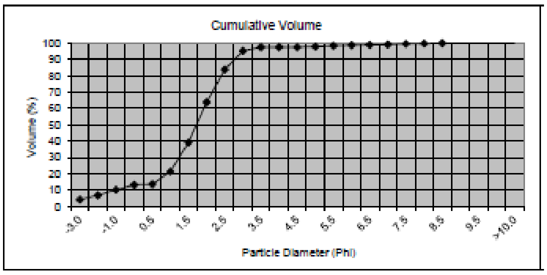
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.316	1.487	1.664
Median	0.292		1.776
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	1.28	Poorly Sorted
Skewness	-0.34	Very Negative(fine)
Kurtosis	1.80	Very Leptokurtic
Fines (%)	39.11%	
Sands (%)	59.51%	
Gravel (%)	1.38%	

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

Sample No.:	SS_Grab_02	Operator	AW
Source Data:	MOWI Stulaigh South	Date & Time:	20/05/2022 10:01





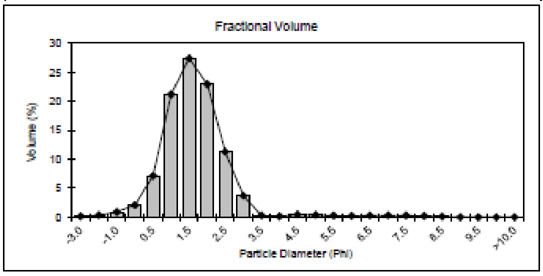
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	4.26	4.26	Pebble
4.0000	-2.0	2.70	6.97	
2.0000	-1.0	3.27	10.24	Granule
1.0000	0.0	3.02	13.26	V.Coarse Sand
0.7100	0.5	0.47	13.73	Coarse Sand
0.5000	1.0	7.69	21.42	
0.3550	1.5	17.80	39.22	Medium Sand
0.2500	2.0	24.58	63.80	
0.1800	2.5	20.01	83.81	Fine Sand
0.1250	3.0	11.46	95.27	
0.0900	3.5	2.23	97.50	V.Fine Sand
0.0630	4.0	0.02	97.53	
0.0440	4.5	0.01	97.54	Coarse Silt
0.0315	5.0	0.35	97.89	
0.0220	5.5	0.51	98.39	Medium Silt
0.0156	6.0	0.28	98.67	
0.0110	6.5	0.19	98.87	Fine silt
0.0078	7.0	0.26	99.13	
0.0055	7.5	0.33	99.46	V.Fine Silt
0.0039	8.0	0.30	99.75	
0.0028	8.5	0.21	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

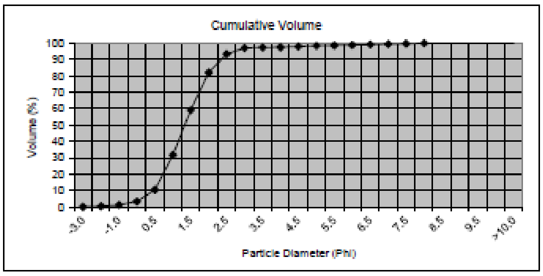
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.330	2.219	1.600
Median	0.309		1.695
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	1.34	Poorly Sorted
Skewness	-0.35	Very Negative(fine)
Kurtosis	2.04	Very Leptokurtic
Fines (%)	28.72%	
Sands (%)	64.89%	
Gravel (%)	6.39%	

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

Sample No.:	SS_Grab_03	Operator	AW
Source Data:	MOWI Stulaigh South	Date & Time:	20/05/2022 10:08





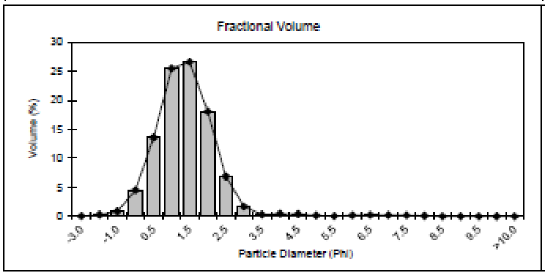
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.13	0.13	Pebble
4.0000	-2.0	0.36	0.49	
2.0000	-1.0	0.87	1.36	Granule
1.0000	0.0	2.09	3.45	V.Coarse Sand
0.7100	0.5	7.12	10.57	Coarse Sand
0.5000	1.0	21.18	31.76	
0.3550	1.5	27.39	59.15	Medium Sand
0.2500	2.0	22.92	82.06	
0.1800	2.5	11.27	93.33	Fine Sand
0.1250	3.0	3.71	97.04	
0.0900	3.5	0.30	97.35	V.Fine Sand
0.0630	4.0	0.13	97.47	
0.0440	4.5	0.47	97.95	Coarse Silt
0.0315	5.0	0.38	98.32	
0.0220	5.5	0.25	98.57	Medium Silt
0.0156	6.0	0.22	98.79	
0.0110	6.5	0.28	99.07	Fine silt
0.0078	7.0	0.31	99.38	
0.0055	7.5	0.28	99.66	V.Fine Silt
0.0039	8.0	0.22	99.88	
0.0028	8.5	0.13	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

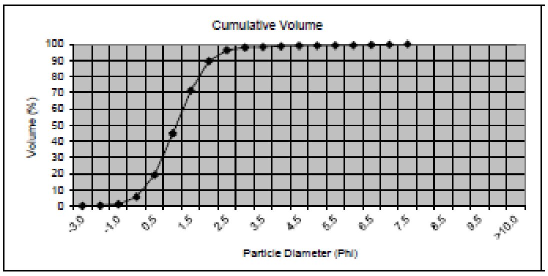
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.398	0.273	1.330
Median	0.403		1.310
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	0.76	Moderately Sorted
Skewness	0.05	Symmetrical
Kurtosis	1.06	Mesokurtic
Fines (%)	23.92%	
Sands (%)	75.23%	
Gravel (%)	0.85%	

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

Sample No.:	SS_Grab_04	Operator	AW
Source Data:	MOWI Stulaigh South	Date & Time:	20/05/2022 10:15





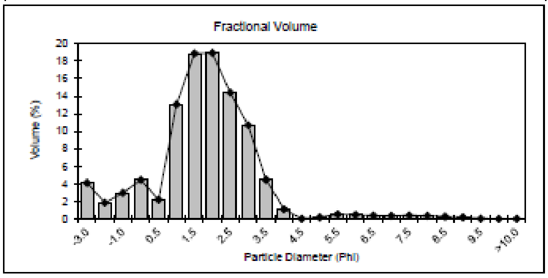
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.03	0.03	Pebble
4.0000	-2.0	0.26	0.29	
2.0000	-1.0	0.86	1.14	Granule
1.0000	0.0	4.52	5.66	V.Coarse Sand
0.7100	0.5	13.58	19.25	Coarse Sand
0.5000	1.0	25.45	44.69	
0.3550	1.5	26.60	71.30	Medium Sand
0.2500	2.0	18.07	89.37	
0.1800	2.5	6.89	96.26	Fine Sand
0.1250	3.0	1.65	97.91	
0.0900	3.5	0.29	98.20	V.Fine Sand
0.0630	4.0	0.43	98.63	
0.0440	4.5	0.37	99.00	Coarse Silt
0.0315	5.0	0.14	99.13	
0.0220	5.5	0.03	99.16	Medium Silt
0.0156	6.0	0.18	99.34	
0.0110	6.5	0.22	99.56	Fine silt
0.0078	7.0	0.20	99.77	
0.0055	7.5	0.17	99.94	V.Fine Silt
0.0039	8.0	0.07	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

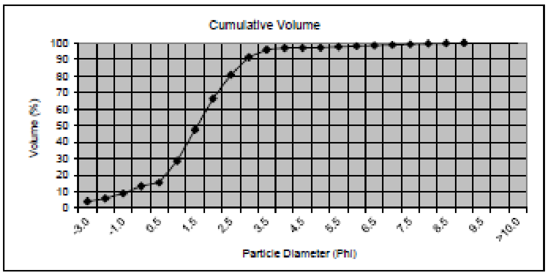
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.469	0.335	1.092
Median	0.471		1.086
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	0.76	Moderately Sorted
Skewness	0.01	Symmetrical
Kurtosis	1.06	Mesokurtic
Fines (%)	16.24%	
Sands (%)	75.21%	
Gravel (%)	8.55%	

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

Sample No.:	SS_Grab_05	Operator	AW
Source Data:	MOWI Stulaigh South	Date & Time:	20/05/2022 10:22





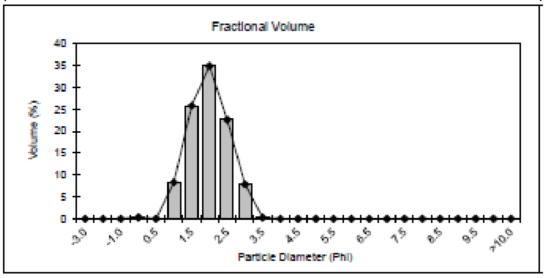
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	4.08	4.08	Pebble
4.0000	-2.0	1.82	5.91	
2.0000	-1.0	2.95	8.86	Granule
1.0000	0.0	4.44	13.30	V.Coarse Sand
0.7100	0.5	2.19	15.49	Coarse Sand
0.5000	1.0	13.06	28.55	
0.3550	1.5	18.88	47.43	Medium Sand
0.2500	2.0	18.92	66.35	
0.1800	2.5	14.40	80.75	Fine Sand
0.1250	3.0	10.67	91.42	
0.0900	3.5	4.45	95.87	V.Fine Sand
0.0630	4.0	1.10	96.97	
0.0440	4.5	0.01	96.97	Coarse Silt
0.0315	5.0	0.18	97.16	
0.0220	5.5	0.50	97.66	Medium Silt
0.0156	6.0	0.45	98.11	
0.0110	6.5	0.37	98.47	Fine silt
0.0078	7.0	0.36	98.83	
0.0055	7.5	0.39	99.21	V.Fine Silt
0.0039	8.0	0.35	99.56	
0.0028	8.5	0.25	99.82	
0.0020	9.0	0.17	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

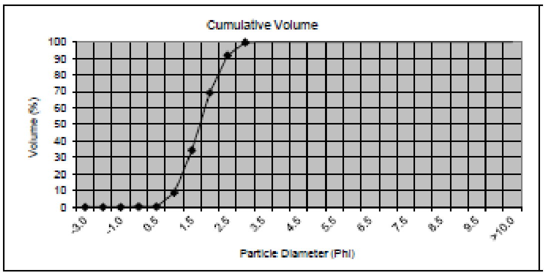
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.339	1.902	1.560
Median	0.341		1.553
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	1.43	Poorly Sorted
Skewness	-0.19	Negative (Fine)
Kurtosis	1.72	Very Leptokurtic
Fines (%)	23.31%	
Sands (%)	73.42%	
Gravel (%)	3.27%	

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

Sample No.:	SS_Grab_06	Operator	AW
Source Data:	MOWI Stulaigh South	Date & Time:	20/05/2022 10:33





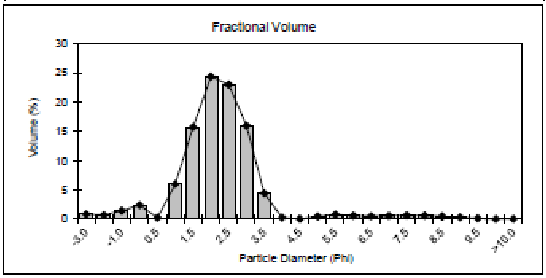
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.00	0.00	
2.0000	-1.0	0.00	0.00	Granule
1.0000	0.0	0.29	0.29	V.Coarse Sand
0.7100	0.5	0.00	0.29	Coarse Sand
0.5000	1.0	8.34	8.62	
0.3550	1.5	25.80	34.43	Medium Sand
0.2500	2.0	34.87	69.30	
0.1800	2.5	22.59	91.89	Fine Sand
0.1250	3.0	7.86	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

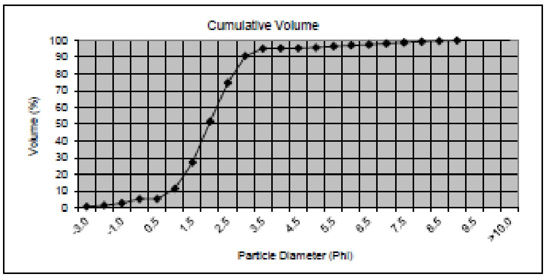
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.307	0.155	1.705
Median	0.308		1.699
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	0.58	Moderately Well Sorted
Skewness	0.01	Symmetrical
Kurtosis	0.96	Mesokurtic
Fines (%)	30.09%	
Sands (%)	57.75%	
Gravel (%)	12.16%	

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

Sample No.:	SS_Grab_07	Operator	AW
Source Data:	MOWI Stulaigh South	Date & Time:	20/05/2022 10:40





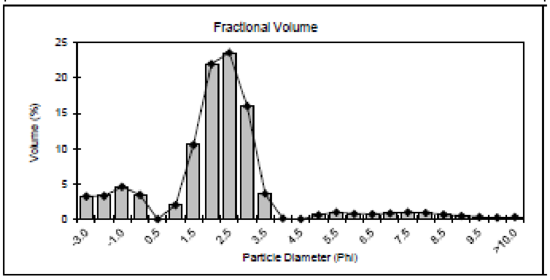
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.81	0.81	Pebble
4.0000	-2.0	0.66	1.47	
2.0000	-1.0	1.42	2.88	Granule
1.0000	0.0	2.39	5.28	V.Coarse Sand
0.7100	0.5	0.18	5.46	Coarse Sand
0.5000	1.0	5.99	11.45	
0.3550	1.5	15.74	27.20	Medium Sand
0.2500	2.0	24.37	51.57	
0.1800	2.5	23.02	74.59	Fine Sand
0.1250	3.0	15.99	90.59	
0.0900	3.5	4.43	95.01	V.Fine Sand
0.0630	4.0	0.24	95.25	
0.0440	4.5	0.01	95.26	Coarse Silt
0.0315	5.0	0.42	95.68	
0.0220	5.5	0.76	96.44	Medium Silt
0.0156	6.0	0.56	97.00	
0.0110	6.5	0.46	97.46	Fine silt
0.0078	7.0	0.53	97.99	
0.0055	7.5	0.62	98.61	V.Fine Silt
0.0039	8.0	0.57	99.18	
0.0028	8.5	0.42	99.61	
0.0020	9.0	0.28	99.89	Coarse Clay
0.0014	9.5	0.12	100.00	
0.0010	10.0	0.00	100.00	Medium Clay
<0.001	>10.0	0.00	100.00	Fine Clay

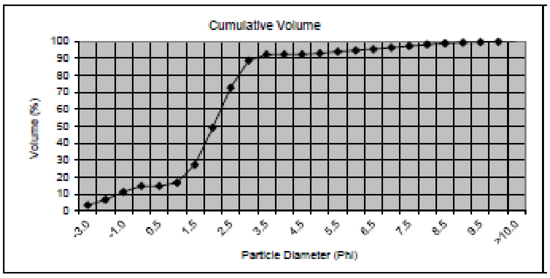
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.259	0.323	1.949
Median	0.257		1.962
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	0.96	Moderately Sorted
Skewness	-0.10	Symmetrical
Kurtosis	1.39	Leptokurtic
Fines (%)	25.55%	
Sands (%)	69.01%	
Gravel (%)	5.44%	

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

Sample No.:	SS_Grab_08	Operator	AW
Source Data:	MOWI Stulaigh South	Date & Time:	20/05/2022 10:46





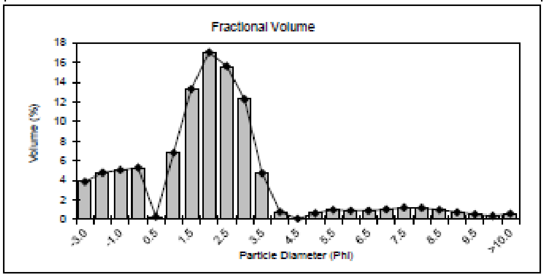
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	3.23	3.23	Pebble
4.0000	-2.0	3.29	6.52	
2.0000	-1.0	4.58	11.10	Granule
1.0000	0.0	3.45	14.55	V.Coarse Sand
0.7100	0.5	0.00	14.55	Coarse Sand
0.5000	1.0	2.01	16.56	
0.3550	1.5	10.53	27.09	Medium Sand
0.2500	2.0	21.94	49.03	
0.1800	2.5	23.57	72.60	Fine Sand
0.1250	3.0	15.97	88.56	
0.0900	3.5	3.61	92.17	V.Fine Sand
0.0630	4.0	0.11	92.28	
0.0440	4.5	0.01	92.30	Coarse Silt
0.0315	5.0	0.60	92.90	
0.0220	5.5	0.99	93.89	Medium Silt
0.0156	6.0	0.77	94.66	
0.0110	6.5	0.72	95.37	Fine silt
0.0078	7.0	0.85	96.22	
0.0055	7.5	0.98	97.19	V.Fine Silt
0.0039	8.0	0.89	98.09	
0.0028	8.5	0.66	98.75	
0.0020	9.0	0.45	99.20	Coarse Clay
0.0014	9.5	0.30	99.50	
0.0010	10.0	0.20	99.70	Medium Clay
<0.001	>10.0	0.30	100.00	Fine Clay

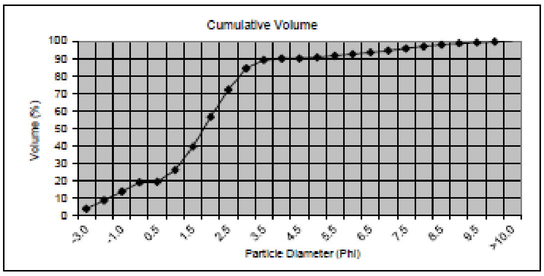
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.269	1.933	1.895
Median	0.247		2.017
Wentworth Classification		Medium Sand	

Sorting	Value	Inference
Coefficient	1.83	Poorly Sorted
Skewness	-0.11	Negative (Fine)
Kurtosis	3.10	Extremely Leptokurtic
Fines (%)	32.51%	
Sands (%)	64.04%	
Gravel (%)	3.45%	

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

Sample No.:	SS_Grab_09	Operator	AW
Source Data:	MOWI Stulaigh South	Date & Time:	20/05/2022 10:53





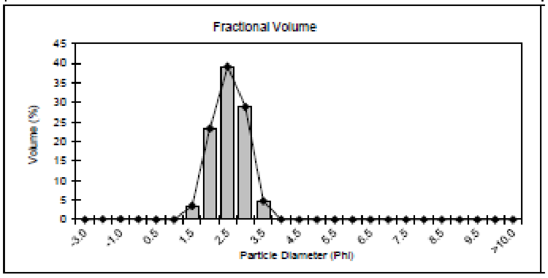
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	3.87	3.87	Pebble
4.0000	-2.0	4.78	8.65	
2.0000	-1.0	5.05	13.70	Granule
1.0000	0.0	5.30	19.00	V.Coarse Sand
0.7100	0.5	0.30	19.30	Coarse Sand
0.5000	1.0	6.79	26.09	
0.3550	1.5	13.28	39.37	Medium Sand
0.2500	2.0	17.03	56.41	
0.1800	2.5	15.60	72.01	Fine Sand
0.1250	3.0	12.25	84.25	
0.0900	3.5	4.74	89.00	V.Fine Sand
0.0630	4.0	0.80	89.80	
0.0440	4.5	0.10	89.89	Coarse Silt
0.0315	5.0	0.64	90.53	
0.0220	5.5	0.99	91.52	Medium Silt
0.0156	6.0	0.90	92.41	
0.0110	6.5	0.91	93.33	Fine silt
0.0078	7.0	1.05	94.37	
0.0055	7.5	1.21	95.58	V.Fine Silt
0.0039	8.0	1.19	96.77	
0.0028	8.5	0.98	97.75	
0.0020	9.0	0.75	98.50	Coarse Clay
0.0014	9.5	0.54	99.04	
0.0010	10.0	0.36	99.40	Medium Clay
<0.001	>10.0	0.60	100.00	Fine Clay

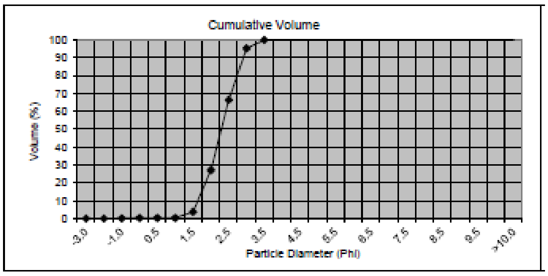
Graphical	mm	StDev (mm)	Phi
Mean (MZ)	0.385	2.375	1.376
Median	0.289		1.788
Wentworth Classification	Medium Sand		

Sorting	Value	Inference
Coefficient	2.43	Very Poorly Sorted
Skewness	-0.13	Negative (Fine)
Kurtosis	2.45	Very Leptokurtic
Fines (%)	19.21%	
Sands (%)	69.52%	
Gravel (%)	11.27%	

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

Sample No.:	SS_Grab_10	Operator	AW
Source Data:	MOWI Stulaigh South	Date & Time:	20/05/2022 10:58





