



## EIAR Addendum

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Appendix 8-A Benthic Subtidal  
Survey Report 2025



# Appendix 8-A Benthic Subtidal Report 2025

CWP-NPC-CON-10-REP-0008

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**Codling Wind Park Limited (CWPL)**

5 February 2026



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## Document history

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**Table C: Abbreviations used with the text**

Acronym	Definition
AL	Action Level
ANOSIM	One-way Analysis of Similarity
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CWP	Codling Wind Park
CWPL	Codling Wind Park Limited
GPS	Global Positioning System
EIAR	Environmental Impact Assessment Report
EMODnet	European Marine Observation and Data Network

Acronym	Definition
FOCI	Features of Conservation Interest
HPI	Habitat of Principal Importance
JAMP	Joint Assessment and Monitoring Programme
JNCC	Joint Nature Conservation Committee
LOI	Loss on Ignition
MAC	Marine Area Consent
MarLIN	Marine Life Information Network
MEDIN	Marine Environmental Data and Information Network
NMBAQC	National Marine Biological Analytical Quality Control
NMDS	Non-Metric Multidimensional Scaling
NPWS	National Parks and Wildlife Service
OECC	offshore export cable corridor
OSPAR	Oslo-Paris Convention for the Protection of the Marine Environment of the North-East Atlantic
OWF	offshore wind farm
PMF	Priority Marine Feature
PSA	Particle Size Analysis
RFI	Request for Further Information
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SIMPER	Similarity Percentages Analysis
SIMPROF	Similarity Profile Analysis
SSC	Suspended Sediment Concentration
TOC	Total Organic Carbon
UK BAP	United Kingdom Biodiversity Action Plan
UKAS	United Kingdom Accreditation Service
WoRMS	World Register of Marine Species

# 1. Introduction

## 1.1. Project Background

Codling Wind Park Limited (CWPL) is proposing to develop the Codling Wind Park (CWP) Project, which is located in the Irish Sea approximately 13 - 22 km off the east coast of Ireland, at County Wicklow.

On Friday 6th September 2024 CWPL (referred to hereafter as the 'Applicant') applied for planning permission to An Coimisiún Pleanála (ACP) (referred to hereafter as the 'Commission') under Section 291 of the Planning and Development Act (PDA) 2000, as amended, for the construction, operation and decommissioning of the CWP Project.

On 1<sup>st</sup> August 2025, having reviewed the application documentation, including the Environmental Impact Assessment Report (EIAR) and the Natura Impact Statement (NIS), the Commission issued a Further Information Request (FIR) in relation to the CWP Project.

Natural Power Consultants Ltd (Natural Power) has been appointed to manage and execute the delivery of a benthic subtidal ecology survey to support the Applicant's FIR response.

This document is intended to support **Section 8** of the **EIAR Addendum** and provides a validation of the baseline characterisation provided in **Volume 3, Chapter 8 Subtidal and Intertidal Ecology** and **Volume 4, Appendix 8.3 Benthic Baseline Report** of the EIAR.

## 1.2. Document Purpose

This report has been produced to present the findings of the 2025 subtidal benthic ecology survey. The survey had two objectives:

- To undertake an underwater video survey and a grab survey, the repeating sample locations wherever practicable; and
- To collect sediment samples for contaminated sediment analysis at a subset of the benthic sampling stations.

## 2. Benthic Baseline Survey Design

Sampling stations were located throughout the array site and offshore export cable corridor (OECC) areas with locations positioned to achieve the following criteria:

- Repeat locations previously sampled for comparison where possible;
- Achieve an even spread of locations across the survey area; and
- Ensure a proportional representation of habitat types known or predicted to exist within the survey area.

Underwater video sampling took place prior to benthic grabbing and the footage assessed *in situ* to identify any protected habitats or species.

### 2.1. Summary of Existing Knowledge of the Site

No Annex I habitats or Annex II species were recorded during the previous site-specific surveys undertaken within the offshore development area. Although the reef-forming polychaetes *Sabellaria spinulosa* and *Sabellaria alveolata* were detected at low abundances within both the array site and the OECC, no stations met the criteria to be classified as *Sabellaria* reef habitat (see **Volume 4, Appendix 8.3 Benthic Baseline Report** of the EIAR). The nearest potential *Sabellaria* reef occurs within the Wicklow Reef Special Area of Conservation (SAC) to the south of the development area (National Parks and Wildlife Service (NPWS, 2013<sup>1</sup>)).

There are no protected areas for benthic habitats within the footprint of the array site itself. The offshore export cable corridor (OECC) intersects two designated Natura 2000 sites:

- Rockabill to Dalkey Island SAC, designated for intertidal and subtidal reefs; and
- South Dublin Bay SAC, designated for mudflats and sandflats, saltmarsh and dune habitats.

The landfall point for the OECC is located within the South Dublin Bay SAC. Rockabill to Dalkey Island SAC supports a range of reef habitats associated with flat and sloping bedrock, vertical rock faces, cobbles and boulders. These reef features occur in association with the islands within the SAC, on the south coast of Howth, and in offshore areas between Lambay Island and Rush Village (NPWS, 2013<sup>2</sup>).

Within the South Dublin Bay SAC, the mudflats and sandflats Qualifying Interest includes a *Zostera sp.* seagrass bed located in the southern portion of the protected area (NPWS, 2013<sup>3</sup>). Although this lies outside the OECC, and is not a listed feature of the SAC, it is of conservation significance, being listed as both an Annex I and Oslo-Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) habitat. The baseline subtidal benthic ecology survey found a heterogenous environment with four biotopes classified across the array and OECC. The sediment types varied and included gravel and cobbles, boulders, sand, gravel, gravelly sand/sandy gravel and slightly gravelly sand. The most widespread biotope across the array area is *Mediomastus fragilis*, *Lumbrineris spp.* and venerid bivalves in circalittoral coarse sand or gravel (SS.SCS.CCS.MedLumVen). No single biotope dominated the OECC but all most consisted of circalittoral coarse sediment (**Volume 4, Appendix 8.3 Benthic Baseline Report** of the EIAR).

## 3. Survey Methodology

### 3.1. Underwater Video Survey

All sample locations were sampled using an observation class Remotely Operated Vehicle (ROV). The ROV recorded video footage within the unit at ultra-high definition 4K resolution which was viewed in real time at the surface during deployment, with a minimum of three minutes of video footage collected at each sample station. During deployment, whilst recording video imagery, a minimum of three still images were captured per sampling station. The system was equipped with video LED flood lights (6000 lumens) to provide illumination of the seabed.

Surveys were undertaken during appropriate tides/weather conditions to allow optimum visual imagery capture. At each sampling station, the immediate survey area was checked for obstructions e.g., static fishing gear. The ROV was prepared for deployment while the vessel moved into position to start the drop. The vessel approached the sample location identified and positioned itself so that wind and tide caused the vessel to drift away from the equipment whilst deployed to avoid snagging of the umbilical cable.

The image feed was reviewed as the data was collected to enable the confirmation of image quality, and any seabed features recorded.

Notes on the visible sediment conditions, seabed features and fauna were made *in situ* together with Global Positioning System (GPS) position, water depth and date/time. Positions were fixed at the start and end of each deployment. The ROV was recovered to the vessel, and the haul line was coiled into a box to ensure it did not tangle for any subsequent deployments and to avoid trip hazards. The vessel then moved to the next sampling station. In accordance with Irish guidance (Department of Communications, Climate Action and Environment (DCCAE), 2016) the ROV was also used to check suitability of benthic grab stations, ensuring no Annex I (EU Habitats Directive 92/43/EEC) or sensitive habitats were present prior to grabs being collected.

### 3.2. Benthic Grab Survey

The grab survey was undertaken at 44 of the 46 sampling stations where sediment was suitable for grab sampling (it was not possible to achieve a grab sample at two stations and at an additional station it was not possible to achieve a grab sample for sediment analysis), across the CWP array and OECC, in order to collect information on the physical nature of the seafloor and the composition of the infauna, as per DCCAE (2016), Limpenny *et al.* (2010), Coggan *et al.* (2007), and JNCC Marine Monitoring Handbook Procedural Guidance 3-5 (Holt & Sanderson, 2001) and the JNCC Marine Monitoring Handbook Procedural Guideline 3-9 (Thomas N.S., 2001) and the Centre for Environment, Fisheries and Aquaculture Science (Cefas) guidelines (Ware and Kenny 2011).

Benthic sampling was undertaken using a 0.1 m<sup>2</sup> mini-Hamon grab with a sample depth penetration of up to 20 cm. At each sampling station the grab was deployed via the vessel crane and winch operated only by experienced vessel crew, and once fired on the seabed, recovered. After successful grabs were recovered, providing each grab sample was deemed acceptable by the lead surveyor (according to the relevant protocols), the samples were fully described (sediment and biological characterisation), and a photograph was taken before further processing. Up to three failed attempts per sampling station was allowed, prior to abandoning that sampling station. The sample was deemed unacceptable if the sample represented less than half the total capacity, the grab had not struck the seabed in a flat area resulting in an incomplete sample, or the grab jaws were not fully closed. All locations where a grab failed were recorded using GPS positions.

A subsample for Particle Size Analysis (PSA) and Total Organic Carbon (TOC) analysis was collected, with a minimum of 100 ml of muddy sediments and up to 500 ml of coarse sediment, using a metal scoop and the sample labelled and transported in a cool box prior to analysis. Samples were collected and stored in accordance with the National Marine Biological Analytical Quality Control (NMBAQC) PSA protocol. Each acceptable benthic fauna sample was sieved on board through a 1 mm sieve, with care being taken during the sieving process in order to

minimise damage to taxa such as spionids, scale worms, phyllodocids and amphipods. Larger rocks/shells were placed directly into the sample pot. The sieved residues were then gently backwashed into sealable containers and preserved by adding borax buffered 4-5% saline formalin solution. Each sample was labelled clearly on the lid and an additional waterproof label placed in the container which recorded the client, survey name, date, area, station number and grab number. Benthic faunal sampling was carried out in accordance with JNCC Procedural Guideline No.3-9 (Thomas, 2001).

At a subset of 23 benthic sampling stations, a separate 0.1 m<sup>2</sup> Van Veen grab was deployed for collecting contaminants samples. Sampling stations were selected in areas of finer sediment within the array area (required for the analyses) and in the OECC focused in nearshore areas where higher levels of contamination are expected. Samples were taken from an undisturbed sediment surface, with the appropriate metal scoop and transferred to appropriate containers for each analysis. The samples were stored in accordance with the guidelines for sampling / storage of sediments for chemical analyses (from OSPAR Joint Assessment and Monitoring Programme (JAMP) guidelines for monitoring contaminants in sediments) (Cronin *et al.*, 2006).

On successful completion of the work at that sampling station, the vessel moved to the next station where the procedure was repeated until all stations were sampled. A full survey log was maintained throughout the survey detailing time of sampling, GPS position, number of attempts required, station number, water depth, physical characteristics of the sample, digital image number and presence of any other relevant features.

## 4. Sample Analysis

### 4.1. Underwater Video Imagery Analysis

Imagery was reviewed, processed, and analysed in accordance with current guidelines, including the standards for analysis in visual seabed surveys (BS EN 16260:2012) and Turner *et al.*, 2016. Imagery was also assessed using the NMBAQC image quality categories whereby the video footage is allocated a score of 'good', 'poor' or 'very poor'. The imagery was reviewed for features of conservation interest, including an Annex I reef assessment following the appropriate JNCC guidance notes (Gubbay, 2007; Irving, 2009; Golding *et al.*, 2020).

The main purpose of the analysis of the imagery was to identify what fauna and broadscale habitats exist in a video record or still image, to provide quantitative and semi-quantitative data, and to note where one substrate type changes to another. The imagery was viewed at normal or slower than normal speed, noting the physical and biological characteristics, such as substrate type and composition (in line with current guidelines), seabed character, conspicuous taxa, and life forms along with any modifiers or visible impacts present.

Taxa were identified visually and taxonomic guides and illustrations, along with websites (e.g., Marine Life Information Network (MarLIN), 2025), were used to confirm and assist with identifications. All taxonomic names used were checked to be accepted within the World Register of Marine Species (WoRMS). Where an analyst was uncertain of identification of epifauna at a certain taxonomic level, then a broader taxonomic level or morphological group was used.

### 4.2. Benthic Faunal Analysis

All biota was extracted and identified according to the NMBAQC Taxonomic Discrimination Protocol (Worsfold *et al.*, 2010). Samples were washed with tap water through sieves to remove the preserving agent, with different sized sieves used to aid in sorting. To further aid sorting and to avoid damage to specimens, light organic matter and fauna were elutriated (floated off) and sorted separately. The larger retained contents were sorted in a white sorting tray, whilst smaller fauna were sorted under a stereomicroscope.

Fauna were identified to the lowest taxonomic level practicable using appropriate keys and references and enumerated. Species that were present as juveniles were differentiated from adults where possible. Colonial organisms were recorded as present or absent. Broken or damaged specimens that may not be fully identified were described as 'Taxa Indet.' (indeterminate). Juvenile specimens not displaying adult characteristics necessary for identification to species were described as 'Taxa juv.', and groups not generally identified to species because of taxonomic or morphological reasons were recorded as Taxa sp.

### 4.3. PSA and TOC Analysis

PSA was carried out on sediment fractions ranging from <63  $\mu\text{m}$  to >63 mm using NMBAQC-compliant methodology. Approximately 100 g of dried sediment was first weighed and treated with hydrogen peroxide to remove organic material. Samples were then processed through stacked sieves at 0.5-phi intervals over the Wentworth scale size range (**Table D**), typically from 63  $\mu\text{m}$  to <8 mm or, where applicable, up to 64 mm. Sieves were shaken for 15 minutes, after which the material retained on each sieve was collected and weighed. Finer fractions (<63  $\mu\text{m}$ ) were oven-dried and weighed separately; where this fine fraction exceeded 5% of the total sample, additional laser granulometry was undertaken to more precisely characterise sediment composition.

The percentage of each particle size class was calculated from the weight retained on each sieve, with the <63  $\mu\text{m}$  silt/clay fraction determined either directly (from dried fines) or, where these fines were lost during washing stages, by subtracting the cumulative retained weight from the initial sample weight. For reporting, PSA results for each

station were expressed as cumulative percentages passing each sieve and subsequently converted to absolute percentages retained, following the classification system and sorting indices described by Buchanan et al. (1984).

TOC content was determined using Loss on Ignition (LOI). Each sample was weighed and heated to 100–105 °C until carbonates and organic material were combusted, after which the sample was reweighed. The change in mass represented the LOI, which was then expressed as a percentage of the sediment's pre-ignition weight and converted to TOC using an appropriate conversion factor.

**Table D: The classification of sediment particle size ranges into size classes**

Range of Particle Size	Wentworth Sediment Classification	Phi Unit
<63µm	Silt/Clay	>4 Ø
63-125 µm	Very Fine Sand	4 Ø, 3.5 Ø
125-250 µm	Fine Sand	3 Ø, 2.5 Ø
250-500 µm	Medium Sand	2 Ø, 1.5 Ø
500-1000 µm	Coarse Sand	1 Ø, 1.5 Ø
1000-2000 µm (1 – 2mm)	Very Coarse Sand	0 Ø, -0.5 Ø
2000 – 4000 µm (2 – 4mm)	Very Fine Gravel	-1 Ø, -1.5 Ø
4000 -8000 µm (4 – 8mm)	Fine Gravel	-2 Ø, -2.5 Ø
8 -64 mm	Medium, Coarse & Very Coarse Gravel	-3 Ø to -5.5 Ø
64 – 256 mm	Cobble	-6 Ø to -7.5 Ø
>256 mm	Boulder	< -8 Ø

Source: adapted from Buchanan, 1984

#### 4.4. Contaminant Analysis

Samples were analysed for the Marine Institute full suite of analyses as detailed in the Material Analysis Reporting Form by a United Kingdom Accreditation Service (UKAS) accredited laboratory and the results compared against Irish guideline limits and Cefas Action levels (Appendix F).

## 5. Data Analysis

### 5.1. Benthic Grab Analysis

All data collected from surveys, including up to date species nomenclature in accordance with the WoRMs database, abundance, biomass and physical parameters such as PSA and depth, were collated in Excel spreadsheets. Based on PSA results, each sampling station was assigned a Folk (1954) classification using the Folk Ternary diagram provided in the JNCC guidance (Parry, 2015) and the percentage composition of gravel, sand and mud was calculated.

A suite of statistical analysis on the data collected from the grab survey work were undertaken using the “vegan” package in R, with some univariate indices calculated manually in R. General R packages used in the statistical analysis and production of outputs were: “tidyverse”, “magrittr”, “ggpubr”, “janitor”, “taxize”, “rstatix”, “readxl”, “bookdown”, “pander”, “plotrix”, “cluster”, “clustig”, “factoextra”, “ggrepel”, “dendextend”, and “patchwork”.

#### 5.1.1. Univariate Analysis

The following species diversity indices were calculated for the benthic grab sample species data:

- Number of Species (S) (Taxa): provides the number of species present in a sample, with no indication of relative abundances;
- Effective species: the number of equally abundant species needed to obtain the same mean proportional species abundance as that observed in the survey data;
- Species Diversity - Shannon-Wiener index (H'): measures the uncertainty in predicting the identity of the next species withdrawn from a sample. Typically between 1.5 and 3.5, a lower value shows lower diversity;
- Species Richness - Margalef's index (d): measures the number of species present for a given number of individuals. The higher the index means the greater the diversity present; and
- Pielou's Evenness (J'): shows how evenly the individuals in a sample are distributed. J' is a range of zero to one. The less variation in the samples, the higher J' is.

These univariate indices enable the reduction of large datasets into useful metrics, which can be used to accurately describe community structures.

#### 5.1.2. Multivariate Analysis

Multivariate analysis is an effective method for detecting subtle changes in species community datasets. Multivariate analyses were calculated in R using the vegan package (Oksanen *et al.*, 2022). Due to the partially skewed nature of species data, and its varying abundances, a square root transformation was applied to normalise the data distribution, reducing dominant effects of highly abundant taxa. A Bray-Curtis resemblance matrix was applied to the transformed infauna data. To cluster stations based on the similarity profiles (SIMPROF) of community composition, hierarchical clustering and permutation testing were utilised to identify the coherence of groups of stations. This process effectively creates a dendrogram of similarity between stations and descends nodes while testing for significant multivariate structure within the node until the total number of significant stations is identified.

Bray-Curtis distance matrices provide information on how similar or conversely dissimilar samples are from one another. If a pair of samples share the number of species and individuals, dissimilarity would be 0 and similarity would be 1 (on a 0-1 scale). This is calculated by taking 2\* the sum of the species in common between the two samples, and dividing by the total number of species in each sample, summed.

Similarity Percentage (SIMPER) is normally used to identify the taxa that are primarily responsible for an observed difference between groups of samples for example, what species contribute to the dissimilarity between clusters of stations identified with SIMPROF. This analysis has been conducted here, however, SIMPER often does not work well in R as it is often misinterpreted, and is sensitive to over-estimating driving species, even when groups are exact copies. In addition, the proportion of species' abundance contributing to the overall group abundance is also calculated manually.

One-way Analysis of Similarity (ANOSIM) was used to determine whether there was a significant difference in community composition between stations, and folk classifications. This uses a Bray-Curtis dissimilarity matrix to determine whether there is a greater difference in the mean ranks between groups than those within groups, where groups are variables such as station and folk class. The resultant R statistic quantifies that difference, with values of 0 representing random groupings (i.e., there is no significant influence of group on species composition), and values of closer to  $-1$  or  $+1$  showing a stronger influence of groups; values closer to  $+1$  indicate variations between groups are larger than within groups, and value closer  $-1$  indicate that samples within groups are more different from each other than they are to samples in other groups.

Non-Metric Multi-Dimensional Scaling (NMDS - a distance-based ordination technique) was used to visualise multiple dimensions of community composition in a simplified way to depict the similarity of stations / samples based on their SIMPROF-identified cluster, or folk classification. This essentially plots similar samples near one another, and dissimilar sample units far away from one another. As NMDs are three-dimensional (at least), two-dimensional representations usefulness will depend on the orientation of the view; but it does a good job of representing complex multi-dimensional data in a small number of dimensions. The 'stress' reported indicates whether the nMDS is valuable to interpret, calculated by comparing the ranked distances in the original matrix to those in the NMDS. A stress of  $>0.35$  is where samples are placed essentially at random, with little relation to original ranked distances;  $>0.20$  could be dangerous to interpret;  $<0.20$  is useful but has potential to mislead;  $<0.10$  is a good ordination;  $<0.05$  is an excellent representation. These thresholds are a guide only, and in reality will be influenced by sample size and the nature of the data.

Non-Metric Multidimensional Scaling (NMDS) plots were produced to examine the similarity between sampling stations. The similarity profile (SIMPROF) analysis routine was utilised to determine the statistically significant groups (i.e., samples that would naturally group as communities). One-way Analysis of Similarity (ANOSIM) revealed whether there were any statistically significant results and, if significant, the Similarity Percentages (SIMPER) function was used to provide information on the main species driving the groupings, which aids in determining the community structure and biotopes.

