Addendum to the
Natura Impact Statement

NISA
North Irish Sea Array

Volume 2: Appendices

Appendix A4
Benthic Ecology Survey Report 2025

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Appendix:

Benthic Ecology Survey Report 2025

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Report Approval Sheet

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List of Acronyms/Glossary

DDV	Drop down video
ECR	Export Cable Route
JNCC	Joint Nature Conservation Committee
LOI	Loss On Ignition
NMBAQC	Northeast Marine Biological Analytical Quality Control
PSA	Particle Size Analysis
TOC	Total Organic Carbon

North Irish Sea Array Windfarm Ltd (NISA, hereafter referred to as 'the Developer') has been considering the Request for Further Information (RFI) issued by An Bord Pleanála (now An Coimisiún Pleanála) as well as the third-party submissions received following public consultation. At An Coimisiún Pleanála's behest, the Developer has also continued to consult with stakeholders in respect of the 2024 planning application throughout 2024-2026. The Developer has refined elements of the design to respond to the third-party submissions, the continued public and stakeholder consultation and the RFI. Full details of consultation undertaken can be found in Appendix A1.2: Consultation Report.

For the purposes of clarity, this document shall be read in conjunction with Chapter 12: Benthic Subtidal and Intertidal Ecology.

Any cross reference to a chapter, section, table, image, figure or appendix within this document is to another location within the Addendum to the EIAR unless explicitly stated otherwise. Any cross reference to anything included in the 2024 EIAR will be clearly labelled as such.

The sections relevant to Appendix A12.1: Benthic Ecology Survey Report 2025 in the RFI are included below.

RFI Section	RFI	Relevance to Chapter
1 (b)	The scientific information provided as part of the planning application documentation should be based on up-to-date survey reports and data. Accordingly, the applicant is requested to confirm/provide justification/verification that the information submitted in support of the planning application remains relevant and appropriate at the point of submitting further information or to update same as required.	Benthic surveys were undertaken in 2025 to validate the baseline data assumptions presented in the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS). Baseline surveys were previously undertaken in 2022. This Appendix A12.1 Benthic Ecology Survey Report 2025, therefore complies with RFI Section 1 (b).
1 (c)	The applicant is requested to confirm whether any on-going or additional surveying has been carried out since the application was lodged and, if so, the applicant is invited to submit any further survey data results and analysis and update the planning application documentation, as appropriate.	Benthic surveys were undertaken in 2025 to validate the baseline data assumptions presented in the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS). Baseline surveys were previously undertaken in 2022. In addition, sample analysis from the current survey will be used to support a Dumping at Sea (DaS) Licence Application. This Appendix A12.1 Benthic Ecology Survey Report 2025, therefore complies with RFI Section 1 (c).

1. Introduction

The Developer commissioned AQUAFACT to undertake a benthic subtidal ecology survey covering the array area and export cable route (ECR) of North Irish Sea Array Windfarm (hereafter 'the proposed development'). Following an RFI from An Coimisiún Pleanála, the works to be executed and the deliverables are intended to validate the baseline data assumptions presented in the Environmental Impact Assessment Report (EIAR) and Natura Impact Statement (NIS). Baseline surveys were previously undertaken in 2022. In addition, sample analysis from the current survey will be used to support a Dumping at Sea (DaS) Licence Application.

The benthic ecology study area is defined by the OWF array area and ECR. The array area covers approximately 89 km^2 and at its closest point is approximately 11.3 km from land in water depths of approximately 30 m to 63 m below lowest astronomical tide (LAT), while the ECR covers an area of approximately 36 km^2 (see **Figure 1.1**).

The benthic ecology survey took place on 9th, 10th and 15th October 2025.

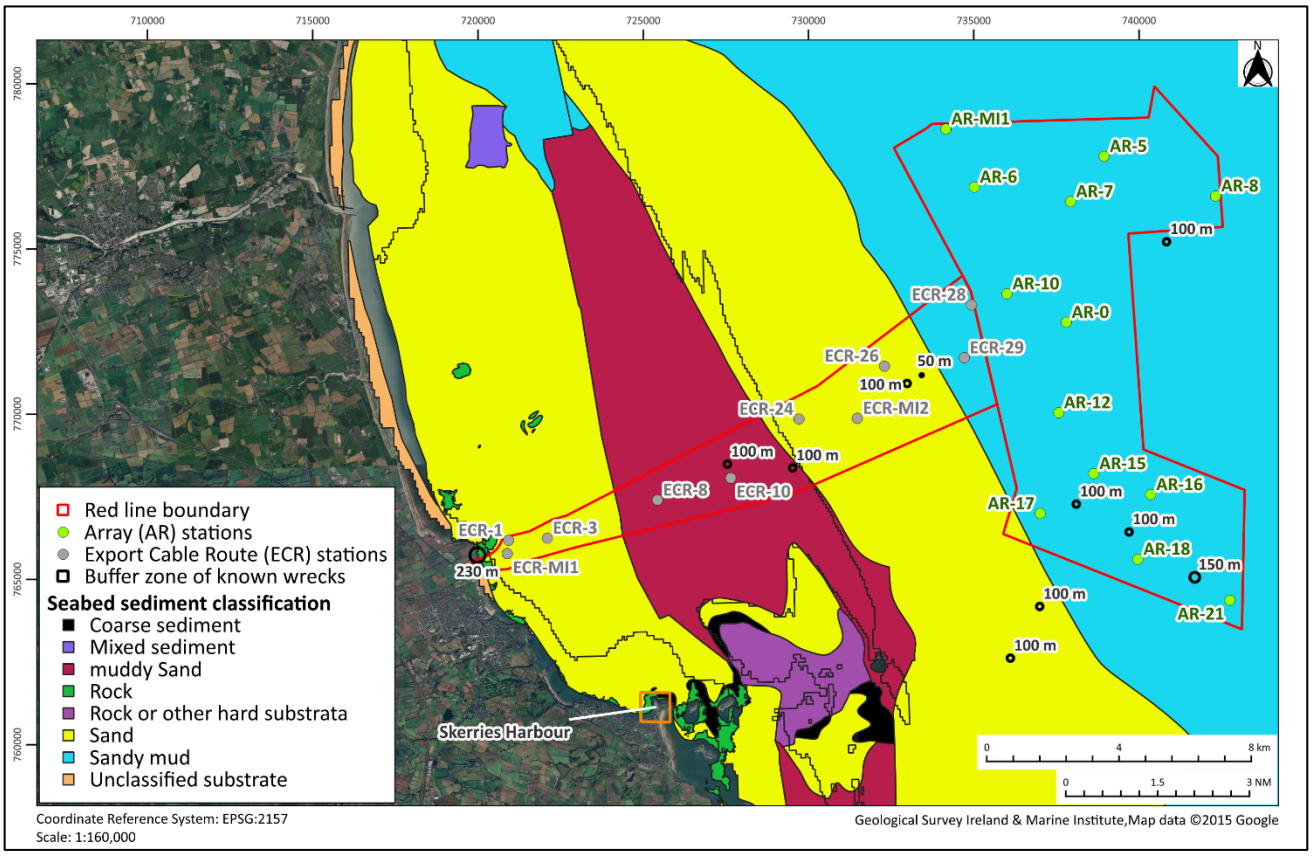

Figure 1.1: Sampling sites within the proposed development, North Irish Sea.

2. Materials & Methods

The scope of work required to carry out the subtidal benthic survey of the proposed developments' array area and cable route as presented in **Table 2.1**.

Table 2.1: Scope of survey work for the subtidal benthic ecology survey of the array area and cable route.

Task	Requirement	Objective	Sampling sites	Data	Station IDs
1	Benthic Ecology Drop Down Video survey	Record benthic habitats (for sites in ECR and Array). To determine substrate type in advance of grab survey campaign (for sites in ECR and Array Area)	23	23 drop down video station footage and high-quality stills	ECR-1, ECR-3, ECR-8, ECR-10, ECR-24, ECR-26, ECR-28, ECR-29, ECR-MI1, ECR-MI2, AR-0, AR-5, AR-6, AR-7, AR-8, AR-10, AR-12, AR-15, AR-16, AR-17, AR-18, AR-21, AR-MI1
2	Benthic Ecology Grab Survey	Record benthic habitats and infauna species populations for comparison with 2022 baseline results	23	23 grabs (0.1 m^2) for faunal analysis	ECR-1, ECR-3, ECR-8, ECR-10, ECR-24, ECR-26, ECR-28, ECR-29, ECR-MI1, ECR-MI2, AR-0, AR-5, AR-6, AR-7, AR-8, AR-10, AR-12, AR-15, AR-16, AR-17, AR-18, AR-21, AR-MI1
3	Sediment Particle Size Analysis (PSA)	To characterise sediment in the ECR and array area for comparison with 2022 baseline results	23	23 grabs (0.1 m^2) for sediment analysis	ECR-1, ECR-3, ECR-8, ECR-10, ECR-24, ECR-26, ECR-28, ECR-29, ECR-MI1, ECR-MI2, AR-0, AR-5, AR-6, AR-7, AR-8, AR-10, AR-12, AR-15, AR-16, AR-17, AR-18, AR-21, AR-MI1
4	Sediment total carbon content	To determine total organic content in the ECR and array area for comparison with 2022 baseline results	23	23 grabs (0.1 m^2) for sediment analysis	ECR-1, ECR-3, ECR-8, ECR-10, ECR-24, ECR-26, ECR-28, ECR-29, ECR-MI1, ECR-MI2, AR-0, AR-5, AR-6, AR-7, AR-8, AR-10, AR-12, AR-15, AR-16, AR-17, AR-18, AR-21, AR-MI1
5	Contaminant analysis (major trace elements and hydrocarbon)	To determine contaminant loads for DaS application	23	23 grabs (0.1 m^2) for sediment analysis	ECR-1, ECR-3, ECR-8, ECR-10, ECR-24, ECR-26, ECR-28, ECR-29, ECR-MI1, ECR-MI2, AR-0, AR-5, AR-6, AR-7, AR-8, AR-10, AR-12, AR-15, AR-16, AR-17, AR-18, AR-21, AR-MI1
6	Radiological analysis	To determine radioactive contaminants for DaS application	12	12 grabs (0.1 m^2) for sediment analysis	ECR-1, ECR-8, ECR-24, ECR-29, AR-0, AR-6, AR-7, AR-8, AR-12, AR-16, AR-18, AR-21

2.1 Video Survey (Drop-Down Video)

Offshore still and video seabed photographic data were acquired at each of the 23 grab station locations using a high-resolution underwater camera. AQUAFACT follows the NMBAQC and JNCC guidelines for the best practice acquisition of video stills imaging of benthic substrata and epibenthic species, ensuring that the data collected is fit for purpose in relation to the needs and requirements of the proposed survey.

A STR SeaSpyder HD (manufactured by STR www.str-subsea.com) drop-down video camera was used for the survey. The SeaSpyderHD is designed for operation in water depths down to 3000m depth utilising coaxial or fibre-optic umbilicals. The standard system offers simultaneous uninterrupted recording of low latency live video footage with high resolution stills photography, along with interfacing to a wide range of sensors and dataloggers. The stills camera is fitted with a high quality 18 mega pixel digital SLR Camera offering full control of all photographic parameters including manual focus, shutter speed and aperture. The stills camera is housed within a robust 3000 m depth rated aluminium enclosure along with a water corrected lens and also forms the mounting point for HD video camera and quad scaling lasers. Laser scaling is essential for conducting an assessment of reef size and to determine the percentage cover.