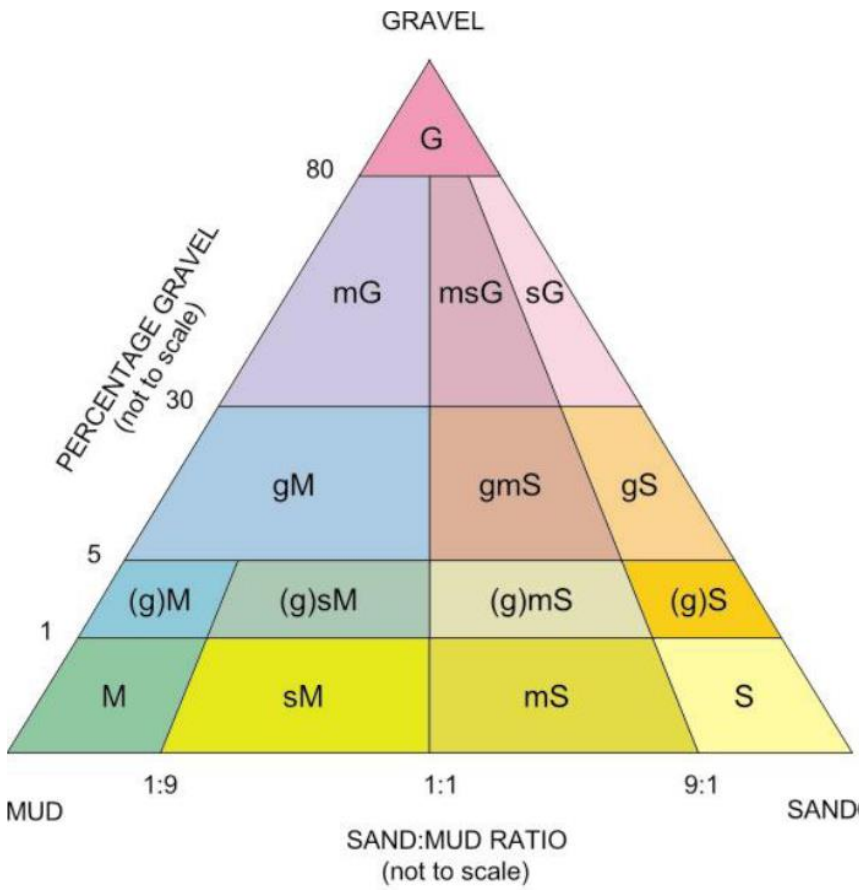
Aperture (mm)	Aperture (Phi unit)	Percentage Fractional	Cumulative	Sediment Description
8.0000	-3.0	0.00	0.00	Pebble
4.0000	-2.0	0.11	0.11	
2.0000	-1.0	0.13	0.23	Granule
1.0000	0.0	0.11	0.34	V.Coarse Sand
0.7100	0.5	0.00	0.34	Coarse Sand
0.5000	1.0	0.00	0.34	
0.3550	1.5	3.50	3.84	Medium Sand
0.2500	2.0	23.35	27.19	
0.1800	2.5	39.13	66.32	Fine Sand
0.1250	3.0	28.86	95.18	
0.0900	3.5	4.76	99.94	V.Fine Sand
0.0630	4.0	0.06	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)	0.209	0.087	2.255
Median	0.209		2.257
Wentworth Classification	Fine Sand		

Sorting	Value	Inference
Coefficient	0.48	Well Sorted
Skewness	0.00	Symmetrical
Kurtosis	0.91	Mesokurtic
Fines (%)	31.45%	
Sands (%)	67.12%	
Gravel (%)	1.43%	

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

Modified Folk Classification



- M ______ Mud
- sM ______ Sandy mud
- (g)M ______ Slightly gravelly mud
- (g)sM ______ Slightly gravelly sandy mud
- gM ______ Gravelly mud
- S ______ Sand
- mS ______ Muddy sand
- (g)S ______ Slightly gravelly sand
- (g)mS ______ Slightly gravelly muddy sand
- gmS ______ Gravelly muddy sand
- gS ______ Gravelly sand
- G ______ Gravel
- mG ______ Muddy gravel
- msG ______ Muddy sandy gravel
- sG ______ Sandy gravel

Appendix IV – Grab Sampling Log Sheets

Seabed Sampling (Deck Observations)															
Job No:	2205			Operators:	BSL	Vessel:	Vega de Lyra							Projection	Datum
Date:	from:	25/03/2022		Harley Bailey and Charlotte Cooke		Project:	Stulaigh South				Client:	MOWI		British Grid	OSGB36
	to:	26/03/2022													
Cast #	Station	Sampler Used	Water Depth	Time (UTC)	Date	Volume Recovered	Sample Name		Container Type and Quantity		Sediment Description: Comments	Colour	Sediment Description / Stratification / Fauna	Easting (m)	Northing (m)
1	SS_GRAB_05	Day Grab	40	15:28	25/03/2022	90	F1	PSA 1 & TOC 1	3L	3 x Ziplock Bags	-	Grey/Green	Shelly muddy sand Ophiuroids, Turritella, Tusk Shell	83411	822272
2	SS_GRAB_05	Day Grab	40	15:46	25/03/2022	0	NS		-		-	-	-	83401	822288
3	SS_GRAB_05	Day Grab	40	15:53	25/03/2022	80	F2		1L		-	Grey/Green	Shelly sandy gravel Ophiuroids, Turritella, Tusk Shell, Sea Potato	83402	822273
4	SS_GRAB_03	Day Grab	43	16:14	25/03/2022	0	NS		-		-	-	-	83245	822209
5	SS_GRAB_03	Day Grab	43	16:20	25/03/2022	70	F1	PSA 1 TOC 1 eDNA 1	1L	3 x Ziplock Bags	-	Grey/Green	Shelly sandy mud Ophiuroids, Turritella	83267	822210
6	SS_GRAB_03	Day Grab	43	16:32	25/03/2022	0	NS		-		-	-	-	83247	822228
7	SS_GRAB_03	Day Grab	43	16:37	25/03/2022	0	NS		-		-	-	-	83257	822221
8	SS_GRAB_03	Day Grab	43	16:42	25/03/2022	70	F2		1L		-	Grey/Green	Shelly sandy mud with shell debris Ophiuroids, Turritella	83261	822204
9	SS_GRAB_01	Day Grab	42	16:48	25/03/2022	0	NS		-		-	-	-	83398	822137
10	SS_GRAB_01	Day Grab	42	16:56	25/03/2022	0	NS		-		-	-	-	83389	822127
11	SS_GRAB_01	Day Grab	42	17:04	25/03/2022	0	NS		-		-	-	-	83393	822146
12	SS_GRAB_01	Day Grab	42	17:16	25/03/2022	20	F2		1L	3 x Ziplock Bags	Due to the no samples, the sample was kept in case two samples could not be acquired. After 8 attempts, only one sample >40% was acquired, therefore, this 20% sample was kept in case.	Grey/Green	Mud with shell debris Ophiuroids	83391	822130
13	SS_GRAB_01	Day Grab	42	17:21	25/03/2022	0	NS		-		-	-	-	83377	822144
14	SS_GRAB_01	Day Grab	42	17:34	25/03/2022	60	F1	PSA 1 TOC 1 eDNA 1	1L		-	Grey/Green	Mud with shell debris Ophiuroids	83376	822121
15	SS_GRAB_01	Day Grab	42	17:41	25/03/2022	0	NS		-		-	-	-	83380	822139
16	SS_GRAB_01	Day Grab	42	17:48	25/03/2022	0	NS		-		-	-	-	83378	822124

Seabed Sampling (Deck Observations)

Job No:	2205	Operators:	BSL	Vessel:	Vega de Lyra	
Date: from:	25/03/2022	Harley Bailey and Charlotte Cooke		Project:	Stulaigh South	Client: MOWI
to:	26/03/2022					
Projection	British Grid	Datum	OSGB36			

Cast #	Station	Sampler Used	Water Depth	Time (UTC)	Date	Volume Recovered	Sample Name	Container Type and Quantity	Comments	Colour	Sediment Description / Stratification / Fauna	Easting (m)	Northing (m)
17	SS_GRAB_06	Day Grab	38	17:53	25/03/2022	0	NS	-	-	-	-	83197	822096
18	SS_GRAB_06	Day Grab	38	17:59	25/03/2022	70	F1 PSA 1 TOC 1 eDNA 1	5L 3 x Ziplock Bags	-	Olive grey	Mud with shell debris	83200	822094
19	SS_GRAB_06	Day Grab	38	18:07	25/03/2022	70	F2	3L	-	Olive grey	Mud with shell debris Sea Potato	83207	822092
20	SS_GRAB_02	Day Grab	37	18:14	25/03/2022	70	F1 PSA 1 TOC 1 eDNA 1	3L 3 x Ziplock Bags	-	Olive grey	Mud with shell debris Polychaetes, Ophiuroids	83360	822014
21	SS_GRAB_02	Day Grab	37	18:28	25/03/2022	70	F2	5L	-	Olive grey	Mud with shell debris Polychaetes, Ophiuroids	83361	822007
22	SS_GRAB_04	Day Grab	44	18:36	25/03/2022	0	NS	-	-	-	-	83470	822029
23	SS_GRAB_04	Day Grab	44	18:43	25/03/2022	70	F1 PSA 1 TOC 1 eDNA 1	3L 3 x Ziplock Bags	-	Olive grey	Mud with shell debris Ophiuroids	83477	822038
24	SS_GRAB_04	Day Grab	44	18:59	25/03/2022	70	F2	3L	-	Olive grey	Mud with shell debris Ophiuroids	83452	822033
25	SS_GRAB_07	Day Grab	37	19:11	25/03/2022	70	F1 PSA 1 TOC 1 eDNA 1	3L 3 x Ziplock Bags	-	Olive grey	Shelly, muddy sand Ophiuroids, Polychaetes	83713	822214
26	SS_GRAB_07	Day Grab	37	19:20	25/03/2022	0	NS	-	-	-	-	83700	822209
27	SS_GRAB_07	Day Grab	37	19:26	25/03/2022	0	NS	-	-	-	-	83700	822219
28	SS_GRAB_07	Day Grab	37	08:49	26/03/2022	0	NS	-	-	-	-	83699	822205
29	SS_GRAB_07	Day Grab	37	08:56	26/03/2022	0	NS	-	-	-	-	83698	822213
30	SS_GRAB_07	Day Grab	37	09:01	26/03/2022	50	F2	3L	-	Olive grey	Shelly mud Ophiuroids, Polychaetes, Tusk Shell	83697	822215
31	SS_GRAB_08	Day Grab	35	09:10	26/03/2022	60	F1 PSA 1 TOC 1 eDNA 1	3L 3 x Ziplock Bags	-	Olive grey	Mud with shell debris Turritella, Sea Potato	83675	822526
32	SS_GRAB_08	Day Grab	35	09:21	26/03/2022	0	NS	-	-	-	-	83693	822519
33	SS_GRAB_08	Day Grab	35	09:32	26/03/2022	0	NS	-	-	-	-	83689	822513
34	SS_GRAB_08	Day Grab	35	09:35	26/03/2022	0	NS	-	-	-	-	83713	822523
35	SS_GRAB_08	Day Grab	35	09:40	26/03/2022	0	NS	-	-	-	-	83693	822530

Seabed Sampling (Deck Observations)								
Job No:	2205	Operators:	BSL	Vessel:	Vega de Lyra	Client:	MOWI	Projection: British Grid
Date:	from: 25/03/2022 to: 26/03/2022		Harley Bailey and Charlotte Cooke	Project:	Stulaigh South			Datum: OSGB36

Cast #	Station	Sampler Used	Water Depth	Time (UTC)	Date	Volume Recovered	Sample Name		Container Type and Quantity		Sediment Description: Comments	Sediment Description: Colour	Sediment Description: Sediment Description / Stratification / Fauna	Easting (m)	Northing (m)
36	SS_GRAB_08	Day Grab	35	09:45	26/03/2022	0	NS		-		-	-	-	83695	822514
37	SS_GRAB_08	Day Grab	35	09:50	26/03/2022	50	F2		3L		Jaws were slightly open but sample kept as was the 5th attempt of F2	Olive grey	Mud with shell debris	83689	822524
38	SS_GRAB_10	Day Grab	40	09:58	26/03/2022	0	NS		-		-	-	-	83232	822383
39	SS_GRAB_10	Day Grab	40	10:05	26/03/2022	60	F1	PSA 1 TOC 1 eDNA 1	1L	3 x Ziplock Bags	-	Olive grey	Mud with shell debris Ophiuroids, Turritella, crab	83220	822372
40	SS_GRAB_10	Day Grab	40	10:08	26/03/2022	70	F2		1L		-	Olive grey	Mud with shell debris Ophiuroids, Turritella	83236	822371
41	SS_GRAB_09	Day Grab	38	10:18	26/03/2022	80	F1	PSA 1 TOC 1 eDNA 1	5L	3 x Ziplock Bags	-	Dark yellow	Shell debris layer over shelly mud layer	83431	821655
42	SS_GRAB_09	Day Grab	38	10:25	26/03/2022	0	NS		-		-	-	-	83406	821633
43	SS_GRAB_09	Day Grab	38	10:30	26/03/2022	0	NS		-		-	-	-	83437	821655
44	SS_GRAB_09	Day Grab	38	10:35	26/03/2022	70	F2		5L		-	Dark yellow	Shell debris layer over shelly mud layer	83415	821625

Appendix V – Macrofaunal Species List

Infaunal Species

Macroinvertebrate Matrix		BLS Project 2205.04 - Stulaigh South	Stulaigh South																														
AphiaID	Phylum	Taxa	Authority	SS_GRAB_01_F1	SS_GRAB_01_F2	SS_GRAB_02_F1	SS_GRAB_02_F2	SS_GRAB_03_F1	SS_GRAB_03_F2	SS_GRAB_04_F1	SS_GRAB_04_F2	SS_GRAB_05_F1	SS_GRAB_05_F2	SS_GRAB_06_F1	SS_GRAB_06_F2	SS_GRAB_07_F1	SS_GRAB_07_F2	SS_GRAB_08_F1	SS_GRAB_08_F2	SS_GRAB_09_F1	SS_GRAB_09_F2	SS_GRAB_10_F1	SS_GRAB_10_F2	SS_GRAB_01	SS_GRAB_02	SS_GRAB_03	SS_GRAB_04	SS_GRAB_05	SS_GRAB_06	SS_GRAB_07	SS_GRAB_08	SS_GRAB_09	SS_GRAB_10
100665	Cnidaria	Edwardsiidae	Andres, 1881	1			3	2	3	4	4			5	2	1			1	2	2	1		1	3	5	8		7	1	1	4	1
135144	Cnidaria	*Caryophyllia (Caryophyllia) smithii*	Stokes & Broderip, 1828														1													1			
283798	Cnidaria	*Cerianthus lloydii*	Gosse, 1859																1		1										1	1	
799	Nematoda	Nematoda		3	1	6	2	7	2	2	5	1	1	3	5		1	5			1	2	1	4	8	9	7	2	8	1	5	1	3
152391	Nemertea	Nemertea		1	4	6	7	2	2	1	3	7	4	6	4	2	2	2		1	5	4	7	5	13	4	4	11	10	4	2	6	11
793	Platyhelminthes	Platyhelminthes	Minot, 1876			1	3	1								1	1				1				4	1				2		1	
175026	Annelida	*Golfingia (Golfingia) elongata*	(Keferstein, 1862)	5			3	3	2	5				1	2							2		5	3	5	5		3				2
410724	Annelida	*Golfingia (Golfingia) vulgaris vulgaris*	(de Blainville, 1827)											1															1				
136060	Annelida	*Nephasoma (Nephasoma) minutum*	(Keferstein, 1862)			1				2										1					1		2					1	
136063	Annelida	*Thysanocardia procera*	(Möbius, 1875)	1	1							3		1	2		1	1				1	3	2				3	3	1	1		4
410749	Annelida	*Phascolion (Phascolion) strombus strombus*	(Montagu, 1804)	3		3	1	3	4	4	6	4	4	3	3	6	6	3				5	1	3	4	7	10	8	6	12	3		6
137349	Annelida	*Grania*	Southern, 1913																		6											6	
129141	Annelida	*Macrochaeta*	Grube, 1850																		1											1	
129781	Annelida	*Ampharete lindstroemi*	Hessle, 1917	1				1					1											1		1		1					
332932	Annelida	*Ampharete octocirrata*	(Sars, 1835)			1		1																	1	1							
129156	Annelida	*Amphicteis*	Grube, 1850						1																	1							
129789	Annelida	*Anobothrus gracilis*	(Malmgren, 1866)					1	1			1														2		1					
129821	Annelida	*Sosane sulcata*	Malmgren, 1866																	1												1	
129198	Annelida	*Apistobranchus*	Levinsen, 1884											1															1				
129211	Annelida	*Capitella*	Blainville, 1828												1														1				
129892	Annelida	*Mediomastus fragilis*	Rasmussen, 1973				3			1				3				1	5	1	1				3		1		3		6	2	
129220	Annelida	*Notomastus*	M. Sars, 1851				2			2	1			2	1										2		3		3				
129906	Annelida	*Peresiella clymenoides*	Harmelin, 1968	4	2	5	6		2	6	5	4	4	3	5			1				2	2	6	11	2	11	8	8		1		4
129911	Annelida	*Pseudonotomastus southerni*	Warren & Parker, 1994				1				3			1											1		3		1				
129233	Annelida	*Spiochaetopterus*	M Sars, 1856					1				1	3	1								4	2			1		4	1				6
129240	Annelida	*Aphelochaeta* sp. A	Blake, 1991	1			1	1	1	4		1						1						1	1	2	4	1			1		
129943	Annelida	*Caulleriella alata*	(Southern, 1914)							1																	1						
129242	Annelida	*Chaetozone*	Malmgren, 1867	3		9	15	10	7	4	5	10	4	22	12		1	3		2		5	8	3	24	17	9	14	34	1	3	2	13
129955	Annelida	*Chaetozone setosa*	Malmgren, 1867		1																1		2	1								1	2
336485	Annelida	*Chaetozone zetlandica*	McIntosh, 1911							1																	1						
884676	Annelida	*Kirkegaardia*	Blake, 2016		1		2				1			1	1								1	1	2		1		2				1
152269	Annelida	*Tharyx killariensis*	(Southern, 1914)				1				1														1		1						
129266	Annelida	*Ophryotrocha*	Claparède & Mecznikow, 1869																				1										1
130041	Annelida	*Protodorvillea kefersteini*	(McIntosh, 1869)																1		1										1	1	
742232	Annelida	*Lysidice unicornis*	(Grube, 1840)	1	1	1	2			1	1			3	2	1	2		1		3			2	3		2		5	3	1	3	
130100	Annelida	*Diplocirrus glaucus*	(Malmgren, 1867)	1	2	1	4	4	2	3		7	6	2	1	2			1			8	7	3	5	6	3	13	3	2	1		15
130116	Annelida	*Glycera alba*	(O.F. Müller, 1776)			1								1	1	1	1								1				2	2			
130123	Annelida	*Glycera lapidum*	Quatrefages, 1866							2										1							2					1	
130131	Annelida	*Glycera unicornis*	Lamarck, 1818		2			1		1	1	3	3					1				3	2	2		1	2	6			1		5
130136	Annelida	*Glycinde nordmanni*	(Malmgren, 1866)				2	1		1								3		1		1	1		2	1	1				3	1	2
130140	Annelida	*Goniada maculata*	Örsted, 1843			3	1	1	2	1				4	1	2	2		2	1					4	3	1		5	4	2	1	
710680	Annelida	*Oxydromus flexuosus*	(Delle Chiaje, 1827)								1																1						
130195	Annelida	*Podarkeopsis capensis*	(Day, 1963)						1						1			1		1			1			1			1		1	1	1
152249	Annelida	*Psamathe fusca*	Johnston, 1836				1							1											1				1				
130198	Annelida	*Syllidia armata*	Quatrefages, 1866																		1											1	
146469	Annelida	*Abyssoninoe hibernica*	(McIntosh, 1903)			1				2	1	1		2		1			1				1		1		3	1	2	1	1		1
130240	Annelida	*Lumbrineris cingulata*	Ehlers, 1897	4	2	8	19	7	5	7	13	8	8	8	7	1	3	3	7	3	4	7	7	6	27	12	20	16	15	4	10	7	14
130266	Annelida	*Magelona alleni*	Wilson, 1958		1	1	1	5	3		3	5	6	3	3	1		3				7	13	1	2	8	3	11	6	1	3		20
130270	Annelida	*Magelona minuta*	Eliason, 1962								1												1				1						1
209899	Annelida	*Euclymene lombricoides*	(Quatrefages, 1866)			1	1																		2								
130294	Annelida	*Euclymene oerstedii* agg.	(Claparède, 1863)	8		2	17	15	14	3	2	13	15	4	5			5				11	19	8	19	29	5	28	9		5		30
146991	Annelida	*Leiochone*	Grube, 1868		1	1	1		4				5									1	4	1	2	4		5					5
130309	Annelida	*Microclymene tricirrata*	Arwidsson, 1906					2																		2							
130322	Annelida	*Praxillella affinis*	(M. Sars in G.O. Sars, 1872)	2				6	6	1	1	6	6	6	2		1	1				7	12	2		12	2	12	8	1	1		19
130331	Annelida	*Rhodine loveni*	Malmgren, 1866	1																				1									
129808	Annelida	*Melinna palmata*	Grube, 1870				1	2	2			1		1	1							2	7		1	4		1	2				9
130343	Annelida	*Aglaophamus agilis*	(Langerhans, 1880)																		1											1	
130359	Annelida	*Nephtys hombergii*	Savigny in Lamarck, 1818	1		1					1		2			1						2	1	1	1		1	2		1			3
130363	Annelida	*Nephtys kersivalensis*	McIntosh, 1908	3	1	1	2	3	4	2		2	2		2	2		1					1	4	3	7	2	4	2	2	1		1
129381	Annelida	*Platynereis*	Kinberg, 1865			1																			1								
129861	Annelida	*Notocirrus scoticus*	McIntosh, 1869				1	1			3									1					1	1	3					1	