### 5.1.3. Biotope Assignment

Infauna survey results groupings and characterising species were identified through the SIMPROF, NMDS and SIMPER analyses and these were used in combination with the PSA results and physical characteristics (such as depth and zone) to classify the grab sample station biotopes according to the Marine Habitat Classification for Britain and Ireland (Conner *et al.*, 2004).

Underwater video samples were assigned habitat classifications based on species present according to the most current classification. Where appropriate, broadscale habitats, FOCI or Habitats Directive, Annex I Habitat were also assigned to each sampling station and still image. Guidance notes provided by JNCC report 546 (Parry, 2015) were used to assist this process.

Infauna (grab) and epibenthic (underwater video) biotope classifications were incorporated into an Excel spreadsheet alongside physical characteristics such as depth and PSA, and final benthic habitats assigned to each sampling station. The majority of infauna and epibenthic habitat assignment at a sampling station were consistent or complimentary. At the underwater video stations, where no benthic grabs were taken, the underwater video

classification was ground truthed to existing geophysical data prior to assigning final biotopes. Classification was supported by use of JNCC comparative tables and guidance (Parry, 2019).

#### 5.1.4. Reefiness Assessment

Underwater video and stills were assessed for potential resemblance to stony reef habitats in accordance with the criteria outlined in Irving (2009) and Golding *et al.* (2020). For an area to be considered Annex I stony reef (either on solid or soft seabed) all of the following four criteria must be met, as a minimum: composition (diameter of cobbles/boulders and 'patchiness'), elevation (height of constituent cobbles/boulders), extent (area) and biota (dominated by infaunal or epifaunal species). The level to which these criteria are met determine the 'resemblance' to stony reef, categorised as low, medium and high resemblance to being stony reef and not a reef (Irving, 2009, Golding *et al.*, 2020). The underwater video and stills were analysed for all criteria and the infaunal community present in benthic grabs samples considered when assessing the biota criteria.

## 6. Results

The subtidal underwater imagery survey was carried out between the 26 August and 1 September 2025 and the benthic grab survey was conducted between the 26 August and 2 September 2025. For the underwater imagery survey samples were successfully collected from all 46 sampling stations and for the grab survey samples were collected from 44 of the 46 sampling stations. The sediment was found to be too hard at the remaining two stations for suitable grabs to be obtained, however underwater imagery adequately characterised these sampling locations. Samples for PSA and TOC were taken at 43 stations, where the sediment type allowed. Underwater imagery samples were analysed for epifauna, and benthic grabs samples were analysed for infauna, PSA and TOC. Grab samples were successfully collected from twelve stations in the OECC for contaminant analysis. It was not possible to collect suitable contaminant samples from the array site because of the coarse nature of the sediment at all sampled locations (see Appendix E), as the 500g volume of sediment required by the guidelines for analysis could not be achieved using the Van Veen grab which is necessary to provide an undisturbed sediment surface from which to sample (Cronin *et al.*, 2006).

All stations sampled can be seen in **Figure A** while the station coordinates and depths are shown in Appendix A (**Table AA**).

### 6.1. Underwater Video

Underwater videos samples were collected from all of the 46 sample stations and a total of 320 still images were captured for analysis. The results from analysis of the video footage and still imagery showed that in the OECC, Stations 1 to 12, closest to the intertidal, consisted of muddy sand sediments with varying degrees of shell, at these stations epifauna were dominated by common brittle star (*Ophiothrix fragilis*), common starfish (*Asterias rubens*), hermit crabs such as *Pagurus bernhardus* and occasional dead man's fingers (*Alcyonium digitatum*). Sediment became more coarse with less silt as the OECC moves further from shore and the epifauna mainly comprises brittlestars (*Ophiothrix fragilis* and *Ophiocomina nigra*), dead man's fingers (*Alcyonium digitatum*), common starfish (*Asterias rubens*) and Dahlia anemone (*Urticina felina*). The array site stations are predominantly sandy sediments with pebbles, cobbles and shells. The epifauna is dominated by the tube building polychaete *Spirobranchus triqueter*, Dahlia anemone (*Urticina felina*), common starfish and sometimes dense brittlestars with occasional red algae *Lithothamnion sp.* present on rocks. Other species present included hydroids *Flustra foliacea* and *Nemertesia antennina* and saddle oyster *Anomia ephippium*.

### 6.2. Infauna

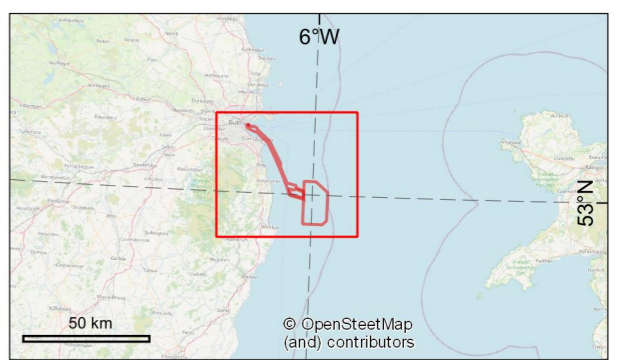
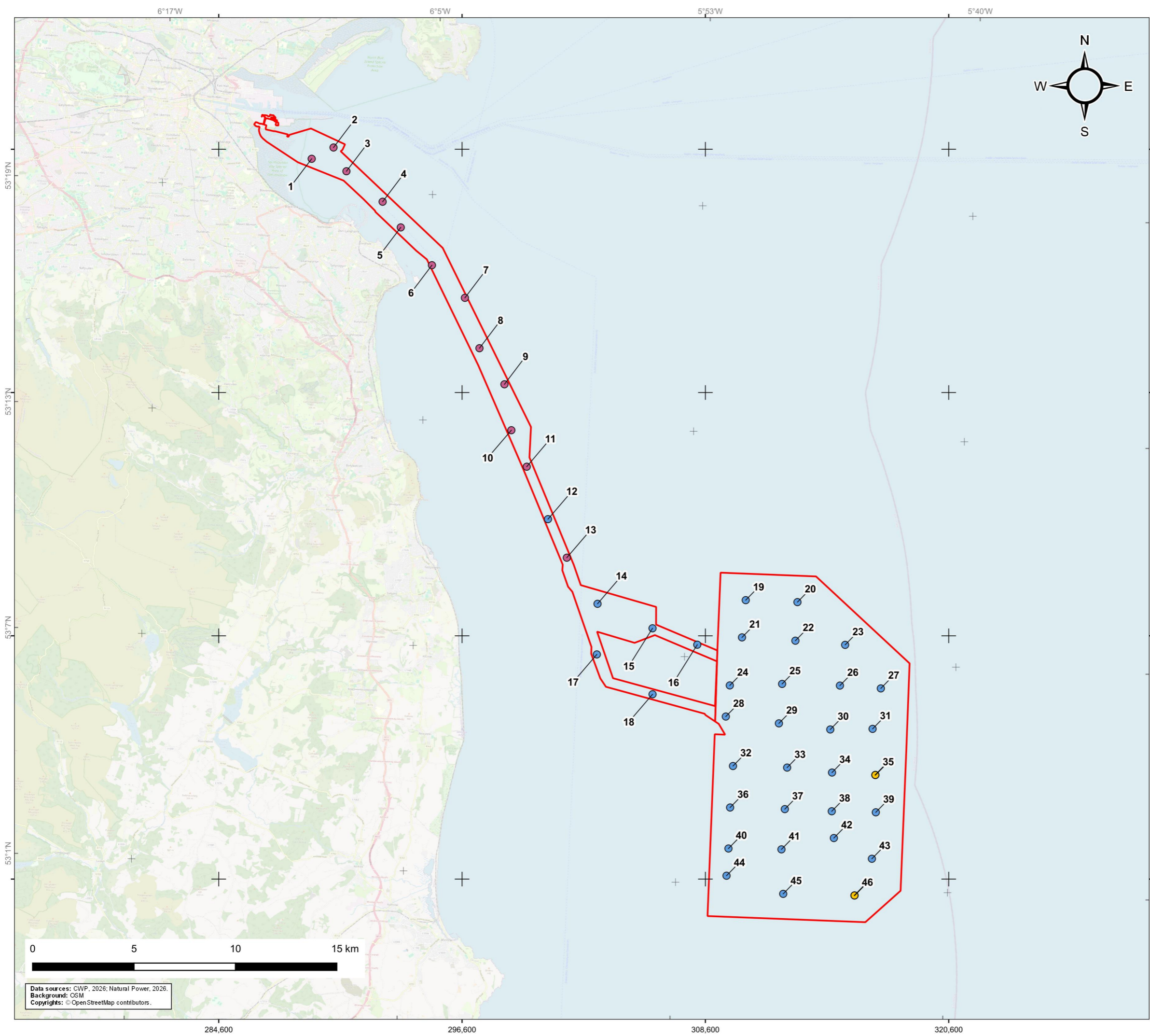
In total 8,022 individuals were found within the 44 infaunal samples, representing 414 unique aphialDs (the full species list is provided in Appendix B, **Table BA**). Henceforth, where 'species' is referred to, this is in relation to a unique aphialD. The most abundant species across the survey area was the *Spirobranchus sp.* which was present within 54 % of the sampling stations, followed by the family Anomiidae, present in 42% of sampling stations and *Ampelisca diadema*, present in 14% of stations (**Table E**).

Although the *Spirobranchus sp.* is the species with the highest level of abundance, the family Mytilidae was found in the largest number of sampling stations (26/45).

**Table E: Fifteen most abundant species and stations at which they were present**

Species	Total Abundance	Number of Stations found at	Stations
<i>Spirobranchus sp.</i>	887	24	6, 10, 11, 13, 15, 16, 18, 19, 20, 21, 22, 23, 27, 28, 32, 34, 36, 38, 39, 41, 42, 43, 44, 45

Species	Total Abundance	Number of Stations found at	Stations
Anomiidae	405	19	6, 11, 12, 13, 14, 16, 19, 20, 21, 22, 23, 25, 27, 28, 39, 41, 42, 43, 44
<i>Ampelisca diadema</i>	364	6	6, 10, 12, 16, 32, 41
Mytilidae	361	26	1, 2, 6, 12, 14, 15, 19, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30, 33, 37, 39, 40, 41, 42, 43, 44, 45
<i>Jassa herdmani</i>	303	2	13, 15
<i>Spirobranchus lamarcki</i>	270	22	6, 9, 10, 11, 13, 15, 16, 17, 18, 20, 21, 23, 25, 27, 28, 32, 39, 41, 42, 43, 44, 45
<i>Kurtiella bidentata</i>	170	11	2, 3, 4, 5, 14, 15, 19, 20, 41, 44, 45
<i>Abra</i> sp.	160	21	1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 19, 20, 21, 25, 32, 39, 42, 43, 44
<i>Caprella septentrionalis</i>	160	2	15, 21
<i>Pisidia longicornis</i>	151	19	6, 12, 13, 14, 15, 16, 19, 20, 21, 23, 25, 28, 32, 39, 41, 42, 43, 44, 45
<i>Galathowenia oculata</i>	144	5	2, 3, 4, 5, 6
<i>Abra alba</i>	140	16	2, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14, 15, 19, 20, 39, 45
<i>Nucula nucleus</i>	138	6	7, 10, 12, 13, 18, 45
<i>Amphipholis squamata</i>	119	17	4, 10, 15, 16, 18, 19, 21, 25, 27, 28, 36, 39, 41, 42, 43, 44, 45
<i>Mediomastus fragilis</i>	118	23	4, 6, 9, 12, 13, 14, 15, 16, 17, 19, 20, 21, 25, 27, 28, 33, 36, 38, 39, 41, 42, 43, 44



**Legend**

- Planning Application Boundary (PAB)

**Subtidal sampling station**

- Benthic grab, contaminant and DDV station
- Benthic grab and DDV station
- DDV only station

	Project: Codling Wind Park	Contractor:  www.naturalpower.com
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**Figure A**  
Subtidal survey stations

CWP doc. number: CWP-NPC-CON-09-MAP-2134

Internal descriptive code: N/A	Size: A3 Scale: 1:180,000	CRS: EPSG 25830
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Rev.	Updates	Date	By	Chk'd	App'd
00	For FIR submission	2026/04/21	AC	ME/EA	LJ

Data sources: CWP, 2026; Natural Power, 2026.  
Background: OSM  
Copyrights: © OpenStreetMap contributors.

### 6.2.1. Diversity

The number of taxa identified per station ranged from 2 (Station 31) to 92 (Station 42). The number of individuals ranged from 2 (Station 31) to 835 (Station 15). Richness ranged from 1.44 (Station 31) to 14.63 (Station 42).

Species richness and diversity values varied across the survey area however was generally higher in areas of coarser sediment. Evenness was also variable across the survey area, reflecting the heterogeneity of the benthic environment. Diversity Indices results are shown in **Figure B** and Appendix D (**Table DA**).

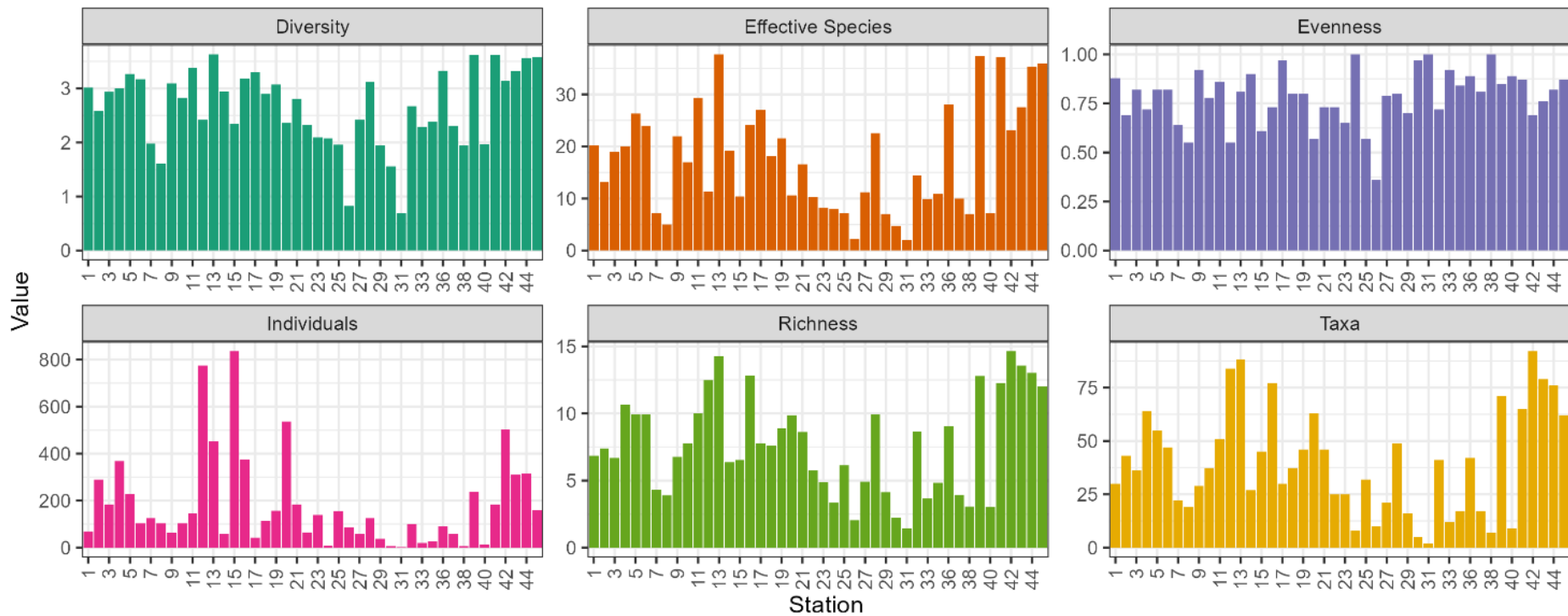
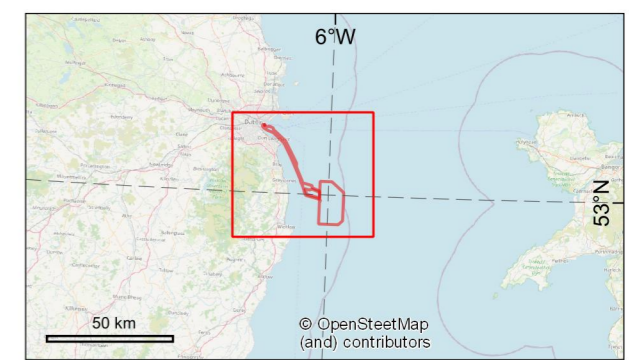
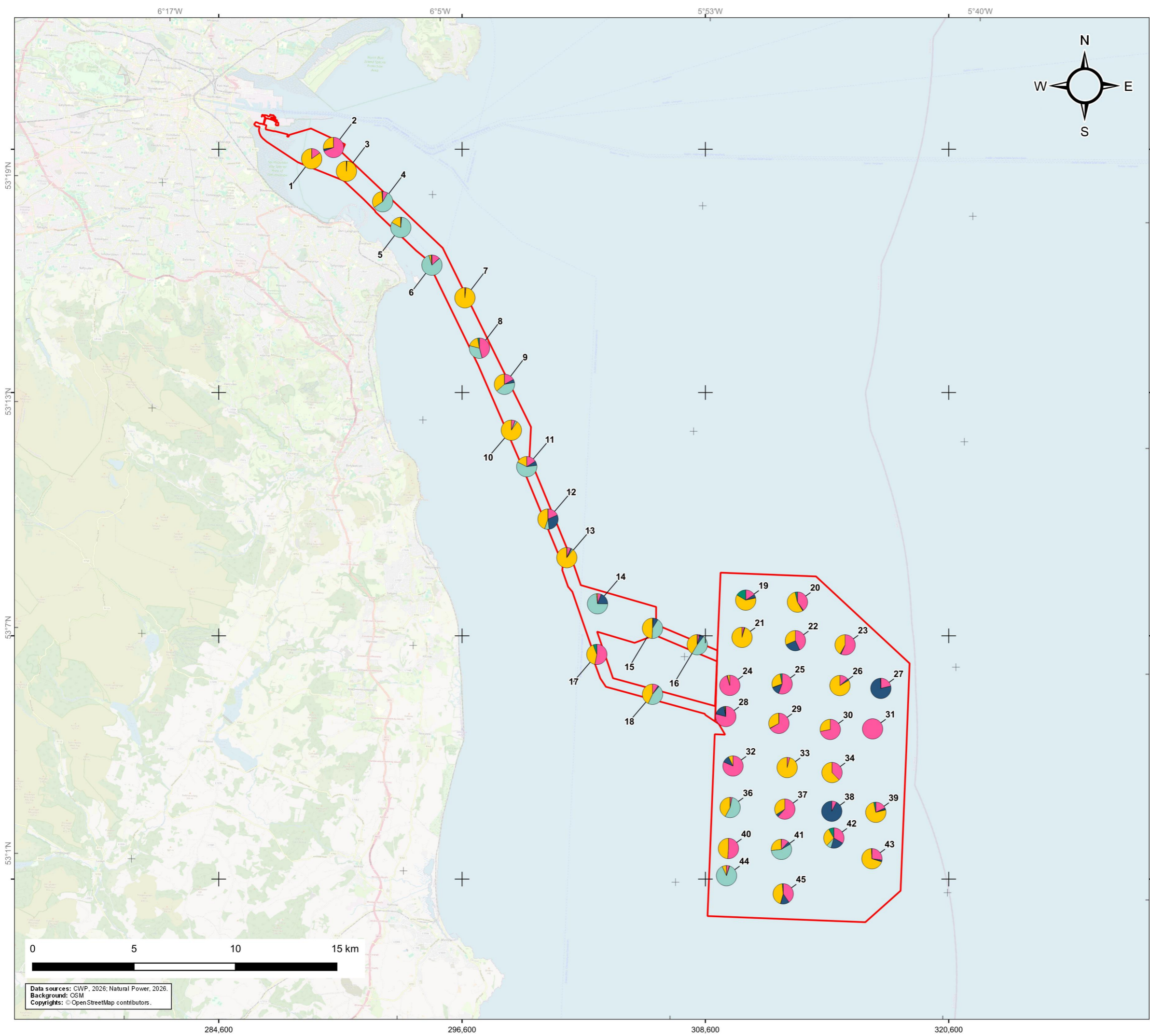


Figure B: Univariate diversity indices at benthic grab sampling stations

Taxa from all stations were identified to aphiaID level, resulting in 414 unique aphiaIDs across the 44 stations sampled. For each benthic grab faunal station, the biomass of each major faunal groups, as a proportion of overall biomass, is shown in **Figure C**. The dominant contributors to total abundance varied between stations, but Annelida and Mollusca were generally the most numerically abundant groups across much of the survey area, consistent with the mixed coarse sediment habitats present. Echinodermata, while less widespread, were locally important at several stations; notably *Amphipholis squamata* was among the most abundant species within clusters containing stations 39, 42, 43, and 44, and contributed strongly to the characterisation of station 44 in particular. These patterns reflect the heterogeneous nature of the benthic community across the array site and OECC, shaped by variation in sediment composition and hydrodynamic conditions.