Video footage was captured by the STR Sea Spectrum HD camera offering high quality 1080P video feed via HD-SDI over dedicated high speed fibre optic link. All data is transferred directly to the surface unit for live interpretation, this includes HD video, stills photos, serial sensor data and Ethernet data such as an imaging sonar. A 19” rack mount Surface Control Unit and powerful topside processor give full remote control of the camera via the easy-to-use GUI software. As standard, the purpose designed camera deployment frame is fitted with a subsea electronics and camera housing, high power underwater flash, an array of four high intensity LED lamps, quad scaling lasers, altimeter, depth sensor and a heading sensor. Many other sensors are easily integrated via serial & Ethernet data channels.

Prior to the deployment of grab equipment, DDV transects were conducted to check the suitability of the substrate at each station to ensure no protected or sensitive species or habitats were present. As outlined above, if protected or sensitive species were present, the sampling location was restricted to DDV sampling only.

Short drifts were used at each station, with video recorded within the vicinity (5-10 m) of the station location with the camera approximately 50 cm to 1 m above the seabed. The camera was landed on the seabed at a minimum of 5 times to capture still images a few metres apart in order to enable an assessment of spatial variability. If a site was found to have no appropriate substrate to perform a benthic grab, a 25m DDV transect was carried out at the site to get a more comprehensive understanding of the station following analysis of DDV footage.

From the DDV footage for each station, benthic habitat assessments were undertaken using the current guidance notes *i.e.,* Gubbay (2007) and Limpenny *et al.* (2010) for *Sabellaria* reefs, and Irving (2009) for potential cobble reefs.

Surveys were undertaken during appropriate tides/weather conditions to allow optimum video capture. At each station the immediate survey area was checked for obstructions such as static gear. Notes on visible sediment conditions, seabed features, flora and fauna, notable sensitive and protected species were made *in-situ* together with DGPS position, water depth, date and time. The locations of the 23 stations completed for the DDV survey are provided in **Table 2.2**. Station AR-21 was excluded from the DDV survey and sediment grab sampling as the station was deemed too deep to sample.

Table 2.2: Coordinates of Drop-Down Video stations based on the WGS 84 (EPSG:4326) datum.

Station	Latitude	Longitude	Depth (m)
ECR-1	53.631	-6.172	7.3
ECR-3	53.631	-6.153	10.0
ECR-8	53.641	-6.103	16.5
ECR-10	53.647	-6.069	20.0
ECR-24	53.662	-6.037	26.0
ECR-26	53.676	-5.998	32.0
ECR-28	53.692	-5.957	39.0
ECR-29	53.678	-5.961	38.0
ECR-MI1	53.627	-6.172	6.0
ECR-MI2	53.662	-6.010	30.0
AR-0	53.686	-5.913	49.0
AR-5	53.731	-5.894	49.0
AR-6	53.724	-5.954	41.0
AR-7	53.719	-5.910	47.0
AR-8	53.719	-5.843	55.0
AR-10	53.694	-5.940	43.0
AR-12	53.662	-5.918	48.0
AR-15	53.645	-5.903	51.0
AR-16	53.639	-5.877	55.0
AR-17	53.634	-5.928	45.0
AR-18	53.621	-5.884	53.0
*AR-21 (excluded from sampling at time of survey)	53.609	-5.842	61.0
AR-MI1	53.740	-5.966	40.0

2.2 Benthic Grab Survey

The potential grab stations were confirmed with inference from the drop-down video survey.

From the DDV survey, each station was assessed for suitability for grab sampling based on the standard operating procedure for station selection for benthic sampling using drop-down video survey (T2-SOP-Field Methods-04). The standard operating procedure was followed on the vessel to identify and assess suitability of substrates prior to benthic sampling. Decisions on whether sampling was to be carried out at a location was based on the following criteria:

- Presence or absence of biogenic and non-biogenic reefs (see **Table 2.3**).
  Areas with biogenic and non-biogenic reefs identified during the video survey would not be sampled and sampling would be redirected to suitable areas identified during the video survey as per the MARA licence conditions. Where reef habitats are identified, sampling would be restricted to video surveying only. No deployment of survey equipment was conducted in those areas of reef habitats.
- Sampling would also not be carried out in areas where the presence of fauna or flora could be adversely impacted by the sampling (see **Table 2.4**).
- The suitability of sediment type for grab sampling.
- Selection of stations for sediment sampling is based on sediment type suitability which is outlined in**Table 2.5.**

Any other considerations that could impact the surrounding environment or affect benthic sampling (see **Table 2.6**).

Table 2.3: Station Selection Based on Reef Classification.

Feature	Feature Description	Suitability for Benthic Sampling
Biogenic Reef	Any reef made by a living organism.	NOT SUITABLE
Non-Biogenic Reef	The structure of reefs varies from bedrock to boulders or cobbles while topography ranges from horizontal to vertical and the reefs may have numerous ledges and crevices. The geology includes limestone, shale, granite, schists and gneiss. Brown fucoid algae generally dominate the intertidal down to shallow subtidal areas. The latter are characterised by kelp species, frequently with an understorey of red foliose algae. Below the kelp and down to about 30 m,	NOT SUITABLE

Feature	Feature Description	Suitability for Benthic Sampling
	red algae characterise the substratum with very few brown algae. Below this, the habitat is characterised by faunal species; very few foliose or filamentous red algae occur although encrusting red algae may be common.	
Serpula Reefs	The polychaete worm *Serpula vermicularis* secretes a calcareous tube and is common as a solitary worm. The worms aggregate and form structures which may be up to 1 m in height and about 2 m in diameter.	NOT SUITABLE
Sabellaria Reef	These are constructed by the polychaete worm *Sabellaria spinulosa* and *Sabellaria alveolata.* The reefs are constructed of sand grains by the worm and form a substrate for many other species that would not normally be present in the area in the absence of the reefs. The reefs can be up to a metre in thickness.	NOT SUITABLE
Bivalve Reefs	Reefs caused by accumulations of bivalve populations.	NOT SUITABLE
Cold Water Coral Reefs	Cold water coral reefs are from 200–1600 m, where the water temperature is 4–8ºC and the salinity is 32–36%. Coral reefs found to date are generally associated with carbonate mounds, features that rise up to 300-500 m above the sea floor.	NOT SUITABLE

Table 2.4: Station Selection Based on Identifiable Fauna/Flora.

Feature	Feature Description	Suitability for Benthic Sampling
Fauna	• Any bottom fixing fauna species. • Any large populations or accumulations of benthic species.	NOT SUITABLE
Flora	Any bottom fixing flora species.	NOT SUITABLE
Drift Flora	Any non-attached drift flora.	SUITABLE

Table 2.5: Station Selection Based on Sediment Classification.

Feature	Feature Description	Suitability for Benthic Sampling
Boulders/Cobbles/Pebbles	• Boulders (>256 mm) • Cobbles (64 – 256 mm) • Pebbles (4-64 mm)	NOT SUITABLE
Small Granules	• Shell/Gravel (*c.* 4 mm)	SUITABLE
Coarse Sediments	• Gravel(G) • sandy Gravel (s-G) • gravelly Sand (G-s)	SUITABLE
Mixed Sediments	• muddy Gravel (m-G) • muddy sandy Gravel (m-s-G) • gravelly Mud (g-m) • gravelly muddy Sand (g-m-S)	SUITABLE
Mud	• Mud	SUITABLE
Sand	• Sand	SUITABLE

Table 2.6: Other Considerations that Influence Station Selection.

Feature	Feature Description	Suitability for Benthic Sampling
Man Made Structures	• Any visible mad man structure	NOT SUITABLE
Wrecks or Similar Archaeological Material	• Any visible archaeological material.	NOT SUITABLE
Large Accumulation of Marine Litter	• Any visible large accumulation of marine litter.	NOT SUITABLE

The benthic survey was undertaken aboard the ICCB vessel '*Ros Áine'.* This vessel is fully licensed and equipped with all materials necessary to conduct the survey as per the tender specifications. The survey vessel operated out of Skerries Harbour. The faunal grab samples were collected from the pre-determined stations based on subset of the previous sampling points from the 2022 baseline survey and chosen in consultation with the client.

AQUAFACT has in-house standard operating procedures for benthic sampling, and these were followed for this project. These were in accordance with those outlined in Coggan *et al.,* 2007, Limpenny *et al.,* 2010, and the Marine Monitoring Handbook procedural guidance 3.5. Additionally, the NMBAQC 'Guidelines for processing marine macrobenthic invertebrate samples' (Worsfold *et al.,* 2010) were adhered to.

The benthic sampling for infauna was undertaken using a 0.1 m^2 stainless steel Day Grab sampler. The grabs were mounted on a common pivot, and each bucket has the capacity to collect a sample of approximately 0.1 m^2. Windows on the top of the grab were used to allow inspection of the grab contents. Samples were sieved

on a series of nested sieves to prevent damage from cobbles and ultimately sieved on a 1 mm mesh sieve prior to preservation. At each faunal station the drop-down video survey was conducted first and assessed prior to deployment and the suitability of the station for grab sampling was determined (*i.e.* presence of sensitive features, such as *Sabellaria* reef or presence of large boulders that would prevent a successful grab sample being collected).

On arrival at each pre-selected survey station, the location was recorded using differential Global Positioning Satellite (dGPS) (Latitude/Longitude & Irish National Grid (ING)). Additional information (such as date, site name, sample code, water depth at each replicate, type and specification of the sampling device used, anchorage, weather, sea state, quality of the sample, penetration depth, description of the sediment and mesh size) were recorded.

The DDV survey revealed unsuitable sampling location being too deep for video and grab sampling. Of the 23 planned stations for DDV analysis and faunal sampling, 22 stations were surveyed and sampled for fauna and sediment PSA and contaminants analysis (see **Table 2.7** for list of final samples taken vs planned samples and reasoning for each).

Figure 2.1 below also shows the locations where sediment was successfully taken for sediment analysis and macroinvertebrate community analysis.

Table 2.7: Grab survey suitability assessment following DDV survey.