Macroinvertebrate Matrix		BLS Project 2205.04 - Stulaigh South	Stulaigh South																														
AphiaID	Phylum	Taxa	Authority	SS_GRAB_01_F1	SS_GRAB_01_F2	SS_GRAB_02_F1	SS_GRAB_02_F2	SS_GRAB_03_F1	SS_GRAB_03_F2	SS_GRAB_04_F1	SS_GRAB_04_F2	SS_GRAB_05_F1	SS_GRAB_05_F2	SS_GRAB_06_F1	SS_GRAB_06_F2	SS_GRAB_07_F1	SS_GRAB_07_F2	SS_GRAB_08_F1	SS_GRAB_08_F2	SS_GRAB_09_F1	SS_GRAB_09_F2	SS_GRAB_10_F1	SS_GRAB_10_F2	SS_GRAB_01	SS_GRAB_02	SS_GRAB_03	SS_GRAB_04	SS_GRAB_05	SS_GRAB_06	SS_GRAB_07	SS_GRAB_08	SS_GRAB_09	SS_GRAB_10
130452	Annelida	*Aponuphis bilineata*	(Baird, 1870)			1	1			3	1			1		1	1		4	6	5				2		4		1	2	4	11	
130467	Annelida	*Nothria conchylega*	(Sars, 1835)											1			1				2								1	1		2	
130500	Annelida	*Ophelina acuminata*	Örsted, 1843															1													1		
146951	Annelida	*Galathowenia fragilis*	(Nilsen & Holthe, 1985)								1												1				1						1
146950	Annelida	*Galathowenia oculata*	(Zachs, 1923)	2		1	2					2	3	2										2	3			5	2				
130540	Annelida	*Myriochele danielsseni*	Hansen, 1878					1						1	1		1						4			1			2	1			4
129427	Annelida	*Owenia*	Delle Chiaje, 1844		1	1	2	1	7		3	5		3	2		2	1	3	1		3	3	1	3	8	3	5	5	2	4	1	6
130576	Annelida	*Cirrophorus branchiatus*	Ehlers, 1908							2	1	1		1			1		2								3	1	1	1	2		
130585	Annelida	*Paradoneis lyra*	(Southern, 1914)					1												2		2	2			1						2	4
152448	Annelida	*Amphictene auricoma*	(O.F. Müller, 1776)	4	2	2	3	2	2		1	2	7			2	1	1	1			3	2	6	5	4	1	9		3	2		5
152367	Annelida	*Lagis koreni*	Malmgren, 1866				1																		1								
130616	Annelida	*Eteone longa*	(Fabricius, 1780)			1								1						1	1				1				1			2	
130625	Annelida	*Eulalia expusilla*	Pleijel, 1987																	1												1	
130631	Annelida	*Eulalia mustela*	Pleijel, 1987																		1											1	
130639	Annelida	*Eulalia viridis*	(Linnaeus, 1767)																		3											3	
129446	Annelida	*Eumida*	Malmgren, 1865				1	1						1	1						1				1	1			2			1	
130641	Annelida	*Eumida bahusiensis*	Bergstrom, 1914			1	1				1				1	1									2		1		1	1			
130644	Annelida	*Eumida sanguinea*	(Örsted, 1843)				1			2							1					1			1		2			1			1
130661	Annelida	*Notophyllum foliosum*	(Sars, 1835)							1																	1						
130670	Annelida	*Phyllodoce laminosa*	Savigny in Lamarck, 1818			1																			1								
130673	Annelida	*Phyllodoce longipes*	Kinberg, 1866																1		1										1	1	
334514	Annelida	*Phyllodoce rosea*	(McIntosh, 1877)				1																1		1								1
130683	Annelida	*Pseudomystides limbata*	(Saint-Joseph, 1888)			1											1				1				1					1		1	
130690	Annelida	*Sige fusigera*	Malmgren, 1865								1					1											1			1			
130697	Annelida	*Litocorsa stremma*	Pearson, 1970								1																1						
130711	Annelida	*Poecilochaetus serpens*	Allen, 1904													1														1			
129472	Annelida	*Polygordius*	Schneider, 1868																		2											2	
147008	Annelida	*Malmgrenia andreapolis*	McIntosh, 1874								1										1		2				1					1	2
863197	Annelida	*Malmgrenia darbouxi*	(Pettibone, 1993)			1	2																		3								
236678	Annelida	*Pettibonesia furcosetosa*	(Loshamn, 1981)				1			1															1		1						
129524	Annelida	*Branchiomma*	Kölliker, 1858				1			1															1		1						
882443	Annelida	*Dialychone dunerificta*	(Tovar-Hernández, Licciano, Giangrande, 2007)																		6											6	
390407	Annelida	*Euchone pararosea*	Giangrande & Licciano, 2006																				1										1
130910	Annelida	*Euchone southerni*	Banse, 1970																		2											2	
130921	Annelida	*Jasmineira elegans*	Saint-Joseph, 1894			1								1									1		1				1				1
130979	Annelida	*Scalibregma celticum*	Mackie, 1991																		1											1	
130980	Annelida	*Scalibregma inflatum*	Rathke, 1843				1														1				1							1	
131009	Annelida	*Hydroides norvegica*	Gunnerus, 1768	1		1										1	1						1	1	1					2			1
130599	Annelida	*Pholoe baltica*	Örsted, 1843	2			1	3	5	2	5	3	4	3	4	2		2	2	1	4		4	2	1	8	7	7	7	2	4	5	4
130601	Annelida	*Pholoe inornata*	Johnston, 1839	2			1	1			2			1					1					2	1	1	2		1		1		
131065	Annelida	*Fimbriosthenelais minor*	(Pruvot & Racovitza, 1895)				1																		1								
130707	Annelida	*Pisione remota*	(Southern, 1914)																		1											1	
131077	Annelida	*Sthenelais limicola*	(Ehlers, 1864)						1																	1							
131107	Annelida	*Aonides paucibranchiata*	Southern, 1914				1														1				1							1	
131123	Annelida	*Dipolydora saintjosephi*	(Eliason, 1920)																				1										1
131127	Annelida	*Laonice bahusiensis*	Söderström, 1920	1			3				2		1			1					6			1	3		2	1		1		6	
129620	Annelida	*Prionospio*	Malmgren, 1867					1		2				2					4		3					1	2		2		4	3	
1521915	Annelida	*Pseudopolydora nordica*	Radashevsky, 2021				2		2		2	2	1				2		1				1		2	2	2	3		2	1		1
596189	Annelida	*Spio symphyta*	Meißner, Bick & Bastrop, 2011								1					1							1				1			1			1
131187	Annelida	*Spiophanes bombyx*	(Claparède, 1870)																			1											1
131188	Annelida	*Spiophanes kroyeri*	Grube, 1860		2	2	1		2		2	3			1							2	1	2	3	2	2	3	1				3
129659	Annelida	*Myrianida*	Milne Edwards, 1845			1																			1								
131327	Annelida	*Odontosyllis fulgurans*	(Audouin & Milne Edwards, 1833)																				1										1
757970	Annelida	*Parexogone hebes*	(Webster & Benedict, 1884)											1							1								1			1	
131394	Annelida	*Sphaerosyllis taylori*	Perkins, 1981							1																	1						
196002	Annelida	*Syllis parapari*	San Martín & López, 2000	3		1	2	3		4	3	1	2	1	2	6	4	1				2		3	3	3	7	3	3	10	1		2
131471	Annelida	*Amaeana trilobata*	(Sars, 1863)				2						1			1	1	1			1				2			1		2	1	1	
152389	Annelida	*Hauchiella tribullata*	(McIntosh, 1869)				1																		1								
131495	Annelida	*Lanice conchilega*	(Pallas, 1766)																				2										2
129708	Annelida	*Pista*	Malmgren, 1866							1		1		1													1	1	1				
131516	Annelida	*Pista cristata*	(Müller, 1776)															1													1		
131519	Annelida	*Pista mediterranea*	Gaillande, 1970		1				1							1								1		1				1			
129710	Annelida	*Polycirrus*	Grube, 1850	3	4	1	11	1		6	4	1		3		1	3	1	2	2	1	4	2	7	12	1	10	1	3	4	3	3	6
129712	Annelida	*Streblosoma*	M. Sars in G.O. Sars, 1872		1								1											1				1					
129717	Annelida	*Terebellides*	Sars, 1835	3		2	1			2	1	5	5	3	1	1	1				1	3	4	3	3		3	10	4	2		1	7
131574	Annelida	*Trichobranchus glacialis*	Malmgren, 1866											2															2				
131575	Annelida	*Trichobranchus roseus*	(Malm, 1874)									1																1					

Macroinvertebrate Matrix		BLS Project 2205.04 - Stulaigh South	Stulaigh South																														
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102497	Arthropoda	*Acidostoma obesum*	(Spence Bate, 1862)					1	1														1			2							1
101445	Arthropoda	*Ampelisca*	Krøyer, 1842				1	1		1		1		2		1		2					2		1	1	1	1	2	1	2		2
101896	Arthropoda	*Ampelisca diadema*	(Costa, 1853)						4	1	2		1				2	1	1			2				4	3	1		2	2		2
101928	Arthropoda	*Ampelisca spinipes*	Boeck, 1861							2										3	2						2					5	
101930	Arthropoda	*Ampelisca tenuicornis*	Liljeborg, 1856	1		3						2	4			3								1	3			6		3			
101933	Arthropoda	*Ampelisca typica*	(Spence Bate, 1856)		1					1					1		1		1	1				1			1		1	1	1	1	
101368	Arthropoda	Aoridae	Stebbing, 1899													1														1			
179538	Arthropoda	*Nototropis vedlomensis*	(Spence Bate & Westwood, 1862)			1	1								4					3					2				4			3	
102794	Arthropoda	*Cheirocratus assimilis*	(Lilljeborg, 1852)																		1											1	
102036	Arthropoda	*Leptocheirus hirsutimanus*	(Spence Bate, 1862)																		1											1	
102611	Arthropoda	*Lysianassa plumosa*	Boeck, 1871			1	3			1										1	1				4		1					2	
534781	Arthropoda	*Othomaera othonis*	(H. Milne Edwards, 1830)			2		1			1				1	1									2	1	1		1	1			
102788	Arthropoda	*Abludomelita obtusata*	(Montagu, 1813)	2			1	1			1	2												2	1	1	1	2					
547074	Arthropoda	*Kroyera carinata*	Spence Bate, 1857										1															1					
102928	Arthropoda	*Synchelidium maculatum*	Stebbing, 1906							1	1								1				1				2				1		1
102932	Arthropoda	*Westwoodilla caecula*	(Spence Bate, 1857)			1			1									1							1	1					1		
102364	Arthropoda	*Gammaropsis maculata*	(Johnston, 1828)											1															1				
102377	Arthropoda	*Megamphopus cornutus*	Norman, 1869												1						1								1			1	
102383	Arthropoda	*Photis longicaudata*	(Spence Bate & Westwood, 1862)											3															3				
102960	Arthropoda	*Harpinia antennaria*	Meinert, 1890																			1	1										2
102981	Arthropoda	*Metaphoxus fultoni*	(Scott, 1890)																				1										1
102598	Arthropoda	*Lepidepecreum longicorne*	(Spence Bate & Westwood, 1861)				1												1						1						1		
761800	Arthropoda	*Tryphosa crenata*	(Chevreux & Fage, 1925)				1																		1								
101658	Arthropoda	*Tmetonyx*	Stebbing, 1906							1																	1						
110460	Arthropoda	*Iphinoe serrata*	Norman, 1867			1							1												1			1					
110481	Arthropoda	*Diastylis laevis*	Norman, 1869	3		4		2				1	2		1			1				1	1	3	4	2		3	1		1		2
110524	Arthropoda	*Eudorella emarginata*	(Krøyer, 1846)					1																		1							
110535	Arthropoda	*Eudorella truncatula*	(Bate, 1856)																				1										1
110550	Arthropoda	*Campylaspis legendrei*	Fage, 1951											1	2														3				
107273	Arthropoda	*Atelecyclus rotundatus*	(Olivi, 1792)							1												1	1				1						2
107301	Arthropoda	*Ebalia tuberosa*	(Pennant, 1777)			1																			1								
107318	Arthropoda	*Eurynome aspera*	(Pennant, 1777)				1																		1								
107387	Arthropoda	*Liocarcinus depurator*	(Linnaeus, 1758)											1															1				
107188	Arthropoda	*Pisidia longicornis*	(Linnaeus, 1767)				1																		1								
118445	Arthropoda	*Astacilla*	Cordiner, 1793							1										1							1					1	
118843	Arthropoda	*Eurydice affinis*	Hansen, 1905																		1											1	
118859	Arthropoda	*Natatolana borealis*	(Lilljeborg, 1851)																1												1		
118437	Arthropoda	*Gnathia*	Leach, 1814							1																	1						
118995	Arthropoda	*Gnathia oxyuraea*	(Lilljeborg, 1855)				1	1		1					1										1	1	1		1				
459311	Arthropoda	*Nebalia reboredae*	Moreira & Urgorri, 2009																1												1		
136458	Arthropoda	*Tanaopsis graciloides*	(Lilljeborg, 1864)				3							1			3	1					1		3				1	3	1		1
134599	Arthropoda	*Achelia echinata*	Hodge, 1864			1	1											1							2						1		
134643	Arthropoda	*Callipallene brevirostris*	(Johnston, 1837)			1																			1								
134723	Arthropoda	*Anoplodactylus petiolatus*	(Krøyer, 1844)			7	4		1	5	3	1	1					5					3		11	1	8	2			5		3
239867	Arthropoda	*Pycnogonum litorale*	(Strøm, 1762)																		1											1	
106213	Arthropoda	*Balanus balanus*	(Linnaeus, 1758)				5			1		3	2		5	2				1					5		1	5	5	2		1	
106215	Arthropoda	*Balanus crenatus*	Bruguière, 1789	2		11	21			22	18	5			2	2		2		29	1		2	2	32		40	5	2	2	2	30	2
106204	Arthropoda	*Scalpellum scalpellum*	(Linnaeus, 1767)												1														1				
106257	Arthropoda	*Verruca stroemia*	(O.F. Müller, 1776)		1	8					1				1	9	3		1		1			1	8		1		1	12	1	1	

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AphiaID	Phylum	Taxa	Authority	SS_GRAB_01_F1	SS_GRAB_01_F2	SS_GRAB_02_F1	SS_GRAB_02_F2	SS_GRAB_03_F1	SS_GRAB_03_F2	SS_GRAB_04_F1	SS_GRAB_04_F2	SS_GRAB_05_F1	SS_GRAB_05_F2	SS_GRAB_06_F1	SS_GRAB_06_F2	SS_GRAB_07_F1	SS_GRAB_07_F2	SS_GRAB_08_F1	SS_GRAB_08_F2	SS_GRAB_09_F1	SS_GRAB_09_F2	SS_GRAB_10_F1	SS_GRAB_10_F2	SS_GRAB_01	SS_GRAB_02	SS_GRAB_03	SS_GRAB_04	SS_GRAB_05	SS_GRAB_06	SS_GRAB_07	SS_GRAB_08	SS_GRAB_09	SS_GRAB_10
140103	Mollusca	*Hiatella arctica*	(Linnaeus, 1767)							1			1			1					3	1					1	1		1		3	1
140737	Mollusca	*Phaxas pellucidus*	(Pennant, 1777)					1				1	1			1										1		2		1			
140870	Mollusca	*Gari fervensis*	(Gmelin, 1791)					1																		1							
140873	Mollusca	*Gari tellinella*	(Lamarck, 1818)																	1												1	
141433	Mollusca	*Abra alba*	(W. Wood, 1802)			1		1					1												1	1		1					
141435	Mollusca	*Abra nitida*	(O. F. Müller, 1776)					6	1				1				2						3			7		1		2			3
141436	Mollusca	*Abra prismatica*	(Montagu, 1808)			1						1				2									1			1		2			
141541	Mollusca	*Azorinus chamasolen*	(da Costa, 1778)	1		1	1	2			1			1							2	1		1	2	2	1		1			2	1
141577	Mollusca	*Arcopagia crassa*	(Pennant, 1777)																		1											1	
147021	Mollusca	*Moerella donacina*	(Linnaeus, 1758)				1									2	1		2		1				1					3	2	1	
140365	Mollusca	*Devonia perrieri*	(Malard, 1904)								1												1				1						1
140366	Mollusca	*Epilepton clarkiae*	(W. Clark, 1852)							1																	1						
140161	Mollusca	*Kellia suborbicularis*	(Montagu, 1803)																	1												1	
345281	Mollusca	*Kurtiella bidentata*	(Montagu, 1803)	12	3	20	12	14	19	2	7	7	13	10	9	4	3	5	3		2	5	33	15	32	33	9	20	19	7	8	2	38
146952	Mollusca	*Tellimya ferruginosa*	(Montagu, 1808)												3														3				
140283	Mollusca	*Lucinoma borealis*	(Linnaeus, 1767)		1				2			3	1	3	1		1	3	1			1	3	1		2		4	4	1	4		4
140287	Mollusca	*Myrtea spinifera*	(Montagu, 1803)	8	3	5	8	5	7	3	1	13	11	5	7	1		10	2				17	11	13	12	4	24	12	1	12		17
234161	Mollusca	*Axinulus croulinensis*	(Jeffreys, 1847)										2									1						2					1
141662	Mollusca	*Thyasira flexuosa*	(Montagu, 1803)	1	3	6	3	10	5	2	1	4	6	4		3	2	2	1			6	5	4	9	15	3	10	4	5	3		11
378492	Mollusca	*Varicorbula gibba*	(Olivi, 1792)		1	3	1								1				1					1	4				1		1		
140431	Mollusca	*Mya truncata*	Linnaeus, 1758																			1											1
140461	Mollusca	*Modiolula phaseolina*	(Philippi, 1844)				1																		1								
140589	Mollusca	*Nucula nitidosa*	Winckworth, 1930	1				2	1		3		3		5			2					1	1		3	3	3	5		2		1
140590	Mollusca	*Nucula nucleus*	(Linnaeus, 1758)	2			1													1				2	1							1	
138802	Mollusca	*Arctica islandica*	(Linnaeus, 1767)									1																1					
141908	Mollusca	*Chamelea striatula*	(da Costa, 1778)		1		1	1	1			3			1								3	1	1	2		3	1				3
141909	Mollusca	*Clausinella fasciata*	(da Costa, 1778)																1	2	4										1	6	
141912	Mollusca	*Dosinia lupinus*	(Linnaeus, 1758)	5	2	5	4	6	4	3	5	7	4	1	2	3		4	1	2		10	3	7	9	10	8	11	3	3	5	2	13
141916	Mollusca	*Gouldia minima*	(Montagu, 1803)																1	1	2										1	3	
140728	Mollusca	*Mysia undata*	(Pennant, 1777)					1	2				1	1	1							3	1			3		1	2				4
141929	Mollusca	*Timoclea ovata*	(Pennant, 1777)			1	1			1									1	4	7				2		1				1	11	
140291	Mollusca	*Lyonsia norwegica*	(Gmelin, 1791)														1													1			
140675	Mollusca	*Pandora pinna*	(Montagu, 1803)														1													1			
141644	Mollusca	*Thracia convexa*	(W. Wood, 1815)																				2										2
152378	Mollusca	*Thracia phaseolina*	(Lamarck, 1818)												1														1				
139106	Mollusca	*Chaetoderma nitidulum*	Lovén, 1844			1							1	1	1										1			1	2				
139112	Mollusca	*Falcidens crossotus*	Salvini-Plawen, 1968	1		1	1		1			1	5	2									1	1	2	1		6	2				1
140250	Mollusca	*Scutopus ventrolineatus*	Salvini-Plawen, 1968																			1											1
140560	Mollusca	*Neomenia carinata*	Tullberg, 1875														1													1			
138691	Mollusca	*Acteon tornatilis*	(Linnaeus, 1758)					1																		1							
139486	Mollusca	*Roxania utriculus*	(Brocchi, 1814)									1																1					
139476	Mollusca	*Cylichna cylindracea*	(Pennant, 1777)	3			1	1	4			1										5	7	3	1	5		1					12
161	Mollusca	Philinidae	Gray, 1850 (1815)																1		1	1									1	1	1
138760	Mollusca	*Aporrhais pespelecani*	(Linnaeus, 1758)														1													1			
139761	Mollusca	*Erato voluta*	(Montagu, 1803)			1																			1								
139800	Mollusca	*Eulima bilineata*	Alder, 1848										1		1													1	1				
139805	Mollusca	*Eulima glabra*	(da Costa, 1778)					1					1					1								1		1			1		
139832	Mollusca	*Melanella alba*	(da Costa, 1778)							1																	1						
140129	Mollusca	*Hyala vitrea*	(Montagu, 1803)			1																			1								
151894	Mollusca	*Euspira nitida*	(Donovan, 1803)													1				2										1		2	
847930	Mollusca	*Sorgenfreispira brachystoma*	(Philippi, 1844)					1					1										1			1		1					1
1762	Mollusca	Nudibranchia	Cuvier, 1817				1																		1								
224401	Mollusca	*Megastomia conoidea*	(Brocchi, 1814)									1			1													1	1				
141033	Mollusca	*Ondina divisa*	(J. Adams, 1797)										1															1					
1381415	Mollusca	*Turritellinella tricarinata*	(Brocchi, 1814)	4	1	4	1	6	4	2	3	12	2	1	2			1	4			12	5	5	5	10	5	14	3		5		17
140199	Mollusca	*Leptochiton asellus*	(Gmelin, 1791)			2				1				1						1					2		1		1			1	
140201	Mollusca	*Leptochiton cancellatus*	(G. B. Sowerby II, 1840)																	1												1	
150534	Mollusca	*Antalis entalis*	(Linnaeus, 1758)	1	1	2	1	2	1	2	1	5	6	3		1	3	3				3	1	2	3	3	3	11	3	4	3		4
128545	Phoronida	*Phoronis*	Wright, 1856	2		5	4	5	9	1	1	4	2	3		1	2	4	1		2	3	1	2	9	14	2	6	3	3	5	2	4