**Legend**

□ Planning Application Boundary (PAB)

**Percentage composition of faunal groups**

- Annelida
- Arthropoda
- Echinodermata
- Mollusca
- Miscellaneous

		Project: Codling Wind Park	Contractor:  <a href="http://www.naturalpower.com">www.naturalpower.com</a>		
<b>Figure C</b> <b>Percentage biomass of major faunal groups</b>					
CWP doc. number: CWP-NPC-CON-09-MAP-2135					
Internal descriptive code: N/A		Size: A3 Scale: 1:180,000	CRS: EPSG 25830		
Rev. 00	Updates For FIR submission	Date 2026/04/21	By AC	Chk'd ME/EA	App'd LJ

Data sources: CWP, 2026; Natural Power, 2026.  
 Background: OSM  
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284,600      296,600      308,600      320,600

### 6.2.2. PSA and TOC

PSA and TOC analysis were undertaken at 43 of the 46 sampling stations, with sediment not recovered at Stations 23, 35 and 46 due to rocky ground conditions. Sediments across the survey area are dominated by sand, with varying proportions of gravel and mud depending on station groupings. Within the array site, sediments comprise gravelly muddy Sand, gravelly Sand, and muddy sandy Gravel, reflecting a predominantly coarse, mixed-sediment environment rather than uniform coarse gravel with cobbles and boulders. Stations in the central and western parts of the array site (Group d) are characterised mainly by slightly gravelly Sands and slightly gravelly muddy Sands, whereas stations in the northern and north-eastern array area (Group a) contain higher proportions of gravelly muddy Sand and gravelly Sand. Along the OECC, sediment types shift toward sandy gravel and muddy sandy Gravel, containing larger proportions of coarse sediment than the array but still dominated by sand fractions. These patterns demonstrate a transition from sand-rich sediments in nearshore/central sections to more gravel-rich substrates offshore. **Figure D** and **Figure E** demonstrate the sediment type across the survey area. Generally, the TOC values across the samples are low, ranging from 0.16% to 0.84%, indicating limited organic enrichment across the survey area.

The full list of the percentages of each particle size and TOC results is provided in Appendix E (**Table EA**).

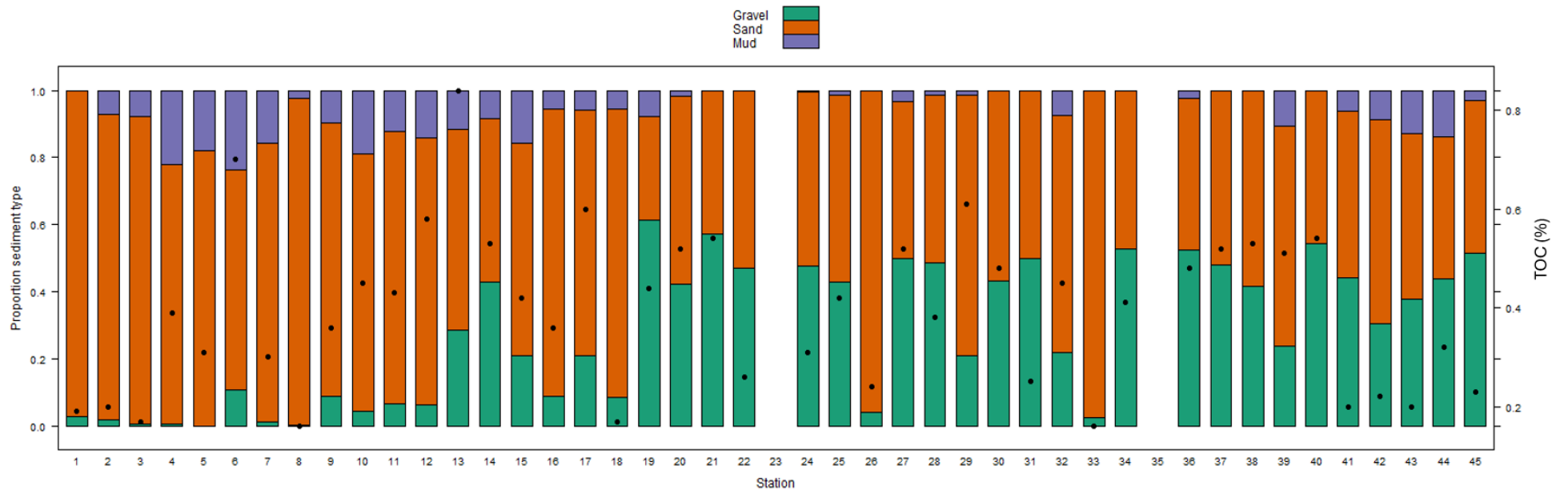
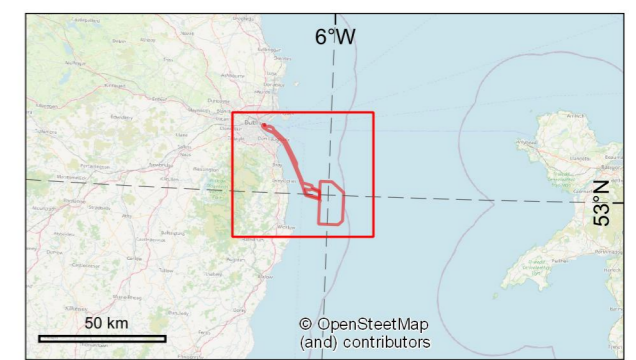
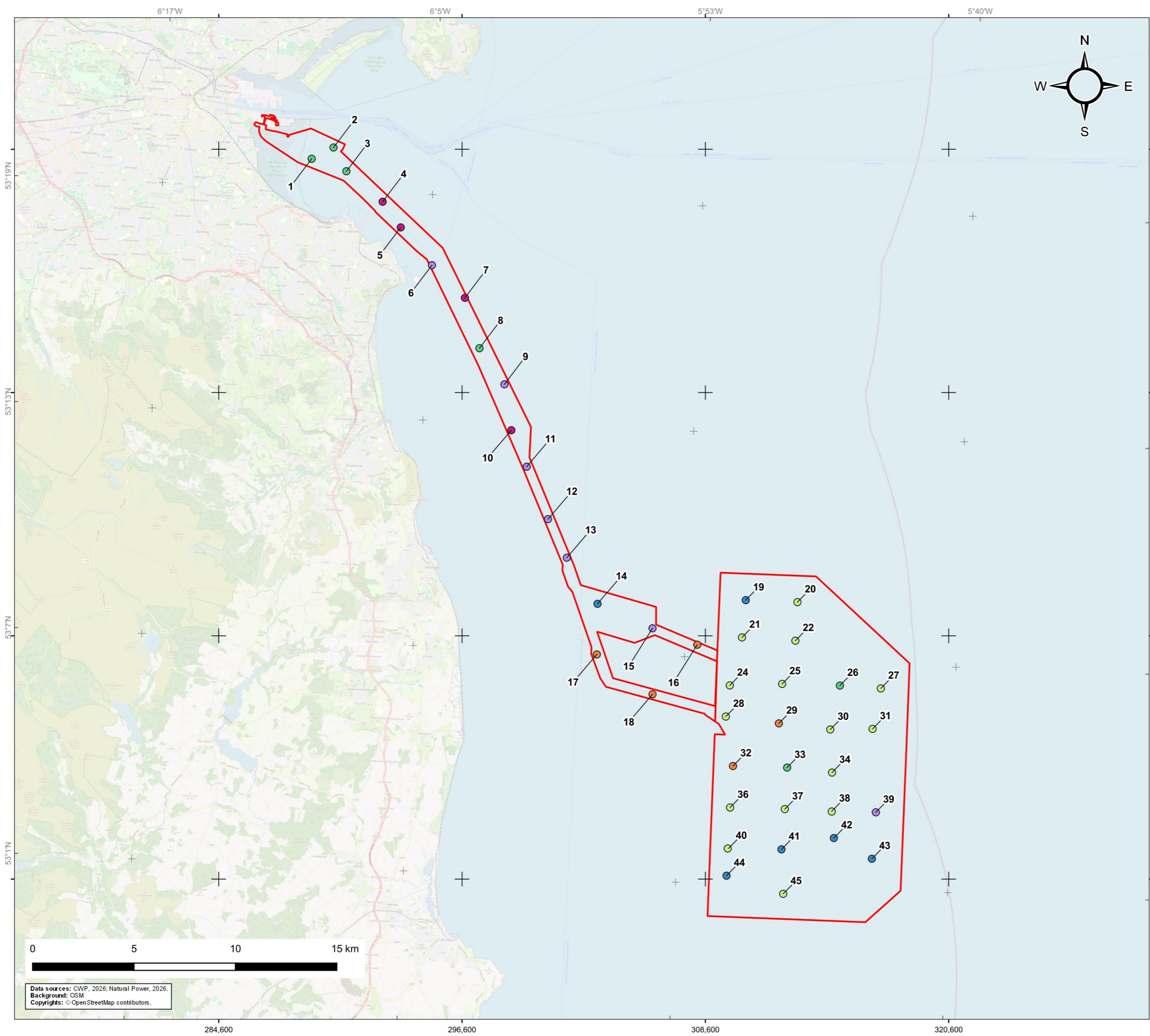


Figure D: PSA and TOC at subtidal benthic grab sampling locations along the export cable



**Legend**

- Planning Application Boundary (PAB)

**PSA Folk (1954) Classification and seabed sediment composition**

- Gravelly muddy sand (gMS)
- Gravelly sand (gS)
- Muddy sandy gravel (msG)
- Sandy gravel (sG)
- Slightly gravelly muddy sand ((g)mS)
- Slightly gravelly sand ((g)S)

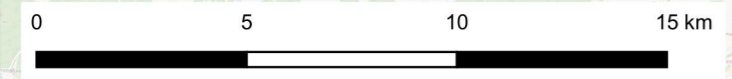
	Project: Codling Wind Park	Contractor:  www.naturalpower.com
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**Figure E**  
Particle size analysis Folk classification

CWP doc. number: CWP-NPC-CON-09-MAP-2136

Internal descriptive code: N/A	Size: A3 Scale: 1:180,000	CRS: EPSG 25830
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Rev.	Updates	Date	By	Chk'd	App'd
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Data sources: CWP, 2026; Natural Power, 2026.  
Background: OSM  
Copyrights: © OpenStreetMap contributors.

284,600      296,600      308,600      320,600

5.913,400  
5.901,400  
5.889,400  
5.877,400

### 6.2.3. Contaminants

At twelve stations, samples were successfully collected and analysed for a range of contaminants, all other sample locations were demonstrably below requirements for contaminant analysis. Contaminants levels were assessed against Irish (Cronin *et al.*, 2006) and Cefas action levels. When assessed against Irish guidelines, stations 8, 10, 11 and 13 had Arsenic levels above the Lower action level (AL) but below the Upper AL. When assessed against Cefas guidelines, all metal levels were below action level one (AL1). No other contaminants assessed were above Irish Lower ALs or Cefas AL1. A full breakdown of contaminant results can be found in Appendix F.

### 6.2.4. Community Analysis

SIMPROF found twenty statistically significant groups of stations ( $P < 0.05$ ) based on relatedness of species composition (**Figure F, Table F**). Groups a, b, f, k, l, m, o, p, q and r contain a single sampling station and groups d, g, i and t consist of only two sampling stations (**Table F**). It is unlikely that each grouping represents a distinct biotope type, however the relatively large number of groupings may be reflective of the heterogeneity of the environment and the transitional change from one habitat to another across the offshore development area.

These groups are shown in **Table F** and range in size from groupings containing many stations to those with only five stations. None of the clusters represent unique or distinct habitat types; instead, the pattern reflects the underlying heterogeneity of sediment conditions across the Development Area and the presence of gradual transitions between coarse, mixed and sand-dominated substrates. The grouping structure is therefore consistent with the natural variability in seabed conditions observed across the array site and OECC, and the significant cluster divisions produced by SIMPROF largely correspond to differences in Folk sediment classifications rather than discrete ecological communities

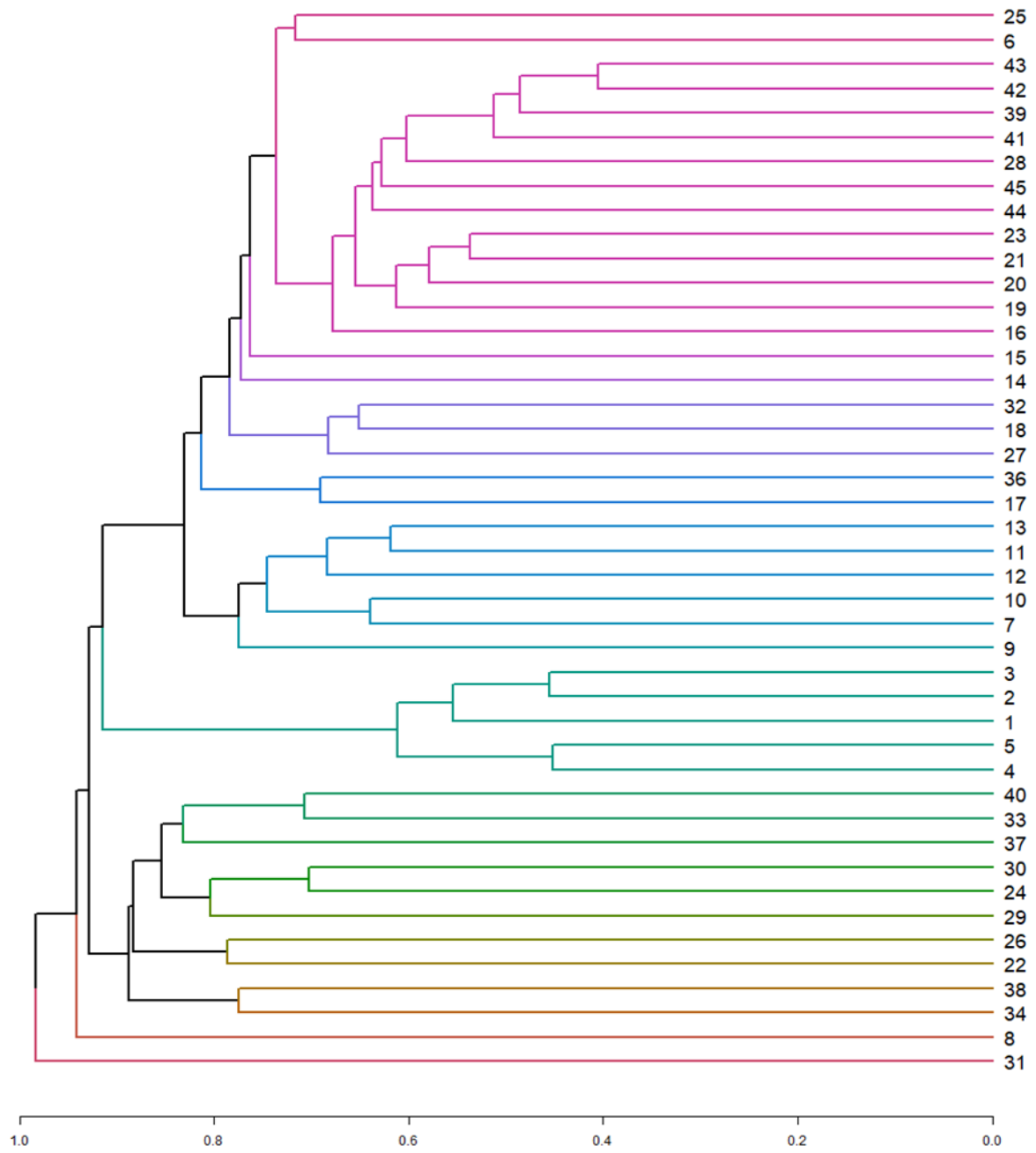


Figure F: Bray-Curtis cluster analysis dendrogram of species composition clusterings between sampling stations

**Table F: Station groupings determined through cluster analysis of benthic sampling stations, and the three most abundant species (with cluster abundance in brackets)**

Groupings	Stations	Three most abundant species in grouping
a	31	<i>Alcyonidium diaphanum</i> (1), <i>Travisia forbesii</i> (1)
b	8	Balanidae (64), <i>Balanus crenatus</i> (12), <i>Ophelia borealis</i> (6)
c	22, 24, 26, 29, 30, 33, 34, 37, 38, 40	Mytilidae (103), <i>Spirobranchus</i> sp. (28), <i>Balanus crenatus</i> (20)
d	4, 5	<i>Kurtiella bidentata</i> (146), <i>Phaxas pellucidus</i> (62), <i>Magelona filiformis</i> (35)
e	1, 2, 3	<i>Galathowenia oculata</i> (124), <i>Magelona filiformis</i> (74), <i>Magelona johnstoni</i> (40)
f	9	<i>Urothoe elegans</i> (9), <i>Lumbrineris cingulata</i> (5), <i>Ophiura albida</i> (5)
g	10, 7	<i>Abra alba</i> (65), <i>Nucula nucleus</i> (64), <i>Euclymene oerstedii</i> (9)
h	11, 12, 13	<i>Ampelisca diadema</i> (356), <i>Ampelisca spinipes</i> (105), <i>Ampelisca</i> sp. (93)
i	17, 36	Nematoda (21), <i>Sphaerosyllis bulbosa</i> (10), <i>Spirobranchus</i> sp. (6)
j	18, 27, 32	<i>Spirobranchus lamarcki</i> (76), <i>Spirobranchus</i> sp. (50), <i>Nucula nucleus</i> (13)
k	14	<i>Pisidia longicornis</i> (10), <i>Mediomastus fragilis</i> (7), <i>Abra</i> sp. (5)
l	15	<i>Jassa herdmani</i> (302), <i>Caprella septentrionalis</i> (159), <i>Mytilus edulis</i> (85)
m	16	<i>Spirobranchus</i> (107), <i>Spirobranchus lamarcki</i> (31), Corophiidae (25)
n	19, 20, 21, 23	<i>Spirobranchus</i> (281), Anomiidae (214), Mytilidae (152)
o	44	<i>Amphipholis squamata</i> (42), Anomiidae (24), <i>Janira maculosa</i> (21)
p	45	<i>Pisidia longicornis</i> (32), Trochidae (8), Corophiidae (7)
q	28	<i>Spirobranchus</i> (38), Anomiidae (8), <i>Aonides paucibranchiata</i> (7)
r	41	<i>Spirobranchus</i> sp. (36), <i>Timoclea ovata</i> (10), <i>Aonides paucibranchiata</i> (8)
s	39, 42, 43	<i>Spirobranchus</i> sp. (281), <i>Spirobranchus lamarcki</i> (79), <i>Timoclea ovata</i> (71)
t	25, 6	<i>Spirobranchus triqueter</i> (90), Anomiidae (35), <i>Mediomastus fragilis</i> (19)

Stations were grouped by the Folk classification to determine whether species composition varied between Folk classes (**Figure G**). When species assemblages were compared between Folk classifications by ANOSIM (**Figure H**), a significant result was found ( $p = 0.001$ ,  $R = 0.481$ ). The clustering of stations in Gravel and Cobbles (**Figure H**) illustrates the species composition at these stations differs significantly from that of stations in Sand and Slightly Gravelly Sand.

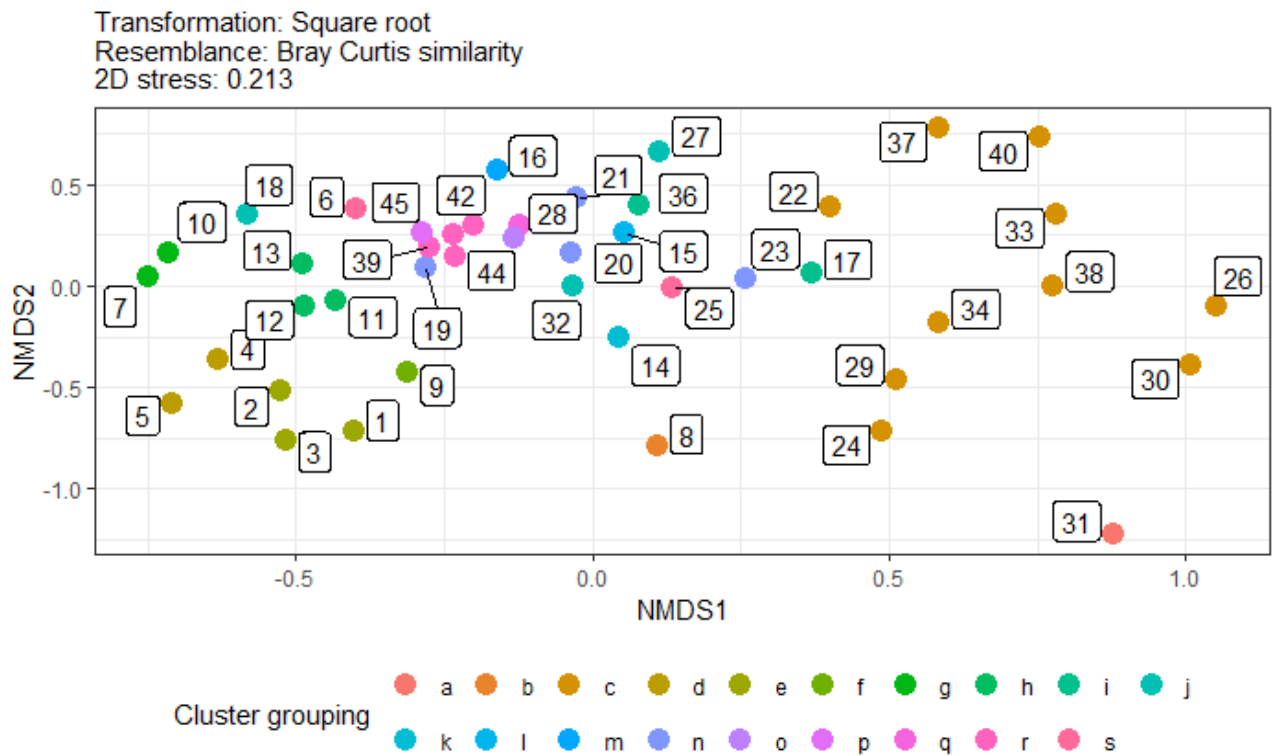


Figure G: nMDS plot showing similarity of stations based on community composition, coloured by SIMPROF identified station clusters

Below shows (Figure H) the same nMDS but instead of species clustering, the ordination is coloured by Folk classification. It should be noted that station 23 does not have a folk classification due to being unable to sample sediment at this station.