Station	Latitude (N)	Longitude (W)	Dropdown video	Sediment analysis	Fauna	Grab suitability
ECR-1	53.631	-6.172	Y	Y	Y	Suitable
ECR-3	53.631	-6.153	Y	Y	Y	Suitable
ECR-8	53.641	-6.103	Y	Y	Y	Suitable
ECR-10	53.647	-6.069	Y	Y	Y	Suitable
ECR-24	53.662	-6.037	Y	Y	Y	Suitable
ECR-26	53.676	-5.998	Y	Y	Y	Suitable
ECR-28	53.692	-5.957	Y	Y	Y	Suitable
ECR-29	53.678	-5.961	Y	Y	Y	Suitable
ECR-MI1	53.627	-6.172	Y	Y	Y	Suitable
ECR-MI2	53.662	-6.010	Y	Y	Y	Suitable
AR-0	53.686	-5.913	Y	Y	Y	Suitable
AR-5	53.731	-5.894	Y	Y	Y	Suitable
AR-6	53.724	-5.954	Y	Y	Y	Suitable
AR-7	53.719	-5.910	Y	Y	Y	Suitable
AR-8	53.719	-5.843	Y	Y	Y	DDV taken at high and low tide; station too deep to sample at high tide
AR-10	53.694	-5.940	Y	Y	Y	Suitable
AR-12	53.662	-5.918	Y	Y	Y	Suitable
AR-15	53.645	-5.903	Y		Y	Suitable
AR-16	53.639	-5.877	Y	Y	Y	Grab retaken at low tide; too deep for collection when attempted at high tide
AR-17	53.634	-5.928	Y	Y	Y	Suitable
AR-18	53.621	-5.884	Y	Y	Y	Grab retaken at low tide; too deep for collection when attempted at high tide

Station	Latitude (N)	Longitude (W)	Dropdown video	Sediment analysis	Fauna	Grab suitability
AR-21	53.609	-5.842	N	N	N	DDV taken at high and low tide; station too deep to sample at high tide and low tide
AR-MI1	53.740	-5.966	Y	Y	Y	Suitable

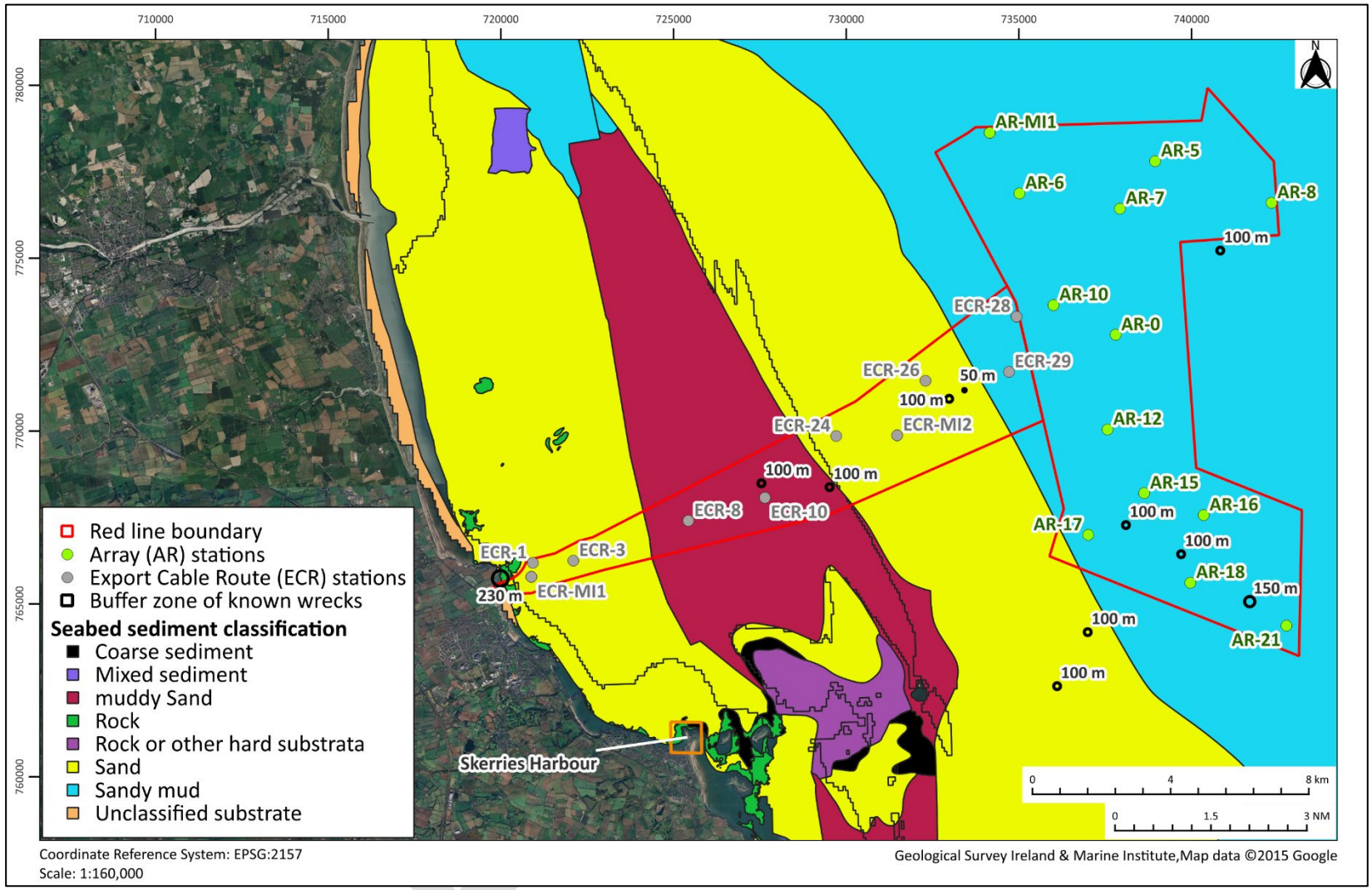

Figure 2.1: Location of preselected sampling locations within the proposed development, North Irish Sea. The DDV survey revealed unsuitability for grab sampling, explained in detail in Table 2.7.

2.2.1.1 Biological Sampling

Grab deployment and recovery rates did not exceed 1 m/s and were <0.5 m/s for the last 5 metres for water depths up to 30 m and for the last 10 m for depths greater than 30 m. This gentle lowering and hauling of the grab reduced the risk of loss of surficial sediment (particularly fines). The winch wire was kept as vertical as possible to ensure the grab was set down and lifted vertically. Upon retrieval of the grab, penetration depth (thickness of the material at the centre of the grab) was measured and recorded in the sample data sheet. To ensure adequate material was retained for analysis, sample volume of less than 5L or those with jaws not fully closed or otherwise deemed incomplete (*e.g.,* due to grab not landing on a flat surface) were discarded and a repeat sample was taken.

Following a successful grab, photographs of the sample (including sample label) were taken and notes on sediment type, texture, grain size, colour, odour (H_2S), residues, layering, volume, presence of fauna/tubes, algae, surface features etc were also recorded. A sample of 500ml was collected for PSA using a plastic scoop and labelled to be stored in a cool box prior to PSA analysis by SOCOTEC UK laboratory.

A digital image of each sample was taken in the grab. The contents of the grab were then emptied into a container and the grab washed down into the container to avoid any loss of the sample. The sample was then transferred to a nested sieve with an ultimate 1mm mesh sieve as a sediment water suspension.

The sample was carefully and gently sieved. Great care was taken during the sieving process to minimise damage to taxa such as spionids, scale worms, phyllodocids and amphipods. A direct jet of water against the mesh was not used as the force of the water can damage the fauna. Very stiff clay was fragmented carefully by hand. Fragile animals were picked out by hand to minimise damage and large stones and shells were removed to avoid the grinding effects on organisms against the sieve.

Once the sample was thoroughly washed through, a labelled photograph was taken of the residue retained on the sieve. Additional notes on dominant fauna, presence of dead shells/stones was added to the data sheet.

The residue was then backwashed into a storage bucket pending addition of fixing solution. Spoons or other scraping tools were not used. The sieve was checked for any residual trapped fauna.

The samples were fixed with borax buffered 4-5% saline formalin. The sample was covered by the fixative solution.

Each faunal sample was stored and documented separately. All samples were labelled and the information on the labels were sufficient to identify the sample with certainty (*e.g*. date, location, station, job number, client, survey name etc). Labels were made of waterproof chemical resistant paper using a soft carbon pencil that

prevents fading in the fixing or alcohol solutions. These labels were placed in the bucket with the sample, and the bucket was also be labelled on the outside using a waterproof marker.

The grab and the sieve were washed between stations to prevent cross contamination.

Upon returning to the AQUAFACT laboratory, all samples were registered in a central logbook. Each sample was allocated a unique AQUAFACT ID number (which was written on the bucket) and notes taken on the station ID, survey and job number, date, sampler and who collected and registered the sample. As samples were further processed, the date and person responsible were entered in the logbook.

As the samples were fixed on board the vessel immediately after collection, the next step in the AQUAFACT laboratory was to wash off the formalin and preserve them in 70% alcohol. The samples were in the formalin for a minimum of 72 hours and a maximum of two weeks before they were transferred to alcohol. The removal of formalin was necessary to avoid damage to organisms with calcareous structures and alcohol is safer to handle than formalin. In addition, the washing helps in the removal of excess silt and mud balls that may have been broken down during fixation.

2.2.1.2 Sediment Sampling

SOCOTEC UK Ltd was the accredited laboratory contracted to analyse sediment samples for parameters as laid out in the Marine Institute criteria for the assessment of dredged material in Irish waters (Cronin *et al.,* 2006; Marine Institute, 2019). The seven sediment samples were analysed for the following parameters:

- Visual inspection, to include colour, texture, odour, presence of animals, *etc*.
- Water content, density (taking into account sample collection and handling).
- Granulometry including % gravel (> 2mm fraction), % sand (< 2mm fraction) and % mud (< 63µm fraction) and laser diffraction analysis for <63 µm.
- The following determinants in the sand-mud (< 2mm) fraction* must be measured:
    - total organic carbon
    - carbonate
    - mercury, arsenic, cadmium, copper, lead, zinc, chromium, nickel, lithium, aluminium.
    - organochlorines Hexachlorobenzene and γ-Hexachlorocyclohexane (Lindane), and PCBs (to be reported as the 7 individual CB congeners: 28, 52, 101, 118, 138, 153, 180.

  - total extractable hydrocarbons.
  - tributyltin (TBT) and dibutyltin (DBT)
  - Polycyclic aromatic hydrocarbons (PAH) - Acenaphthene, Acenaphthylene, Anthracene, Benzo (a) anthracene, Benzo (a) pyrene, Benzo (b) fluoranthene, Benzo (ghi) perylene, Benzo (k) fluoranthene, Chrysene, Dibenz (a,h) anthracene, Flourene, Fluoranthene, Indeno 1,2,3 – cd pyrene, Naphthalene, Phenanthrene, Pyrene.
  - Toxicity tests (Microtox or whole sediment bioassay) using appropriate representative aquatic species. This requirement will depend on the results of the chemical analyses.

- Folk (1954) sediment classification.
- An estimate of organic matter (LOI %) Or total organic content.
- Dry solids (%)
- Sum of USEPA 16 PAHs[1]: acenaphthene, acenaphthylene, anthracene, benzo[a,h]anthracene, benzo[b]fluoranthene, benzo[k]flouranthene, benzo[a]pyrene, benzo[g,h,i]perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene.
- Sum of the seven ICES polychlorinated biphenyls: PCB 028, PCB 052, PCB 101, PCB 118, PCB 138, BCB 153 and PCB 180.
- DDT, DDD, DDE and DDX.

**where the gravel fraction (> 2mm) constitutes a significant part of the total sediment, this should be taken into account in the calculation of the concentrations).*

Upon retrieval of the grab after deployment, a digital image was taken through the grab window and then the sediment transferred to a stainless-steel tray positioned beneath the grab jaws. Another image was then taken of the tray. These images are available on request. The sediment was subsequently transferred to the appropriate containers for analysis. This included 3x500 ml plastic tubs and 2x amber jars with tinfoil barriers on the lids for each station. The grab sampler was cleaned with Decon90 (dilute Potassium Hydroxide solution) between stations to prevent cross-contamination of sediment contaminants.

Samples were couriered to the SOCOTEC UK Laboratories in Burton on Trent. **Table 2.8** details the analysis method for each parameter.

Twelve samples for radiological analysis were sent to the Environmental Protection Agency (EPA Office of Radiation Protection and Environmental Monitoring) where analysis was carried out by high resolution gamma spectrometry. Results are not yet available and are expected to be available by the end of January 2026.