Macroinvertebrate Matrix		BLS Project 2205.04 - Stulaigh South	Stulaigh South																														
AphiaID	Phylum	Taxa	Authority	SS_GRAB_01_F1	SS_GRAB_01_F2	SS_GRAB_02_F1	SS_GRAB_02_F2	SS_GRAB_03_F1	SS_GRAB_03_F2	SS_GRAB_04_F1	SS_GRAB_04_F2	SS_GRAB_05_F1	SS_GRAB_05_F2	SS_GRAB_06_F1	SS_GRAB_06_F2	SS_GRAB_07_F1	SS_GRAB_07_F2	SS_GRAB_08_F1	SS_GRAB_08_F2	SS_GRAB_09_F1	SS_GRAB_09_F2	SS_GRAB_10_F1	SS_GRAB_10_F2	SS_GRAB_01	SS_GRAB_02	SS_GRAB_03	SS_GRAB_04	SS_GRAB_05	SS_GRAB_06	SS_GRAB_07	SS_GRAB_08	SS_GRAB_09	SS_GRAB_10
124273	Echinodermata	*Echinocyamus pusillus*	(O.F. Müller, 1776)	5	1			2				1			2		1	1	2	4	8	2		6		2		1	2	1	3	12	2
124392	Echinodermata	*Echinocardium cordatum*	(Pennant, 1777)										1		1													1	1				
1474372	Echinodermata	*Paraleptopentacta elongata*	(Düben & Koren, 1846)			1							1				1								1			1		1			
124661	Echinodermata	*Pseudothyone raphanus*	(Düben & Koren, 1846)							1																	1						
124455	Echinodermata	*Labidoplax buskii*	(MacIntosh, 1866)																	1												1	
123449	Echinodermata	*Leptosynapta*	Verrill, 1867					1			1															1	1						
124462	Echinodermata	*Leptosynapta bergensis*	(Östergren, 1905)				1		1		3											1	2		1	1	3						3
124465	Echinodermata	*Leptosynapta inhaerens*	(O.F. Müller, 1776)				1																		1								
125064	Echinodermata	*Amphipholis squamata*	(Delle Chiaje, 1828)			3	1	4	1	3															4	5	3						
125073	Echinodermata	*Amphiura chiajei*	Forbes, 1843		1			2	4	2	1	7	6					1				6	1	1		6	3	13			1		7
125080	Echinodermata	*Amphiura filiformis*	(O.F. Müller, 1776)	19	5	19	23	12	33	7	6	6	17	5	7	3	3	3	4	1		16	23	24	42	45	13	23	12	6	7	1	39
125110	Echinodermata	*Ophiactis balli*	(W. Thompson, 1840)			1				1															1		1						
1818	Hemichordata	Hemichordata	Bateson, 1885											1			1						1						1	1			1
			S	45	33	71	87	65	49	68	60	56	57	65	58	46	45	45	41	39	57	51	75	60	115	79	96	78	89	70	70	81	88
			N	138	56	200	262	192	195	163	157	199	201	169	143	85	76	98	74	91	119	180	270	194	462	387	320	400	312	161	172	210	450
			J'	0.9	0.95	0.88	0.86	0.9	0.87	0.91	0.9	0.92	0.91	0.91	0.92	0.93	0.96	0.93	0.94	0.81	0.93	0.91	0.85	0.89	0.84	0.85	0.88	0.88	0.89	0.92	0.93	0.88	0.85
			d	8.93	7.95	13.2	15.4	12.2	9.1	13.2	11.7	10.4	10.6	12.5	11.5	10.1	10.2	9.6	9.29	8.42	11.7	9.63	13.2	11.2	18.6	13.1	16.5	12.9	15.3	13.6	13.4	15	14.2
			1-Lambda	0.96	0.98	0.97	0.97	0.97	0.95	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.98	0.97	0.97	0.89	0.98	0.97	0.96	0.97	0.97	0.96	0.97	0.97	0.97	0.98	0.98	0.97	0.97
			H'(log(2))	4.95	4.81	5.4	5.53	5.4	4.86	5.54	5.34	5.32	5.28	5.46	5.39	5.16	5.26	5.13	5.04	4.3	5.43	5.18	5.3	5.28	5.77	5.35	5.78	5.52	5.75	5.65	5.68	5.55	5.52
			ITI	65.9	60.7	68.3	61.5	59.8	65.9	65.6	62.4	64	60.3	56.1	58.1	68.7	64.6	56.4	57.1	74.1	60.9	67.1	60.8	64.4	64.5	62.9	64	62.1	57	66.9	56.7	66.7	63.3

Epifaunal, Juveniles & Other Species

Macroinvertebrate Matrix		BLS Project 2205.04 - Stulaigh South																															
AphiaID	Phylum	Taxa	Authority	SS_GRAB_01_F1	SS_GRAB_01_F2	SS_GRAB_02_F1	SS_GRAB_02_F2	SS_GRAB_03_F1	SS_GRAB_03_F2	SS_GRAB_04_F1	SS_GRAB_04_F2	SS_GRAB_05_F1	SS_GRAB_05_F2	SS_GRAB_06_F1	SS_GRAB_06_F2	SS_GRAB_07_F1	SS_GRAB_07_F2	SS_GRAB_08_F1	SS_GRAB_08_F2	SS_GRAB_09_F1	SS_GRAB_09_F2	SS_GRAB_10_F1	SS_GRAB_10_F2	SS_GRAB_01	SS_GRAB_02	SS_GRAB_03	SS_GRAB_04	SS_GRAB_05	SS_GRAB_06	SS_GRAB_07	SS_GRAB_08	SS_GRAB_09	SS_GRAB_10
Epifaunal Species																																	
100688	Cnidaria	Epizoanthidae	Delage & Hérouard, 1901			P	P			P	P			P	P	P	P		P	P	P				P		P		P	P	P	P	
1594	Cnidaria	Bougainvilliidae	Lütken, 1850			P						P													P			P					
13551	Cnidaria	Anthoathecata	Cornelius, 1992	P					P		P											P	P	P		P	P						P
117368	Cnidaria	*Clytia hemisphaerica*	(Linnaeus, 1767)				P														P				P							P	
1613	Cnidaria	Plumulariidae	McCrady, 1859				P			P															P		P						
117890	Cnidaria	*Hydrallmania falcata*	(Linnaeus, 1758)				P																		P								
132026	Porifera	*Cliona*	Grant, 1826								P				P				P								P		P		P		
558	Porifera	Porifera	Grant, 1836			P	P			P	P					P					P				P		P			P		P	
111796	Entoprocta	*Pedicellina*	Sars, 1835												P				P										P		P		
111079	Bryozoa	*Hippoporina pertusa*	(Esper, 1796)							P	P				P												P		P				
110829	Bryozoa	*Schizomavella*	Canu & Bassler, 1917			P				P	P										P				P		P					P	
110731	Bryozoa	Bugulidae	Gray, 1848																P												P		
834002	Bryozoa	*Bugulina flabellata*	(Thompson in Gray, 1848)												P														P				
110842	Bryozoa	*Dendrobeania*	Levinsen, 1909				P																		P								
111184	Bryozoa	*Alderina imbellis*	(Hincks, 1860)							P	P				P												P		P				
111250	Bryozoa	*Scrupocellaria scruposa*	(Linnaeus, 1758)				P				P														P		P						
110869	Bryozoa	*Cellaria*	Ellis & Solander, 1786				P				P														P		P						
111314	Bryozoa	*Cribrilina punctata*	(Hassall, 1841)								P						P										P			P			
111355	Bryozoa	*Electra pilosa*	(Linnaeus, 1767)			P	P				P		P									P	P		P		P	P					P
111361	Bryozoa	*Eucratea loricata*	(Linnaeus, 1758)	P	P	P	P			P	P	P	P			P	P	P			P			P	P		P	P		P	P	P	
111418	Bryozoa	*Fenestrulina malusii*	(Audouin, 1826)																		P											P	
111367	Bryozoa	*Flustra foliacea*	(Linnaeus, 1758)		P		P						P			P	P		P		P			P	P			P		P	P	P	
111374	Bryozoa	*Securiflustra securifrons*	(Pallas, 1766)				P				P														P		P						
111397	Bryozoa	*Celleporella hyalina*	(Linnaeus, 1767)																			P	P										P
111421	Bryozoa	*Microporella ciliata*	(Pallas, 1766)													P														P			
111484	Bryozoa	*Escharella immersa*	(Fleming, 1828)							P																	P						
111509	Bryozoa	*Neolagenipora collaris*	(Norman, 1867)							P																	P						
110993	Bryozoa	*Alcyonidium*	Lamouroux, 1813				P																		P								
111597	Bryozoa	*Alcyonidium diaphanum*	(Hudson, 1778)				P				P	P		P		P		P							P		P	P	P	P	P		
111604	Bryozoa	*Alcyonidium parasiticum*	(Fleming, 1828)													P														P			
111011	Bryozoa	*Nolella*	Gosse, 1855				P																		P								
111022	Bryozoa	*Amathia*	Lamouroux, 1812												P														P				
111706	Bryozoa	*Crisidia cornuta*	(Linnaeus, 1758)				P																		P								

Macroinvertebrate Matrix		BLS Project 2205.04 - Stulaigh South																															
AphiaID	Phylum	Taxa	Authority	SS_GRAB_01_F1	SS_GRAB_01_F2	SS_GRAB_02_F1	SS_GRAB_02_F2	SS_GRAB_03_F1	SS_GRAB_03_F2	SS_GRAB_04_F1	SS_GRAB_04_F2	SS_GRAB_05_F1	SS_GRAB_05_F2	SS_GRAB_06_F1	SS_GRAB_06_F2	SS_GRAB_07_F1	SS_GRAB_07_F2	SS_GRAB_08_F1	SS_GRAB_08_F2	SS_GRAB_09_F1	SS_GRAB_09_F2	SS_GRAB_10_F1	SS_GRAB_10_F2	SS_GRAB_01	SS_GRAB_02	SS_GRAB_03	SS_GRAB_04	SS_GRAB_05	SS_GRAB_06	SS_GRAB_07	SS_GRAB_08	SS_GRAB_09	SS_GRAB_10
Juvenile Species																																	
2		Animalia											P		P													P	P				
1268	Annelida	Sipuncula	Stephen, 1965										1						1				1					1			1		1
938	Annelida	Aphroditidae	Malmgren, 1867	2					1			1				1								2		1		1		1			
129296	Annelida	*Glycera*	Lamarck, 1818	1		2	1		2		2					1	1	1	1		4	1		1	3	2	2			2	2	4	1
953	Annelida	Goniadidae	Kinberg, 1866			1									1										1				1				
129370	Annelida	*Nephtys*	Cuvier, 1817	1		2	1		1	1		4	3	1	1			2	1			2	2	1	3	1	1	7	2		3		4
965	Annelida	Onuphidae	Kinberg, 1865			1									1	1			1		1				1				1	1	1	1	
980	Annelida	Pectinariidae	Quatrefages, 1866			1																			1								
982	Annelida	Terebellidae	Johnston, 1846					1			1			1					1	1						1	1		1		1	1	
106905	Arthropoda	*Inachus*	Weber, 1795												1														1				
106889	Arthropoda	*Ebalia*	Leach, 1817				1										1								1					1			
106738	Arthropoda	Paguridae	Latreille, 1802				1				1														1		1						
118437	Arthropoda	*Gnathia*	Leach, 1814										1															1					
1082	Arthropoda	Cirripedia	Burmeister, 1834				1			1	1				1										1		2		1				
229	Mollusca	Cardiidae	Lamarck, 1809							1	2			1	1	1	2										3		2	3			
138388	Mollusca	*Gari*	Schumacher, 1817														1													1			
138474	Mollusca	*Abra*	Lamarck, 1818			1	1	2				1	1									2			2	2		2					2
138127	Mollusca	*Limatula*	S. V. Wood, 1839														1													1			
247	Mollusca	Myidae	Lamarck, 1809								1			1													1		1				
211	Mollusca	Mytilidae	Rafinesque, 1815				1				3				4				1	2	1				1		3		4		1	3	
214	Mollusca	Anomiidae	Rafinesque, 1815			2	3				1		4			3					2				5		1	4		3		2	
213	Mollusca	Pectinidae	Rafinesque, 1815										1															1					
138802	Mollusca	*Arctica islandica*	(Linnaeus, 1767)																				1										1
138636	Mollusca	Dosinia	Scopoli, 1777	2	1	4	5	2	9	4	6	2	6	8	11	3	4	6	1			7	19	3	9	11	10	8	19	7	7		26
243	Mollusca	Veneridae	Rafinesque, 1815								1										2						1					2	
382318	Mollusca	Thracioidea	Stoliczka, 1870 (1839)			1	1		2		1		3	1						1	1	1	2		2	2	1	3	1			2	3
145	Mollusca	Naticidae	Guilding, 1834								1										1						1					1	
246140	Mollusca	*Tritia*	Risso, 1826							1					1												1		1				
101	Mollusca	Gastropoda	Cuvier, 1795				P																										
55	Mollusca	Polyplacophora	Gray, 1821				3			1	1				2				4	2	11				3		2		2		4	13	
123082	Echinodermata	Echinoidea	Leske, 1778				1				1														1		1						
123106	Echinodermata	Spatangoida	L. Agassiz, 1840						1							1							1			1				1			1
123626	Echinodermata	*Ophiothrix*	Müller & Troschel, 1840			1																			1								
123084	Echinodermata	Ophiuroidea	Gray, 1840	11	4	14	13	18	24	1	6	12	27	1	9	3	7	10	5		1	33	40	15	27	42	7	39	10	10	15	1	73
Damaged Species																																	
918	Annelida	Chaetopteridae	Audouin & Milne Edwards, 1833															1													1		
939	Annelida	Polynoidae	Kinberg, 1856			1	2		1	4	2				1							2			3	1	6		1				2
988	Annelida	Serpulidae	Rafinesque, 1815							2	2			1													4		1				
101	Mollusca	Gastropoda	Cuvier, 1795				1					1									1		1		1			1				1	1
Other Species																																	
112299	Foraminifera	*Astrorhiza*	Sandahl, 1858		2	1	8	2	8	3	14	1	13	2	21		30	8	6	1	1	7	6	2	9	10	17	14	23	30	14	2	13
1080	Arthropoda	Copepoda	Milne Edwards, 1840											1															1				
1078	Arthropoda	Ostracoda	Latreille, 1802																1												1		

Appendix VI – Seabed Photographic Positions and Maerl Coverage

Geodetics: British Grid: OSGB36															
Transect	Easting	Northing	Photo Name	Predominant Physical Habitat		No maerl	Dead maerl	Live Maerl Presence				Megaripples	Nephrops	Burrows	
				Gravelly Muddy Sand	Bedrock			<5%	<25%	<50%	>50%			1-3cm	3-15cm
SS_CAM_01_A	83838	822382	SS_CAM_01_A_0002.jpg	x		x									
SS_CAM_01_A	83828	822379	SS_CAM_01_A_0003.jpg	x		x									
SS_CAM_01_A	83819	822376	SS_CAM_01_A_0004.jpg	x		x									
SS_CAM_01_A	83811	822375	SS_CAM_01_A_0005.jpg	x		x									
SS_CAM_01_A	83803	822374	SS_CAM_01_A_0006.jpg	x		x									
SS_CAM_01_A	83794	822375	SS_CAM_01_A_0007.jpg	x		x									
SS_CAM_01_A	83786	822374	SS_CAM_01_A_0008.jpg	x		x									
SS_CAM_01_A	83778	822374	SS_CAM_01_A_0009.jpg		x	x									
SS_CAM_01_A	83770	822373	SS_CAM_01_A_0010.jpg		x	x									
SS_CAM_01_A	83757	822368	SS_CAM_01_A_0011.jpg		x	x									
SS_CAM_01_A	83751	822367	SS_CAM_01_A_0012.jpg		x	x									
SS_CAM_01_A	83744	822366	SS_CAM_01_A_0013.jpg		x	x									
SS_CAM_01_A	83736	822366	SS_CAM_01_A_0014.jpg		x	x									
SS_CAM_01_A	83720	822365	SS_CAM_01_A_0015.jpg		x	x									
SS_CAM_01_A	83714	822363	SS_CAM_01_A_0016.jpg	x		x									
SS_CAM_01_A	83706	822362	SS_CAM_01_A_0017.jpg	x		x								1	
SS_CAM_01_A	83697	822361	SS_CAM_01_A_0018.jpg		x	x									
SS_CAM_01_A	83688	822360	SS_CAM_01_A_0019.jpg		x	x									
SS_CAM_01_A	83677	822359	SS_CAM_01_A_0020.jpg		x	x									
SS_CAM_01_A	83669	822358	SS_CAM_01_A_0021.jpg	x		x									
SS_CAM_01_A	83661	822357	SS_CAM_01_A_0022.jpg	x		x									
SS_CAM_01_A	83653	822355	SS_CAM_01_A_0023.jpg	x		x									
SS_CAM_01_A	83647	822350	SS_CAM_01_A_0024.jpg	x		x									
SS_CAM_01_A	83642	822345	SS_CAM_01_A_0025.jpg	x		x									
SS_CAM_01_A	83637	822339	SS_CAM_01_A_0026.jpg	x		x									
SS_CAM_01_A	83631	822332	SS_CAM_01_A_0027.jpg	x		x									
SS_CAM_01_A	83625	822326	SS_CAM_01_A_0028.jpg	x		x									
SS_CAM_01_A	83617	822322	SS_CAM_01_A_0029.jpg	x		x									
SS_CAM_01_A	83609	822320	SS_CAM_01_A_0030.jpg	x		x									
SS_CAM_01_A	83602	822315	SS_CAM_01_A_0031.jpg	x		x									
SS_CAM_01_A	83597	822308	SS_CAM_01_A_0032.jpg		x	x									
SS_CAM_01_A	83591	822298	SS_CAM_01_A_0033.jpg		x	x									
SS_CAM_01_A	83588	822291	SS_CAM_01_A_0034.jpg	x		x									
SS_CAM_01_A	83578	822277	SS_CAM_01_A_0035.jpg	x		x									
SS_CAM_01_A	83571	822275	SS_CAM_01_A_0036.jpg	x		x									
SS_CAM_01_A	83561	822275	SS_CAM_01_A_0037.jpg	x		x									
SS_CAM_01_A	83553	822277	SS_CAM_01_A_0038.jpg	x		x									
SS_CAM_01_A	83544	822280	SS_CAM_01_A_0039.jpg	x		x									
SS_CAM_01_A	83535	822283	SS_CAM_01_A_0040.jpg	x		x									
SS_CAM_01_A	83526	822284	SS_CAM_01_A_0041.jpg	x		x									
SS_CAM_01_A	83518	822282	SS_CAM_01_A_0042.jpg		x	x									
SS_CAM_01_A	83511	822279	SS_CAM_01_A_0043.jpg*												
SS_CAM_01_A	83502	822273	SS_CAM_01_A_0044.jpg		x	x									
SS_CAM_01_A	83495	822269	SS_CAM_01_A_0045.jpg		x	x									
SS_CAM_01_A	83485	822264	SS_CAM_01_A_0046.jpg	x		x									
SS_CAM_01_A	83475	822258	SS_CAM_01_A_0047.jpg	x		x									
SS_CAM_01_A	83454	822245	SS_CAM_01_A_0048.jpg	x		x									
SS_CAM_01_A	83445	822242	SS_CAM_01_A_0049.jpg	x		x									
SS_CAM_01_A	83438	822239	SS_CAM_01_A_0050.jpg	x		x									
SS_CAM_01_A	83420	822237	SS_CAM_01_A_0051.jpg	x		x									
SS_CAM_01_A	83410	822238	SS_CAM_01_A_0052.jpg	x		x									
SS_CAM_01_A	83399	822239	SS_CAM_01_A_0053.jpg	x		x									
SS_CAM_01_A	83389	822240	SS_CAM_01_A_0054.jpg	x		x									
SS_CAM_01_A	83380	822241	SS_CAM_01_A_0055.jpg	x		x									
SS_CAM_01_A	83371	822241	SS_CAM_01_A_0056.jpg	x		x									
SS_CAM_01_A	83366	822242	SS_CAM_01_A_0057.jpg	x		x									
SS_CAM_01_A	83356	822242	SS_CAM_01_A_0058.jpg	x		x									
SS_CAM_01_A	83347	822244	SS_CAM_01_A_0059.jpg	x		x									
SS_CAM_01_A	83337	822245	SS_CAM_01_A_0060.jpg	x		x									
SS_CAM_01_A	83327	822247	SS_CAM_01_A_0061.jpg	x		x									
SS_CAM_01_A	83316	822246	SS_CAM_01_A_0062.jpg	x		x									
SS_CAM_01_A	83306	822243	SS_CAM_01_A_0063.jpg	x		x									
SS_CAM_01_A	83297	822239	SS_CAM_01_A_0064.jpg	x		x								1	
SS_CAM_01_A	83288	822233	SS_CAM_01_A_0065.jpg	x		x									
SS_CAM_01_A	83280	822228	SS_CAM_01_A_0066.jpg	x		x									
SS_CAM_01_A	83270	822221	SS_CAM_01_A_0067.jpg	x		x									
SS_CAM_01_A	83261	822216	SS_CAM_01_A_0068.jpg	x		x									
SS_CAM_01_A	83252	822213	SS_CAM_01_A_0069.jpg	x				x							
SS_CAM_01_A	83243	822212	SS_CAM_01_A_0070.jpg	x		x									
SS_CAM_01_A	83234	822211	SS_CAM_01_A_0071.jpg	x		x									
SS_CAM_01_A	83223	822212	SS_CAM_01_A_0072.jpg	x		x									
SS_CAM_01_A	83213	822213	SS_CAM_01_A_0073.jpg	x		x									
SS_CAM_01_A	83202	822213	SS_CAM_01_A_0074.jpg	x		x									
SS_CAM_01_A	83193	822213	SS_CAM_01_A_0075.jpg	x		x									