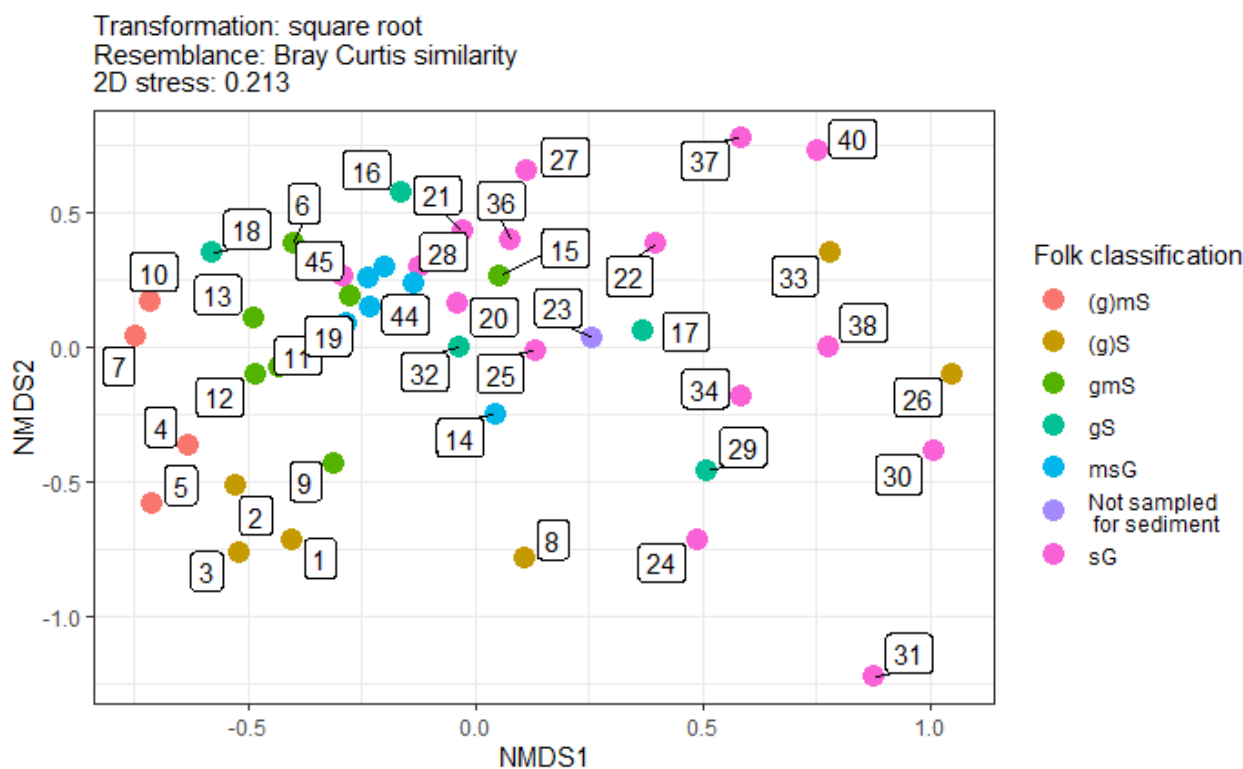


Figure H: nMDS plot showing similarity of stations based on community composition, coloured by the Folk (1954) classification of the sediment

## 6.3. Biotope Assignment

### 6.3.1. Underwater Video

Nine biotopes were identified from underwater video across the array site and OECC (Table G). Full biotope descriptions are given in Appendix C.

Table G: Subtidal biotopes identified during analysis of video imagery

Biotope	MNCR classification description	Stations
CR.MCR.EcCr	Echinoderms and crustose communities	35
CR.MCR.EcCr.UrtScr	<i>Urticina felina</i> and sand-tolerant fauna on sand-scoured or covered circalittoral rock	15, 16
SS.SCS.CCS	Circalittoral coarse sediment	31, 36, 44
SS.SCS.CCS.SpiB	<i>Spirobranchus triqueter</i> with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles.	18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 32, 33, 34, 37, 38, 39, 40, 41, 42, 43, 46
SS.SMx.CMx	Circalittoral mixed sediment	6, 11
SS.SMx.CMx.FluHyd	<i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment	13, 17, 25, 30
SS.SMx.CMx.OphMx	<i>Ophiothrix fragilis</i> and/or <i>Ophiocomina nigra</i> brittlestar beds on sublittoral mixed sediment	14, 45
SS.SSa.CMuSa	Circalittoral muddy sand	7, 8, 9, 10, 12

Biotope	MNCR classification description	Stations
SS.SSa.IMuSa	Infralittoral muddy sand	1, 2, 3, 4, 5

### 6.3.2. Benthic Grabs

SIMPER analysis was run to determine species contributing greatest variation between Folk classifications and the five top contributors to the SIMPROF station groupings (Table H).

Table H: Average contributions of species most similar between station groupings, based on SIMPER analysis

Station Grouping	Most influential species driving dissimilarity	Folk sediment classification	Approximate depth range (m)
a	<i>Alcyonidium diaphanum</i> , <i>Travisia forbesii</i>	Slightly gravelly sand (sG)	18–23
b	Balanidae, <i>Balanus crenatus</i> , <i>Ophelia borealis</i>	Slightly gravelly sand (g)S	17-24
c	Mytilidae, <i>Spirobranchus</i> , <i>Balanus crenatus</i> , <i>Manayunkia aestuarina</i>	Sandy gravel (sG), slightly gravelly sand (g)S, gravelly sand (gS)	20-30
d	<i>Kurtiella bidentata</i> , <i>Phaxas pellucidus</i> , <i>Magelona filiformis</i> , <i>Amphiura filiformis</i>	Slightly gravelly muddy sand (g)mS	15-25
e	<i>Galathowenia oculata</i> , <i>Magelona filiformis</i> , <i>Magelona johnstoni</i> , <i>Phaxas pellucidus</i> , <i>Abra</i>	Slightly gravelly sand (g)S	10-20

Samples across the array site and OECC were taken from depths ranging approximately 42 m to 97 m, with most stations falling between 50 m and 80 m based on recorded grab depths in the faunal dataset. Although the sediment types differ between the SIMPROF sediment groupings, all groupings are dominated by coarse and mixed sand fractions, with varying contributions of gravel and smaller proportions of mud, consistent with the Folk classifications assigned (gravelly Sand, sandy Gravel, muddy sandy Gravel, and gravelly muddy Sand). Faunal composition shows clear overlap between several of the multivariate station clusters, with certain taxa occurring as influential or characterising species across multiple groupings. Species such as *Spirobranchus*, *Spirobranchus lamarcki*, *Anomiidae*, *Mytilidae*, *Abra alba*, *Nucula nucleus*, *Magelona filiformis*, and *Kurtiella bidentata* appear repeatedly in the SIMPER outputs and manually calculated contributions tables, indicating that these species contribute substantially to the dissimilarity structure between clusters and are widespread across the site. This overlap suggests the presence of a complex of similar or transitional coarse sediment biotopes throughout both the array area and the alternative export cable route, with communities shaped largely by the energetic, sand- and gravel-dominated seabed typical of the offshore Irish Sea.

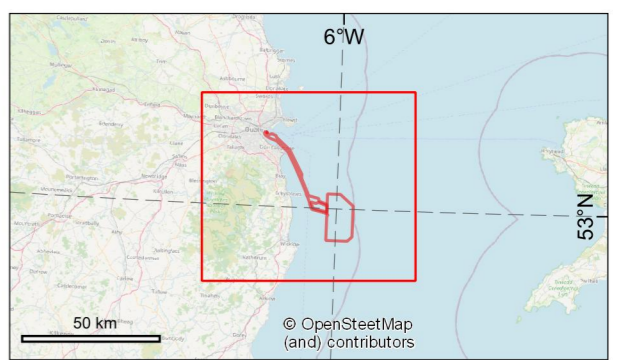
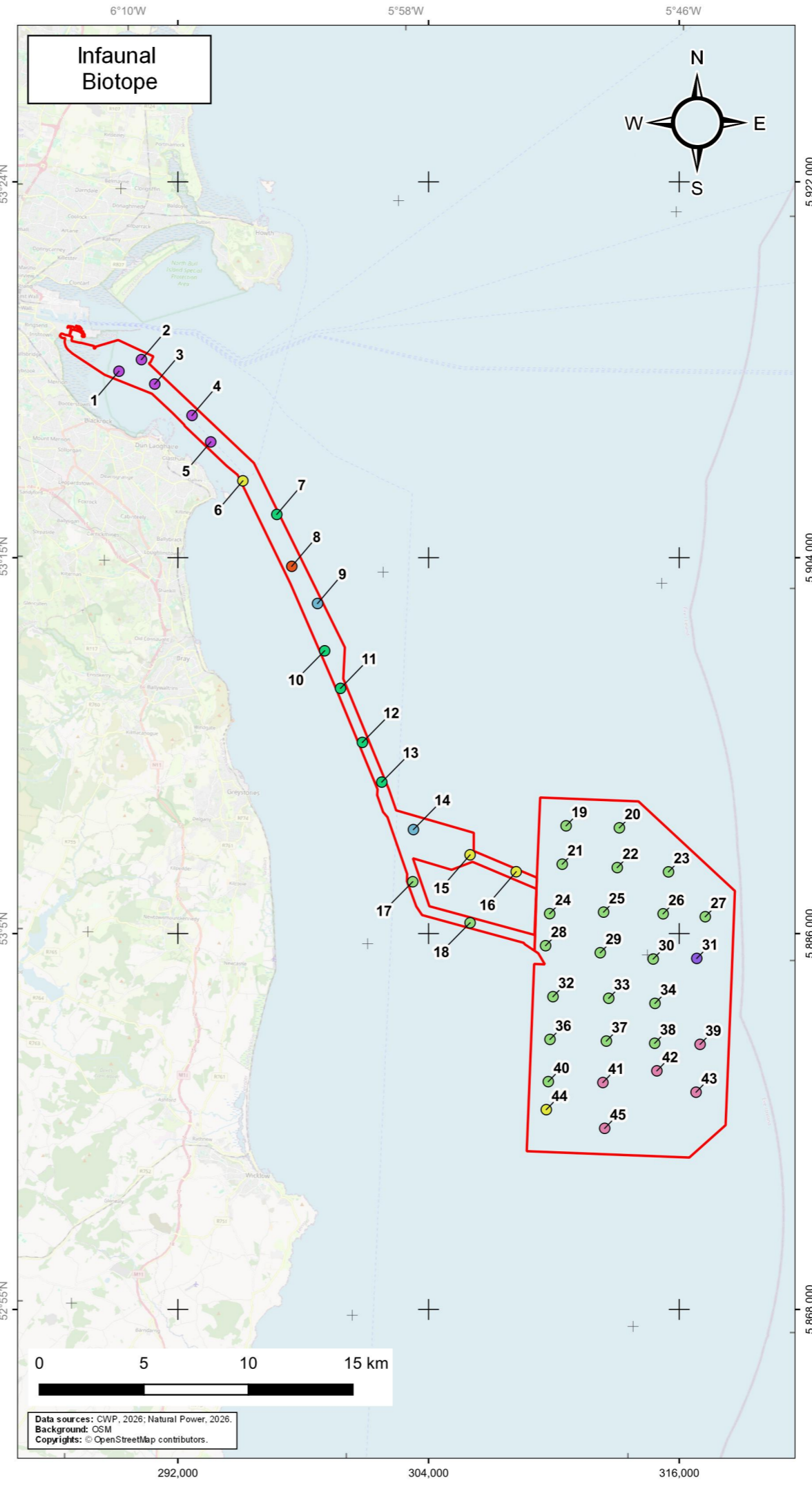
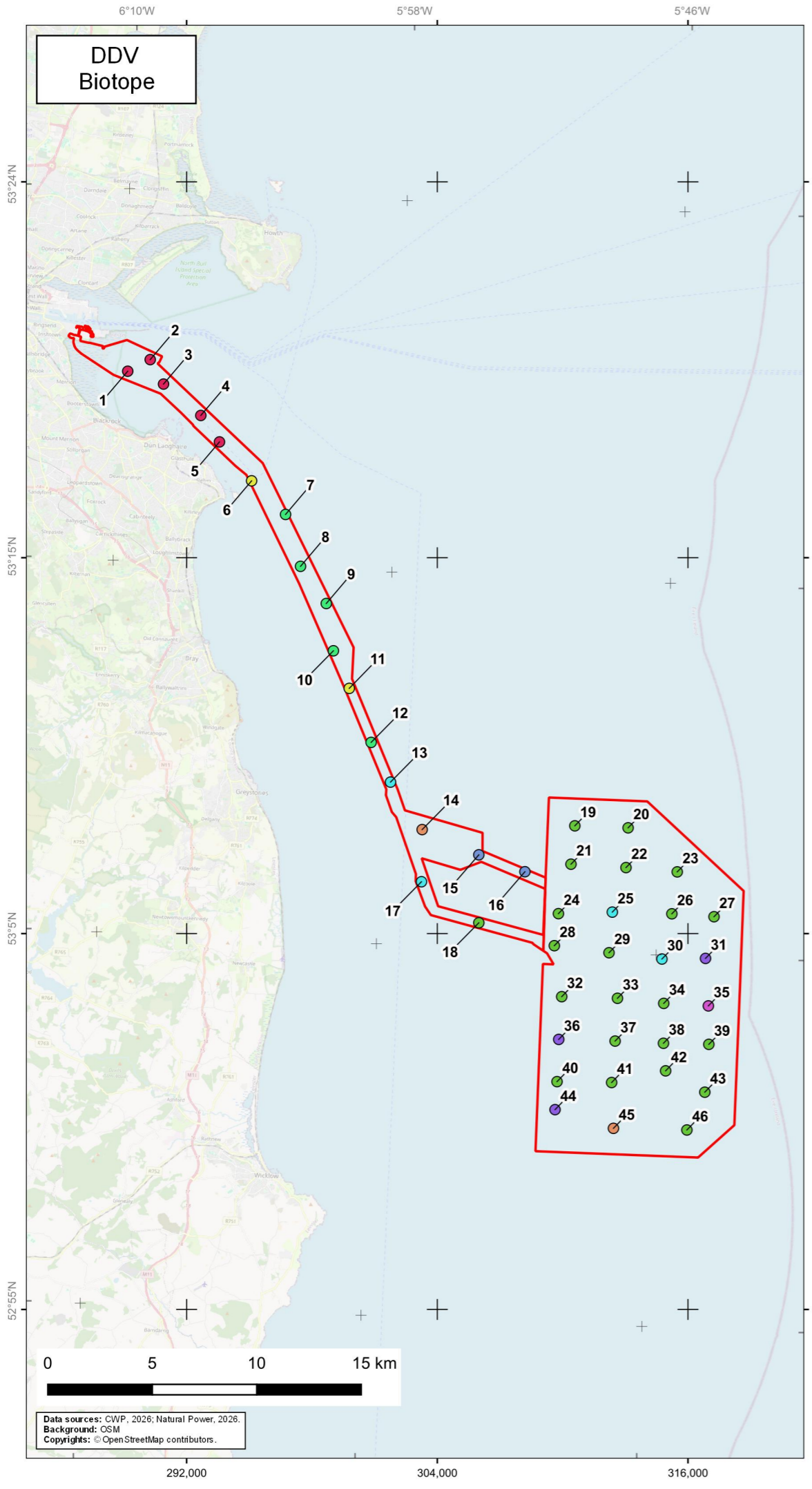
Infauna (grab) characterising species were incorporated into an Excel spreadsheet alongside epibenthic (underwater video) biotope classifications (where available), physical characteristics such as depth and sediment characteristics, and final benthic habitats assigned to each sampling station. Biotopes assigned from video are not necessarily always reflective of the final biotope once other defining parameters such as a PSA and infauna are taken into consideration, since imagery only accounts for epifaunal or visible infaunal species.

### 6.3.2.1. Biotope Classification

Infauna (grab) characterising species were incorporated into an Excel spreadsheet alongside physical characteristics such as depth and PSA, and benthic habitats assigned to each sampling station. A total of eight biotopes were classified across the CWP survey area. The most common biotope found was *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles. (SS.SCS.CCS.SpiB). All biotopes are provided in **Table I** and **Figure I**, and full biotope descriptions are given in Appendix C.

**Table I: Biotope Classification**

Biotope	MNCR classification description	Stations
SS.SCS.CCS	Circalittoral coarse sediment	31
SS.SCS.CCS.MedLumVen	<i>Mediomastus fragilis</i> , <i>Lumbrineris spp.</i> and venerid bivalves in circalittoral coarse sand or gravel	9, 14
SS.SCS.CCS.SpiB	<i>Spirobranchus triqueter</i> with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles.	17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 36, 37, 38, 40
SS.SMx.CMx	Circalittoral mixed sediment	6, 15, 16, 44
SS.SMx.OMx.PoVen	Polychaete-rich deep Venus community in offshore mixed sediments	39, 41, 42, 43, 45
SS.SSa.CFiSa.EpusOborApri	<i>Echinocyamus pusillus</i> , <i>Ophelia borealis</i> and <i>Abra prismatica</i> in circalittoral fine sand	8
SS.SSa.CMuSa.AalbNuc	<i>Abra alba</i> and <i>Nucula nitidosa</i> in circalittoral muddy sand or slightly mixed sediment	7, 10, 11, 12, 13,
SS.SSa.IMuSa.FfabMag	<i>Fabulina fabula</i> and <i>Magelona mirabilis</i> with venerid bivalves and amphipods in infralittoral compacted fine muddy sand	1, 2, 3, 4, 5



**Legend**

□ Planning Application Boundary (PAB)

**Biotope**

- CR.MCR.EcCr
- CR.MCR.EcCr.UrtScr
- SS.SCS.CCS
- SS.SCS.CCS.MedLumVen
- SS.SCS.CCS.SpiB
- SS.SMx.CMx
- SS.SMx.CMx.FluHyd
- SS.SMx.CMx.OphMx
- SS.SMx.OMx.PoVen
- SS.SSa.CFiSa.EpusOborApri
- SS.SSa.CMuSa
- SS.SSa.CMuSa.AalbNuc
- SS.SSa.IMuSa
- SS.SSa.IMuSa.FfabMag

		Project: Codling Wind Park	Contractor: 		
<b>Figure I</b> Benthic biotopes classification					
CWP doc. number:		CWP-NPC-CON-09-MAP-2137			
Internal descriptive code:		Size: A3	CRS:		
N/A		Scale: 1:250,000	EPSG 25830		
Rev.	Updates	Date	By	Chk'd	App'd
00	For FIR submission	2026/04/21	AC	ME/EA	LJ

## 6.4. Reefiness Assessment

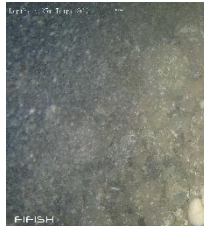
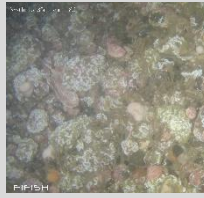
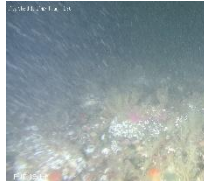
Of the 28 sampling stations located in the array site, seven stations (Stations 23, 27, 32, 35, 39, 43 and 46) were assessed as having attributes that could qualify as low resemblance stony reef, including composition, elevation and biota. Six of these seven stations were located on the eastern edge of the array site and the remaining station on the western side of the array site just south of where the OECC meets the array site.