Table 2.8: Method of analysis for each parameter by SOCOTEC.

Method	Sample and Fraction Size	Method Summary
Total Solids	Wet Sediment	Calculation (100%-Moisture Content). Moisture content determined by drying a portion of the sample at 120°C to constant weight.
Particle Size analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Total Organic Carbon (TOC)	Air dried and sieved to <2mm	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.
Carbonate	Air dried and sieved to <2mm	Quantitative digestion with Hydrochloric Acid back titration with 1M Sodium Hydroxide to pH 7
Metals	Air dried and sieved to <2mm	Microwave assisted HF/Boric extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-FID analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Solvent extraction and clean up followed by GC-FID analysis.
Polychlorinated Biphenyls (PCBs)	Air dried and sieved to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.
Organochlorine Pesticides (OCPs)	Air dried and sieved to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.

2.3 Lab Analysis

2.3.1 Sediment Processing

In addition to SOCOTEC sediment chemistry analysis, granulometry and organic content of sediment samples was determined for each sample by expressing it as a percentage the sediment weight loss following combustion over the initial weight of the sediment. In general, Loss Of carbon Ignition (LOI) correlates with sediment particle size with fine-grained sediments typically containing higher levels of organic matter than coarse sediments.

For the granulometric analysis of sediment samples, the <63 µm (Silt-Clay) fraction was determined by laser diffraction following sieving of the coarser fractions. Coarser fractions comprising the sediment samples were determined by mechanical dry sieving through a series of Wentworth sieves; >4 mm (Fine Gravel), 2-4 mm (Very Fine Gravel), 1-2 mm (Very Coarse Sand), 0.5-1 mm (Coarse Sand), 0.25-0.5mm (Medium Sand), 125-250 µm (Fine Sand), 62.5-125 µm (Very Fine Sand). For each station, the weight of each fraction of the sediment retained on the sieve was expressed as a percentage of the total sample. The relative proportion of sediments in each fraction was used to classify sediments at the station *sensu* Folk (1954). **Table 2.9** shows the classification of sediment particle size ranges into size classes. Sieves, which corresponded to the range of particle sizes were used in the analysis. The full suite of radiological analysis was carried out by EPA.

Table 2.9: The classification of sediment particle size ranges into size classes (adapted from Buchanan, 1984).

Range of Particle Size	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

2.3.1.1 Fauna Sample Processing

All faunal samples were placed in an illuminated shallow white tray and sorted first by eye to remove large specimens and then sorted under a stereo microscope (x10 magnification). Following the removal of larger specimens, the samples were placed into Petri dishes, approximately one-half teaspoon at a time and sorted using a binocular microscope at x25 magnification.

The faunal samples were sorted into four main groups: Annelida, Mollusca, Arthropoda, and others. The 'others' group consisted of echinoderms, nematodes, nemerteans, cnidarians, and other lesser phyla. The fauna was maintained in stabilised 70% industrial methylated spirit (IMS) following retrieval and identified to species level where practical using a binocular microscope, a compound microscope and all relevant taxonomic keys. After identification and enumeration, specimens were pooled and stored station level.

2.4 Data Analysis

2.4.1 Sediment Data

Organic content of sediment samples was determined for each sample by expressing it as a percentage the sediment weight loss following combustion over the initial weight of the sediment. In general, Loss of carbon Ignition (LOI) correlates with sediment particle size with fine-grained sediments typically containing higher levels of organic matter than coarse sediments.

For the granulometric analysis of sediment samples, wet sediments are subject to wet and dry sieving followed by laser diffraction. The <63 µm (Silt-Clay) fraction was determined by laser diffraction analysis. Coarser fractions comprising the sediment samples were determined by mechanical dry sieving through a series of Wentworth sieves; >4mm (Fine Gravel), 2-4mm (Very Fine Gravel), 1-2mm (Very Coarse Sand), 0.5-1mm (Coarse Sand), 0.25-0.5mm (Medium Sand), 125-250µm (Fine Sand), 62.5-125µm (Very Fine Sand). For each station, the weight of each fraction of the sediment retained on the sieve was expressed as a percentage of the total sample. The relative proportion of sediments in each fraction was used to classify sediments at the station *sensu* Folk (1954).

2.4.2 Faunal Data

Univariate statistical analysis of the faunal data was undertaken using PRIMER v.6 (Plymouth Routines in Ecological Research).

2.4.2.1 Univariate Analysis

Using PRIMER, the faunal data was used to produce a range of univariate indices. Univariate indices are designed to condense species data in a sample into a single coefficient that provides quantitative estimates of biological variability (Heip *et al*., 1998; Clarke and Warwick, 2001). Univariate indices can be categorised as primary or derived indices.

Primary biological indices used in the current study include:

- number of taxa (S) in the samples and
- number of individuals (N) in the samples.

Derived biological indices, which are calculated based on the relative abundance of species in samples, used in the study include:

- Margalef's species richness index (D) (Margalef, 1958),

$$D = \frac{S - 1}{\log_2 N}$$

where: N is the number of individuals and S is the number of species

Margalef's species richness (D) is a measure of the total number of species present for a given number of individuals.

- Pielou's Evenness index (J) (Pielou, 1977)

$$J = \frac{H'(observed)}{H'_{max}}$$

where: H'_{max} is the maximum possible diversity, which could be achieved if all species were equally abundant (= $\log_2 S$)

Pielou's evenness is a measure of how evenly the individuals are distributed among different species.

- Shannon-Wiener diversity index (H') (Pielou, 1977)

$$H' = -\sum_{i=1}^{S} p_i (\log_2 p_i)$$

where: p_i is the proportion of the total count accounted for by the i^{th} taxa

Shannon-Wiener diversity index takes both species abundance and species richness into account quantify diversity (Shannon & Wiener, 1949).

- Simpson's Diversity Index (Simpson, 1949)

$$1\text{-}\lambda' = 1\text{-}\{\Sigma_i N_i(N_i\text{-}1)\} / \{N(N\text{-}1)\}$$

where N is the number of individuals of species i.

- The Shannon-Wiener based Effective Number of Species (ENS) (Hill, 1973; Jost, 2006)

$$H = \exp(H')$$

where H' is the Shannon-Wiener diversity index.

The Shannon-Wiener index diversity index is converted to ENS to reflect 'true diversities' (Hill, 1973, Jost, 2006) that can then be compared across communities (MacArthur, 1965; Jost, 2006). The ENS is equivalent to the number of equally abundant species that would be needed in each sample to give the same value of a diversity index, *i.e.,* Shannon-Wiener Diversity index. The ENS behaves as one might intuitively expect when diversity is doubled or halved, while other standard indices of diversity do not (Jost, 2006). If the ENS of one community is twice that of another, then it can be said that the community is twice as diverse as the other.

2.4.2.2 Multivariate Analysis

The PRIMER programme (Clarke & Warwick, 2001) was used to carry out multivariate analyses on the station-by-station faunal data. All species abundance data from the grab surveys was square root transformed and used to prepare a Bray-Curtis similarity matrix in PRIMER. The square root transformation allows some of the less abundant species to be upweighted in the similarity calculation. Various ordination and clustering techniques can then be applied to the similarity matrix to determine the relationship between the samples.

Multidimensional scaling (MDS) is a technique that ordinates samples as points in 2D or 3D space based on similarity in species distribution data. MDS performed on the Bray-Curtis similarity matrix produce ordination maps whereby the placement of samples reflects the similarity of their biological communities, rather than their simple geographical location (Clarke & Warwick, 2001).

An indication of how well the similarity matrix is represented by the ordination is given by stress values calculated by comparing the interpoint distances in the similarity matrix with the corresponding interpoint distances on the ordinations. Perfect or near perfect matches are rare in field data, especially in the absence

of a single overriding forcing factor such as an organic enrichment gradient. Stress values increase, not only with the reducing dimensionality (lack of clear forcing structure), but also with increasing quantity of data (it is a sum of the squares type regression coefficient). Clarke & Warwick (2001) have provided a classification of the reliability of MDS plots based on stress values, having compiled simulation studies of stress value behaviour and archived empirical data.

This classification generally holds well for ordinations of the type used in this study. Their classification is given below:

- Stress value < 0.05: Excellent representation of the data with no prospect of misinterpretation.
- Stress value < 0.10: Good representation, no real prospect of misinterpretation overall structure, but very fine detail may be misleading in compact subgroups.
- Stress value < 0.20: This provides a useful picture, but detail may be misinterpreted, particularly nearing 0.20.
- Stress value 0.20 to 0.30: This should be viewed with scepticism, particularly in the upper part of the range, and discarded for a small to moderate number of points such as < 50.
- Stress values > 0.30: The data points are close to being randomly distributed in the ordination and not representative of the underlying similarity matrix.

Each stress value must be interpreted both in terms of its absolute value and the number of data points. In the case of this study, the moderate number of data points indicates that the stress value can be interpreted more or less directly. While the above classification is arbitrary, it does provide a framework that has proved effective in this type of analysis.

Hierarchical Agglomerative Clustering (HAC) is used to cluster samples based on between-sample similarities into groups in dendrograms. Similarity Profiling (SIMPROF) is used to test if differences between HAC derived similarity-based clusters are significant. Similarity Percentages (SIMPER) analysis can be used to determine the characterising species of each cluster of stations identified either arbitrarily (by eye) from HAC dendrograms or statistically using SIMPROF testing (Clarke and Warwick, 2001; Clarke and Gorley, 2006; Anderson *et al*., 2008).

The species, which are responsible for the grouping of samples in CLUSTER analyses, were identified using the PRIMER programme SIMPER (Clarke & Warwick, 1994). This programme determined the percentage contribution of each species to the dissimilarity/similarity within and between each sample group.

2.4.3 Biomass Measurement

Determination of biomass is carried out as per the Guidelines for processing marine macrobenthic invertebrate samples under the NMBAQC Scheme (Worsfold *et al.,* 2010). It is carried out by measuring the 'blotted' wet weight so as not to damage the specimens. All biomass estimations are recorded on faunal datasheet. All taxa awaiting biomass determination are stored in preservative. Only quantitively recorded taxa are weighed. For this project biomass is recorded to major phyla level (Annelida, Arthropoda, Mollusca, Echinodermata, and miscellaneous).

- All fragments of organisms are extracted from the sample and identifiable fragments are assigned to their respective taxa as far as possible.
- Where practicable, tube dwelling animals are carefully removed from their tubes before biomass estimation. Where it is not practicable to remove animals from tubes (for example, with *Phoronis* or *Galathowenia*) then tubes are 'topped and tailed' to remove empty tube portions and confirm that a head or tail is present.
- Attached fauna for example, parasites and commensals, are left attached and weighed with the host.
- Animals that contain large amounts of preservative (for example some Echinoidea, Echiuroidea and bivalve molluscs) are pierced or opened to allow the fluids to drain out prior to weighing. Bivalves are weighed intact (*i.e.* with shells).