Transect	Easting	Northing	Photo Name	Predominant Physical Habitat: Gravelly Muddy Sand	Predominant Physical Habitat: Bedrock	No maerl	Dead maerl	Live Maerl Presence: <5%	Live Maerl Presence: <25%	Live Maerl Presence: <50%	Live Maerl Presence: >50%	Megaripples	Nephrops	Burrows: 1-3cm	Burrows: 3-15cm
Geodetics: British Grid: OSGB36															
SS_CAM_01_A	83186	822212	SS_CAM_01_A_0076.jpg	x		x									
SS_CAM_01_A	83178	822211	SS_CAM_01_A_0077.jpg	x		x									
SS_CAM_01_A	83170	822210	SS_CAM_01_A_0078.jpg	x		x									
SS_CAM_01_A	83163	822209	SS_CAM_01_A_0079.jpg	x		x									
SS_CAM_01_A	83156	822208	SS_CAM_01_A_0080.jpg	x		x									
SS_CAM_01_A	83149	822209	SS_CAM_01_A_0081.jpg	x		x									
SS_CAM_01_A	83141	822210	SS_CAM_01_A_0082.jpg	x		x									
SS_CAM_01_A	83123	822211	SS_CAM_01_A_0083.jpg	x		x									
SS_CAM_01_A	83114	822210	SS_CAM_01_A_0084.jpg	x		x									
SS_CAM_01_A	83108	822207	SS_CAM_01_A_0085.jpg	x		x								2	
SS_CAM_01_A	83101	822202	SS_CAM_01_A_0086.jpg	x		x									
SS_CAM_01_A	83094	822197	SS_CAM_01_A_0087.jpg	x		x									
SS_CAM_01_A	83089	822191	SS_CAM_01_A_0088.jpg	x		x									
SS_CAM_01_A	83082	822184	SS_CAM_01_A_0089.jpg	x		x									
SS_CAM_01_A	83067	822175	SS_CAM_01_A_0090.jpg	x		x									
SS_CAM_01_A	83059	822173	SS_CAM_01_A_0091.jpg	x		x									
SS_CAM_01_A	83049	822173	SS_CAM_01_A_0092.jpg	x		x									
SS_CAM_01_A	83040	822175	SS_CAM_01_A_0093.jpg	x		x								1	
SS_CAM_01_A	83031	822176	SS_CAM_01_A_0094.jpg	x		x									
SS_CAM_01_A	83024	822177	SS_CAM_01_A_0095.jpg	x		x								1	
SS_CAM_01_A	83017	822177	SS_CAM_01_A_0096.jpg		x	x									
SS_CAM_01_A	83011	822177	SS_CAM_01_A_0097.jpg	x		x									
SS_CAM_01_A	82995	822177	SS_CAM_01_A_0098.jpg		x	x									
SS_CAM_02	83878	822272	SS_CAM_02_0004.jpg	x		x									
SS_CAM_02	83857	822265	SS_CAM_02_0005.jpg	x		x									
SS_CAM_02	83848	822262	SS_CAM_02_0006.jpg	x		x									
SS_CAM_02	83825	822250	SS_CAM_02_0007.jpg	x		x									
SS_CAM_02	83817	822248	SS_CAM_02_0008.jpg	x		x									
SS_CAM_02	83809	822247	SS_CAM_02_0009.jpg	x		x									
SS_CAM_02	83802	822247	SS_CAM_02_0010.jpg	x		x									
SS_CAM_02	83796	822246	SS_CAM_02_0011.jpg	x		x									
SS_CAM_02	83791	822244	SS_CAM_02_0012.jpg	x		x									
SS_CAM_02	83786	822239	SS_CAM_02_0013.jpg	x		x									
SS_CAM_02	83781	822232	SS_CAM_02_0014.jpg	x		x									
SS_CAM_02	83774	822226	SS_CAM_02_0015.jpg	x		x									
SS_CAM_02	83768	822222	SS_CAM_02_0016.jpg	x		x									
SS_CAM_02	83760	822219	SS_CAM_02_0017.jpg	x		x									
SS_CAM_02	83752	822217	SS_CAM_02_0018.jpg	x		x									
SS_CAM_02	83743	822214	SS_CAM_02_0019.jpg	x		x									
SS_CAM_02	83736	822212	SS_CAM_02_0020.jpg	x		x									
SS_CAM_02	83727	822210	SS_CAM_02_0021.jpg	x		x									
SS_CAM_02	83718	822208	SS_CAM_02_0022.jpg	x		x									
SS_CAM_02	83709	822209	SS_CAM_02_0023.jpg	x		x									
SS_CAM_02	83700	822211	SS_CAM_02_0024.jpg	x		x									
SS_CAM_02	83691	822211	SS_CAM_02_0025.jpg	x		x									
SS_CAM_02	83684	822209	SS_CAM_02_0026.jpg	x		x									
SS_CAM_02	83675	822205	SS_CAM_02_0027.jpg	x		x									
SS_CAM_02	83664	822200	SS_CAM_02_0028.jpg	x		x									
SS_CAM_02	83655	822195	SS_CAM_02_0029.jpg	x		x									
SS_CAM_02	83646	822191	SS_CAM_02_0030.jpg		x	x									
SS_CAM_02	83636	822186	SS_CAM_02_0031.jpg	x		x									
SS_CAM_02	83626	822182	SS_CAM_02_0032.jpg	x		x									
SS_CAM_02	83614	822179	SS_CAM_02_0033.jpg		x	x									
SS_CAM_02	83592	822176	SS_CAM_02_0034.jpg	x		x									
SS_CAM_02	83580	822176	SS_CAM_02_0035.jpg		x	x									
SS_CAM_02	83566	822176	SS_CAM_02_0036.jpg*												
SS_CAM_02	83556	822176	SS_CAM_02_0037.jpg	x		x									
SS_CAM_02	83546	822176	SS_CAM_02_0038.jpg	x		x									
SS_CAM_02	83537	822175	SS_CAM_02_0039.jpg	x		x									
SS_CAM_02	83528	822172	SS_CAM_02_0040.jpg		x	x									
SS_CAM_02	83519	822170	SS_CAM_02_0041.jpg		x	x									
SS_CAM_02	83508	822167	SS_CAM_02_0042.jpg	x		x									
SS_CAM_02	83499	822167	SS_CAM_02_0043.jpg	x				x							
SS_CAM_02	83488	822169	SS_CAM_02_0044.jpg	x		x									
SS_CAM_02	83477	822172	SS_CAM_02_0045.jpg	x		x									
SS_CAM_02	83466	822174	SS_CAM_02_0046.jpg	x		x								2	
SS_CAM_02	83458	822173	SS_CAM_02_0047.jpg	x		x									
SS_CAM_02	83449	822170	SS_CAM_02_0048.jpg	x		x									
SS_CAM_02	83440	822166	SS_CAM_02_0049.jpg	x		x									
SS_CAM_02	83431	822160	SS_CAM_02_0050.jpg	x		x									
SS_CAM_02	83424	822156	SS_CAM_02_0051.jpg	x		x									
SS_CAM_02	83408	822145	SS_CAM_02_0052.jpg	x		x									
SS_CAM_02	83398	822141	SS_CAM_02_0053.jpg	x		x									
SS_CAM_02	83377	822133	SS_CAM_02_0054.jpg	x		x									
SS_CAM_02	83367	822130	SS_CAM_02_0055.jpg	x		x									
SS_CAM_02	83356	822126	SS_CAM_02_0056.jpg	x		x									
SS_CAM_02	83344	822124	SS_CAM_02_0057.jpg	x		x									
SS_CAM_02	83333	822122	SS_CAM_02_0058.jpg	x		x									

Geodetics: British Grid: OSGB36															
Transect	Easting	Northing	Photo Name	Predominant Physical Habitat		No maerl	Dead maerl	Live Maerl Presence				Megaripples	Nephrops	Burrows	
				Gravelly Muddy Sand	Bedrock			<5%	<25%	<50%	>50%			1-3cm	3-15cm
SS_CAM_02	83324	822120	SS_CAM_02_0059.jpg	x		x									
SS_CAM_02	83313	822116	SS_CAM_02_0060.jpg	x		x									
SS_CAM_02	83304	822112	SS_CAM_02_0061.jpg	x		x									
SS_CAM_02	83293	822107	SS_CAM_02_0062.jpg	x		x									
SS_CAM_02	83282	822101	SS_CAM_02_0063.jpg	x		x									
SS_CAM_02	83272	822098	SS_CAM_02_0064.jpg	x		x									
SS_CAM_02	83246	822098	SS_CAM_02_0065.jpg	x		x									
SS_CAM_02	83237	822098	SS_CAM_02_0066.jpg	x		x									
SS_CAM_02	83225	822098	SS_CAM_02_0067.jpg	x		x									
SS_CAM_02	83204	822094	SS_CAM_02_0068.jpg	x		x									
SS_CAM_02	83195	822090	SS_CAM_02_0069.jpg	x		x									
SS_CAM_02	83184	822083	SS_CAM_02_0070.jpg	x		x									
SS_CAM_02	83176	822078	SS_CAM_02_0071.jpg	x		x									
SS_CAM_02	83129	822064	SS_CAM_02_0072.jpg	x		x									
SS_CAM_02	83121	822061	SS_CAM_02_0073.jpg		x	x									
SS_CAM_02	83114	822059	SS_CAM_02_0074.jpg		x	x									
SS_CAM_02	83087	822057	SS_CAM_02_0075.jpg	x		x									
SS_CAM_02	83079	822057	SS_CAM_02_0076.jpg	x		x									
SS_CAM_02	83071	822057	SS_CAM_02_0077.jpg	x		x									
SS_CAM_02	83061	822057	SS_CAM_02_0078.jpg	x		x									
SS_CAM_02	83047	822058	SS_CAM_02_0079.jpg*												
SS_CAM_02	83042	822061	SS_CAM_02_0080.jpg	x		x									
SS_CAM_02	83029	822069	SS_CAM_02_0081.jpg		x	x									
SS_CAM_02	83024	822071	SS_CAM_02_0082.jpg		x	x									
SS_CAM_02	83018	822072	SS_CAM_02_0083.jpg		x	x									
SS_CAM_02	83012	822073	SS_CAM_02_0084.jpg	x		x									
SS_CAM_02	83005	822073	SS_CAM_02_0085.jpg	x		x									
SS_CAM_03	83962	822168	SS_CAM_03_0002.jpg	x		x									
SS_CAM_03	83938	822161	SS_CAM_03_0003.jpg		x	x									
SS_CAM_03	83931	822160	SS_CAM_03_0004.jpg		x	x									
SS_CAM_03	83914	822158	SS_CAM_03_0005.jpg		x	x									
SS_CAM_03	83906	822157	SS_CAM_03_0006.jpg		x	x									
SS_CAM_03	83875	822141	SS_CAM_03_0007.jpg		x	x									
SS_CAM_03	83865	822134	SS_CAM_03_0008.jpg		x	x									
SS_CAM_03	83857	822128	SS_CAM_03_0009.jpg	x		x									
SS_CAM_03	83851	822124	SS_CAM_03_0010.jpg	x		x									
SS_CAM_03	83846	822120	SS_CAM_03_0011.jpg	x		x									
SS_CAM_03	83842	822117	SS_CAM_03_0012.jpg	x		x									
SS_CAM_03	83837	822114	SS_CAM_03_0013.jpg		x	x									
SS_CAM_03	83833	822112	SS_CAM_03_0014.jpg	x		x									
SS_CAM_03	83827	822112	SS_CAM_03_0015.jpg		x	x									
SS_CAM_03	83820	822112	SS_CAM_03_0016.jpg		x	x									
SS_CAM_03	83811	822114	SS_CAM_03_0017.jpg	x		x									
SS_CAM_03	83803	822115	SS_CAM_03_0018.jpg	x		x									
SS_CAM_03	83794	822114	SS_CAM_03_0019.jpg	x		x									
SS_CAM_03	83741	822094	SS_CAM_03_0020.jpg		x	x									
SS_CAM_03	83735	822091	SS_CAM_03_0021.jpg	x		x									
SS_CAM_03	83729	822089	SS_CAM_03_0022.jpg	x		x								2	
SS_CAM_03	83722	822086	SS_CAM_03_0023.jpg	x		x									
SS_CAM_03	83716	822085	SS_CAM_03_0024.jpg	x		x								4	
SS_CAM_03	83710	822085	SS_CAM_03_0025.jpg	x		x								6	
SS_CAM_03	83702	822087	SS_CAM_03_0026.jpg	x		x									
SS_CAM_03	83696	822089	SS_CAM_03_0027.jpg	x		x								2	
SS_CAM_03	83682	822094	SS_CAM_03_0028.jpg	x		x								2	
SS_CAM_03	83671	822099	SS_CAM_03_0029.jpg	x		x								2	
SS_CAM_03	83667	822101	SS_CAM_03_0030.jpg	x		x									
SS_CAM_03	83662	822103	SS_CAM_03_0031.jpg	x		x									
SS_CAM_03	83658	822105	SS_CAM_03_0032.jpg	x		x									
SS_CAM_03	83653	822107	SS_CAM_03_0033.jpg	x		x									
SS_CAM_03	83648	822108	SS_CAM_03_0034.jpg	x		x									
SS_CAM_03	83644	822110	SS_CAM_03_0035.jpg	x		x									
SS_CAM_03	83640	822111	SS_CAM_03_0036.jpg	x		x									
SS_CAM_03	83637	822111	SS_CAM_03_0037.jpg	x		x									
SS_CAM_03	83632	822111	SS_CAM_03_0038.jpg	x		x									
SS_CAM_03	83627	822109	SS_CAM_03_0039.jpg	x		x									
SS_CAM_03	83622	822105	SS_CAM_03_0040.jpg	x		x									
SS_CAM_03	83617	822100	SS_CAM_03_0041.jpg	x		x									
SS_CAM_03	83611	822095	SS_CAM_03_0042.jpg	x		x									
SS_CAM_03	83605	822089	SS_CAM_03_0043.jpg	x		x									
SS_CAM_03	83597	822085	SS_CAM_03_0044.jpg	x		x									
SS_CAM_03	83588	822081	SS_CAM_03_0045.jpg	x		x									
SS_CAM_03	83581	822078	SS_CAM_03_0046.jpg	x		x									
SS_CAM_03	83574	822075	SS_CAM_03_0047.jpg	x		x									
SS_CAM_03	83567	822071	SS_CAM_03_0048.jpg	x		x									
SS_CAM_03	83563	822068	SS_CAM_03_0049.jpg	x		x									
SS_CAM_03	83557	822063	SS_CAM_03_0050.jpg		x	x									
SS_CAM_03	83553	822059	SS_CAM_03_0051.jpg	x		x									
SS_CAM_03	83547	822052	SS_CAM_03_0052.jpg	x		x									

Geodetics: British Grid: OSGB36

Transect	Easting	Northing	Photo Name	Predominant Physical Habitat		No maerl	Dead maerl	Live Maerl Presence				Megaripples	Nephrops	Burrows	
				Gravelly Muddy Sand	Bedrock			<5%	<25%	<50%	>50%			1-3cm	3-15cm
SS_CAM_03	83540	822045	SS_CAM_03_0053.jpg	x		x									
SS_CAM_03	83510	822033	SS_CAM_03_0054.jpg	x		x									
SS_CAM_03	83500	822032	SS_CAM_03_0055.jpg	x		x									
SS_CAM_03	83491	822031	SS_CAM_03_0056.jpg	x		x									
SS_CAM_03	83482	822031	SS_CAM_03_0057.jpg	x		x									
SS_CAM_03	83474	822031	SS_CAM_03_0058.jpg	x		x									
SS_CAM_03	83466	822031	SS_CAM_03_0059.jpg	x		x									
SS_CAM_03	83459	822031	SS_CAM_03_0060.jpg	x		x									
SS_CAM_03	83451	822030	SS_CAM_03_0061.jpg	x		x									
SS_CAM_03	83445	822030	SS_CAM_03_0062.jpg	x		x									
SS_CAM_03	83436	822030	SS_CAM_03_0063.jpg	x		x									
SS_CAM_03	83429	822030	SS_CAM_03_0064.jpg	x		x									
SS_CAM_03	83421	822031	SS_CAM_03_0065.jpg	x		x									
SS_CAM_03	83415	822032	SS_CAM_03_0066.jpg	x		x									
SS_CAM_03	83407	822033	SS_CAM_03_0067.jpg	x		x									
SS_CAM_03	83399	822034	SS_CAM_03_0068.jpg	x		x									
SS_CAM_03	83391	822033	SS_CAM_03_0069.jpg	x		x									
SS_CAM_03	83384	822032	SS_CAM_03_0070.jpg	x		x									
SS_CAM_03	83380	822029	SS_CAM_03_0071.jpg	x		x									
SS_CAM_03	83374	822024	SS_CAM_03_0072.jpg	x		x									
SS_CAM_03	83366	822019	SS_CAM_03_0073.jpg	x		x									
SS_CAM_03	83359	822016	SS_CAM_03_0074.jpg	x		x									
SS_CAM_03	83351	822013	SS_CAM_03_0075.jpg	x		x									
SS_CAM_03	83344	822010	SS_CAM_03_0076.jpg	x		x									
SS_CAM_03	83337	822008	SS_CAM_03_0077.jpg	x		x									
SS_CAM_03	83330	822006	SS_CAM_03_0078.jpg	x		x									
SS_CAM_03	83321	822005	SS_CAM_03_0079.jpg	x			x								
SS_CAM_03	83310	822003	SS_CAM_03_0080.jpg	x		x									
SS_CAM_03	83302	822000	SS_CAM_03_0081.jpg	x			x								
SS_CAM_03	83294	821997	SS_CAM_03_0082.jpg	x			x								
SS_CAM_03	83288	821992	SS_CAM_03_0083.jpg	x			x								
SS_CAM_03	83281	821979	SS_CAM_03_0084.jpg	x			x								
SS_CAM_03	83274	821970	SS_CAM_03_0085.jpg	x		x									
SS_CAM_03	83268	821965	SS_CAM_03_0086.jpg	x			x								
SS_CAM_03	83261	821962	SS_CAM_03_0087.jpg	x			x								
SS_CAM_03	83253	821960	SS_CAM_03_0088.jpg	x			x	x							
SS_CAM_03	83244	821959	SS_CAM_03_0089.jpg	x			x	x							
SS_CAM_03	83237	821956	SS_CAM_03_0090.jpg	x			x	x							
SS_CAM_03	83229	821953	SS_CAM_03_0091.jpg	x			x	x						1	
SS_CAM_03	83220	821951	SS_CAM_03_0092.jpg	x			x	x							
SS_CAM_03	83212	821949	SS_CAM_03_0093.jpg	x			x	x							
SS_CAM_03	83202	821948	SS_CAM_03_0094.jpg	x			x	x							
SS_CAM_03	83193	821946	SS_CAM_03_0095.jpg		x		x								
SS_CAM_03	83182	821946	SS_CAM_03_0096.jpg		x		x								
SS_CAM_03	83172	821945	SS_CAM_03_0097.jpg		x		x								
SS_CAM_03	83154	821946	SS_CAM_03_0098.jpg	x			x	x							
SS_CAM_03	83145	821946	SS_CAM_03_0099.jpg	x			x	x							
SS_CAM_03	83139	821947	SS_CAM_03_0100.jpg	x			x								
SS_CAM_03	83132	821946	SS_CAM_03_0101.jpg	x			x	x							
SS_CAM_03	83125	821946	SS_CAM_03_0102.jpg	x			x	x							
SS_CAM_03	83108	821946	SS_CAM_03_0103.jpg	x			x								
SS_CAM_03	83098	821948	SS_CAM_03_0104.jpg	x			x	x							
SS_CAM_03	83087	821953	SS_CAM_03_0105.jpg	x			x	x							
SS_CAM_03	83076	821957	SS_CAM_03_0106.jpg	x			x	x							
SS_CAM_03	83061	821959	SS_CAM_03_0107.jpg	x			x	x							
SS_CAM_03	83044	821956	SS_CAM_03_0108.jpg	x			x	x							
SS_CAM_03	83039	821955	SS_CAM_03_0109.jpg	x			x	x							
SS_CAM_03	83034	821953	SS_CAM_03_0110.jpg	x			x								
SS_CAM_03	83022	821952	SS_CAM_03_0111.jpg	x			x	x							
SS_CAM_03	83016	821954	SS_CAM_03_0112.jpg	x			x	x							
SS_CAM_04	83504	821406	SS_CAM_04_0002.jpg	x		x									
SS_CAM_04	83500	821414	SS_CAM_04_0003.jpg	x		x									
SS_CAM_04	83496	821420	SS_CAM_04_0004.jpg	x		x									
SS_CAM_04	83490	821427	SS_CAM_04_0005.jpg	x		x									
SS_CAM_04	83482	821451	SS_CAM_04_0006.jpg	x		x									
SS_CAM_04	83479	821473	SS_CAM_04_0007.jpg	x			x								
SS_CAM_04	83477	821480	SS_CAM_04_0008.jpg	x			x								
SS_CAM_04	83474	821487	SS_CAM_04_0009.jpg	x			x								
SS_CAM_04	83470	821494	SS_CAM_04_0010.jpg	x			x								
SS_CAM_04	83467	821499	SS_CAM_04_0011.jpg	x		x									
SS_CAM_04	83463	821506	SS_CAM_04_0012.jpg	x			x								
SS_CAM_04	83459	821514	SS_CAM_04_0013.jpg	x			x								
SS_CAM_04	83456	821519	SS_CAM_04_0014.jpg	x			x								
SS_CAM_04	83454	821527	SS_CAM_04_0015.jpg	x			x								
SS_CAM_04	83452	821531	SS_CAM_04_0016.jpg*												
SS_CAM_04	83449	821537	SS_CAM_04_0017.jpg	x			x								
SS_CAM_04	83446	821545	SS_CAM_04_0018.jpg	x			x								
SS_CAM_04	83443	821549	SS_CAM_04_0019.jpg*												