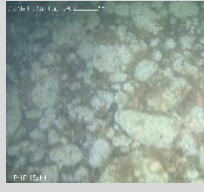
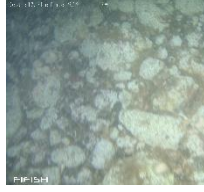


**Table J** presents the underwater video and benthic grab biotopes for each of these stations, six of which are classified as *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (SS.SCS.CCS.SpiB) from the underwater video, three of which are also determined to be this biotope from the benthic grab data, and two of which are Polychaete-rich deep Venus community in offshore mixed sediments (SS.SMx.OMx.PoVen) from the benthic grab data. It was not possible to obtain a grab sample at two locations; stations 35 and 46. Station 35 was classified as the hard substrate biotope Echinoderms and crustose communities (CR.MCR.EcCr) in the underwater video.

The majority of the array site is the biotope complex Circalittoral coarse sediment with an area in the south east of the array site being the biotope complex Circalittoral mixed sediments from the grabs, the majority of stations were assessed as 'not reef' as those areas were comprised mainly of smaller pebbles with a higher degree of patchiness, and dominated by infaunal species. Whereas stations determined as potential low resemblance stony reef had a higher percentage of cobbles with occasional boulders, were more consolidated i.e. showed less 'patchiness' and fauna dominated with epifaunal species.

It should be noted however, that the attributes of elevation and extent for assessing reefiness are best assessed using geophysical data and existing geophysical data for the site classified the entire array site as sedimentary and as such are unlikely to be considered as having a 'low resemblance' to Annex I stony reef.

**Table J: Biotopes of low resemblance stony reef stations.**

Station number	Underwater video biotope	Benthic grab biotope	Underwater video image
23	SS.SCS.CCS.S piB	SS.SCS.CCS.S piB	
27	SS.SCS.CCS.S piB	SS.SCS.CCS.S piB	
32	SS.SCS.CCS.S piB	SS.SCS.CCS.S piB	

Station number	Underwater video biotope	Benthic grab biotope	Underwater video image
35	CR.MCR.EcCr	No grab	
39	SS.SCS.CCS.S piB	SS.SMx.OMx.P oVen	
43	SS.SCS.CCS.S piB	SS.SMx.OMx.P oVen	
46	SS.SCS.CCS.S piB	No grab	

## 7. Discussion

The subtidal benthic ecology survey depicts a heterogeneous environment with eight biotopes classified from the benthic grabs and nine biotopes classified from the underwater video across the offshore development area. Sediments across the survey area are dominated by sand, with varying proportions of gravel, mud, pebbles, cobbles and boulders. The typical community structure is characterised by a range of species including polychaetes, bivalves, amphipods, echinoderms, hydroids and bryozoans. The infaunal community was dominated by polychaetes, bivalves and amphipods whilst the epifaunal community varied throughout the survey area but consisted mainly of echinoderms such as brittlestars and starfish, molluscs, cnidaria such as anemones, soft corals and bryozoans. Species richness and diversity values varied across the survey area however was generally higher in areas of coarser sediment.

No single biotope dominated the OECC, muddy sand biotopes *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (SS.SSa.IMuSa.FfabMag) and *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (SS.SSa.CMuSa.AalbNuc) dominated stations closest to the intertidal area with the habitat changing to mixed sediment habitats as the silt content reduces and biotopes *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (SS.SCS.CCS.SpiB) and Circalittoral mixed sediment (SS.SMx.CMx) closest to the array. The predominant biotope in the array site was *Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (SS.SCS.CCS.SpiB) or Circalittoral Coarse Sediment (SS.SCS.CCS) At a few of these stations the epifaunal biotope *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment was present as an overlay, with the hydroids indicating slightly less scour at these stations. Mixed sediment biotopes Circalittoral mixed sediment (SS.SMx.CMx) and Polychaete-rich deep Venus community in offshore mixed sediments (SS.SMx.OMx.PoVen) are present in the south of the array site with brittle star beds present at one station. One station in a discrete area of boulders and cobbles the array site, was classified as the biotope Echinoderms and crustose communities (CR.MCR.EcCr). Two stations had an epifaunal biotope classification of *Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock (CR.MCR.EcCr,UrtScr) Which typically occurs on sand covered rock and cobbles on gravel and sand, and is characterised by the Dahlia anemone *Urticina felina* The infaunal biotope classified from benthic grabs at these stations Circalittoral Mixed Sediments (SS.SMx.CMx).

The sediment types present at all stations within the array site were too coarse to allow for adequate sampling for contaminants analysis to be collected; the minimum quantity of sample required being 500g (Cronin *et al.*, 2006). However, as contaminants primarily accumulate in fine-grained sediments rather than coarse-grained sediments it is anticipated that levels of contaminants within the array site are low. In the OECC, levels of contaminants were all generally below Irish and Cefas lower action levels for all contaminants. Only heavy metal arsenic was present above Irish lower action levels at a few stations, and these levels were below the Irish upper level and below both upper and lower Cefas action levels.

No Annex II species were recorded during the 2025 surveys, however a reefiness assessment indicated that seven stations in the array site had attributes that could qualify as Annex I low resemblance stony reef, including composition, elevation and biota. These stations were mainly located on the eastern edge of the array site with one station on the western side near the OECC. It should be noted however, existing geophysical data for the site classified the entire array site as sedimentary and this concurs with publicly available INFOMAR and EUSeamap data. The majority of the array site is mobile sand, pebbles and cobbles with infaunal communities present underneath. It is likely that in areas of larger and/or more consolidated stone, that these stones are highly mobile and ephemeral and while *Spirobranchus triqueter* itself is a common reef-building or encrusting species, its presence on unstable, mobile pebbles typically makes the area a "coarse sediment" habitat rather than an Annex I reef.

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## Appendices

### A. Locations of Sampling Stations and Type of Sample Taken

Table AA: Subtidal Benthic Grab and DDV Sampling Stations

Station	Latitude	Longitude	Depth	Sample Taken
1	53°19'24.547" N	6°9'55.967" E	1.7	Fauna; PSA; TOC; Contaminants
2	53°19'44.069" N	6°8'59.198" E	5	Fauna; PSA; TOC; Contaminants
3	53°19'7.122" N	6°8'22.046" E	6.6	Fauna; PSA; TOC; Contaminants
4	53°18'21.065" N	6°6'42.157" E	10.7	Fauna; PSA; TOC; Contaminants
5	53°17'41.382" N	6°5'50.958" E	12	Fauna; PSA; TOC; Contaminants
6	53°16'43.319" N	6°4'23.694" E	25	Fauna; PSA; TOC; Contaminants
7	53°15'53.527" N	6°2'52.323" E	32.5	Fauna; PSA; TOC; Contaminants
8	53°14'34.188" N	6°2'7.975" E	26.9	Fauna; PSA; TOC; Contaminants
9	53°13'38.341" N	6°0'57.516" E	30.5	Fauna; PSA; TOC; Contaminants
10	53°12'25.634" N	6°0'34.029" E	29.1	Fauna; PSA; TOC; Contaminants
11	53°11'28.517" N	5°59'49.121" E	38.8	Fauna; PSA; TOC; Contaminants
12	53°10'6.286" N	5°58'46.966" E	45.4	Fauna; PSA; TOC
13	53°9'6.074" N	5°57'52.790" E	44.5	Fauna; PSA; TOC; Contaminants
14	53°7'54.587" N	5°56'26.320" E	32.3	Fauna; PSA; TOC
15	53°7'19.094" N	5°53'57.932" E	10	Fauna; PSA; TOC
16	53°6'55.809" N	5°51'57.607" E	14.1	Fauna; PSA; TOC
17	53°6'33.831" N	5°56'22.596" E	30.1	Fauna; PSA; TOC
18	53°5'33.909" N	5°53'50.790" E	37	Fauna; PSA; TOC
19	53°8'9.937" N	5°49'53.889" E	10.9	Fauna; PSA; TOC
20	53°8'10.054" N	5°47'36.593" E	12.2	Fauna; PSA; TOC
21	53°7'10.311" N	5°49'59.855" E	11	Fauna; PSA; TOC
22	53°7'8.409" N	5°47'38.030" E	13.4	Fauna; PSA; TOC
23	53°7'4.824" N	5°45'25.798" E	14.6	Fauna
24	53°5'52.978" N	5°50'27.120" E	14.2	Fauna; PSA; TOC
25	53°5'58.657" N	5°48'8.729" E	15.1	Fauna; PSA; TOC
26	53°5'59.607" N	5°45'35.439" E	14.1	Fauna; PSA; TOC
27	53°5'57.582" N	5°43'46.799" E	15	Fauna; PSA; TOC
28	53°5'3.119" N	5°50'34.419" E	15	Fauna; PSA; TOC
29	53°4'55.548" N	5°48'13.131" E	16.5	Fauna; PSA; TOC
30	53°4'49.006" N	5°45'56.506" E	14.1	Fauna; PSA; TOC
31	53°4'52.552" N	5°44'4.560" E	16.7	Fauna; PSA; TOC
32	53°3'44.660" N	5°50'10.232" E	16.4	Fauna; PSA; TOC
33	53°3'45.563" N	5°47'46.811" E	16.9	Fauna; PSA; TOC
34	53°3'40.432" N	5°45'47.470" E	16.8	Fauna; PSA; TOC

Station	Latitude	Longitude	Depth	Sample Taken
35	53°3'39.186" N	5°43'52.568" E	17	None (hard ground)
36	53°2'38.319" N	5°50'13.520" E	18.7	Fauna; PSA; TOC
37	53°2'39.182" N	5°47'48.589" E	14.7	Fauna; PSA; TOC
38	53°2'38.659" N	5°45'44.229" E	18.7	Fauna; PSA; TOC
39	53°2'39.690" N	5°43'47.595" E	21	Fauna; PSA; TOC
40	53°1'32.841" N	5°50'13.593" E	17.9	Fauna; PSA; TOC
41	53°1'34.780" N	5°47'53.365" E	17.9	Fauna; PSA; TOC
42	53°1'56.103" N	5°45'35.937" E	213	Fauna; PSA; TOC
43	53°1'25.395" N	5°43'53.251" E	22.7	Fauna; PSA; TOC
44	53°0'49.361" N	5°50'15.850" E	18.8	Fauna; PSA; TOC
45	53°0'23.970" N	5°47'44.144" E	18.3	Fauna; PSA; TOC
46	53°0'25.820" N	5°44'35.516" E	23.4	None (hard ground)





Golfingiidae (juv)	2032	0	0	0	0	5	0	4	91	12	0	15	0	15	1	0	3	8	0	7	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	12	0	0	0	0	0	0	0	0	0	3	0	
Golfingia (Golfingia) vulgaris vulgaris	410724	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Nephasoma (Nephasoma) minutum	136060	0	1	7	0	4	3	6	74	11	0	1	0	54	0	0	0	8	19	7	0	0	0	0	5	2	0	0	0	0	0	0	0	1	3	0	6	1	0	0	0	0	0	4	0	2	0	
<b>Phascolionidae</b>	1647	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Phascolion (Phascolion) strombus strombus	410749	0	0	0	0	0	0	0	1	1	0	0	0	4	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	1	0	
<b>ANNELIDA</b>	882	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
<b>POLYCHAETA</b>	883	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>PHYLLODOCIDA</b>	892	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Aphroditidae</b>	938	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Aphrodita aculeata	129840	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	
Polynoidae (juv)	939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Subadyte pellucida	130833	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	
Harmothoe sp. (damaged)	129491	0	5	2	2	0	0	2	2	1	0	0	0	2	4	3	1	3	9	0	2	1	0	1	1	0	1	0	0	1	0	3	0	2	6	2	1	1	0	0	0	0	0	0	0	0	0	
Harmothoe antilopes	130754	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	
Harmothoe glabra	571832	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Harmothoe impar	130770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Eteone longa agg.	130616	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	0		
Eulalia sp. (damaged)	129445	2	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Eulalia bilineata	130624	0	0	0	0	0	1	2	8	5	0	0	0	1	0	0	0	1	0	2	0	0	0	0	2	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0			
Eulalia exusilla	130625	0	0	0	0	0	0	0	4	1	0	0	0	2	0	0	0	1	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Eumida sp. (damaged)	335309	1	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	2	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Eumida bahusiensis	130641	0	3	0	1	0	2	2	2	0	2	0	0	3	2	0	0	3	5	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0			
Eumida sanguinea	130644	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0			
Hesionura elongata	130649	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	0	0	0				
Hypereteone foliosa	152250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Pseudomystides limbata	130683	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0			
Phyllodoce groenlandica	334506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	2	0	0	4	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0			
Phyllodoce mucosa	334512	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0			
Paranaitis kosteriensis	130662	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
<b>Glyceridae</b>	952	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Glycera sp. (juv)	129296	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	2	0	0	0			
Glycera alba	130116	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0			
Glycera lapidum agg.	130123	0	0	0	0	2	0	0	1	0	0	0	0	3	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	0	0	3	1	0	3	0	0	0	0	6	5	0	2	0





Sphaerosyllis hystrix	131388	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	1	0	8	0	0	0	0	2	0	2	0	0	0				
Sphaerosyllis sp. (juv)	129677	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0			
Epigamia alexandri	238180	0	0	0	2	0	0	0	0	0	0	0	0	0	0	6	0	0	0	5	0	1	0	0	0	0	0	0	0	1	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0				
Myrianida sp. (juv/damaged)	129659	0	20	8	0	0	1	0	1	1	0	0	0	2	1	2	5	8	1	0	0	0	0	0	1	1	0	0	0	1	3	0	0	1	1	0	0	0	4	0	0	0	0	0	0	0	0		
Myrianida brachycephala	238192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Nereididae (juv)	22496	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0				
Eunereis longissima	130375	0	1	0	0	0	0	0	0	0	0	2	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0			
Perinereis cultrifera	130408	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Platynereis dumerilii	130417	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
<b>Nephtyidae</b>	<b>956</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>				
Nephtys sp. (juv/damaged)	129370	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	4	1	0	1	0	2	1	4	0	0	2	1	1	0	0	0	0	0	0	0	0		
Nephtys assimilis	130353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		
Nephtys caeca	130355	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Nephtys cirrosa	130357	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	1	0	6	0	0	0	1	8	2	0	0	0	0	0	0	0	0	0	1	1
Nephtys hombergii	130359	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	2	0	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	
Nephtys kersivalensis	130363	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0		











































Spisula elliptica	140300	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	3	0	0	0	0	2	0	0	0	0	0	2	7	0	0	0	1	2	1	0	0	0	3	3	8	8	0	0		
Spisula subtruncata	140302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0			
Astarte sulcata	138824	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Goodallia triangularis	138831	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	0	2	0	0	0	
Cardiidae (juv)	229	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Acanthocardia sp. (juv)	137732	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Acanthocardia echinata	138992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Parvicardium pinnulatum	181343	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Laevicardium crassum	139004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Tellinidae (juv)	235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Fabulina fabula	146907	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Limecola balthica	880017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Donax vittatus	139604	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Gari sp. (juv)	138388	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Gari tellinella	140873	0	0	0	0	0	0	0	7	1	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Gari fervensis	140870	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Abra sp. (juv)	138474	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Abra alba	141433	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0







Amphipholis squamata	125064	0	2	0	1	0	0	5	1	0	2	4	0	1	1	1	0	0	32	0	6	0	0	0	1	0	1	0	0	0	0	0	0	0	4	0	1	0	1	0	1	0	0	0	0	0	2	0	0	0
Ophiura sp. (juv)	123574	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	5	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0		
Ophiura albida	124913	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	9	2	6	1	23	1	0	6	0	0	0	0	0	0	0	0	0	0	0	17		
Psammechinus miliaris	124319	2	1	0	2	0	0	0	2	0	0	1	0	1	1	0	1	2	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Echinocyamus pusillus	124273	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Spatangus purpureus	124418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Echinocardium sp. (damaged)	123426	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
Echinocardium flavescens	124394	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Neopentadactyla mixta	124685	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Ocnus brunneus	124639	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Paraleptopentacta elongata	124635	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Leptosynapta bergensis	124462	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptosynapta inhaerens	124465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

## C. Full MNCR Biotope Descriptions

Source - JNCC Marine Habitat Classification (<https://mhc.jncc.gov.uk/>)

### **CR.MCR.EcCr - Echinoderms and crustose communities**

This biotope complex occurs on wave-exposed, moderately strong to weakly tide-swept, circalittoral bedrock and boulders. Echinoderms, faunal (*Parasmittina trispinosa*) and algal crusts (red encrusting algae) dominate this biotope, giving a sparse appearance. Typical echinoderms present are the starfish *Asterias rubens*, the brittlestar *Ophiothrix fragilis* and the sea urchin *Echinus esculentus*. There may be isolated clumps of the hydroids *Nemertesia antennina* and *Abietinaria abietina*, *Alcyonium digitatum*, the anemone *Urticina felina* and the cup coral *Caryophyllia smithii*. Other species present may include the polychaete *Spirobranchus triqueter* and the top shell *Calliostoma zizphinum*. Five biotopes have been identified within this biotope complex: CarSwi, CarSp, FaAlCr, UrtScr and AdigVT.

### **CR.MCR.EcCr.UrtScr - *Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock**

This biotope typically occurs on tide-swept circalittoral bedrock, rock adjacent to mobile sand/gravel in gullies, and cobbles on gravel and sand, characterised by scour-tolerant robust species. Although many of these species are found on subtidal rock, they tend to occur in larger numbers in these highly sand-influenced conditions. The dominant species by far is the anemone *Urticina felina* which commonly occurs on rocks at the sand-rock interface, where the scour levels are at a maximum and few species can tolerate this abrasion. The sponge *Ciocalypa penicillus* is also very characteristic of shifting sand-covered rock. This biotope is only occasionally recorded as a separate entity, because its extent is typically restricted to a very narrow band of rock at the sediment interface. Only occasionally does it cover a large extent of rock (e.g. where the wave action is strong enough to cause sand abrasion well up the rock face or where the rock is low-lying). More often, this scoured zone is recorded as part of whatever biotope occurs on the nearby hard substrata. Other species (which are able to survive, and benefit from the reduced competition) include *Balanus crenatus*, *Spirobranchus triqueter*, *Cellepora pumicosa*, *Alcyonidium diaphanum*, *Cliona celata*, encrusting red algae and *Asterias rubens*.

### **SS.SCS.CCS - Circalittoral coarse sediment**

Tide-swept circalittoral coarse sands, gravel and shingle generally in depths of over 15-20 m. This habitat may be found in tidal channels of marine inlets, along exposed coasts and offshore. This habitat, as with shallower coarse sediments, may be characterised by robust infaunal polychaetes, mobile crustacea and bivalves. Certain species of sea cucumber (e.g., *Neopentadactyla*) may also be prevalent in these areas along with the lancelet *Branchiostoma lanceolatum*.

### **SS.SCS.CCS.MedLumVen - *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel**

Circalittoral gravels, coarse to medium sands, and shell gravels, sometimes with a small amount of silt and generally in relatively deep water (generally over 15-20 m), may be characterised by polychaetes such as *Mediomastus fragilis*, *Lumbrineris* spp., *Glycera lapidum* with the pea urchin *Echinocyamus pusillus*. Other taxa may include *Nemertea* spp., *Protodorvillea kefersteini*, *Owenia fusiformis*, *Spiophanes bombyx* and *Amphipholis squamata* along with amphipods such as *Ampelisca spinipes*. This biotope may also be characterised by the presence of conspicuous venerid bivalves, particularly *Timoclea ovata*. Other robust bivalve species such as *Moerella* spp., *Glycymeris glycymeris* and *Astarte sulcata* may also be found in this biotope. *Spatangus purpureus* may be present especially where the interstices of the gravel are filled by finer particles, in which case, *Gari tellinella* may also be prevalent (Glemarec 1973). Venerid bivalves are often under-sampled in benthic grab surveys and as such may not be conspicuous in many infaunal datasets. Such communities in gravelly sediments may be relatively species-rich and they may also contain epifauna such as *Hydroides norvegicus* and *Spirobranchus lamarcki*. In sand wave areas this biotope may also contain elements of the SS.SSa.IMuSa.FfabMag biotope, particularly *Magelona* species. This

biotope has previously been described as the 'Deep Venus Community' and the 'Boreal Off-Shore Gravel Association' (Ford 1923; Jones 1950) and may also be part of the Venus community described by Thorson (1957) and in the infralittoral stage described by Glemarec (1973). SS.SCS.CCS.MedLumVen may be quite variable over time and in fact may be closer to a biotope complex in which a number of biotopes or sub-biotopes may yet be defined. For example, Ford (1923) describes a 'Series A' and a 'Series B' characterised by *Echinocardium cordatum*-*Chamelea gallina* and *Spatangus purpurea*-*Clausinella fasciata*. Furthermore, mosaics of cobble and lag gravel often contain ridges of coarse gravelly sand and these localised patches are also characterised by robust veneriid and similar bivalves including *Arcopagia crassa*, *Laevicardium crassum* and others including *Glycymeris* (E.I.S. Rees pers. comm., 2002). In the presence of pebbles, cobbles or shell, in coarse sandy gravel sediment, the biotope may support encrusting fauna such as hydroids, *Sertularia cupressina* and *Hydrallmania falcata*, bryozoa including *Disporella hispida*, *Schizomavella* spp., and *Escharella immersa* and encrusting polychaetes, *Spirobranchus triqueter* and instances of *Sabellaria spinulosa*. In the presence of these encrusting forms, and with the transition of sediment types to more tidally swept circalittoral mixed sediment, the biotope may form a transition to SS.SMx.CMx.FluHyd. Other variants in gravel, sands and stones in circalittoral waters, from records in the east English Channel, show this biotope may support high densities of polychaetes and copepods, *Nematoda* and *Nemertea*. The biotope may be represented in moderately exposed, shallower areas, with muddy mixed gravel or sand with shell sediments and maerl (*Hapalidiaceae*), supporting the characteristic fauna of *Mediomastus* and *Hilbigneris gracilis*, but absence of veneriid bivalves. Furthermore, in impoverished variants of the biotopes, there may be a reduced component of *Mediomastus* and *Hilbigneris gracilis*.