2.4.4 Video & Image Stills Data

The video and stills data were analysed following the JNCC Guidance on Assigning Benthic biotopes using EUNIS or the Marine Habitat Classification of Britain and Ireland (Parry, 2019). However, statistical analyses are not applied to species identified from video and still images data as the species identification and number is usually of low resolution. The video data provides a broader picture of the habitat while the image stills allow identification of smaller and less conspicuous species over smaller areas. The video and stills data capture different sections of the community and as a result they are analysed separately. Generally, for each species identified from the video or stills, both abundance and SACFOR is provided per video section or per still, but sometimes only presence/absence is used. In situations where *Sabellaria* reef are found, the guidance provided by Gubbay (2007) is followed to cover techniques to map, avoid disturbance and conserve *Sabellaria* reef.

2.4.5 Assigning Biotopes (JNCC) & EUNIS Assemblage

After analysis, the data from the infauna identified are then matched with the broadscale habitats (EUNIS) data derived from particle size analysis and video/still data and a biotope is assigned according to the Marine

Habitat Classification of Britain and Ireland (Parry, 2019). The biotope name assigned to data should accurately describes the physical environment as well as the biological community. The following steps are followed to assign biotope:

(i) Select physical zone for each sampling point based on depths, light, indicator species, geospatial maps (EMODnet Seabed Habitats Map Viewer).

(ii) Define substrate category (rock, coarse, sediment, missed sediment, sand and muddy sand, and mud and sandy mud). The four sediment categories depend on the relative proportions of mud, sand, and gravel as defined in Folk classification (Folk, 1954).

(iii) Check physical samples based on

- PSA
- grab images and deck logs to get a broader picture of the sediment retained in the whole grab.
- Cross-check any visual samples taken at the same station (including video footage).

(iv) Check visual samples based on

- Notes logs.
- Raw data -video footage.
- PSA results.
- Functional traits of species present giving an indication of the substrate type.

(v) Select energy /mobility category for each sample.

For rock samples:

- Check energy regime on field notes.
- Energy category should reflect types of communities present. Select energy category which best fits community present.
- If energy regime cannot be determined from field data, sample points can be overlain onto EUSeaMap energy class layer from EMODnet Seabed Habitats map viewer.

For sediment samples:

- Check mobility of samples.
- Video footage to gauge mobility of sediment.
- Features such as sand ripples can indicate the mobility of sediment.

(vi) Select salinity category for each sample based on notes in logs, geographic location or any salinity readings taken.

For each sample, the faunal communities are identified which is used to refine the description of the biotope. In the situation where there is any mismatch between the biological community and the habitat type, a number of approaches are taken to clearly indicate that the physical environment differs from the description of the biological community present (Parry, 2019)].

2.4.6 Reef Assessment

Reef assessments were undertaken using appropriate guidance from Irving (2009) and Golding *et al*. (2020) for potential geogenic reefs (*e.g.* stony reefs) and Gubbay (2007) and Limpenny *et al*. (2010) for potential biogenic reefs (such as *Sabellaria spinulosa* and *Modiolus modiolus* reefs, respectively). Where potential Annex I reef habitat would be noted in the still images for a transect, Stony Reef assessments would be undertaken using the criteria and methods in Irving (2009) and Golding *et al*. (2020). Boulders and cobbles are generally considered to be greater than 64 mm diameter and the cobble reef assessment criteria are based on this approach. Following Irving (2009), composition, elevation and biota characteristics were considered to assess whether any stills along each transect had an extent of resemblance to stony reef. Characteristics were scored as 'Low', 'Medium' or 'High' resemblance to cobble reef, or 'No resemblance' and the specific criteria for scoring each of these characteristics is indicated in **Table 2.10**.

The DDV video analysis did not detect any biogenic or geogenic reefs within the array area or the ECR.

Table 2.10: Criteria for Reef Assessment (Irving, 2009). Particle diameter >64 mm represents cobbles/boulders.

Characteristics	Not a Stony Reef	Low	Medium	High
Percentage Composition of Particles >64 mm Diameter	<10%	10-40%	40-95%	>95%
Elevation	Flat Seabed	<64 mm	64 mm – 5 m	>5 m
Extent	<25 m^2	> 25 m^2	> 25 m^2	> 25 m^2
Biota	Dominated by Infauna	Low Epifaunal Dominance	Medium Epifaunal Dominance	80% of Biota Epifaunal

3. Results

3.1 Drop-Down Video

The DDV survey identified areas suitable for grab survey (for fauna and sediment analysis) as well as identifying locations of potential reef habitat.

The nature of the area is characterised by silty sediment deposition. As a result, visibility was often poor in the video footage. There were only a few images captured to assess the characteristics of the substrate and biotopes along the transects surveyed.

Images of the seabed were captured from the video footage recorded at each of the stations where DDV was deployed. Analysis of the epibenthic communities based on the video footage along with representative still images is presented below. The distance between the green lasers in each image is 20 cm. Full video footage from each recording is available upon request. The photo stills captured from the video transects are poor in resolution due to very high turbidity during the survey. Only usable image stills are presented in this section.

The DDV survey provided sufficient visual details to determine the biotopes existing at the proposed development (see **Table 3.1**). Three main broadscale habitats were identified. 'SS.SMu.Omu' - Offshore circalittoral mud (EUNIS code: MD6) corresponded to stations within the array area with the exception of AR-17 and AR-18. These two stations located along the transition boundary between the array and ECR areas mostly corresponded to the broadscale habitat SS.SSa.CMuSa - Circalittoral muddy sand (EUNIS code: MC52) similar to stations within the ECR area located in the circalittoral zone. Stations within the ECR area but located within the infralittoral zone, corresponded to 'SS.SSa.IMuSa - Infralittoral muddy sand' (EUNIS code: MB52). The biotopes distribution is illustrated in **Figure 3.1.**

Table 3.1: The biotope classifications (JNCC 2022) identified for each Drop-down video station.

Station	Biotope Code	Biotope Classification
AR-0	SS.SMu.OMu	Offshore circalittoral mud
AR-5	SS.SMu.OMu	Offshore circalittoral mud
AR-6	SS.SMu.OMu	Offshore circalittoral mud
AR-7	SS.SMu.OMu	Offshore circalittoral mud
AR-8	SS.SMu.OMu	Offshore circalittoral mud
AR-10	SS.SMu.OMu	Offshore circalittoral mud
AR-12	SS.SMu.OMu	Offshore circalittoral mud
AR-15	SS.SMu.OMu	Offshore circalittoral mud
AR-16	SS.SMu.OMu	Offshore circalittoral mud

Station	Biotope Code	Biotope Classification
AR-17	SS.SSa.CMuSa	Circalittoral muddy sand
AR-18	SS.SSa.CMuSa	Circalittoral muddy sand
AR-MI1	SS.SMu.OMu	Offshore circalittoral mud
ECR-1	SS.SSa.IMuSa	Infralittoral muddy sand
ECR-3	SS.SSa.CMuSa	Circalittoral muddy sand
ECR-8	SS.SSa.CMuSa	Circalittoral muddy sand
ECR-10	SS.SSa.CMuSa	Circalittoral muddy sand
ECR-24	SS.SSa.CMuSa	Circalittoral muddy sand
ECR-26	SS.SSa.CMuSa	Circalittoral muddy sand
ECR-28	SS.SSa.CMuSa	Circalittoral muddy sand
ECR-29	SS.SSa.CMuSa	Circalittoral muddy sand
ECR-MI1	SS.SSa.IMuSa	Infralittoral muddy sand
ECR-MI2	SS.SSa.CMuSa	Circalittoral muddy sand

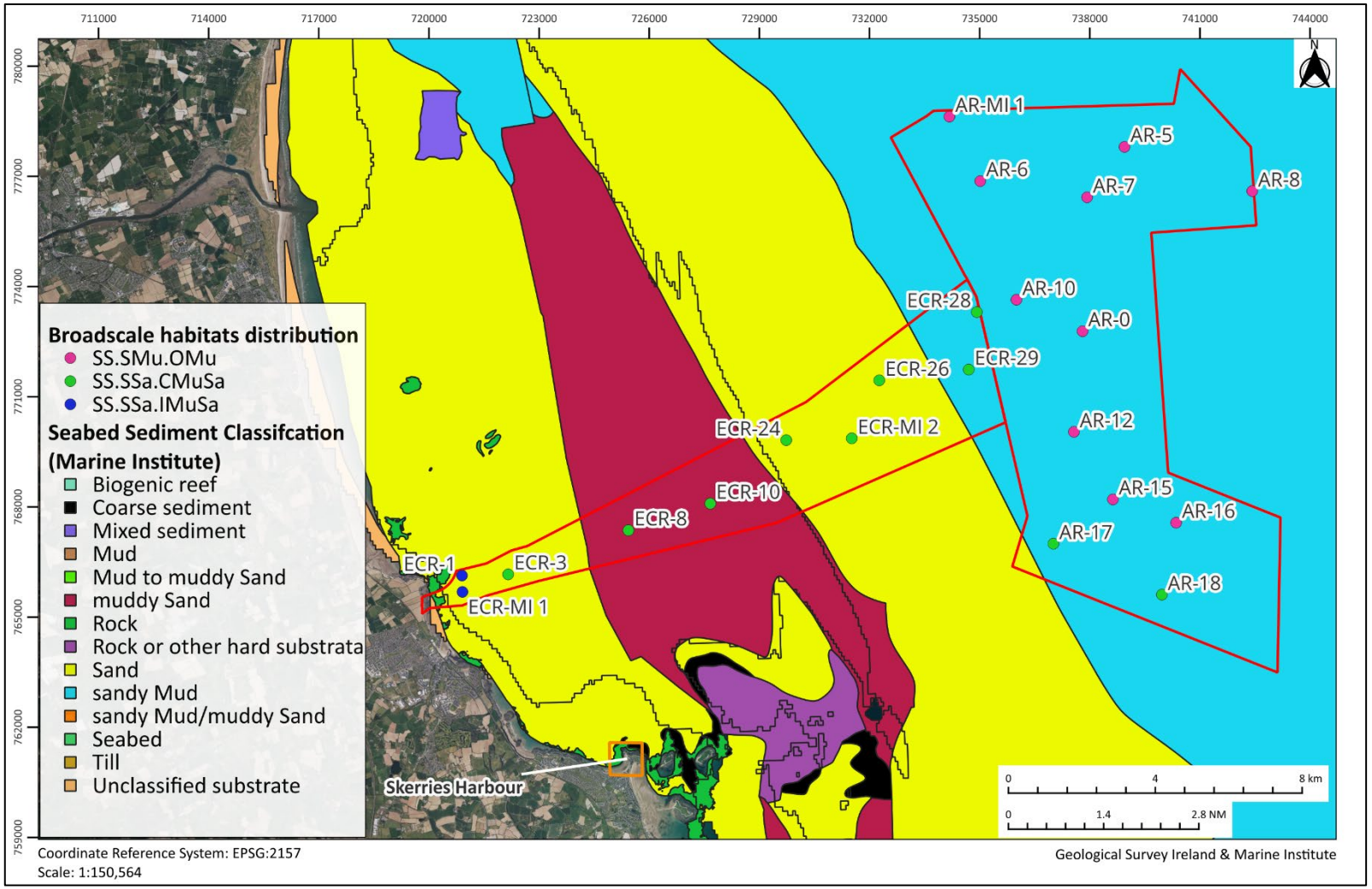

Figure 3.1: DDV biotope distribution across the array area and ECR within the proposed development site, North Irish Sea.