Geodetics: British Grid: OSGB36															
Transect	Easting	Northing	Photo Name	Predominant Physical Habitat		No maerl	Dead maerl	Live Maerl Presence				Megaripples	Nephrops	Burrows	
				Gravelly Muddy Sand	Bedrock			<5%	<25%	<50%	>50%			1-3cm	3-15cm
SS_CAM_04	83439	821557	SS_CAM_04_0020.jpg	x			x								
SS_CAM_04	83436	821563	SS_CAM_04_0021.jpg	x			x								
SS_CAM_04	83433	821571	SS_CAM_04_0022.jpg	x			x								
SS_CAM_04	83431	821578	SS_CAM_04_0023.jpg*												
SS_CAM_04	83430	821586	SS_CAM_04_0024.jpg	x		x									
SS_CAM_04	83429	821593	SS_CAM_04_0025.jpg		x	x									
SS_CAM_04	83428	821602	SS_CAM_04_0026.jpg		x	x									
SS_CAM_04	83426	821611	SS_CAM_04_0027.jpg		x	x									
SS_CAM_04	83425	821620	SS_CAM_04_0028.jpg	x		x									
SS_CAM_04	83422	821627	SS_CAM_04_0029.jpg		x	x									
SS_CAM_04	83420	821634	SS_CAM_04_0030.jpg	x		x									
SS_CAM_04	83416	821642	SS_CAM_04_0031.jpg	x		x									
SS_CAM_04	83413	821648	SS_CAM_04_0032.jpg	x			x	x							
SS_CAM_04	83409	821657	SS_CAM_04_0033.jpg	x			x								
SS_CAM_04	83406	821663	SS_CAM_04_0034.jpg	x			x								
SS_CAM_04	83403	821672	SS_CAM_04_0035.jpg	x			x	x							
SS_CAM_04	83399	821681	SS_CAM_04_0036.jpg	x			x								
SS_CAM_04	83398	821692	SS_CAM_04_0037.jpg	x			x								
SS_CAM_04	83398	821701	SS_CAM_04_0038.jpg	x			x								
SS_CAM_04	83398	821713	SS_CAM_04_0039.jpg	x			x								
SS_CAM_04	83398	821724	SS_CAM_04_0040.jpg	x			x								
SS_CAM_04	83397	821735	SS_CAM_04_0041.jpg	x		x									
SS_CAM_04	83395	821743	SS_CAM_04_0042.jpg	x		x									
SS_CAM_04	83391	821753	SS_CAM_04_0043.jpg	x		x									
SS_CAM_04	83383	821768	SS_CAM_04_0044.jpg	x		x								1	
SS_CAM_04	83382	821774	SS_CAM_04_0045.jpg	x		x									
SS_CAM_04	83381	821781	SS_CAM_04_0046.jpg		x	x									
SS_CAM_04	83381	821789	SS_CAM_04_0047.jpg	x		x								1	
SS_CAM_04	83381	821799	SS_CAM_04_0048.jpg	x		x									
SS_CAM_04	83381	821807	SS_CAM_04_0049.jpg		x	x									
SS_CAM_04	83379	821818	SS_CAM_04_0050.jpg	x		x									
SS_CAM_04	83376	821827	SS_CAM_04_0051.jpg	x		x									
SS_CAM_04	83373	821835	SS_CAM_04_0052.jpg	x		x									
SS_CAM_04	83371	821844	SS_CAM_04_0053.jpg	x		x									
SS_CAM_04	83369	821869	SS_CAM_04_0054.jpg	x			x								
SS_CAM_04	83369	821877	SS_CAM_04_0055.jpg	x			x								
SS_CAM_04	83369	821885	SS_CAM_04_0056.jpg	x			x								
SS_CAM_04	83369	821892	SS_CAM_04_0057.jpg	x			x								
SS_CAM_04	83369	821899	SS_CAM_04_0058.jpg	x		x									
SS_CAM_04	83369	821906	SS_CAM_04_0059.jpg	x		x									
SS_CAM_04	83368	821912	SS_CAM_04_0060.jpg	x		x									
SS_CAM_04	83365	821917	SS_CAM_04_0061.jpg	x		x									
SS_CAM_04	83361	821922	SS_CAM_04_0062.jpg	x		x									
SS_CAM_04	83358	821929	SS_CAM_04_0063.jpg	x		x									
SS_CAM_04	83355	821934	SS_CAM_04_0064.jpg	x		x									
SS_CAM_04	83352	821939	SS_CAM_04_0065.jpg	x		x									
SS_CAM_04	83347	821945	SS_CAM_04_0066.jpg	x		x									
SS_CAM_04	83343	821952	SS_CAM_04_0067.jpg	x		x									
SS_CAM_04	83338	821960	SS_CAM_04_0068.jpg	x		x									
SS_CAM_04	83334	821968	SS_CAM_04_0069.jpg	x		x									
SS_CAM_04	83332	821976	SS_CAM_04_0070.jpg	x		x									
SS_CAM_04	83330	821987	SS_CAM_04_0071.jpg	x		x									
SS_CAM_04	83328	821999	SS_CAM_04_0072.jpg	x		x									
SS_CAM_04	83326	822010	SS_CAM_04_0073.jpg	x		x									
SS_CAM_04	83324	822022	SS_CAM_04_0074.jpg	x			x	x							
SS_CAM_04	83321	822032	SS_CAM_04_0075.jpg	x			x								
SS_CAM_04	83318	822041	SS_CAM_04_0076.jpg	x			x								
SS_CAM_04	83315	822049	SS_CAM_04_0077.jpg	x			x	x							
SS_CAM_04	83311	822058	SS_CAM_04_0078.jpg		x		x								
SS_CAM_04	83307	822067	SS_CAM_04_0079.jpg	x		x									
SS_CAM_04	83303	822077	SS_CAM_04_0080.jpg	x		x									
SS_CAM_04	83301	822089	SS_CAM_04_0081.jpg	x		x									
SS_CAM_04	83299	822101	SS_CAM_04_0082.jpg	x		x									
SS_CAM_04	83297	822114	SS_CAM_04_0083.jpg	x		x									
SS_CAM_04	83296	822123	SS_CAM_04_0084.jpg	x		x									
SS_CAM_04	83295	822135	SS_CAM_04_0085.jpg	x		x									
SS_CAM_04	83293	822148	SS_CAM_04_0086.jpg	x		x									
SS_CAM_04	83291	822158	SS_CAM_04_0087.jpg	x		x									
SS_CAM_04	83288	822170	SS_CAM_04_0088.jpg	x		x									
SS_CAM_04	83286	822180	SS_CAM_04_0089.jpg	x		x									
SS_CAM_04	83283	822192	SS_CAM_04_0090.jpg	x		x									
SS_CAM_04	83279	822204	SS_CAM_04_0091.jpg	x		x								1	
SS_CAM_04	83276	822217	SS_CAM_04_0092.jpg	x		x									
SS_CAM_04	83274	822228	SS_CAM_04_0093.jpg	x		x									
SS_CAM_04	83271	822238	SS_CAM_04_0094.jpg	x		x									
SS_CAM_04	83268	822248	SS_CAM_04_0095.jpg	x		x									
SS_CAM_04	83257	822268	SS_CAM_04_0096.jpg	x		x									
SS_CAM_04	83252	822276	SS_CAM_04_0097.jpg	x		x									

Geodetics: British Grid: OSGB36															
Transect	Easting	Northing	Photo Name	Predominant Physical Habitat		No maerl	Dead maerl	Live Maerl Presence				Megaripples	Nephrops	Burrows	
				Gravelly Muddy Sand	Bedrock			<5%	<25%	<50%	>50%			1-3cm	3-15cm
SS_CAM_04	83248	822285	SS_CAM_04_0098.jpg	x		x									
SS_CAM_04	83246	822293	SS_CAM_04_0099.jpg	x		x									
SS_CAM_04	83246	822302	SS_CAM_04_0100.jpg	x		x									
SS_CAM_04	83246	822314	SS_CAM_04_0101.jpg	x		x									
SS_CAM_04	83246	822324	SS_CAM_04_0102.jpg	x		x									
SS_CAM_04	83245	822334	SS_CAM_04_0103.jpg	x		x									
SS_CAM_04	83243	822355	SS_CAM_04_0104.jpg	x		x									
SS_CAM_04	83241	822367	SS_CAM_04_0105.jpg	x		x									
SS_CAM_04	83240	822379	SS_CAM_04_0106.jpg	x		x									
SS_CAM_04	83240	822389	SS_CAM_04_0107.jpg	x		x									
SS_CAM_04	83239	822397	SS_CAM_04_0108.jpg	x		x									
SS_CAM_04	83237	822407	SS_CAM_04_0109.jpg	x		x									
SS_CAM_04	83234	822419	SS_CAM_04_0110.jpg	x		x									
SS_CAM_04	83232	822429	SS_CAM_04_0111.jpg	x		x									1
SS_CAM_04	83230	822442	SS_CAM_04_0112.jpg	x		x									
SS_CAM_04	83228	822453	SS_CAM_04_0113.jpg	x		x									
SS_CAM_04	83226	822465	SS_CAM_04_0114.jpg	x		x									
SS_CAM_04	83224	822478	SS_CAM_04_0115.jpg	x		x									
SS_CAM_04	83221	822490	SS_CAM_04_0116.jpg	x		x									
SS_CAM_04	83217	822501	SS_CAM_04_0117.jpg	x		x									
SS_CAM_04	83213	822510	SS_CAM_04_0118.jpg	x		x									
SS_CAM_04	83211	822515	SS_CAM_04_0119.jpg	x		x								1	
SS_CAM_04	83209	822519	SS_CAM_04_0120.jpg	x		x									
SS_CAM_04	83208	822522	SS_CAM_04_0121.jpg		x	x									
SS_CAM_04	83206	822525	SS_CAM_04_0122.jpg		x	x									
SS_CAM_04	83201	822530	SS_CAM_04_0123.jpg		x	x									
SS_CAM_04	83194	822534	SS_CAM_04_0124.jpg*												
SS_CAM_04	83187	822540	SS_CAM_04_0125.jpg		x	x									
SS_CAM_04	83181	822546	SS_CAM_04_0126.jpg*												
SS_CAM_04	83175	822552	SS_CAM_04_0127.jpg*												
SS_CAM_04	83167	822560	SS_CAM_04_0128.jpg		x	x									
SS_CAM_04	83159	822569	SS_CAM_04_0129.jpg		x	x									
SS_CAM_04	83153	822582	SS_CAM_04_0130.jpg	x		x									
SS_CAM_04	83144	822606	SS_CAM_04_0131.jpg	x		x								2	
SS_CAM_04	83140	822616	SS_CAM_04_0132.jpg	x		x								1	
SS_CAM_04	83135	822626	SS_CAM_04_0133.jpg		x	x									
SS_CAM_04	83129	822638	SS_CAM_04_0134.jpg		x	x									
SS_CAM_05	83396	822726	SS_CAM_05_0004.jpg	x			x	x						1	
SS_CAM_05	83400	822718	SS_CAM_05_0005.jpg	x			x	x						2	
SS_CAM_05	83404	822710	SS_CAM_05_0006.jpg	x			x	x						1	
SS_CAM_05	83409	822702	SS_CAM_05_0007.jpg	x			x							1	
SS_CAM_05	83414	822695	SS_CAM_05_0008.jpg	x			x							3	
SS_CAM_05	83419	822686	SS_CAM_05_0009.jpg	x			x								
SS_CAM_05	83424	822678	SS_CAM_05_0010.jpg	x			x							1	
SS_CAM_05	83429	822669	SS_CAM_05_0011.jpg	x			x							1	
SS_CAM_05	83434	822657	SS_CAM_05_0012.jpg	x			x								
SS_CAM_05	83438	822648	SS_CAM_05_0013.jpg	x			x								
SS_CAM_05	83443	822638	SS_CAM_05_0014.jpg	x			x								
SS_CAM_05	83448	822630	SS_CAM_05_0015.jpg	x			x	x							
SS_CAM_05	83453	822620	SS_CAM_05_0016.jpg	x			x								
SS_CAM_05	83457	822611	SS_CAM_05_0017.jpg		x		x								
SS_CAM_05	83460	822599	SS_CAM_05_0018.jpg	x			x								
SS_CAM_05	83463	822569	SS_CAM_05_0019.jpg	x		x								3	
SS_CAM_05	83464	822557	SS_CAM_05_0020.jpg	x		x									
SS_CAM_05	83464	822545	SS_CAM_05_0021.jpg	x		x									
SS_CAM_05	83465	822537	SS_CAM_05_0022.jpg	x		x								5	
SS_CAM_05	83466	822526	SS_CAM_05_0023.jpg	x		x								1	
SS_CAM_05	83467	822516	SS_CAM_05_0024.jpg	x		x								2	
SS_CAM_05	83468	822504	SS_CAM_05_0025.jpg	x		x								3	
SS_CAM_05	83469	822497	SS_CAM_05_0026.jpg	x		x								3	
SS_CAM_05	83471	822488	SS_CAM_05_0027.jpg	x		x									
SS_CAM_05	83472	822477	SS_CAM_05_0028.jpg	x		x									
SS_CAM_05	83473	822469	SS_CAM_05_0029.jpg	x		x									
SS_CAM_05	83472	822459	SS_CAM_05_0030.jpg	x		x									
SS_CAM_05	83464	822436	SS_CAM_05_0031.jpg	x		x								2	
SS_CAM_05	83459	822424	SS_CAM_05_0032.jpg	x		x									
SS_CAM_05	83454	822414	SS_CAM_05_0033.jpg		x	x									
SS_CAM_05	83444	822393	SS_CAM_05_0034.jpg	x		x								2	
SS_CAM_05	83436	822381	SS_CAM_05_0035.jpg	x		x									
SS_CAM_05	83427	822373	SS_CAM_05_0036.jpg	x		x								1	
SS_CAM_05	83417	822367	SS_CAM_05_0037.jpg	x				x							
SS_CAM_05	83394	822353	SS_CAM_05_0038.jpg	x		x								2	
SS_CAM_05	83387	822347	SS_CAM_05_0039.jpg	x		x									
SS_CAM_05	83382	822340	SS_CAM_05_0040.jpg	x		x									
SS_CAM_05	83380	822332	SS_CAM_05_0041.jpg	x		x									
SS_CAM_05	83380	822323	SS_CAM_05_0042.jpg*												
SS_CAM_05	83380	822316	SS_CAM_05_0043.jpg	x		x									
SS_CAM_05	83384	822296	SS_CAM_05_0044.jpg	x		x								2	

Geodetics: British Grid: OSGB36															
Transect	Easting	Northing	Photo Name	Predominant Physical Habitat		No maerl	Dead maerl	Live Maerl Presence				Megaripples	Nephrops	Burrows	
				Gravelly Muddy Sand	Bedrock			<5%	<25%	<50%	>50%			1-3cm	3-15cm
SS_CAM_05	83391	822267	SS_CAM_05_0045.jpg	x		x									
SS_CAM_05	83393	822257	SS_CAM_05_0046.jpg	x		x								1	
SS_CAM_05	83396	822245	SS_CAM_05_0047.jpg	x		x									
SS_CAM_05	83400	822232	SS_CAM_05_0048.jpg	x		x									
SS_CAM_05	83403	822220	SS_CAM_05_0049.jpg	x		x									
SS_CAM_05	83406	822208	SS_CAM_05_0050.jpg	x		x									
SS_CAM_05	83410	822198	SS_CAM_05_0051.jpg	x		x								2	
SS_CAM_05	83413	822190	SS_CAM_05_0052.jpg	x		x									
SS_CAM_05	83416	822183	SS_CAM_05_0053.jpg	x		x									
SS_CAM_05	83421	822177	SS_CAM_05_0054.jpg	x		x									
SS_CAM_05	83425	822172	SS_CAM_05_0055.jpg	x				x							
SS_CAM_05	83430	822164	SS_CAM_05_0056.jpg		x	x									
SS_CAM_05	83435	822156	SS_CAM_05_0057.jpg	x		x									
SS_CAM_05	83438	822150	SS_CAM_05_0058.jpg	x		x									
SS_CAM_05	83440	822145	SS_CAM_05_0059.jpg	x		x									
SS_CAM_05	83444	822137	SS_CAM_05_0060.jpg	x		x									
SS_CAM_05	83446	822131	SS_CAM_05_0061.jpg	x		x									
SS_CAM_05	83449	822122	SS_CAM_05_0062.jpg	x		x									
SS_CAM_05	83453	822113	SS_CAM_05_0063.jpg	x		x									
SS_CAM_05	83458	822104	SS_CAM_05_0064.jpg	x		x								3	
SS_CAM_05	83461	822097	SS_CAM_05_0065.jpg	x			x								
SS_CAM_05	83466	822088	SS_CAM_05_0066.jpg	x		x									
SS_CAM_05	83470	822080	SS_CAM_05_0067.jpg	x		x									
SS_CAM_05	83475	822070	SS_CAM_05_0068.jpg	x		x									
SS_CAM_05	83479	822062	SS_CAM_05_0069.jpg	x		x									
SS_CAM_05	83483	822053	SS_CAM_05_0070.jpg	x		x									
SS_CAM_05	83486	822045	SS_CAM_05_0071.jpg	x		x									
SS_CAM_05	83491	822032	SS_CAM_05_0072.jpg	x		x									
SS_CAM_05	83493	822024	SS_CAM_05_0073.jpg	x		x								1	
SS_CAM_05	83496	822015	SS_CAM_05_0074.jpg	x		x								3	
SS_CAM_05	83499	822007	SS_CAM_05_0075.jpg	x			x								
SS_CAM_05	83502	822000	SS_CAM_05_0076.jpg	x		x									
SS_CAM_05	83509	821990	SS_CAM_05_0077.jpg	x		x									
SS_CAM_05	83511	821986	SS_CAM_05_0078.jpg	x		x									
SS_CAM_05	83514	821978	SS_CAM_05_0079.jpg	x		x									
SS_CAM_05	83517	821973	SS_CAM_05_0080.jpg	x		x									
SS_CAM_05	83522	821966	SS_CAM_05_0081.jpg	x		x									
SS_CAM_05	83528	821960	SS_CAM_05_0082.jpg	x		x									
SS_CAM_05	83533	821952	SS_CAM_05_0083.jpg	x		x									
SS_CAM_05	83537	821947	SS_CAM_05_0084.jpg	x		x									
SS_CAM_05	83543	821940	SS_CAM_05_0085.jpg	x		x									
SS_CAM_05	83549	821934	SS_CAM_05_0086.jpg	x		x									
SS_CAM_05	83553	821927	SS_CAM_05_0087.jpg	x		x									
SS_CAM_05	83557	821917	SS_CAM_05_0088.jpg	x		x									
SS_CAM_05	83561	821907	SS_CAM_05_0089.jpg	x		x									
SS_CAM_05	83565	821900	SS_CAM_05_0090.jpg	x		x									
SS_CAM_05	83576	821882	SS_CAM_05_0091.jpg		x	x									
SS_CAM_05	83592	821866	SS_CAM_05_0092.jpg	x		x									
SS_CAM_05	83598	821861	SS_CAM_05_0093.jpg	x		x								4	
SS_CAM_05	83603	821858	SS_CAM_05_0094.jpg	x		x								2	
SS_CAM_05	83616	821851	SS_CAM_05_0095.jpg	x		x									
SS_CAM_05	83624	821845	SS_CAM_05_0096.jpg	x		x									
SS_CAM_05	83629	821842	SS_CAM_05_0097.jpg	x		x									
SS_CAM_05	83645	821818	SS_CAM_05_0098.jpg	x		x									
SS_CAM_05	83652	821807	SS_CAM_05_0099.jpg	x		x									
SS_CAM_05	83658	821799	SS_CAM_05_0100.jpg	x		x									
SS_CAM_05	83663	821795	SS_CAM_05_0101.jpg	x		x									
SS_CAM_05	83670	821790	SS_CAM_05_0102.jpg	x		x									
SS_CAM_05	83676	821785	SS_CAM_05_0103.jpg	x		x									
SS_CAM_05	83688	821772	SS_CAM_05_0104.jpg	x		x								1	
SS_CAM_05	83694	821763	SS_CAM_05_0105.jpg	x		x								3	
SS_CAM_05	83700	821755	SS_CAM_05_0106.jpg	x			x								
SS_CAM_05	83712	821740	SS_CAM_05_0107.jpg*												
SS_CAM_05	83717	821734	SS_CAM_05_0108.jpg		x	x									
SS_CAM_05	83722	821729	SS_CAM_05_0109.jpg		x	x									
SS_CAM_05	83729	821722	SS_CAM_05_0110.jpg	x		x									
SS_CAM_05	83732	821718	SS_CAM_05_0111.jpg		x										
SS_CAM_05	83738	821708	SS_CAM_05_0112.jpg	x		x									
SS_CAM_05	83742	821702	SS_CAM_05_0113.jpg		x	x									
SS_CAM_05	83746	821695	SS_CAM_05_0114.jpg	x		x									
SS_CAM_05	83752	821687	SS_CAM_05_0115.jpg		x	x									
SS_CAM_05	83758	821680	SS_CAM_05_0116.jpg		x	x									
SS_CAM_05	83768	821666	SS_CAM_05_0117.jpg	x		x									
SS_CAM_05	83772	821659	SS_CAM_05_0118.jpg	x		x									
SS_CAM_05	83777	821652	SS_CAM_05_0119.jpg	x		x									
SS_CAM_05	83782	821645	SS_CAM_05_0120.jpg	x		x									
SS_CAM_05	83787	821637	SS_CAM_05_0121.jpg		x	x									
SS_CAM_05	83798	821623	SS_CAM_05_0122.jpg	x		x									