#### **SS.SCS.CCS.SpiB - Spirobranchus triqueter with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles**

This biotope is characterised by a few ubiquitous robust and/or fast growing ephemeral species which are able to colonise pebbles and unstable cobbles and slates which are regularly moved by wave and tidal action. The main cover organisms tend to be restricted to calcareous tube worms such as *Spirobranchus triqueter* or *S. lamarcki*, small barnacles including *Balanus crenatus* and *Balanus balanus*, and a few bryozoan and coralline algal crusts. Scour action from the mobile substratum prevents colonisation by more delicate species. Occasionally in tide-swept conditions tufts of hydroids such as *Sertularia argentea* and *Hydrallmania falcata* are present. Epifauna may include *Asterias rubens*, *Pachycerianthus multiplicatus*, *Munida sarsi*, *Paguroidea*, *Cerianthus lloydii*, and *Sabellidae*. Bryozoa *Parazoanthus anguicomus*, *Ulva*, *Porania*, and *Porifera* can also be present.

#### **SS.SMx.CMx - Circalittoral mixed sediment**

Mixed (heterogeneous) sediment habitats in the circalittoral zone (generally below 15-20 m) including well mixed muddy gravelly sands or very poorly sorted mosaics of shell, cobbles and pebbles embedded in or lying upon mud, sand or gravel. Due to the variable nature of the seabed a variety of communities can develop which are often very diverse. A wide range of infaunal polychaetes, bivalves, echinoderms and burrowing anemones such as *Cerianthus lloydii* are often present in such habitats and the presence of hard substrata (shells and stones) on the surface enables epifaunal species to become established, particularly hydroids such as *Nemertesia* spp. and *Hydrallmania falcata*. The combination of epifauna and infauna can lead to species rich communities. Coarser mixed sediment communities may show a strong resemblance, in terms of infauna, to biotopes within the SS.SCS complex. However, infaunal data for this biotope complex is limited to that described under the biotope SS.SMx.CMx.KurThyMx, and so are not representative of the infaunal component of this biotope complex.

#### **SS.SMx.CMx.FluHyd - Flustra foliacea and Hydrallmania falcata on tide-swept circalittoral mixed sediment**

This biotope represents part of a transition between sand-scoured circalittoral rock where the epifauna is conspicuous enough to be considered as a biotope and a sediment biotope where an infaunal sample is required to characterise it and is possibly best considered an epibiotic overlay. *Flustra foliacea* and the hydroid *Hydrallmania falcata* characterise this biotope; lesser amounts of other hydroids such as *Sertularia argentea*, *Nemertesia antennina* and occasionally *Nemertesia ramosa*, occur where suitably stable hard substrata is found. The anemone

*Urticina felina* and the soft coral *Alcyonium digitatum* may also characterise this biotope. Barnacles *Balanus crenatus* and tube worms *Spirobranchus triqueter* may be present and the robust bryozoans *Alcyonidium diaphanum* and *Vesicularia spinosa* appear amongst the hydroids at a few sites. *Sabella pavonina* and *Lanice conchilega* may be occasionally found in the coarse sediment around the stones. In shallower (i.e. upper circalittoral) examples of this biotope scour-tolerant robust red algae such as *Polysiphonia nigrescens*, *Calliblepharis* spp. and *Gracilaria gracilis* are found. In offshore areas, such as in the Greater Gabbard North Sea Area, where there is circalittoral mixed sediment, with pebbles and gravels, the biotope may further support rich encrusting fauna, including bryozoans, *Spirobranchus lamarcki*, and the barnacle *Verruca stroemia*, and occasionally *Sabellaria spinulosa*. Alongside these encrusting fauna, infauna such as Lumbrinerids (*Hilbigneris gracilis*), *Glycera lapidum*, *Echinocyamus pusillus*, *Amphipholis squamata*, *Caulleriella alata* may be present, and may represent a transitional form between SS.SMx.CMx.FluHyd and SS.SCS.CCS.MedLumVen.

#### **SS.SMx.CMx.OphMx - Ophiothrix fragilis and/or Ophiocomina nigra brittlestar beds on sublittoral mixed sediment**

Circalittoral sediment dominated by brittlestars (hundreds or thousands m<sup>-2</sup>) forming dense beds, living epifaunally on boulder, gravel or sedimentary substrata. *Ophiothrix fragilis* and *Ophiocomina nigra* are the main bed-forming species, with rare examples formed by *Ophiopholis aculeate*. Brittlestar beds vary in size, with the largest extending over hundreds of square metres of sea floor and containing millions of individuals. They usually have a patchy internal structure, with localized concentrations of higher animal density. *Ophiothrix fragilis* or *Ophiocomina nigra* may dominate separately or there may be mixed populations of the two species. *Ophiothrix* beds may consist of large adults and tiny, newly-settled juveniles, with animals of intermediate size living in nearby rock habitats or among sessile epifauna. Unlike brittlestar beds on rock, the sediment based beds may contain a rich associated epifauna (Warner, 1971; Allain, 1974; Davout & Gounin, 1995). Large suspension feeders such as the octocoral *Alcyonium digitatum*, the anemone *Metridium senile* and the hydroid *Nemertesia antennina* are present mainly on rock outcrops or boulders protruding above the brittlestar-covered substratum. The large anemone *Urticina felina* may be quite common. This species lives half-buried in the substratum but is not smothered by the brittlestars, usually being surrounded by a 'halo' of clear space (Brun, 1969; Warner, 1971). Large mobile animals commonly found on *Ophiothrix* beds include the starfish *Asterias rubens*, *Crossaster papposus* and *Luidia ciliaris*, the urchins *Echinus esculentus* and *Psammechinus miliaris*, edible crabs *Cancer pagurus*, swimming crabs *Necora puber*, *Liocarcinus* spp., and hermit crabs *Pagurus bernhardus*. The underlying sediments also contain a diverse infauna including the bivalve *Abra alba*. Warner (1971) found that numbers and biomass of sediment dwelling animals were not significantly reduced under dense brittlestar patches.

#### **SS.SMx.OMx.PoVen - Polychaete-rich deep Venus community in offshore mixed sediments**

In offshore circalittoral slightly muddy mixed sediments, a diverse community particularly rich in polychaetes with a significant venerid bivalve component may be found. Typical species include the polychaetes *Glycera lapidum*, *Aonides paucibranchiata*, *Laonice bahusiensis*, *Mediomastus fragilis*, *Hilbigneris gracilis*, *Pseudomystides limbata*, *Protomystides bidentata* and syllid species and bivalves such as *Timoclea ovata*, *Glycymeris glycymeris*, *Spisula elliptica* and *Goodallia triangularis*. Some examples of this biotope may have abundant juvenile *Modiolus modiolus*. Several echinoderms including *Amphipholis squamata*, *Echinocyamus pusillus* are present in many locations. In coarser variations of the biotope, with gravelly sediment and the presence of pebbles or cobbles, the biotope may support encrusting fauna such as hydroids, *Sertularia cupressina* and *Hydrallmania falcata*, bryozoans and *Spirobranchus triqueter*. Mobile crustacea including the long-clawed porcelain crab *Pisidia longicornis* and amphipod *Nototropis vedlomensis* can also be highly abundant. This biotope has been recorded in the Irish Sea and English Channel and collectively with SS.SCS.CCS.MedLumVen comprise the 'Deep Venus Community' and the 'Boreal Off-Shore Gravel Association' as defined by other workers (Ford 1923; Jones 1950).

#### **SS.SSa.CFiSa.EpusOborApri - Echinocyamus pusillus, Ophelia borealis and Abra prismatica in circalittoral fine sand**

Circalittoral and offshore medium to fine sand (from 40 m to 140 m) characterised by the pea urchin *Echinocyamus pusillus*, the polychaete *Ophelia borealis* and the bivalve *Abra prismatica*. Other species may include the polychaetes *Spiophanes bombyx*, *Pholoe* sp., *Exogone* spp., *Sphaerosyllis bulbosa*, *Goniada maculata*, *Chaetozone setosa*, *Owenia fusiformis*, *Glycera lapidum*, *Lumbrineris latreilli* and *Aricidea cerrutii*. The bivalves *Thracia phaseolina* and *Asbjornsenia pygmaea* and to a lesser extent *Spisula elliptica* and *Timoclea ovata* may also be present. This biotope has been found in the central and northern North Sea. In offshore sandier or gravelly sand sediments in the Western Channel and Celtic sea, the biotope may support species indicative of sandy, muddy and mixed sediment. This variant shares the characteristic fauna of *Echinocyamus pusillus* amongst others, but also supports a wider variety of polychaete worms such as *Spiophanes kroyeri*, *Magelona* sp. and *Tharyx killariensis*, and may represent the transition to the biotope SS.SCS.CCS.Blan.

#### **SS.SSa.CMuSa - Circalittoral muddy sand**

Circalittoral non-cohesive muddy sands with the silt content of the substratum typically ranging from 5% to 20%. This habitat is generally found in water depths of over 15-20m and supports animal-dominated communities characterised by a wide variety of polychaetes, bivalves such as *Abra alba* and *Nucula nitidosa*, and echinoderms such as *Amphiura* spp and *Ophiura* spp., and *Astropecten irregularis*. These circalittoral habitats tend to be more stable than their infralittoral counterparts and as such support a richer infaunal community.

#### **SS.SSa.CMuSa.AalbNuc - *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment**

Non-cohesive muddy sands or slightly shelly/gravelly muddy sand characterised by the bivalves *Abra alba* and *Nucula nitidosa*. Other important taxa include *Nephtys* spp., *Chaetozone setosa* and *Spiophanes bombyx* with *Fabulina fabula* also common in many areas. The echinoderms *Ophiura albida* and *Asterias rubens* may also be present. The epibiotic biotope SS.SSa.IMuSa.EcorEns may overlap this biotope. This biotope is part of the *Abra* community defined by Thorson (1957) and the infralittoral etage described by Glemarec (1973). In organically enriched variants of this biotope, there may be higher occurrences of amphipods, such as *Bathyporeia tenuipes*, *Pericolulodes longimanus*, and *Urothoe elegans*.

#### **SS.SSa.IMuSa - Infralittoral muddy sand**

Non-cohesive muddy sand (with 5% to 20% silt/clay) in the infralittoral zone, extending from the extreme lower shore down to more stable circalittoral zone at about 15-20 m. The habitat supports a variety of animal-dominated communities, particularly polychaetes (*Magelona mirabilis*, *Spiophanes bombyx* and *Chaetozone setosa*), bivalves (*Fabulina fibula* and *Chamelea gallina*) and the urchin *Echinocardium cordatum*.

#### **SS.SSa.IMuSa.FfabMag - *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand**

In stable, fine, compacted sands and slightly muddy sands in the infralittoral and littoral fringe, communities dominated by venerid bivalves such as *Chamelea gallina* occur. This biotope may be characterised by a prevalence of *Fabulina fabula* and *Magelona mirabilis* or other species of *Magelona* (e.g. *M. filiformis*). Other taxa, including the amphipod *Bathyporeia* spp. and polychaetes such as *Chaetozone setosa*, *Spiophanes bombyx* and *Nephtys* spp. are also commonly recorded. In some areas the bivalve *Spisula elliptica* may also occur in this biotope in low numbers. The community is relatively stable in its species composition, however, numbers of *Magelona* and *F. fabulina* tend to fluctuate. Around the Scilly Isles numbers of *F. fabulina* in this biotope are uncommonly low whilst these taxa are often found in higher abundances in muddier communities (presumably due to the higher organic content). In deeper, offshore variants of this biotope, although still present, there is a reduction in the component species *F. fabula*, whilst *Magelona filiformis*, *Bathyporeia* spp., annelid and nemertean worms, and *Amphiuridae* may be more common. Consequently, it may be better to revise this biotope on the basis of less ubiquitous taxa such as key amphipod species (E.I.S. Rees pers. comm. 2002) although more data is required to test this. SS.SSa.IMuSa.FfabMag and SS.SCS.ICCS.MoeVen are collectively considered to be the 'shallow Venus community'

or 'boreal off-shore sand association' of previous workers (see Petersen 1918; Jones 1950; Thorson 1957). These communities have been shown to correlate well with particular levels of current induced 'bed-stress' (Warwick & Uncles 1980). The 'Arctic Venus Community' and 'Mediterranean Venus Community' described to the north and south of the UK (Thorson 1957) probably occur in the same habitat and appears to be the same biotope described as the *Ophelia borealis* community in northern France and the central North Sea (Künitzer *et al.* 1992). Sites with this biotope may undergo transitions in community composition. The epibiotic biotopes SS.SSa.IMUSa.EcorEns and SS.SSa.IMuSa.AreISa may also overlay this biotope in some areas.

## D. Faunal Univariate Results

Table DA: Benthic grab sampling stations univariate measures of community structure

Station	No. Taxa	No. Individuals	Shannon-Wiener Diversity (H')	Richness (d)	Evenness (J')	Effective Species Number	Folk Classification
1	30	70	3.01	6.83	0.88	20.24	(g)S
2	43	290	2.58	7.41	0.69	13.15	(g)S
3	36	185	2.94	6.7	0.82	18.92	(g)S
4	64	368	3	10.66	0.72	20.01	(g)mS
5	55	228	3.27	9.95	0.82	26.29	(g)mS
6	47	102	3.17	9.95	0.82	23.84	gmS
7	22	126	1.98	4.34	0.64	7.28	(g)mS
8	19	104	1.61	3.88	0.55	5	(g)S
9	29	62	3.09	6.78	0.92	21.98	gmS
10	37	102	2.83	7.78	0.78	16.98	(g)mS
11	51	145	3.38	10.05	0.86	29.29	gmS
12	84	775	2.42	12.48	0.55	11.3	gmS
13	88	451	3.63	14.24	0.81	37.68	gmS
14	27	59	2.95	6.38	0.9	19.19	msG
15	45	835	2.34	6.54	0.61	10.35	gmS
16	77	376	3.18	12.82	0.73	24.06	gS
17	30	42	3.3	7.76	0.97	27.01	gS
18	37	114	2.9	7.6	0.8	18.09	gS
19	46	157	3.07	8.9	0.8	21.56	msG
20	63	536	2.36	9.87	0.57	10.61	sG
21	46	184	2.81	8.63	0.73	16.57	sG
22	25	64	2.33	5.77	0.73	10.32	sG
23	25	138	2.1	4.87	0.65	8.2	NA
24	8	8	2.08	3.37	1	8	sG
25	32	154	1.96	6.15	0.57	7.12	sG
26	10	85	0.83	2.03	0.36	2.3	(g)S
27	21	58	2.42	4.93	0.79	11.21	sG
28	49	126	3.12	9.92	0.8	22.57	sG
29	16	38	1.95	4.12	0.7	7.04	gS
30	5	6	1.56	2.23	0.97	4.76	sG
31	2	2	0.69	1.44	1	2	sG
32	41	101	2.67	8.67	0.72	14.46	gS
33	12	20	2.29	3.67	0.92	9.87	(g)S
34	17	27	2.39	4.85	0.84	10.93	sG

Station	No. Taxa	No. Individuals	Shannon-Wiener Diversity (H')	Richness (d)	Evenness (J')	Effective Species Number	Folk Classification
36	42	92	3.33	9.07	0.89	28.05	sG
37	17	59	2.3	3.92	0.81	9.96	sG
38	7	7	1.95	3.08	1	7	sG
39	71	237	3.62	12.8	0.85	37.39	gmS
40	9	14	1.97	3.03	0.89	7.14	sG
41	65	183	3.62	12.29	0.87	37.21	msG
42	92	502	3.14	14.63	0.69	23.06	msG
43	79	313	3.32	13.57	0.76	27.56	msG
44	76	317	3.56	13.02	0.82	35.22	msG
45	62	160	3.58	12.02	0.87	35.96	sG

## E. Subtidal Benthic PSA Results

Table EA: Benthic PSA Analysis showing percent of sediment classification within each station sample

Station	>8mm	4-8mm	2-4mm	1-2mm	0.5-1µm	0.25-0.5µm	125-250 µm	62.5-125µm	<62.5 µm	PSA Folk Classification
<b>OECC</b>										
1	1	1	1	19.4	19.4	19.4	19.4	19.4	0	slightly gravelly Sand
2	0.67	0.67	0.67	18.2	18.2	18.2	18.2	18.2	7	slightly gravelly Sand
3	0.33	0.33	0.33	18.2	18.2	18.2	18.2	18.2	8	slightly gravelly Sand
4	0.33	0.33	0.33	15.4	15.4	15.4	15.4	15.4	22	slightly gravelly muddy Sand
5	0	0	0	16.4	16.4	16.4	16.4	16.4	18	slightly gravelly muddy Sand
6	3.67	3.67	3.67	13	13	13	13	13	24	gravelly muddy Sand
7	0.33	0.33	0.33	16.6	16.6	16.6	16.6	16.6	16	slightly gravelly muddy Sand
8	0	0	0	19.4	19.4	19.4	19.4	19.4	2	slightly gravelly Sand
9	3	3	3	16.4	16.4	16.4	16.4	16.4	10	gravelly muddy Sand
10	1.33	1.33	1.33	15.4	15.4	15.4	15.4	15.4	19	slightly gravelly muddy Sand
11	2.33	2.33	2.33	16.2	16.2	16.2	16.2	16.2	12	gravelly muddy Sand
12	2	2	2	16	16	16	16	16	14	gravelly muddy Sand
13	9.67	9.67	9.67	12	12	12	12	12	12	gravelly muddy Sand
14	14.33	14.33	14.33	9.8	9.8	9.8	9.8	9.8	8	muddy sandy Gravel
15	7	7	7	12.6	12.6	12.6	12.6	12.6	16	gravelly muddy Sand
16	3	3	3	17	17	17	17	17	6	gravelly Sand
17	7	7	7	14.6	14.6	14.6	14.6	14.6	6	gravelly Sand
18	3	3	3	17.2	17.2	17.2	17.2	17.2	5	gravelly Sand
<b>Array Site</b>										

Station	>8mm	4-8mm	2-4mm	1-2mm	0.5-1µm	0.25-0.5µm	125-250 µm	62.5-125µm	<62.5 µm	PSA Folk Classification
19	20.33	20.33	20.33	6.2	6.2	6.2	6.2	6.2	8	muddy sandy Gravel
20	14	14	14	11.2	11.2	11.2	11.2	11.2	2	sandy Gravel
21	19	19	19	8.6	8.6	8.6	8.6	8.6	0	sandy Gravel
22	15.67	15.67	15.67	10.6	10.6	10.6	10.6	10.6	0	sandy Gravel
23										
24	16	16	16	10.4	10.4	10.4	10.4	10.4	1	sandy Gravel
25	14.33	14.33	14.33	11.2	11.2	11.2	11.2	11.2	1	sandy Gravel
26	1.33	1.33	1.33	19.2	19.2	19.2	19.2	19.2	0	slightly gravelly Sand
27	16.67	16.67	16.67	9.4	9.4	9.4	9.4	9.4	3	sandy Gravel
28	16.33	16.33	16.33	10	10	10	10	10	2	sandy Gravel
29	7	7	7	15.6	15.6	15.6	15.6	15.6	1	gravelly Sand
30	14.33	14.33	14.33	11.4	11.4	11.4	11.4	11.4	0	sandy Gravel
31	16.67	16.67	16.67	10	10	10	10	10	0	sandy Gravel
32	7.33	7.33	7.33	14.2	14.2	14.2	14.2	14.2	7	gravelly Sand
33	1	1	1	19.4	19.4	19.4	19.4	19.4	0	slightly gravelly Sand
34	17.67	17.67	17.67	9.4	9.4	9.4	9.4	9.4	0	sandy Gravel
36	17.33	17.33	17.33	9	9	9	9	9	2	sandy Gravel
37	16	16	16	10.4	10.4	10.4	10.4	10.4	0	sandy Gravel
38	14	14	14	11.6	11.6	11.6	11.6	11.6	0	sandy Gravel
39	8	8	8	13.2	13.2	13.2	13.2	13.2	11	gravelly muddy Sand
40	18.33	18.33	18.33	9	9	9	9	9	0	sandy Gravel
41	14.67	14.67	14.67	9.8	9.8	9.8	9.8	9.8	6	muddy sandy Gravel
42	10.33	10.33	10.33	12.2	12.2	12.2	12.2	12.2	9	muddy sandy Gravel
43	12.67	12.67	12.67	9.8	9.8	9.8	9.8	9.8	13	muddy sandy Gravel
44	14.67	14.67	14.67	8.4	8.4	8.4	8.4	8.4	14	muddy sandy Gravel
45	17.33	17.33	17.33	9	9	9	9	9	3	sandy Gravel