3.1.1 Station AR-0

Station AR-0 was composed of soft, sandy mud with an undulating appearance due to infaunal burrowing activity (**Figure 3.2** and **Figure 3.3**). Both burrows and an individual Dublin Bay prawn (*Nephrops norvegicus*) were recorded. The depth of the station was 49m. The habitat type can be assigned to the JNCC biotope 'SS.SMu.Omu - Offshore circalittoral mud' (EUNIS code MD6).

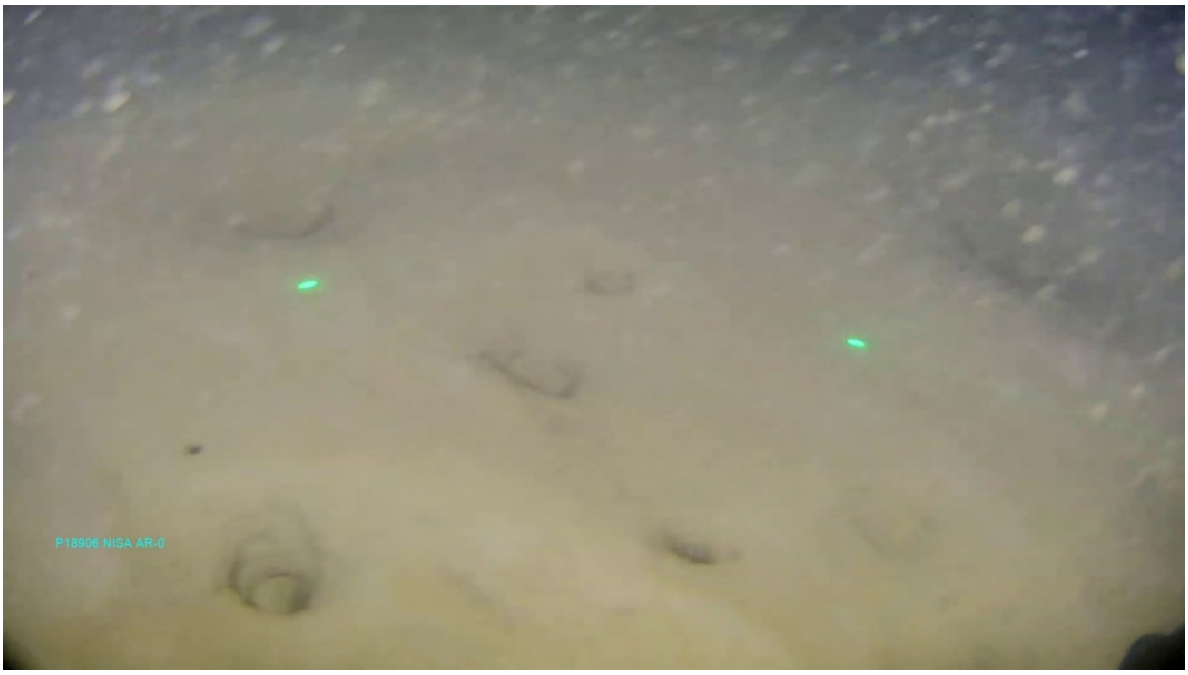

Figure 3.2: Station AR-0 – Soft sandy mud marked with *Nephrops* burrows.

Figure 3.3: Station AR-0 – Soft sandy mud with slightly undulating surface. *Nephrops* in background view

3.1.2 Station AR-5

Station AR-5 consisted of soft, sandy mud with *Nephrops* burrows. Noticeable fauna included a lone fish. No *Nephrops* were observed *in situ* along the transect, however they are common in the area and burrows associated with the species were recorded (**Figure 3.4** and **Figure 3.5**). The depth of the station was 49m. The habitat type can be assigned to the JNCC biotope 'SS.SMu.Omu - Offshore circalittoral mud' (EUNIS code MD6).

Figure 3.4: AR-5 – Soft sandy mud with undulating surface and burrows throughout.

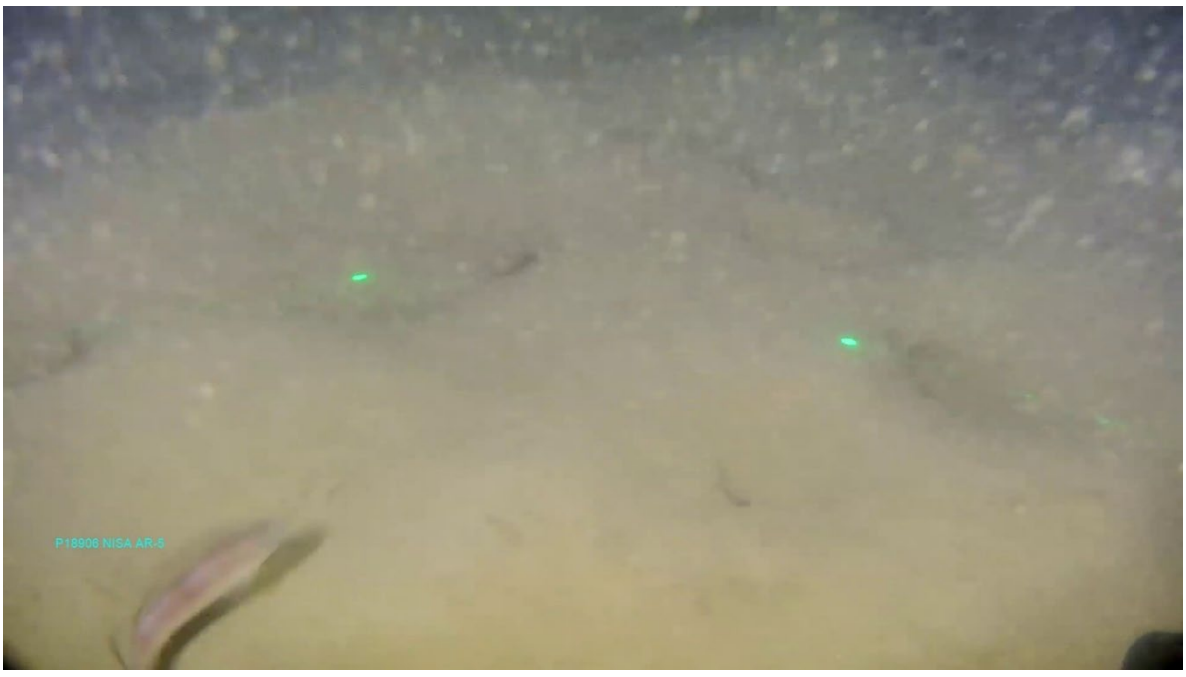

Figure 3.5: AR-5 – Soft sandy mud with burrow holes and undulating surface. Small fish in view.

3.1.3 Station AR-6

Station AR-6 was composed soft sandy mud, consistent along the transect. There was no visible fauna captured in the DDV footage, however, *Nephrops* burrows were observed (**Figure 3.6** and **Figure 3.7**). The depth of the station was 41m. The habitat type can be assigned to the JNCC biotope 'SS.SMu.Omu - Offshore circalittoral mud' (EUNIS code MD6).

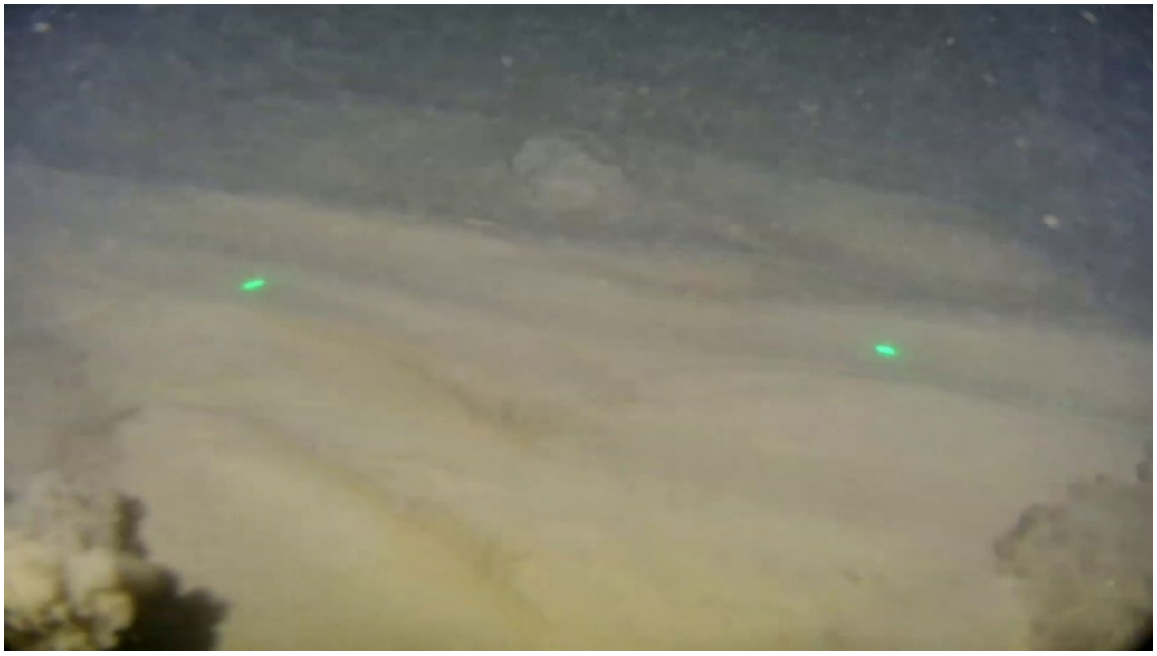

Figure 3.6: AR-6 – Soft sandy mud with rippled surface. Surface sediment loose and partially disturbed by DDV.

Figure 3.7: AR-6 – Soft sandy mud with burrow holes. Sediment surface silty and disturbed by DDV camera.

3.1.4 Station AR-7

Station AR-7 was composed of sandy mud with *Nephrops* burrows throughout. Visible fauna at the station included *N. norvegicus* which were observed at burrow mouths along the station transect (**Figure 3.8** and **Figure 3.9**). The depth of the station was 47m. The habitat type can be assigned to the JNCC biotope 'SS.SMu.Omu - Offshore circalittoral mud' (EUNIS code MD6).

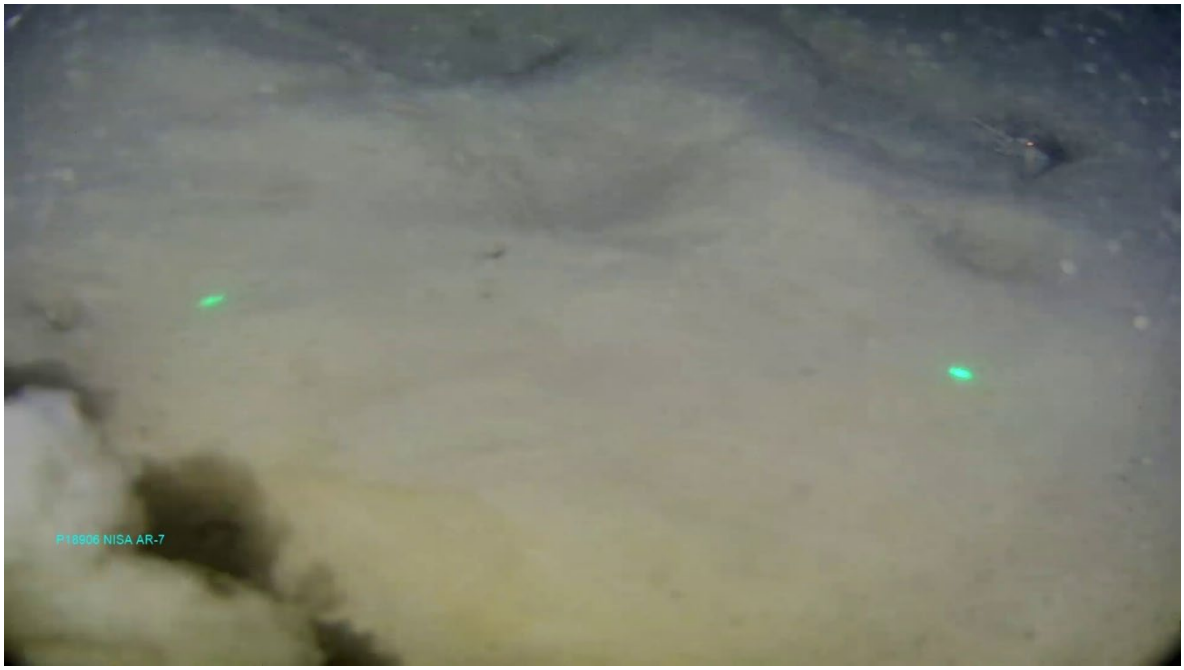

Figure 3.8: AR-7 – Soft sandy mud with burrow holes. *Nephrops* individual at burrow opening.