Geodetics: British Grid: OSGB36															
Transect	Easting	Northing	Photo Name	Predominant Physical Habitat		No maerl	Dead maerl	Live Maerl Presence				Megaripples	Nephrops	Burrows	
				Gravelly Muddy Sand	Bedrock			<5%	<25%	<50%	>50%			1-3cm	3-15cm
SS_CAM_05	83803	821617	SS_CAM_05_0123.jpg	x		x									
SS_CAM_05	83810	821610	SS_CAM_05_0124.jpg	x		x								1	
SS_CAM_05	83817	821604	SS_CAM_05_0125.jpg		x	x									
SS_CAM_05	83829	821592	SS_CAM_05_0126.jpg	x		x									
SS_CAM_05	83836	821585	SS_CAM_05_0127.jpg	x		x									
SS_CAM_05	83845	821578	SS_CAM_05_0128.jpg	x		x									
SS_CAM_05	83850	821571	SS_CAM_05_0129.jpg	x		x									
SS_CAM_05	83855	821565	SS_CAM_05_0130.jpg	x		x									
SS_CAM_05	83861	821558	SS_CAM_05_0131.jpg	x		x									
SS_CAM_05	83864	821552	SS_CAM_05_0132.jpg	x		x								2	
SS_CAM_05	83868	821545	SS_CAM_05_0133.jpg		x	x									
SS_CAM_05	83873	821538	SS_CAM_05_0134.jpg	x		x									
SS_CAM_05	83877	821532	SS_CAM_05_0135.jpg		x	x									
SS_CAM_05	83884	821526	SS_CAM_05_0136.jpg	x		x									
SS_CAM_05	83888	821523	SS_CAM_05_0137.jpg	x		x									
SS_CAM_05	83891	821519	SS_CAM_05_0138.jpg	x		x									
SS_CAM_05	83895	821514	SS_CAM_05_0139.jpg	x		x									
SS_CAM_05	83897	821508	SS_CAM_05_0140.jpg	x		x									
SS_CAM_05	83899	821497	SS_CAM_05_0141.jpg	x		x									
SS_CAM_05	83900	821489	SS_CAM_05_0142.jpg	x		x									
SS_CAM_05	83901	821481	SS_CAM_05_0143.jpg	x		x									
SS_CAM_05	83901	821471	SS_CAM_05_0144.jpg	x		x									
SS_CAM_05	83901	821461	SS_CAM_05_0145.jpg	x		x									
SS_CAM_05	83900	821452	SS_CAM_05_0146.jpg	x		x									
SS_CAM_05	83899	821442	SS_CAM_05_0147.jpg	x		x									
SS_CAM_05	83898	821434	SS_CAM_05_0148.jpg	x		x									
SS_CAM_05	83896	821424	SS_CAM_05_0149.jpg	x		x									
SS_CAM_06_A	83740	821722	SS_CAM_06_A_0002.jpg	x		x								1	
SS_CAM_06_A	83736	821730	SS_CAM_06_A_0003.jpg	x		x									
SS_CAM_06_A	83733	821738	SS_CAM_06_A_0004.jpg	x		x									
SS_CAM_06_A	83727	821750	SS_CAM_06_A_0005.jpg	x		x									
SS_CAM_06_A	83725	821756	SS_CAM_06_A_0006.jpg	x		x									
SS_CAM_06_A	83719	821764	SS_CAM_06_A_0007.jpg	x		x									
SS_CAM_06_A	83712	821774	SS_CAM_06_A_0008.jpg	x		x									
SS_CAM_06_A	83707	821784	SS_CAM_06_A_0009.jpg	x		x								2	
SS_CAM_06_A	83703	821797	SS_CAM_06_A_0010.jpg	x		x									
SS_CAM_06_A	83700	821808	SS_CAM_06_A_0011.jpg	x		x									
SS_CAM_06_A	83697	821821	SS_CAM_06_A_0012.jpg	x		x									
SS_CAM_06_A	83694	821836	SS_CAM_06_A_0013.jpg	x		x									
SS_CAM_06_A	83692	821848	SS_CAM_06_A_0014.jpg		x	x									
SS_CAM_06_A	83688	821861	SS_CAM_06_A_0015.jpg	x		x									
SS_CAM_06_A	83685	821870	SS_CAM_06_A_0016.jpg	x		x									
SS_CAM_06_A	83682	821879	SS_CAM_06_A_0017.jpg	x		x									
SS_CAM_06_A	83678	821885	SS_CAM_06_A_0018.jpg	x		x									
SS_CAM_06_A	83674	821893	SS_CAM_06_A_0019.jpg	x		x								2	
SS_CAM_06_A	83671	821898	SS_CAM_06_A_0020.jpg	x		x									
SS_CAM_06_A	83668	821902	SS_CAM_06_A_0021.jpg	x		x									
SS_CAM_06_A	83665	821907	SS_CAM_06_A_0022.jpg	x		x									
SS_CAM_06_A	83660	821913	SS_CAM_06_A_0023.jpg	x		x									
SS_CAM_06_A	83655	821918	SS_CAM_06_A_0024.jpg	x		x									
SS_CAM_06_A	83651	821923	SS_CAM_06_A_0025.jpg	x		x									
SS_CAM_06_A	83646	821929	SS_CAM_06_A_0026.jpg	x		x									
SS_CAM_06_A	83643	821933	SS_CAM_06_A_0027.jpg	x		x									
SS_CAM_06_A	83640	821938	SS_CAM_06_A_0028.jpg	x		x									
SS_CAM_06_A	83635	821942	SS_CAM_06_A_0029.jpg	x		x									
SS_CAM_06_A	83630	821947	SS_CAM_06_A_0030.jpg	x		x									
SS_CAM_06_A	83624	821951	SS_CAM_06_A_0031.jpg	x		x									
SS_CAM_06_A	83620	821954	SS_CAM_06_A_0032.jpg	x		x									
SS_CAM_06_A	83611	821959	SS_CAM_06_A_0033.jpg	x		x									
SS_CAM_06_A	83605	821962	SS_CAM_06_A_0034.jpg		x	x									
SS_CAM_06_A	83602	821964	SS_CAM_06_A_0035.jpg		x	x									
SS_CAM_06_A	83593	821970	SS_CAM_06_A_0036.jpg		x	x									
SS_CAM_06_A	83587	821974	SS_CAM_06_A_0037.jpg	x		x									
SS_CAM_06_A	83577	821982	SS_CAM_06_A_0038.jpg	x		x									
SS_CAM_06_A	83571	821988	SS_CAM_06_A_0039.jpg		x	x									
SS_CAM_06_A	83566	821994	SS_CAM_06_A_0040.jpg		x	x									
SS_CAM_06_A	83555	822006	SS_CAM_06_A_0041.jpg	x		x									
SS_CAM_06_A	83551	822010	SS_CAM_06_A_0042.jpg	x		x									
SS_CAM_06_A	83547	822015	SS_CAM_06_A_0043.jpg	x		x									
SS_CAM_06_A	83543	822020	SS_CAM_06_A_0044.jpg	x		x									
SS_CAM_06_A	83538	822025	SS_CAM_06_A_0045.jpg	x		x									
SS_CAM_06_A	83533	822031	SS_CAM_06_A_0046.jpg	x		x									
SS_CAM_06_A	83529	822035	SS_CAM_06_A_0047.jpg	x		x									
SS_CAM_06_A	83524	822039	SS_CAM_06_A_0048.jpg	x		x									
SS_CAM_06_A	83518	822042	SS_CAM_06_A_0049.jpg	x		x									
SS_CAM_06_A	83512	822044	SS_CAM_06_A_0050.jpg	x		x									
SS_CAM_06_A	83505	822045	SS_CAM_06_A_0051.jpg	x		x									
SS_CAM_06_A	83500	822046	SS_CAM_06_A_0052.jpg	x		x									

Geodetics: British Grid: OSGB36															
Transect	Easting	Northing	Photo Name	Predominant Physical Habitat		No maerl	Dead maerl	Live Maerl Presence				Megaripples	Nephrops	Burrows	
				Gravelly Muddy Sand	Bedrock			<5%	<25%	<50%	>50%			1-3cm	3-15cm
SS_CAM_06_A	83493	822048	SS_CAM_06_A_0053.jpg	x		x									
SS_CAM_06_A	83488	822050	SS_CAM_06_A_0054.jpg	x		x									
SS_CAM_06_A	83480	822052	SS_CAM_06_A_0055.jpg	x		x									
SS_CAM_06_A	83475	822054	SS_CAM_06_A_0056.jpg	x		x									
SS_CAM_06_A	83469	822058	SS_CAM_06_A_0057.jpg	x		x									
SS_CAM_06_A	83463	822062	SS_CAM_06_A_0058.jpg	x		x									
SS_CAM_06_A	83456	822067	SS_CAM_06_A_0059.jpg	x		x									
SS_CAM_06_A	83450	822072	SS_CAM_06_A_0060.jpg	x		x									
SS_CAM_06_A	83443	822076	SS_CAM_06_A_0061.jpg	x		x									
SS_CAM_06_A	83438	822080	SS_CAM_06_A_0062.jpg	x		x									
SS_CAM_06_A	83432	822083	SS_CAM_06_A_0063.jpg	x		x									
SS_CAM_06_A	83427	822087	SS_CAM_06_A_0064.jpg	x		x								1	
SS_CAM_06_A	83421	822090	SS_CAM_06_A_0065.jpg	x		x									
SS_CAM_06_A	83416	822093	SS_CAM_06_A_0066.jpg		x	x									
SS_CAM_06_A	83409	822096	SS_CAM_06_A_0067.jpg	x		x									
SS_CAM_06_A	83404	822099	SS_CAM_06_A_0068.jpg	x		x									
SS_CAM_06_A	83397	822101	SS_CAM_06_A_0069.jpg	x		x									
SS_CAM_06_A	83390	822103	SS_CAM_06_A_0070.jpg	x		x									
SS_CAM_06_A	83385	822105	SS_CAM_06_A_0071.jpg	x		x									
SS_CAM_06_A	83377	822107	SS_CAM_06_A_0072.jpg		x	x									
SS_CAM_06_A	83369	822111	SS_CAM_06_A_0073.jpg	x		x								1	
SS_CAM_06_A	83363	822114	SS_CAM_06_A_0074.jpg	x		x									
SS_CAM_06_A	83355	822119	SS_CAM_06_A_0075.jpg	x		x								4	
SS_CAM_06_A	83348	822125	SS_CAM_06_A_0076.jpg	x		x								4	
SS_CAM_06_A	83340	822130	SS_CAM_06_A_0077.jpg	x		x									
SS_CAM_06_A	83333	822135	SS_CAM_06_A_0078.jpg	x		x									
SS_CAM_06_A	83327	822140	SS_CAM_06_A_0079.jpg	x		x									
SS_CAM_06_A	83320	822144	SS_CAM_06_A_0080.jpg	x		x									
SS_CAM_06_A	83313	822148	SS_CAM_06_A_0081.jpg	x		x									
SS_CAM_06_A	83307	822151	SS_CAM_06_A_0082.jpg	x		x								2	
SS_CAM_06_A	83300	822155	SS_CAM_06_A_0083.jpg	x		x									
SS_CAM_06_A	83294	822159	SS_CAM_06_A_0084.jpg	x		x									
SS_CAM_06_A	83286	822162	SS_CAM_06_A_0085.jpg	x		x									
SS_CAM_06_A	83278	822166	SS_CAM_06_A_0086.jpg	x		x									
SS_CAM_06_A	83270	822170	SS_CAM_06_A_0087.jpg	x		x									
SS_CAM_06_A	83263	822176	SS_CAM_06_A_0088.jpg	x		x									
SS_CAM_06_A	83255	822184	SS_CAM_06_A_0089.jpg	x		x									
SS_CAM_06_A	83249	822192	SS_CAM_06_A_0090.jpg	x		x									
SS_CAM_06_A	83241	822202	SS_CAM_06_A_0091.jpg	x		x									
SS_CAM_06_A	83233	822211	SS_CAM_06_A_0092.jpg	x		x									
SS_CAM_06_A	83227	822218	SS_CAM_06_A_0093.jpg	x		x								3	
SS_CAM_06_A	83221	822224	SS_CAM_06_A_0094.jpg	x		x								2	
SS_CAM_06_A	83214	822230	SS_CAM_06_A_0095.jpg	x		x									
SS_CAM_06_A	83207	822235	SS_CAM_06_A_0096.jpg	x		x									
SS_CAM_06_A	83200	822239	SS_CAM_06_A_0097.jpg	x		x									
SS_CAM_06_A	83192	822243	SS_CAM_06_A_0098.jpg	x		x									
SS_CAM_06_A	83183	822246	SS_CAM_06_A_0099.jpg	x		x									
SS_CAM_06_A	83176	822248	SS_CAM_06_A_0100.jpg	x		x									
SS_CAM_06_A	83168	822252	SS_CAM_06_A_0101.jpg	x		x								1	
SS_CAM_06_A	83160	822256	SS_CAM_06_A_0102.jpg	x		x								2	
SS_CAM_06_A	83153	822260	SS_CAM_06_A_0103.jpg	x		x								2	
SS_CAM_06_A	83144	822264	SS_CAM_06_A_0104.jpg	x		x								2	
SS_CAM_06_A	83138	822268	SS_CAM_06_A_0105.jpg	x		x									
SS_CAM_06_A	83129	822273	SS_CAM_06_A_0106.jpg	x		x									
SS_CAM_06_A	83121	822277	SS_CAM_06_A_0107.jpg	x		x								2	
SS_CAM_06_A	83115	822283	SS_CAM_06_A_0108.jpg	x		x									
SS_CAM_06_A	83108	822290	SS_CAM_06_A_0109.jpg	x		x									
SS_CAM_06_A	83103	822298	SS_CAM_06_A_0110.jpg	x		x									
SS_CAM_06_A	83098	822307	SS_CAM_06_A_0111.jpg	x		x									
SS_CAM_06_A	83095	822315	SS_CAM_06_A_0112.jpg	x		x									
SS_CAM_06_A	83093	822325	SS_CAM_06_A_0113.jpg	x		x									
SS_CAM_06_A	83090	822333	SS_CAM_06_A_0114.jpg	x		x									
SS_CAM_06_A	83085	822342	SS_CAM_06_A_0115.jpg	x		x									
SS_CAM_06_A	83080	822349	SS_CAM_06_A_0116.jpg	x		x									
SS_CAM_06_A	83073	822355	SS_CAM_06_A_0117.jpg	x		x									
SS_CAM_06_A	83067	822360	SS_CAM_06_A_0118.jpg	x		x									
SS_CAM_06_A	83061	822363	SS_CAM_06_A_0119.jpg	x		x								1	
SS_CAM_06_A	83055	822366	SS_CAM_06_A_0120.jpg	x		x									
SS_CAM_06_A	83050	822369	SS_CAM_06_A_0121.jpg*												
SS_CAM_06_A	83044	822372	SS_CAM_06_A_0122.jpg	x		x									
SS_CAM_06_A	83037	822374	SS_CAM_06_A_0123.jpg	x		x									
SS_CAM_06_A	83032	822377	SS_CAM_06_A_0124.jpg	x		x									
SS_CAM_06_A	83027	822381	SS_CAM_06_A_0125.jpg	x		x									
SS_CAM_06_A	83022	822385	SS_CAM_06_A_0126.jpg			x									
SS_CAM_06_A	83017	822390	SS_CAM_06_A_0127.jpg			x									
SS_CAM_07_A	83213	821808	SS_CAM_07_A_0002.jpg	x			x	x							
SS_CAM_07_A	83219	821811	SS_CAM_07_A_0003.jpg	x			x	x							
SS_CAM_07_A	83225	821815	SS_CAM_07_A_0004.jpg	x			x								

Geodetics: British Grid: OSGB36															
Transect	Easting	Northing	Photo Name	Predominant Physical Habitat		No maerl	Dead maerl	Live Maerl Presence				Megaripples	Nephrops	Burrows	
				Gravelly Muddy Sand	Bedrock			<5%	<25%	<50%	>50%			1-3cm	3-15cm
SS_CAM_07_A	83232	821819	SS_CAM_07_A_0005.jpg	x			x								
SS_CAM_07_A	83235	821822	SS_CAM_07_A_0006.jpg	x			x	x						4	
SS_CAM_07_A	83239	821829	SS_CAM_07_A_0007.jpg	x			x	x						1	
SS_CAM_07_A	83244	821837	SS_CAM_07_A_0008.jpg	x			x	x						1	
SS_CAM_07_A	83259	821862	SS_CAM_07_A_0009.jpg	x			x								
SS_CAM_07_A	83264	821872	SS_CAM_07_A_0010.jpg	x			x	x							
SS_CAM_07_A	83268	821879	SS_CAM_07_A_0011.jpg	x			x								
SS_CAM_07_A	83271	821889	SS_CAM_07_A_0012.jpg	x			x	x							
SS_CAM_07_A	83274	821898	SS_CAM_07_A_0013.jpg	x			x								
SS_CAM_07_A	83276	821907	SS_CAM_07_A_0014.jpg	x			x	x							
SS_CAM_07_A	83277	821915	SS_CAM_07_A_0015.jpg	x			x	x							
SS_CAM_07_A	83277	821923	SS_CAM_07_A_0016.jpg	x			x								
SS_CAM_07_A	83278	821931	SS_CAM_07_A_0017.jpg	x			x	x							
SS_CAM_07_A	83280	821939	SS_CAM_07_A_0018.jpg	x			x	x							
SS_CAM_07_A	83283	821948	SS_CAM_07_A_0019.jpg	x			x	x							
SS_CAM_07_A	83286	821956	SS_CAM_07_A_0020.jpg	x			x	x							
SS_CAM_07_A	83290	821964	SS_CAM_07_A_0021.jpg	x			x	x							
SS_CAM_07_A	83294	821972	SS_CAM_07_A_0022.jpg	x			x								
SS_CAM_07_A	83298	821981	SS_CAM_07_A_0023.jpg	x			x								
SS_CAM_07_A	83302	821988	SS_CAM_07_A_0024.jpg	x			x	x						1	
SS_CAM_07_A	83305	821997	SS_CAM_07_A_0025.jpg	x			x	x							
SS_CAM_07_A	83308	822004	SS_CAM_07_A_0026.jpg	x			x								
SS_CAM_07_A	83311	822011	SS_CAM_07_A_0027.jpg	x			x	x							
SS_CAM_07_A	83315	822018	SS_CAM_07_A_0028.jpg	x			x								
SS_CAM_07_A	83319	822026	SS_CAM_07_A_0029.jpg	x			x								
SS_CAM_07_A	83322	822032	SS_CAM_07_A_0030.jpg	x			x	x							
SS_CAM_07_A	83326	822039	SS_CAM_07_A_0031.jpg	x			x	x							
SS_CAM_07_A	83329	822046	SS_CAM_07_A_0032.jpg		x	x									
SS_CAM_07_A	83335	822056	SS_CAM_07_A_0033.jpg		x		x								
SS_CAM_07_A	83338	822061	SS_CAM_07_A_0034.jpg		x	x									
SS_CAM_07_A	83340	822065	SS_CAM_07_A_0035.jpg		x	x									
SS_CAM_07_A	83343	822070	SS_CAM_07_A_0036.jpg		x	x									
SS_CAM_07_A	83345	822074	SS_CAM_07_A_0037.jpg	x		x									
SS_CAM_07_A	83348	822083	SS_CAM_07_A_0038.jpg	x		x									
SS_CAM_07_A	83351	822087	SS_CAM_07_A_0039.jpg	x		x								1	
SS_CAM_07_A	83355	822092	SS_CAM_07_A_0040.jpg	x		x									
SS_CAM_07_A	83359	822096	SS_CAM_07_A_0041.jpg	x		x									
SS_CAM_07_A	83363	822100	SS_CAM_07_A_0042.jpg	x		x									
SS_CAM_07_A	83366	822104	SS_CAM_07_A_0043.jpg	x		x									
SS_CAM_07_A	83369	822109	SS_CAM_07_A_0044.jpg	x		x									
SS_CAM_07_A	83371	822113	SS_CAM_07_A_0045.jpg	x		x									
SS_CAM_07_A	83372	822118	SS_CAM_07_A_0046.jpg	x		x									
SS_CAM_07_A	83374	822124	SS_CAM_07_A_0047.jpg	x		x									
SS_CAM_07_A	83376	822131	SS_CAM_07_A_0048.jpg	x		x									
SS_CAM_07_A	83377	822136	SS_CAM_07_A_0049.jpg	x		x									
SS_CAM_07_A	83378	822142	SS_CAM_07_A_0050.jpg	x		x									
SS_CAM_07_A	83379	822147	SS_CAM_07_A_0051.jpg	x		x									
SS_CAM_07_A	83379	822151	SS_CAM_07_A_0052.jpg	x		x									
SS_CAM_07_A	83381	822156	SS_CAM_07_A_0053.jpg	x		x									
SS_CAM_07_A	83382	822161	SS_CAM_07_A_0054.jpg	x		x								2	
SS_CAM_07_A	83383	822167	SS_CAM_07_A_0055.jpg	x		x								2	
SS_CAM_07_A	83385	822171	SS_CAM_07_A_0056.jpg	x		x									
SS_CAM_07_A	83386	822176	SS_CAM_07_A_0057.jpg	x		x									
SS_CAM_07_A	83388	822181	SS_CAM_07_A_0058.jpg	x		x									
SS_CAM_07_A	83392	822186	SS_CAM_07_A_0059.jpg	x		x									1
SS_CAM_07_A	83394	822190	SS_CAM_07_A_0060.jpg	x		x									
SS_CAM_07_A	83396	822195	SS_CAM_07_A_0061.jpg	x		x									
SS_CAM_07_A	83398	822199	SS_CAM_07_A_0062.jpg	x		x									
SS_CAM_07_A	83399	822203	SS_CAM_07_A_0063.jpg	x		x									
SS_CAM_07_A	83402	822209	SS_CAM_07_A_0064.jpg	x		x									
SS_CAM_07_A	83404	822214	SS_CAM_07_A_0065.jpg	x		x									
SS_CAM_07_A	83406	822222	SS_CAM_07_A_0066.jpg	x		x									
SS_CAM_07_A	83408	822228	SS_CAM_07_A_0067.jpg	x		x									
SS_CAM_07_A	83409	822234	SS_CAM_07_A_0068.jpg	x		x									
SS_CAM_07_A	83410	822240	SS_CAM_07_A_0069.jpg	x		x								1	
SS_CAM_07_A	83411	822248	SS_CAM_07_A_0070.jpg	x		x									
SS_CAM_07_A	83413	822256	SS_CAM_07_A_0071.jpg	x		x									
SS_CAM_07_A	83414	822263	SS_CAM_07_A_0072.jpg	x		x									
SS_CAM_07_A	83414	822270	SS_CAM_07_A_0073.jpg	x		x									
SS_CAM_07_A	83415	822276	SS_CAM_07_A_0074.jpg	x		x									
SS_CAM_07_A	83418	822283	SS_CAM_07_A_0075.jpg	x		x									
SS_CAM_07_A	83422	822290	SS_CAM_07_A_0076.jpg	x		x									
SS_CAM_07_A	83427	822298	SS_CAM_07_A_0077.jpg	x		x									
SS_CAM_07_A	83430	822305	SS_CAM_07_A_0078.jpg	x		x									
SS_CAM_07_A	83432	822312	SS_CAM_07_A_0079.jpg	x		x									
SS_CAM_07_A	83435	822320	SS_CAM_07_A_0080.jpg	x		x									
SS_CAM_07_A	83439	822329	SS_CAM_07_A_0081.jpg	x		x									
SS_CAM_07_A	83444	822340	SS_CAM_07_A_0082.jpg	x		x									