## F. Contaminated Sediment Results

Table FA: Metal levels within sediment samples

Metal (mg/kg)	Sampling Stations												CEFAS AL1 (ug/Kg)	CEFAS AL2 (ug/Kg)	Irish Lower AL (ug/Kg)	Irish Upper AL (ug/Kg)
	1	2	3	4	5	6	7	8	9	10	11	13				
Arsenic	5	5.5	5.2	5.7	5.4	7.4	5.7	14.4	7.4	9.4	9.4	9.1	20	100	9	70
Cadmium	0.06	0.03	0.06	0.04	0.04	0.12	0.03	0.03	0.04	0.05	0.06	0.12	0.4	5	0.7	4.2
Chromium	38.1	31.4	33.9	29.8	22.9	26.1	19.8	31.1	17.6	20.3	22.4	18.6	40	400	120	370
Copper	3.6	3.5	3.1	4.8	4.6	6.5	3.5	3	3.4	4.1	3.3	4.7	40	400	40	110
Lead	11.4	11.8	12.1	14.8	21.2	16	11.6	11.9	10.9	13.4	12.8	8.7	50	500	60	218
Mercury	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.3	3	0.2	0.7
Nickel	8.5	8.2	8.3	9.7	8.9	11.5	6.2	7.6	6.8	8.2	6.3	10	20	200	21	60
Zinc	24.2	26.5	26.8	35.6	42.2	37.8	34.6	27.3	26.7	34.7	35.8	33.6	130	800	160	410
Aluminium	20400	14600	16900	22100	23900	24700	14500	13700	16700	20300	13600	16500	none	none	none	none
Lithium	21.6	16.4	20.4	29.7	31.4	40.6	22.9	19.7	24.8	51	88.6	134	none	none	none	none

Table FB: Levels of Organotins within sediment samples

Client Reference	Sampling Stations											
	1	2	3	4	5	6	7	8	9	10	11	13
SOCOTEC Ref:	MAR02807 .001	MAR02807 .002	MAR02807 .003	MAR02807 .004	MAR02807 .005	MAR02807 .006	MAR02807 .007	MAR02807 .008	MAR02807 .009	MAR02807 .010	MAR02807 .011	MAR02807 .012
Matrix	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Dibutyltin (DBT)	<5	<5	<5	<5	<5	<5	<5	<1	<5	<5	<1	<5
Tributyltin (TBT)	<5	<5	<5	<5	<5	<5	<5	<1	<5	<5	<1	<5

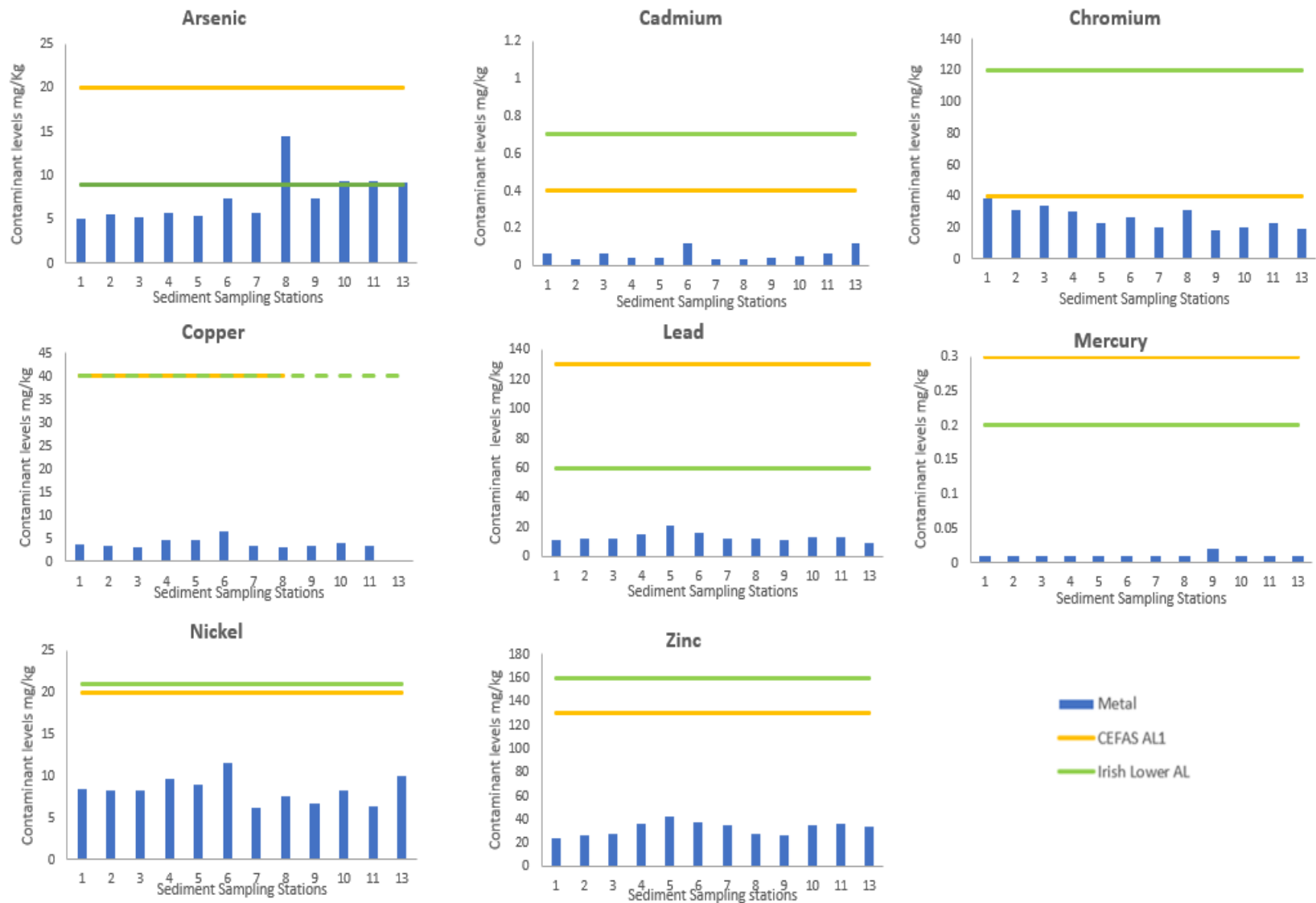


Figure FA: Metal levels within sediment samples compared to CEFAS Action Level 1 (AL1) and the Irish Lower Action Level (AL)

Table FC: Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Total Hydrocarbon Content (THC) within sediment samples

PAH and THC (µg/Kg)	Sampling Stations												CEFAS AL1 (ug/Kg)	Irish Lower AL (ug/Kg)
	1	2	3	4	5	6	7	8	9	10	11	13		
ACENAPTH	1.00	1.00	1.00	1.00	1.00	5.00	1.00	1.00	1.00	1.00	1.00	1.00	-	-
ACENAPHY	1.00	1.00	1.00	1.00	1.00	5.00	1.00	1.00	1.00	1.00	1.00	1.00	-	-
ANTHRACN	1.00	1.00	1.00	1.00	1.44	5.00	1.00	1.00	1.00	1.00	1.00	1.00	-	-
BAA	1.00	1.00	2.76	2.04	3.60	7.55	1.77	1.00	2.17	2.15	1.00	1.40	-	-
BAP	1.00	1.00	2.86	2.70	4.46	8.44	2.37	1.00	2.69	2.56	1.85	1.92	-	-
BBF	1.75	2.18	3.86	4.71	7.09	14.80	3.87	1.00	5.13	5.4	3.39	3.26	-	-
BENZGHIP	1.59	1.84	2.46	3.08	5.49	8.58	3.29	1.00	4.30	4.01	2.19	2.55	-	-
BKF	1.43	1.73	3.66	3.22	5.92	11.00	3.57	1.00	4.19	3.96	2.23	2.30	-	-
CHRYSENE	1.49	1.92	3.63	3.13	5.51	11.60	3.26	1.00	4.52	4.1	2.36	3.01	-	-
DBENZAH	1.00	1.00	1.00	1.00	1.00	5.00	1.00	1.00	1.00	1.00	1.00	1.00	-	-
FLUORANT	1.44	2.44	4.99	3.93	6.36	15.50	3.30	1.00	4.70	4.56	2.17	3.06	-	-
FLUORENE	1.00	1.00	1.00	1.00	1.78	5.00	1.00	1.00	1.93	1.72	1.00	1.00	-	-
INDPYR	1.84	2.40	3.55	4.09	6.77	10.50	3.84	1.00	4.96	4.52	2.49	3.03	-	-
NAPTH	1.00	1.00	1.48	2.31	3.13	8.86	1.98	1.00	3.92	3	1.76	2.46	-	-
PHENANT	1.72	1.93	3.19	3.95	6.10	18.20	3.67	1.00	6.01	6.27	2.74	4.16	-	-
PYRENE	1.55	2.56	4.48	3.47	5.71	16.70	3.01	1.00	3.66	3.41	1.83	2.46	-	-
Sum of PAH <sup>16</sup>	21	25	42	42	66	157	39	16	52	50	29	35	3712	4000
THC	15500	9610	6760	7950	13800	16200	10200	2430	6380	9220.00	3770	2840	100,000	1,000,000

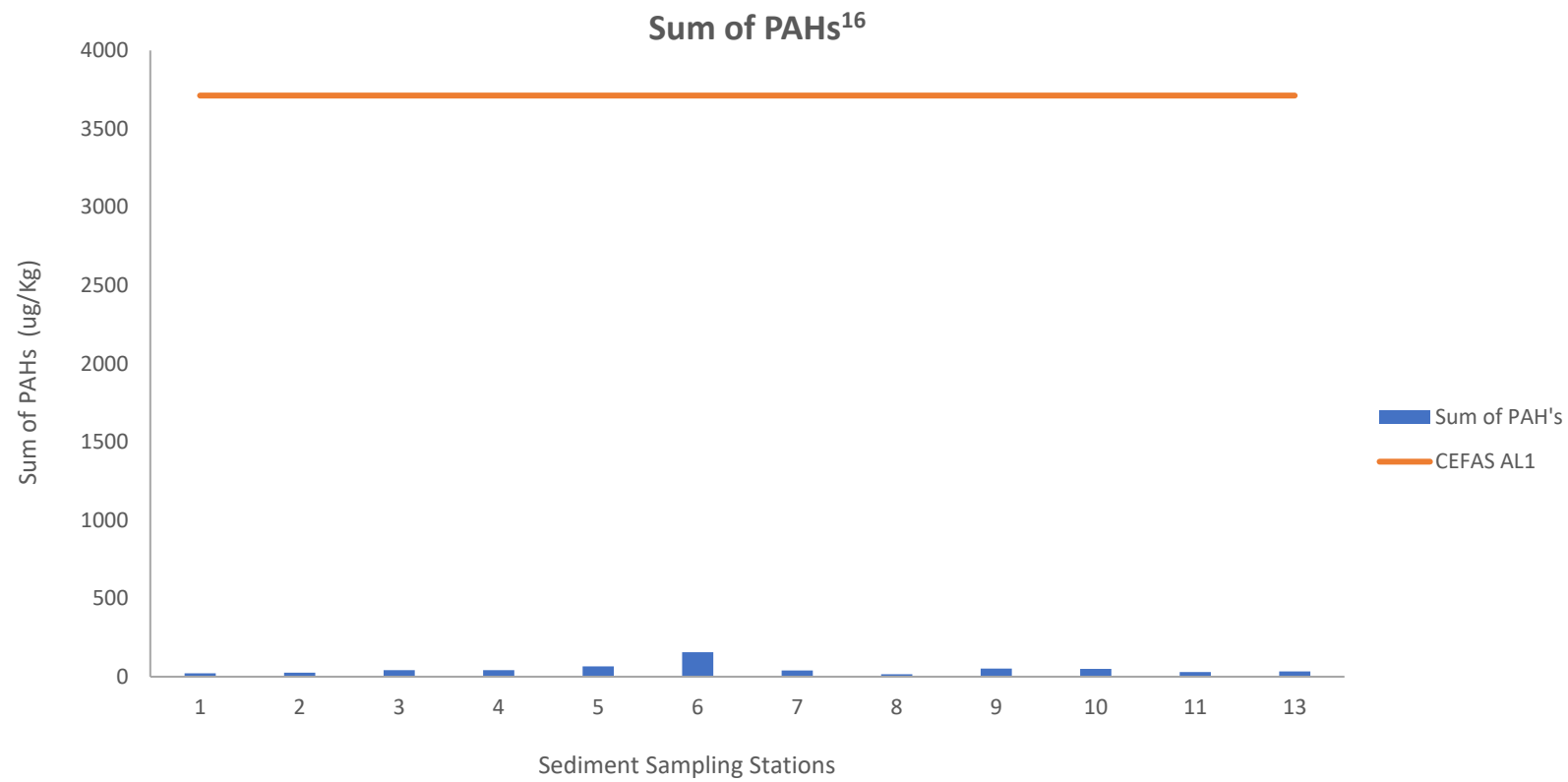


Figure FB: Sum of PAH<sup>16</sup> within sediment samples compared to CEFAS Action Level 1 (AL1)

### Total Hydrocarbon Content (THC)

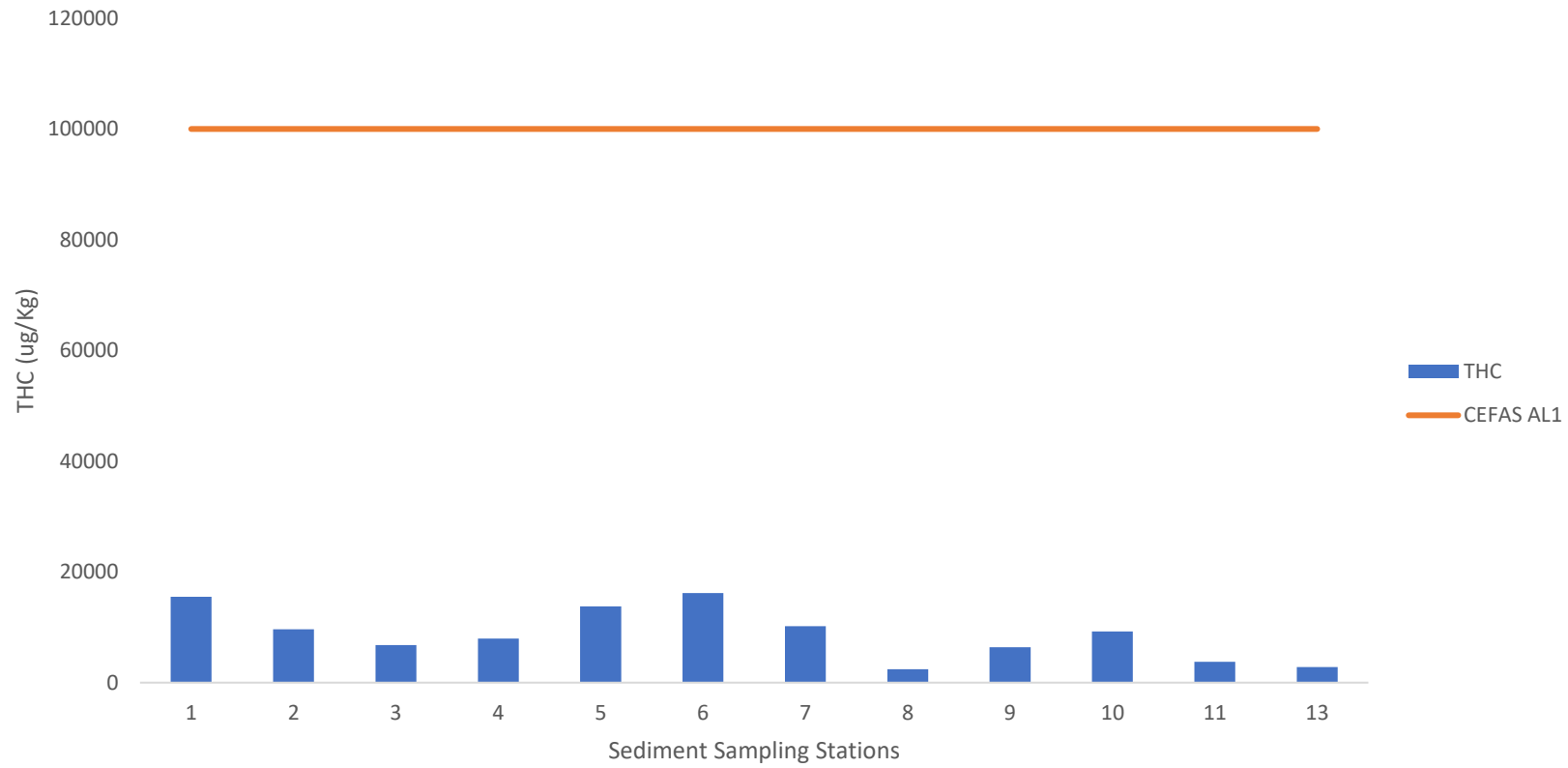


Figure FC: Total Hydrocarbon Content (THC) within sediment samples

Table FD: Levels of Polychlorinated Biphenyls (PCB) within sediment samples

PCB (µg/Kg)	Sampling Station												CEFAS AL1 (ug/Kg)	Irish Lower AL (ug/Kg)	
	1	2	3	4	5	6	7	8	9	10	11	13			
PCB28	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-	1
PCB52	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-	1
PCB101	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-	1
PCB118	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-	1
PCB138	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-	1
PCB153	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-	1
PCB180	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-	1
Sum of PCBs	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	10	7

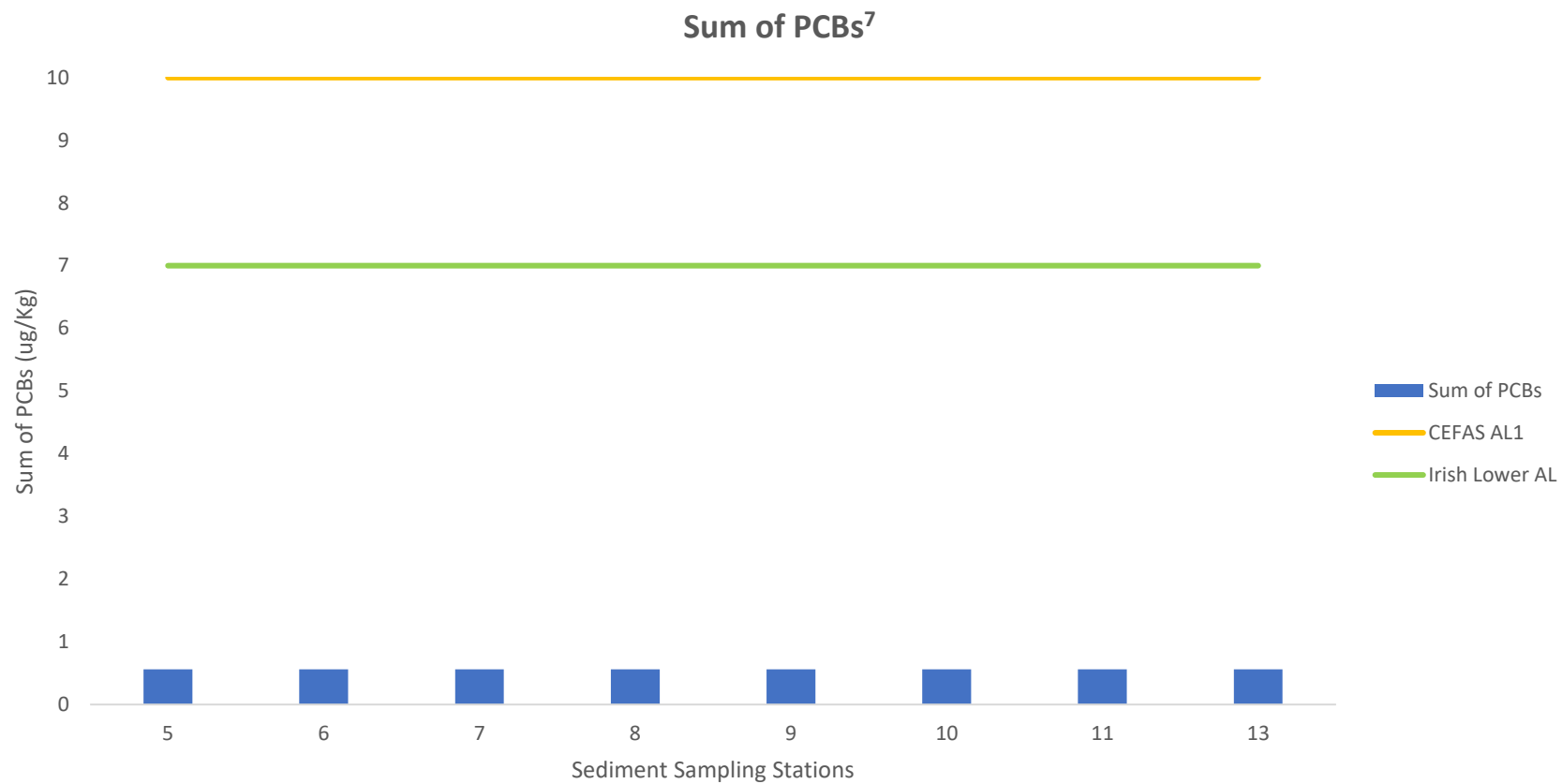
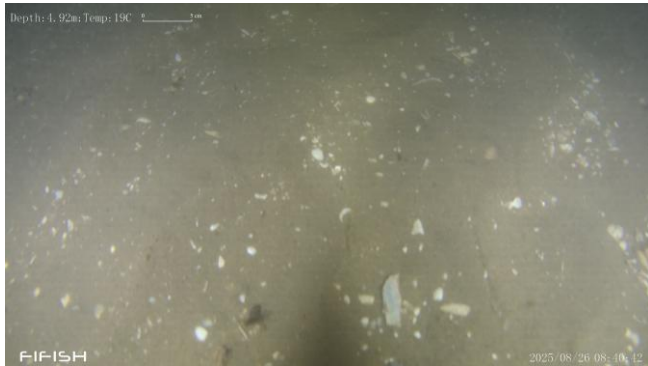