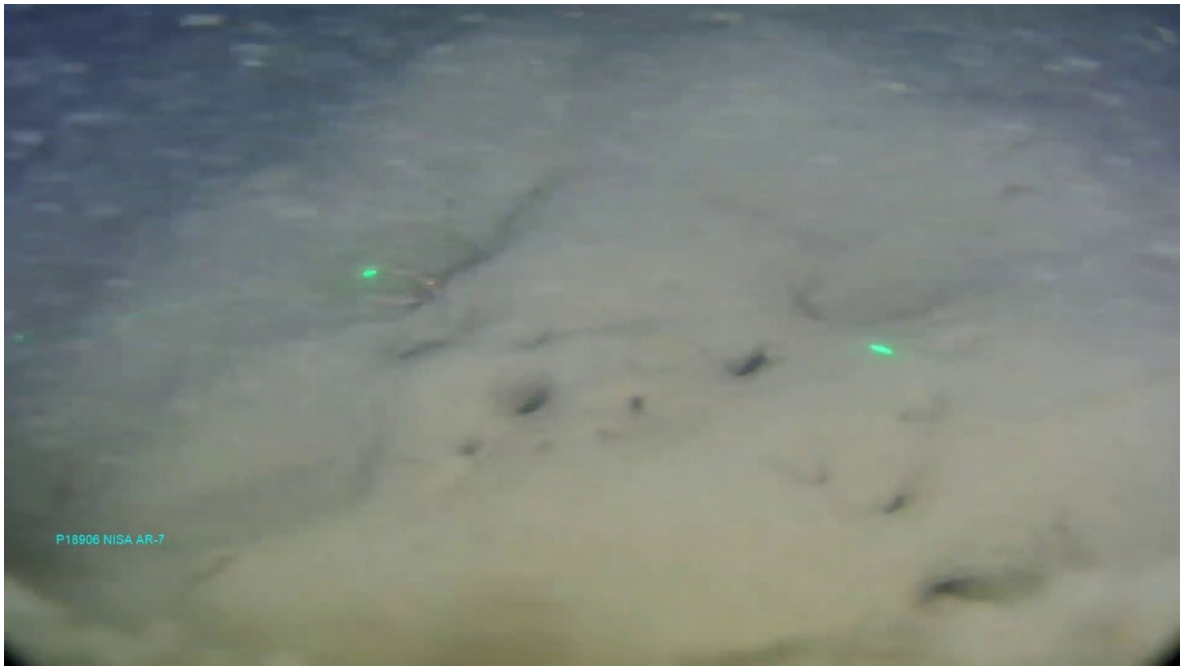

Figure 3.9: AR-7 – Sandy mud with several *Nephrops* burrows. Dublin Bay Prawn (*Nephrops norvegicus*) at burrow opening near left laser point.

3.1.5 Station AR-8

Station AR-8 was composed of soft, sandy mud with *Nephrops* burrows throughout, though no individuals were recorded on the DDV (**Figure 3.10**). The depth of the station was 55m. The habitat type can be assigned to the JNCC biotope 'SS.SMu.Omu - Offshore circalittoral mud' (EUNIS code MD6).

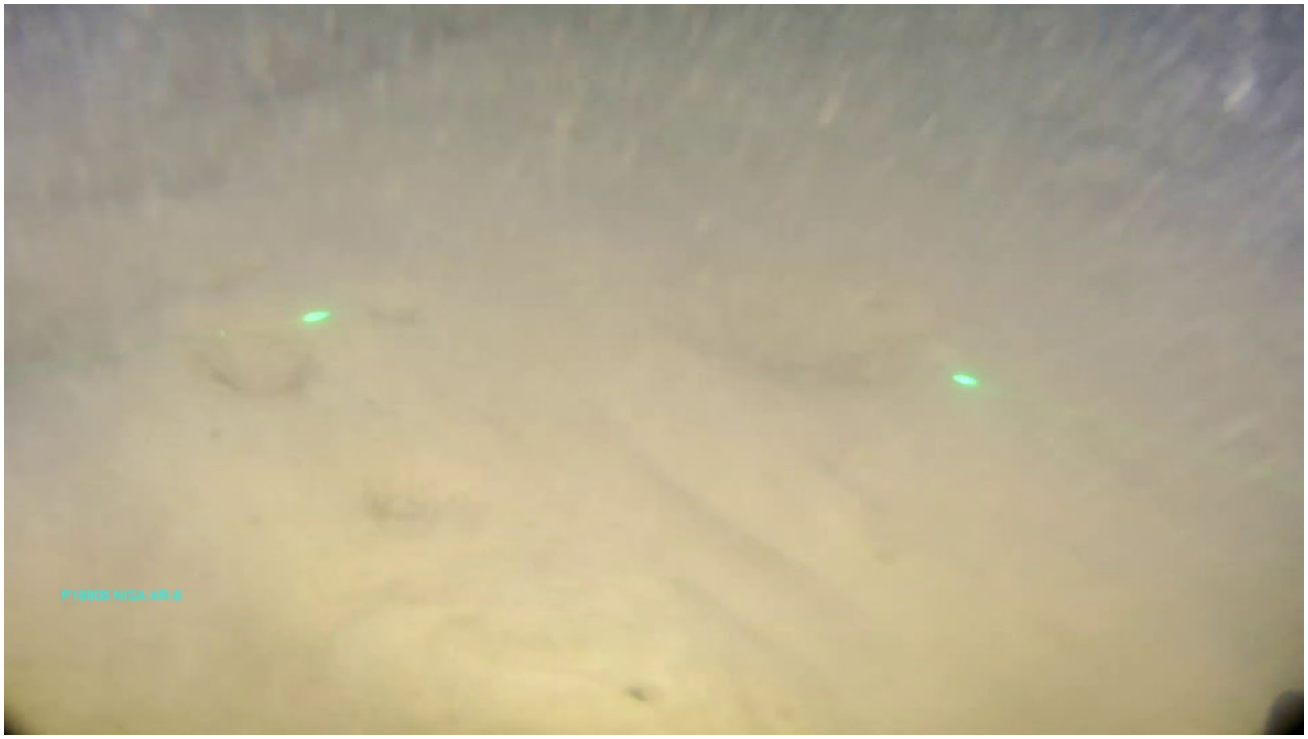

Figure 3.10: AR-8 - Soft, sandy mud with *Nephrops* burrow holes.

3.1.6 Station AR-10

Station AR-10 was consistent along the video transect, with soft, sandy mud and *Nephrops* burrow openings There was no visible macrofauna or benthic vegetation (**Figure 3.11**). Visibility at this site was poor in some areas due to high incidence of sediment resuspension. The depth of the station was 43m. The habitat type can be assigned to the JNCC biotope 'SS.SMu.Omu - Offshore circalittoral mud' (EUNIS code MD6).

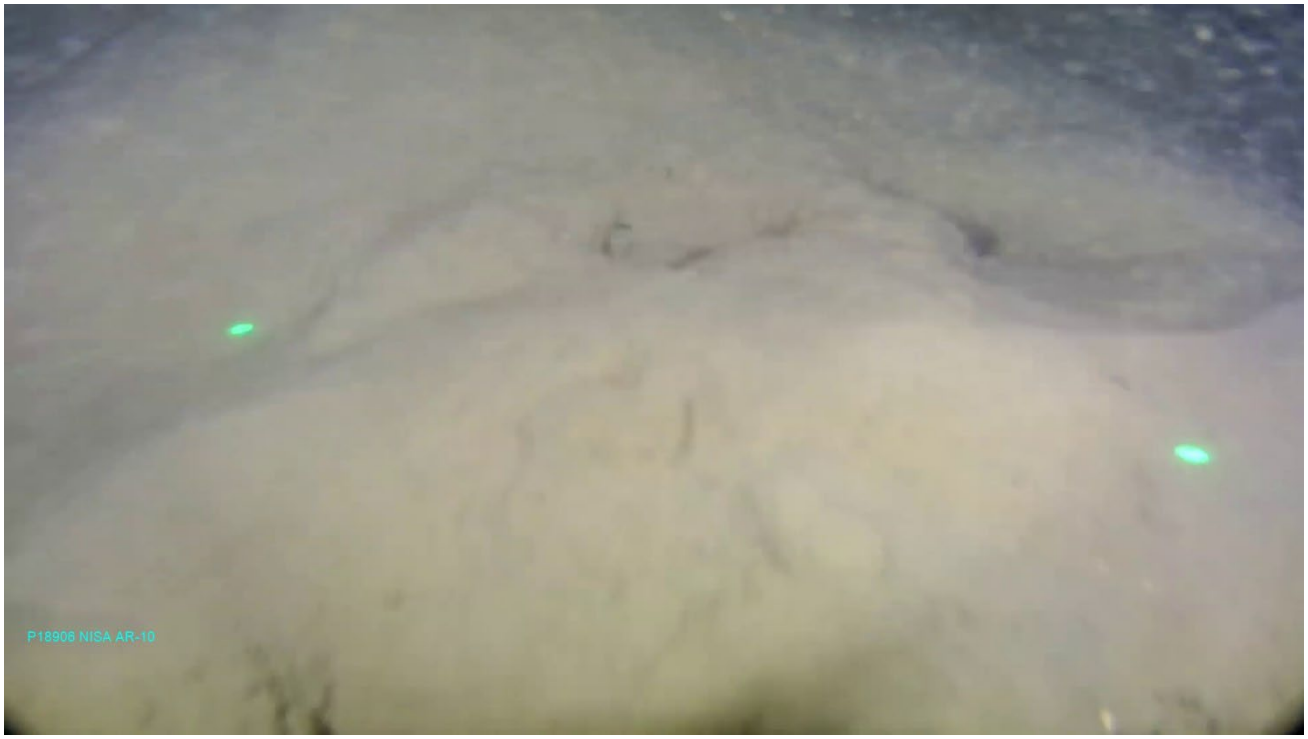

Figure 3.11: AR-10 – Soft, sandy mud substrate with *Nephrops* burrow holes and an undulating surface.