Transect	Easting	Northing	Photo Name	Predominant Physical Habitat: Gravelly Muddy Sand	Predominant Physical Habitat: Bedrock	No maerl	Dead maerl	Live Maerl Presence: <5%	Live Maerl Presence: <25%	Live Maerl Presence: <50%	Live Maerl Presence: >50%	Megaripples	Nephrops	Burrows: 1-3cm	Burrows: 3-15cm
Geodetics: British Grid: OSGB36															
SS_CAM_07_A	83448	822348	SS_CAM_07_A_0083.jpg	x		x									
SS_CAM_07_A	83451	822357	SS_CAM_07_A_0084.jpg	x		x									
SS_CAM_07_A	83455	822366	SS_CAM_07_A_0085.jpg	x		x									
SS_CAM_07_A	83457	822374	SS_CAM_07_A_0086.jpg	x		x									
SS_CAM_07_A	83460	822383	SS_CAM_07_A_0087.jpg	x		x									
SS_CAM_07_A	83462	822391	SS_CAM_07_A_0088.jpg	x		x									
SS_CAM_07_A	83465	822399	SS_CAM_07_A_0089.jpg	x		x									
SS_CAM_07_A	83467	822407	SS_CAM_07_A_0090.jpg		x	x									
SS_CAM_07_A	83469	822415	SS_CAM_07_A_0091.jpg	x		x									
SS_CAM_07_A	83472	822425	SS_CAM_07_A_0092.jpg	x		x								1	
SS_CAM_07_A	83476	822434	SS_CAM_07_A_0093.jpg	x		x									
SS_CAM_07_A	83481	822444	SS_CAM_07_A_0094.jpg	x		x									
SS_CAM_07_A	83485	822453	SS_CAM_07_A_0095.jpg	x		x									
SS_CAM_07_A	83489	822462	SS_CAM_07_A_0096.jpg	x		x									
SS_CAM_07_A	83496	822481	SS_CAM_07_A_0097.jpg	x		x								2	
SS_CAM_07_A	83497	822491	SS_CAM_07_A_0098.jpg	x		x								1	
SS_CAM_07_A	83498	822499	SS_CAM_07_A_0099.jpg	x		x									
SS_CAM_07_A	83497	822509	SS_CAM_07_A_0100.jpg	x		x								4	
SS_CAM_09_Maerl_B	84083	823184	SS_CAM_09_B_0004.jpg	x			x								
SS_CAM_09_Maerl_B	84077	823181	SS_CAM_09_B_0005.jpg	x			x	x							
SS_CAM_09_Maerl_B	84066	823168	SS_CAM_09_B_0006.jpg	x			x	x							
SS_CAM_09_Maerl_B	84062	823158	SS_CAM_09_B_0007.jpg	x			x	x							
SS_CAM_09_Maerl_B	84059	823148	SS_CAM_09_B_0008.jpg	x			x	x						1	
SS_CAM_09_Maerl_B	84056	823138	SS_CAM_09_B_0009.jpg	x			x	x							
SS_CAM_09_Maerl_B	84055	823127	SS_CAM_09_B_0010.jpg	x			x	x						2	
SS_CAM_09_Maerl_B	84053	823117	SS_CAM_09_B_0011.jpg	x			x	x							
SS_CAM_09_Maerl_B	84053	823108	SS_CAM_09_B_0012.jpg	x			x	x							
SS_CAM_09_Maerl_B	84052	823100	SS_CAM_09_B_0013.jpg	x			x	x							
SS_CAM_09_Maerl_B	84050	823093	SS_CAM_09_B_0014.jpg	x			x	x							
SS_CAM_09_Maerl_B	84048	823087	SS_CAM_09_B_0015.jpg	x			x							3	
SS_CAM_09_Maerl_B	84046	823081	SS_CAM_09_B_0016.jpg	x			x	x							
SS_CAM_09_Maerl_B	84043	823075	SS_CAM_09_B_0017.jpg	x			x	x							
SS_CAM_09_Maerl_B	84041	823069	SS_CAM_09_B_0018.jpg	x			x	x							
SS_CAM_09_Maerl_B	84038	823061	SS_CAM_09_B_0019.jpg	x			x	x							
SS_CAM_09_Maerl_B	84035	823055	SS_CAM_09_B_0020.jpg	x			x	x							
SS_CAM_09_Maerl_B	84030	823049	SS_CAM_09_B_0021.jpg	x			x	x							
SS_CAM_09_Maerl_B	84026	823042	SS_CAM_09_B_0022.jpg	x			x	x							
SS_CAM_09_Maerl_B	84023	823034	SS_CAM_09_B_0023.jpg	x			x	x							
SS_CAM_09_Maerl_B	84020	823029	SS_CAM_09_B_0024.jpg	x			x								
SS_CAM_09_Maerl_B	84017	823022	SS_CAM_09_B_0025.jpg	x			x	x							
SS_CAM_09_Maerl_B	84015	823016	SS_CAM_09_B_0026.jpg	x			x	x							
SS_CAM_09_Maerl_B	84012	823010	SS_CAM_09_B_0027.jpg	x			x	x						4	
SS_CAM_09_Maerl_B	84009	823005	SS_CAM_09_B_0028.jpg	x			x	x						2	
SS_CAM_09_Maerl_B	84006	823000	SS_CAM_09_B_0029.jpg	x			x	x							
SS_CAM_09_Maerl_B	84003	822994	SS_CAM_09_B_0030.jpg	x			x	x						2	
SS_CAM_09_Maerl_B	83999	822988	SS_CAM_09_B_0031.jpg	x			x	x						2	
SS_CAM_09_Maerl_B	83997	822982	SS_CAM_09_B_0032.jpg	x			x	x							
SS_CAM_09_Maerl_B	83996	822976	SS_CAM_09_B_0033.jpg	x			x	x							
SS_CAM_09_Maerl_B	83996	822968	SS_CAM_09_B_0034.jpg	x			x	x							
SS_CAM_09_Maerl_B	83995	822961	SS_CAM_09_B_0035.jpg	x			x	x							
SS_CAM_09_Maerl_B	83994	822954	SS_CAM_09_B_0036.jpg	x			x	x							
SS_CAM_09_Maerl_B	83993	822947	SS_CAM_09_B_0037.jpg	x			x								
SS_CAM_09_Maerl_B	83990	822941	SS_CAM_09_B_0038.jpg	x			x								
SS_CAM_09_Maerl_B	83986	822934	SS_CAM_09_B_0039.jpg	x			x								
SS_CAM_09_Maerl_B	83982	822929	SS_CAM_09_B_0040.jpg	x			x	x							
SS_CAM_09_Maerl_B	83978	822922	SS_CAM_09_B_0041.jpg	x			x								
SS_CAM_09_Maerl_B	83975	822917	SS_CAM_09_B_0042.jpg	x			x								
SS_CAM_09_Maerl_B	83973	822910	SS_CAM_09_B_0043.jpg	x			x							1	
SS_CAM_09_Maerl_B	83972	822903	SS_CAM_09_B_0044.jpg	x			x							1	
SS_CAM_09_Maerl_B	83970	822897	SS_CAM_09_B_0045.jpg	x			x								
SS_CAM_09_Maerl_B	83968	822890	SS_CAM_09_B_0046.jpg	x			x								
SS_CAM_09_Maerl_B	83965	822883	SS_CAM_09_B_0047.jpg	x			x								
SS_CAM_09_Maerl_B	83963	822877	SS_CAM_09_B_0048.jpg	x			x								
SS_CAM_09_Maerl_B	83962	822871	SS_CAM_09_B_0049.jpg	x			x								
SS_CAM_09_Maerl_B	83960	822865	SS_CAM_09_B_0050.jpg	x			x								
SS_CAM_09_Maerl_B	83958	822858	SS_CAM_09_B_0051.jpg	x			x	x							
SS_CAM_09_Maerl_B	83956	822852	SS_CAM_09_B_0052.jpg	x			x								
SS_CAM_09_Maerl_B	83953	822846	SS_CAM_09_B_0053.jpg	x			x								
SS_CAM_09_Maerl_B	83950	822841	SS_CAM_09_B_0054.jpg	x			x								
SS_CAM_09_Maerl_B	83945	822834	SS_CAM_09_B_0055.jpg	x			x								
SS_CAM_09_Maerl_B	83939	822829	SS_CAM_09_B_0056.jpg	x			x								
SS_CAM_09_Maerl_B	83933	822824	SS_CAM_09_B_0057.jpg	x			x								
SS_CAM_09_Maerl_B	83928	822819	SS_CAM_09_B_0058.jpg	x			x							1	
SS_CAM_09_Maerl_B	83923	822812	SS_CAM_09_B_0059.jpg	x			x								
SS_CAM_09_Maerl_B	83920	822806	SS_CAM_09_B_0060.jpg	x			x								
SS_CAM_09_Maerl_B	83917	822799	SS_CAM_09_B_0061.jpg	x			x								
SS_CAM_09_Maerl_B	83916	822793	SS_CAM_09_B_0062.jpg	x			x								
SS_CAM_09_Maerl_B	83917	822785	SS_CAM_09_B_0063.jpg	x			x							1	

Geodetics: British Grid: OSGB36															
Transect	Easting	Northing	Photo Name	Predominant Physical Habitat		No maerl	Dead maerl	Live Maerl Presence				Megaripples	Nephrops	Burrows	
				Gravelly Muddy Sand	Bedrock			<5%	<25%	<50%	>50%			1-3cm	3-15cm
SS_CAM_09_Maerl_B	83918	822777	SS_CAM_09_B_0064.jpg	x			x								
SS_CAM_09_Maerl_B	83919	822771	SS_CAM_09_B_0065.jpg	x			x							3	
SS_CAM_09_Maerl_B	83919	822765	SS_CAM_09_B_0066.jpg	x			x							1	
SS_CAM_09_Maerl_B	83919	822759	SS_CAM_09_B_0067.jpg	x			x								1
SS_CAM_09_Maerl_B	83919	822750	SS_CAM_09_B_0068.jpg	x			x								
SS_CAM_09_Maerl_B	83917	822743	SS_CAM_09_B_0069.jpg	x			x								
SS_CAM_09_Maerl_B	83915	822737	SS_CAM_09_B_0070.jpg	x			x								
SS_CAM_09_Maerl_B	83913	822729	SS_CAM_09_B_0071.jpg	x			x							1	
SS_CAM_09_Maerl_B	83911	822722	SS_CAM_09_B_0072.jpg	x			x								
SS_CAM_09_Maerl_B	83909	822715	SS_CAM_09_B_0073.jpg	x			x								
SS_CAM_09_Maerl_B	83906	822707	SS_CAM_09_B_0074.jpg	x			x								
SS_CAM_09_Maerl_B	83904	822701	SS_CAM_09_B_0075.jpg	x			x	x						2	
SS_CAM_09_Maerl_B	83904	822693	SS_CAM_09_B_0076.jpg	x			x								
SS_CAM_09_Maerl_C	83657	822488	SS_CAM_09_C0002.jpg	x		x									
SS_CAM_09_Maerl_C	83663	822496	SS_CAM_09_C0003.jpg	x		x								2	1
SS_CAM_09_Maerl_C	83672	822503	SS_CAM_09_C0004.jpg	x		x									
SS_CAM_09_Maerl_C	83681	822509	SS_CAM_09_C0005.jpg	x		x								2	
SS_CAM_09_Maerl_C	83687	822514	SS_CAM_09_C0006.jpg	x		x									
SS_CAM_09_Maerl_C	83695	822520	SS_CAM_09_C0007.jpg	x		x									
SS_CAM_09_Maerl_C	83700	822525	SS_CAM_09_C0008.jpg	x		x									
SS_CAM_09_Maerl_C	83706	822531	SS_CAM_09_C0009.jpg	x		x									
SS_CAM_09_Maerl_C	83712	822535	SS_CAM_09_C0010.jpg	x		x									
SS_CAM_09_Maerl_C	83720	822539	SS_CAM_09_C0011.jpg	x		x									
SS_CAM_09_Maerl_C	83727	822542	SS_CAM_09_C0012.jpg	x		x									
SS_CAM_09_Maerl_C	83734	822547	SS_CAM_09_C0013.jpg	x			x								
SS_CAM_09_Maerl_C	83740	822551	SS_CAM_09_C0014.jpg	x			x								
SS_CAM_09_Maerl_C	83747	822556	SS_CAM_09_C0015.jpg	x			x								
SS_CAM_09_Maerl_C	83753	822560	SS_CAM_09_C0016.jpg	x			x								
SS_CAM_09_Maerl_C	83762	822564	SS_CAM_09_C0017.jpg	x			x								
SS_CAM_09_Maerl_C	83768	822569	SS_CAM_09_C0018.jpg	x			x								
SS_CAM_09_Maerl_C	83774	822575	SS_CAM_09_C0019.jpg	x			x							2	
SS_CAM_09_Maerl_C	83779	822582	SS_CAM_09_C0020.jpg	x			x								
SS_CAM_09_Maerl_C	83785	822589	SS_CAM_09_C0021.jpg	x			x							2	
SS_CAM_09_Maerl_C	83792	822597	SS_CAM_09_C0022.jpg	x			x							1	
SS_CAM_09_Maerl_C	83798	822601	SS_CAM_09_C0023.jpg	x			x							1	
SS_CAM_09_Maerl_C	83804	822607	SS_CAM_09_C0024.jpg	x			x							3	
SS_CAM_09_Maerl_C	83811	822613	SS_CAM_09_C0025.jpg		x		x								
SS_CAM_09_Maerl_C	83818	822618	SS_CAM_09_C0026.jpg		x		x								
SS_CAM_09_Maerl_C	83824	822622	SS_CAM_09_C0027.jpg		x		x								
SS_CAM_09_Maerl_C	83830	822628	SS_CAM_09_C0028.jpg		x		x								
SS_CAM_09_Maerl_C	83837	822631	SS_CAM_09_C0029.jpg		x		x								

** – due to poor visibility some stills were unable to be included in the interpretation*

Appendix VII – Spearman's Correlation

Spearman's Correlation Coefficient (Two-tailed)	
Number of Data Points	10
p=0.05, 95% Significant	0.648
p=0.01, 99% Significant	0.794
p=0.001, 99.9% Significant	0.903

	Depth (m)	Mean Sediment Size (mm)	Sorting	Skewness	Kurtosis	Fines (%)	Sands (%)	Gravel (%)	TOC (% w/w)	Number of Species (S)	Number of individuals (N) N	Richness (Margalef)	Evenness (Pielou's Evenness)	Shannon-Wiener Diversity	Simpsons Diversity (1-Lambda')
Depth (m)		0.588	-0.435	0.365	-0.482	-0.318	0.506	-0.376	0.050	0.116	0.271	-0.223	-0.306	-0.341	-0.577
Mean Sediment Size (mm)			0.212	0.079	0.127	-0.733	0.648	0.103	-0.479	0.328	0.248	0.115	-0.430	0.127	-0.472
Sorting				-0.673	0.939	-0.115	0.030	0.079	-0.405	-0.363	-0.273	-0.224	0.188	-0.018	0.087
Skewness					-0.721	-0.212	0.297	0.030	-0.147	0.187	-0.055	0.115	-0.042	0.055	-0.050
Kurtosis						0.055	-0.152	0.127	-0.295	-0.328	-0.345	-0.103	0.261	0.127	0.174
Fines (%)							-0.818	-0.358	0.774	-0.398	-0.200	-0.321	0.370	-0.309	0.174
Sands (%)								-0.212	-0.503	0.129	0.261	-0.055	-0.430	-0.091	-0.323
Gravel (%)									-0.528	0.527	-0.127	0.770	0.067	0.794	0.311
TOC (% w/w)										0.017	0.405	-0.172	-0.221	-0.393	-0.222
Number of Species (S)											0.703	0.867	-0.714	0.597	-0.211
Number of individuals (N) N												0.321	-0.842	0.042	-0.385
Richness (Margalef)													-0.418	0.818	0.075
Evenness (Pielou's Evenness)														0.018	0.696
Shannon-Wiener Diversity															0.535
Simpsons Diversity (1-Lambda')															

Appendix VIII – AQC Certification of Laboratories

Title pages of accreditation certificates for laboratories used for analysis are given below, with full certificates available freely online.

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

UKAS TESTING 1252 Accredited to ISO/IEC 17025:2005	**SOCOTEC UK LIMITED** **Issue No:** 090 **Issue date:** 08 October 2019	
	Environmental Chemistry PO Box 100 Bretby Business Park Burton-on-Trent Staffordshire DE15 0XD	Contact: [redacted] Tel: [redacted] website: www.socotec.co.uk
Testing performed by the Organisation at the locations specified		

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details		Activity	Location code
Address SOCOTEC House Bretby Business Park Ashby Road Bretby Burton upon Trent Staffs DE15 0YZ	**Local contact** [redacted] Tel: [redacted]	Environmental Chemistry Forensics Specialist Chemistry	Bretby
Address Unit 12 Moorbrook Southmead Industrial Park Didcot Oxfordshire OX11 7HP	**Local contact** [redacted] Tel: [redacted]	Environmental Radiochemistry Environmental Chemistry	Didcot

Site activities performed away from the locations listed above:

Location details	Activity	Location code
All site locations suitable for the activities listed	Sampling and on-site testing	Site - Env

Schedule of Accreditation
issued by
United Kingdom Accreditation Service
2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

1157 **Accredited to ISO/IEC 17025:2005**	**SOCOTEC UK Limited** **Issue No:** 034 **Issue date:** 01 November 2017	
	Askern Road **Carcroft** **Doncaster** **South Yorkshire** **DN6 8DG**	**Contact:** [redacted] **Tel:** [redacted] **Fax:** [redacted] **E-Ma**[redacted] **Website: www.socotec.co.uk**
Testing performed by the Organisation at the locations specified below		

Locations covered by the organisation and their relevant activities

Laboratory locations:

Location details		Activity	Location code
Address Askern Road Carcroft Doncaster South Yorkshire DN6 8DG	**Local contact** [redacted]	Testing of soil and rock for civil engineering purposes	A

Site activities performed away from the locations listed above:

Location details		Activity	Location code
Ground Investigation Sites	[redacted]	In-situ testing of soils for civil engineering purposes	B
Ground Investigation Sites	[redacted] Tel: [redacted] Fax: [redacted] Emai[redacted]	Cone penetration testing	C

United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE

UKAS
UNITED KINGDOM ACCREDITATION SERVICE

TESTING LABORATORY
No. 1205

Environmental Scientifics Group Limited
Trading as TES Bretby

is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005 *General Requirements for the competence of testing and calibration laboratories.*

This accreditation demonstrates technical competence for a defined scope as detailed in and at the locations specified in the schedule to this certificate, and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated 18 June 2005).

The schedule to this certificate is an essential accreditation document and from time to time may be revised and reissued by the United Kingdom Accreditation Service. The most recent issue of the schedule of accreditation, which bears the same accreditation number as this certificate, is available from the UKAS website www.ukas.org.

This accreditation is subject to continuing conformity with United Kingdom Accreditation Service requirements. The absence of a schedule on the UKAS website indicates that the accreditation is no longer in force.

[redacted]

Accreditation Manager, United Kingdom Accreditation Service

Initial Accreditation date	**This certificate issued on**
12 October 1992	**01 November 2010**

The Department for Innovation, Universities and Skills (DIUS) has entered into a memorandum of understanding with the United Kingdom Accreditation Service (UKAS) through which UKAS is recognised as the national body responsible for assessing and accrediting the competence of organisations in the fields of calibration, testing, inspection and certification of systems, products and persons

Appendix IX – Service Warranty

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