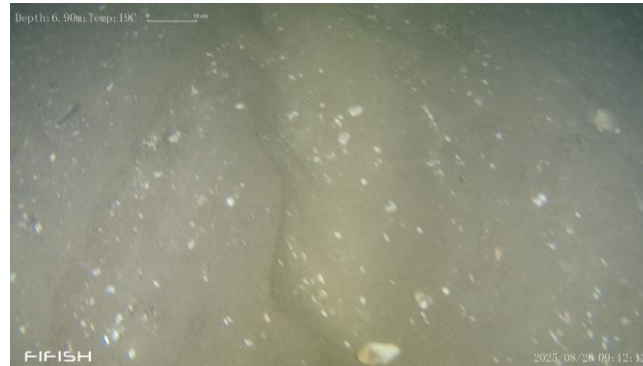
Figure FD: Sum of PCBs<sup>7</sup> within sediment samples compared to CEFAS Action Level 1 (AL1) and the Irish Lower Action Level (AL)

## G. Selection of underwater video stills

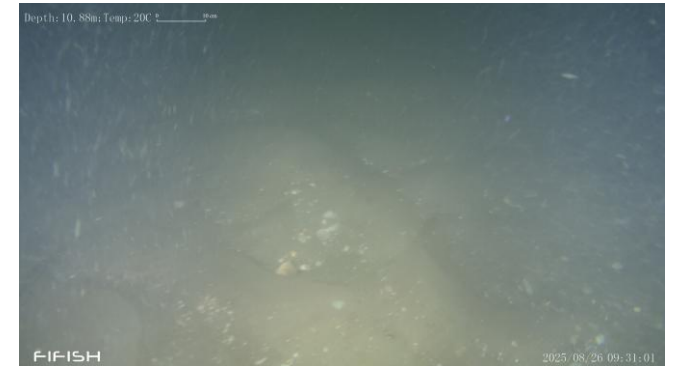
### Selection of DDV Images



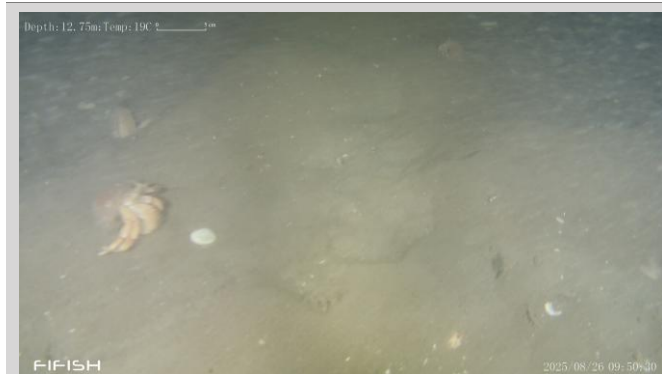
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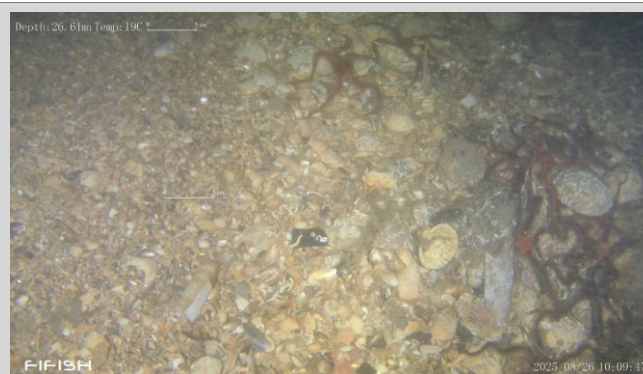
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**Station 4**



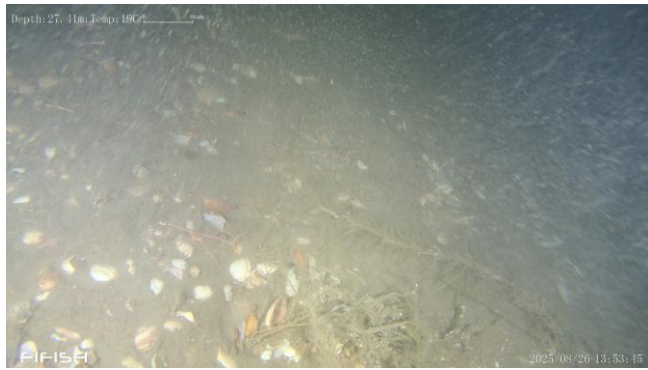
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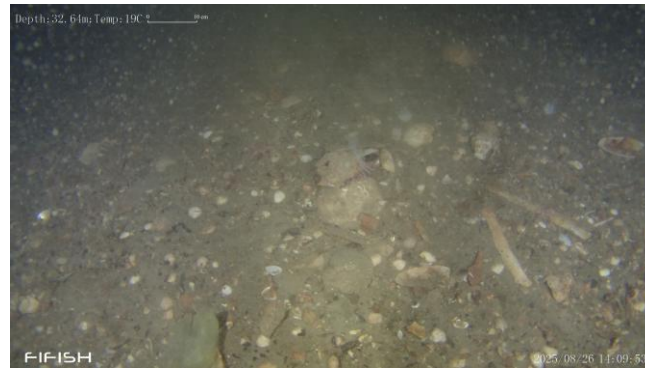
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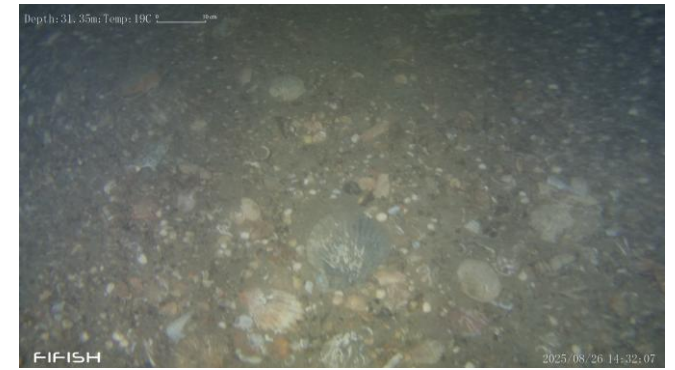
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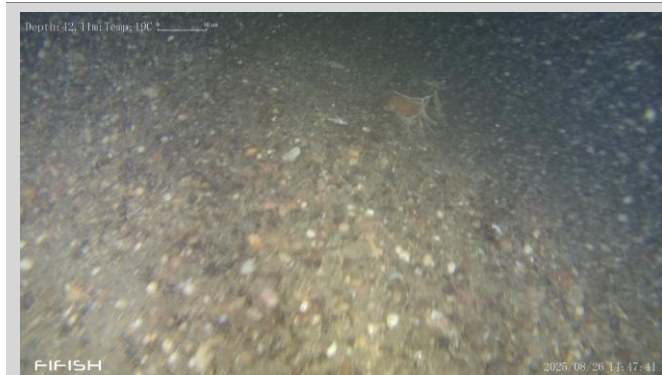
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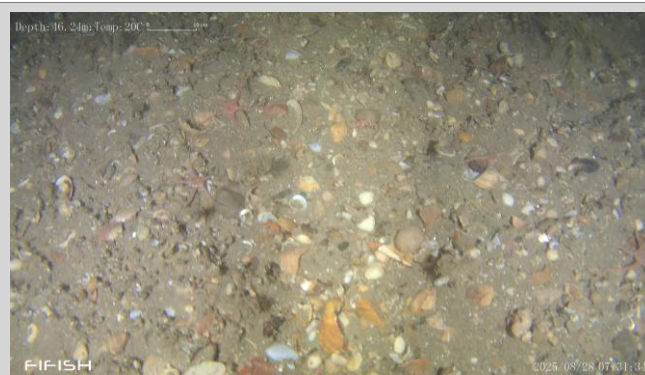
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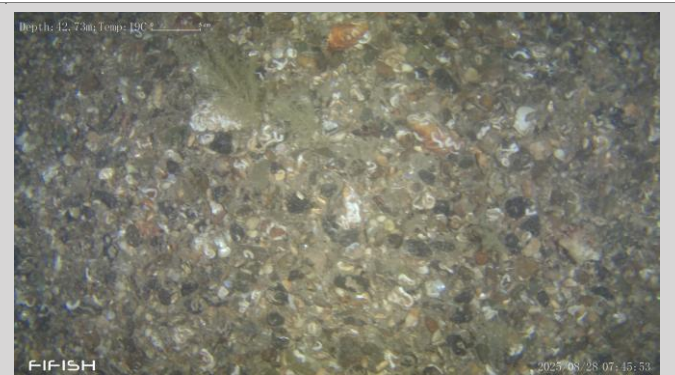
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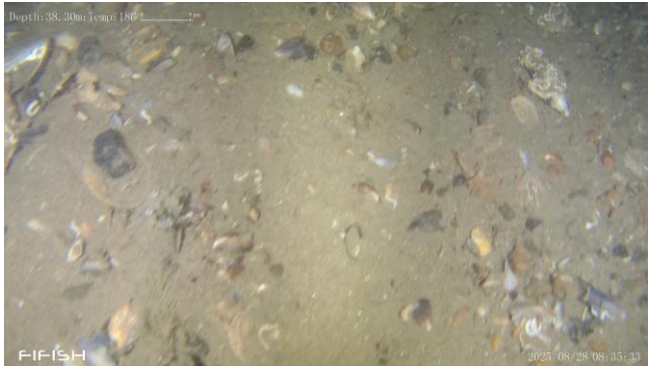
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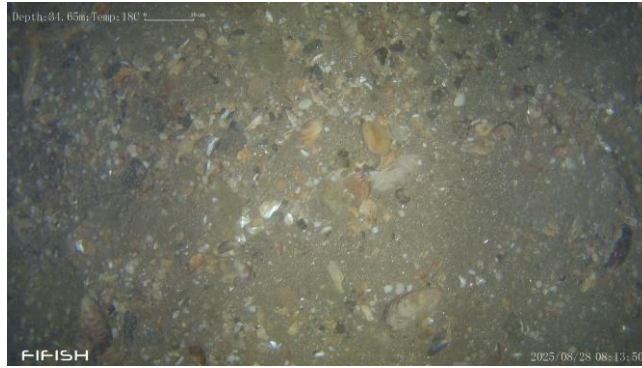
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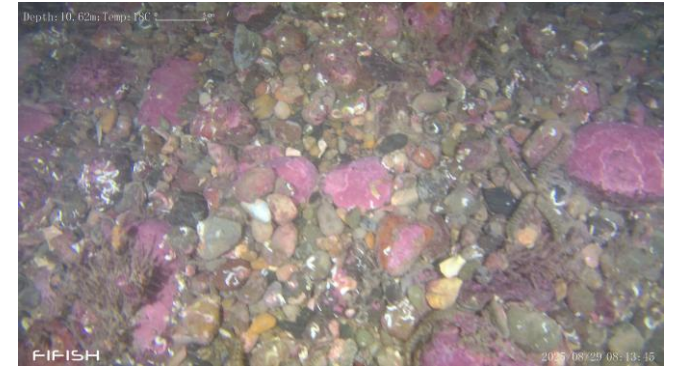
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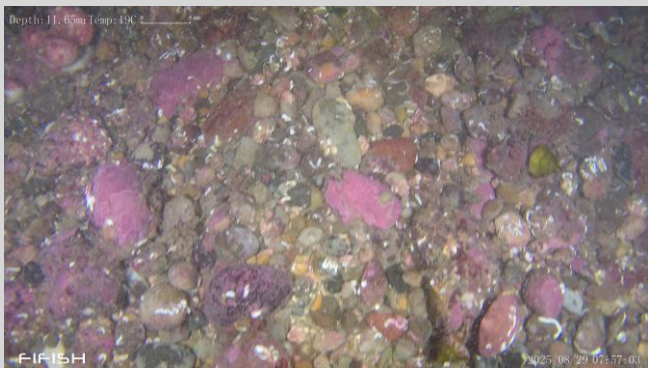
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**Station 17**



**Station 19**



**Station 21**



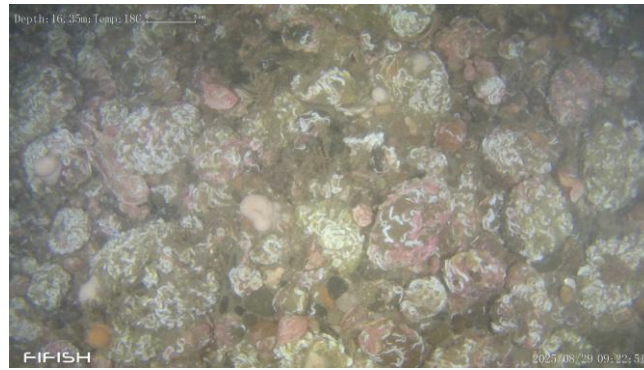
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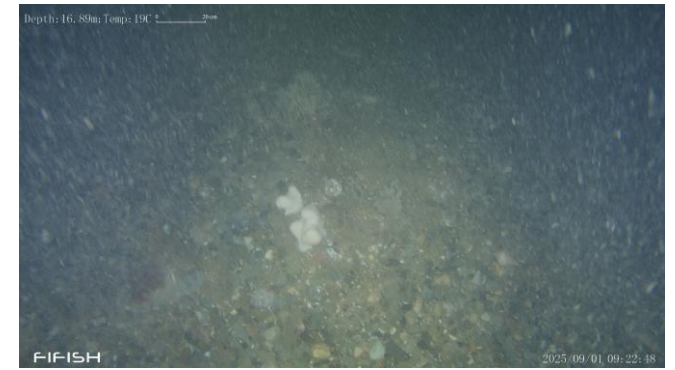
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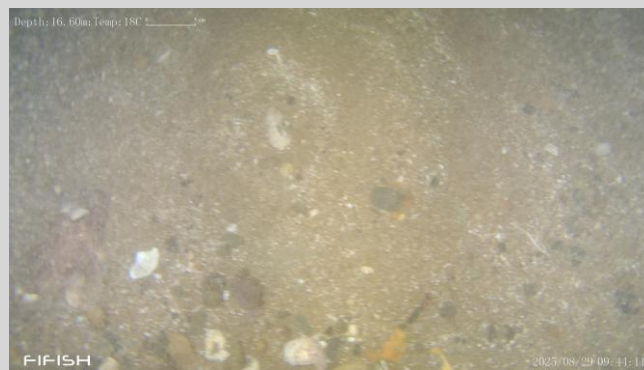
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**Station 29**



**Station 30**



**Station 31**



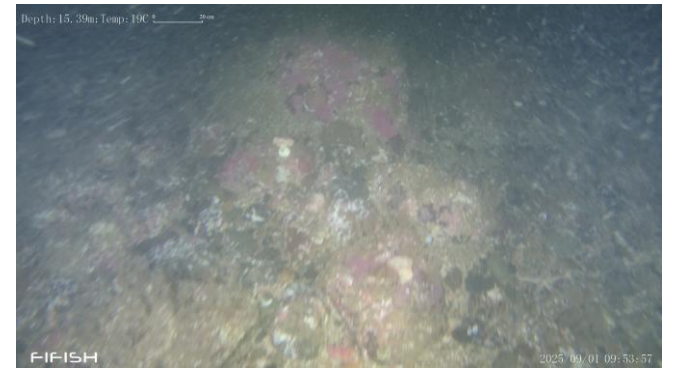
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**Station 34**



**Station 35**



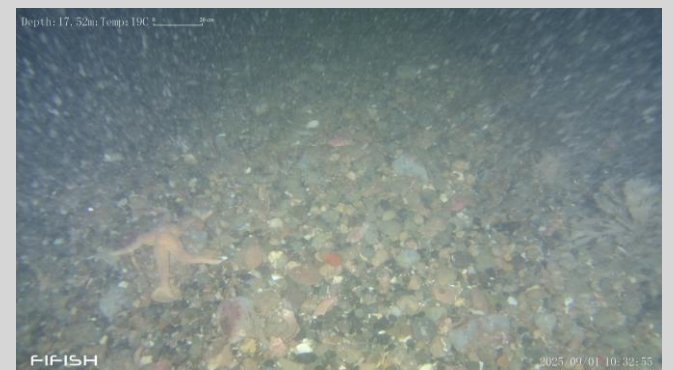
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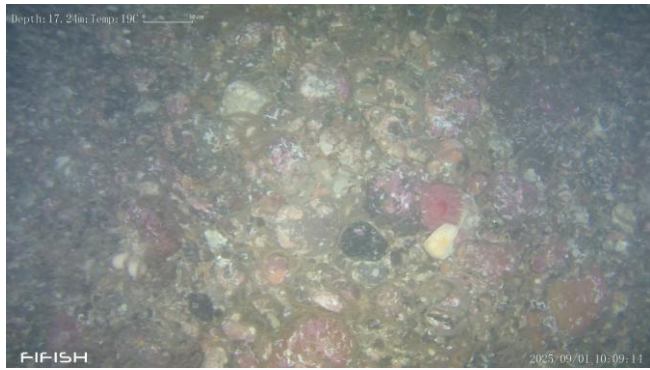
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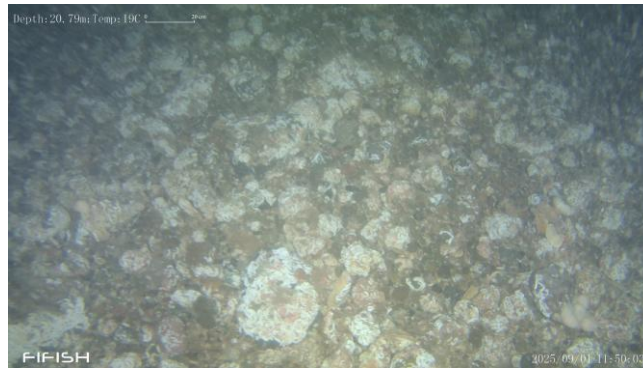
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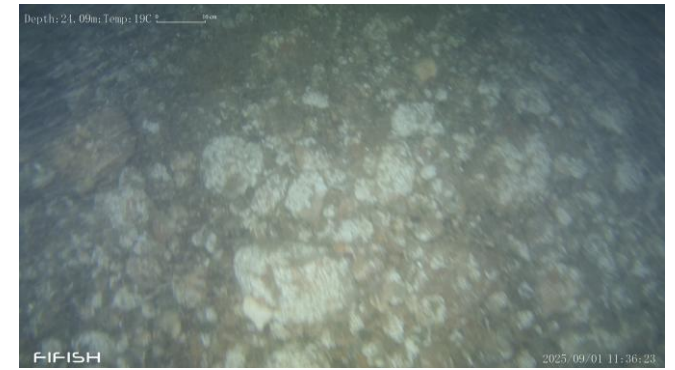
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**Station 41**



**Station 42**



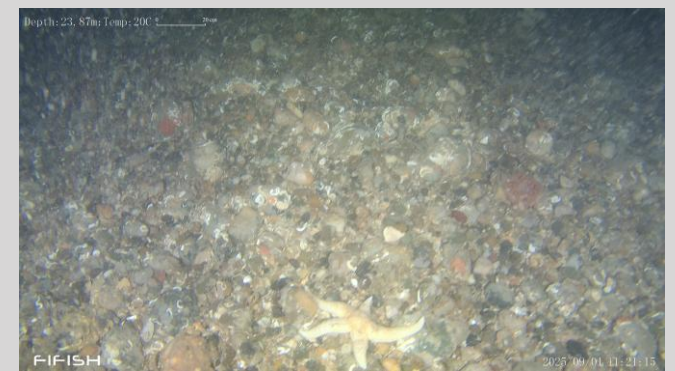
**Station 43**



**Station 44**



**Station 45**



**Station 46**



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