3.1.7 Station AR-12

Station AR-12 was similar to previous stations. No visible surface macrofauna, though burrows were present as evidence of infaunal behaviour likely attributed to *N. norvegicus* (**Figure 3.12**). Visibility was low at this site due to resuspension of surface sediments. The depth of the station was 48m. The habitat type can be assigned to the JNCC biotope 'SS.SMu.Omu - Offshore circalittoral mud' (EUNIS code MD6).

Figure 3.12: AR-12 – Soft, sandy mud marked with openings of *Nephrops* burrows.

3.1.8 Station AR-15

Station AR-15 was composed of sandy mud sediment with sparse shell material interspersed throughout. One individual *N. norvegicus* was observed along the transect. Sediment was easily disturbed thus limiting visibility at the station (**Figure 3.13**). The depth of the station was 51m. The habitat type can be assigned to the JNCC biotope 'SS.SMu.Omu - Offshore circalittoral mud' (EUNIS code MD6).

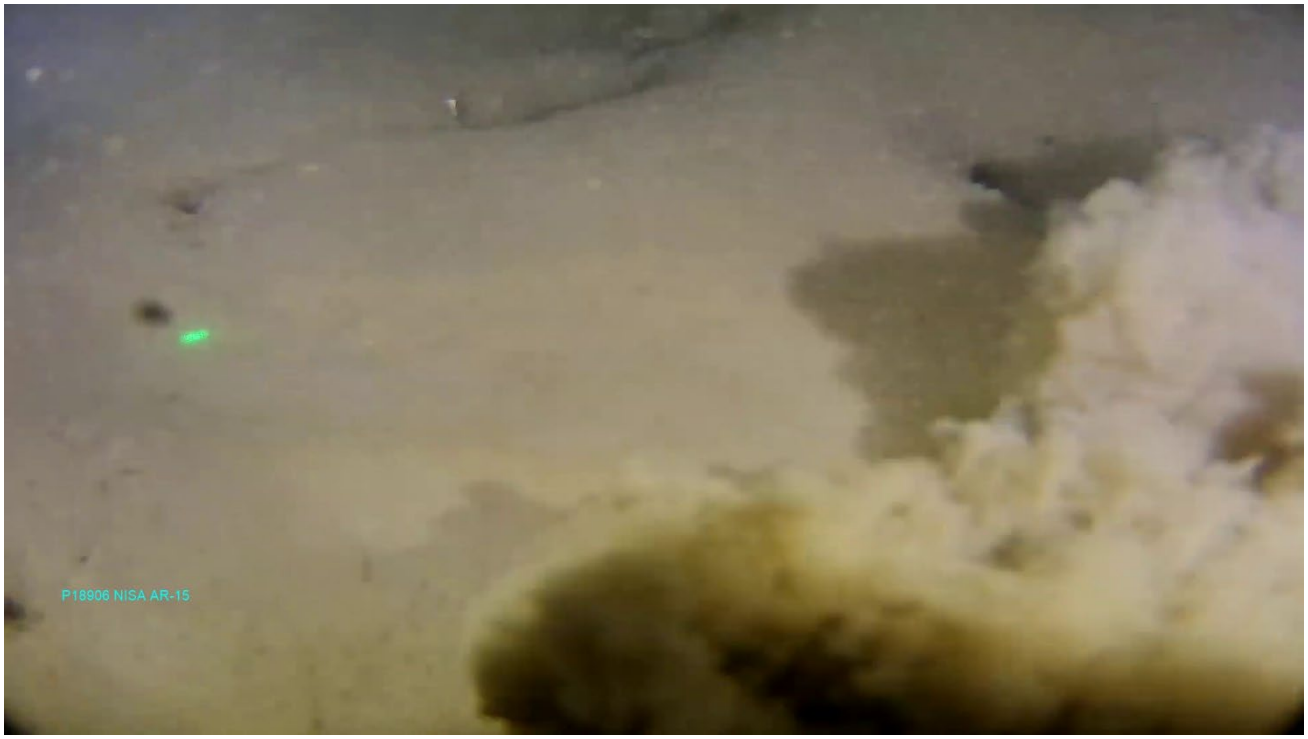

Figure 3.13: AR-15 – Soft undulating seabed with burrows and sparse shell material. Some sediment disturbance visible.

3.1.9 Station AR-16

Station AR-16 was composed of sandy mud with *Nephrops* burrows throughout. No surface dwelling macrofauna was observed directly, though the presence *N. norvegicus* is inferred due to the extensive burrows characteristic of their environments (**Figure 3.14** and **Figure 3.15**). The depth of the station was 55m. The habitat type can be assigned to the JNCC biotope 'SS.SMu.Omu - Offshore circalittoral mud' (EUNIS code MD6).

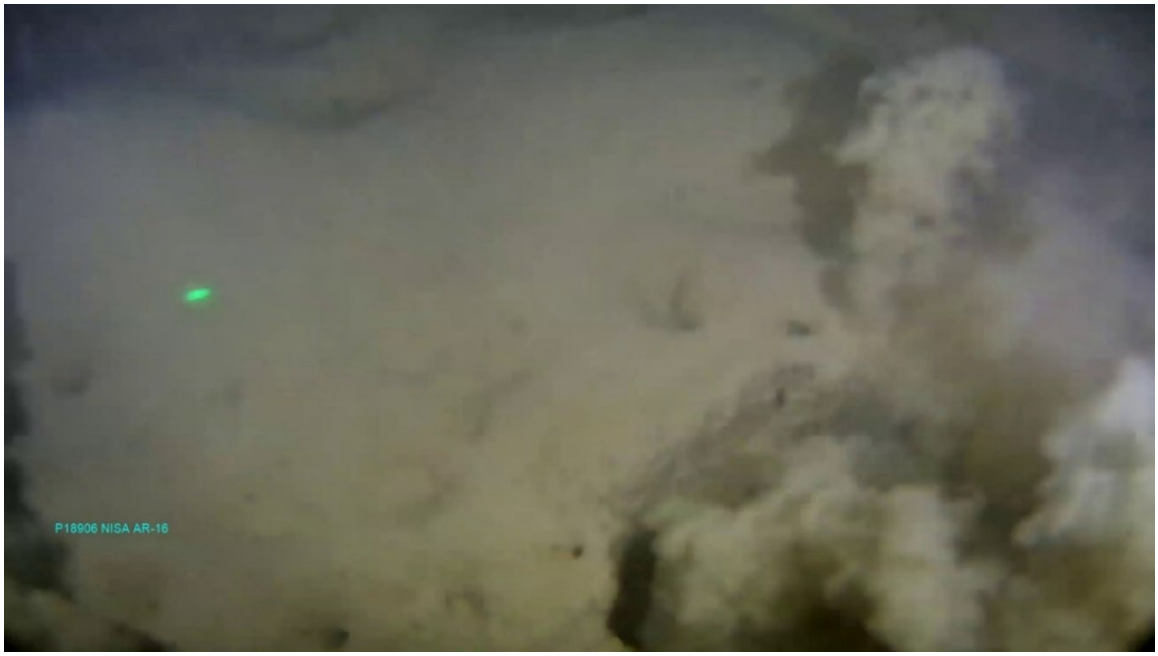

Figure 3.14: AR-16 – Sandy mud with burrow holes. Sediment disturbance due to DDV camera.

Figure 3.15: AR-16 – Close up of *Nephrops* burrow. Fine sandy mud sediment.

3.1.10 Station AR-17

Similar to previous stations, AR-17 had low visibility resulting from disturbed, fine surface sediment. There were no noticeable surface fauna present at the time of survey (**Figure 3.16**) though evidence of *Nephrops* burrowing was apparent. The depth of the station was 45m. The habitat type can be assigned to the JNCC biotope 'SS.SSa.CMuSa- Circalittoral muddy sand' (EUNIS code MD52).

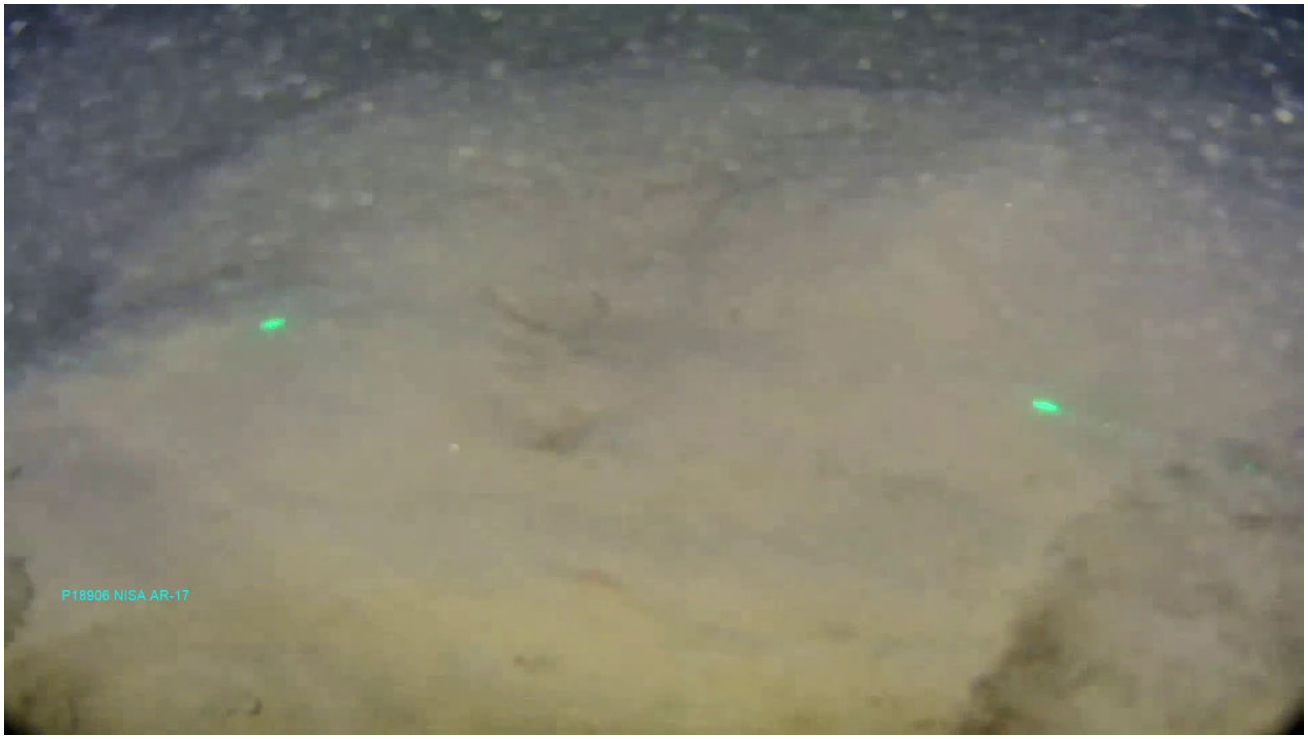

Figure 3.16: AR-17 – Soft, muddy sand with burrow holes and an undulating surface.

3.1.11 Station AR-18

Station AR-18 is similar to Station AR-17. Sediment along the transect was consistent fine, muddy sand substrate with *Nephrops* burrows throughout (**Figure 3.17**). No visible surface macrofauna were observed at the time of the survey. The depth of the station was 53m. The habitat type can be assigned to the JNCC biotope 'SS.SSa.CMuSa - Circalittoral muddy sand' (EUNIS code: MC52).

Figure 3.17: AR-18 – Fine muddy sand rich in *Nephrops* burrows and sparse shell material.

3.1.12 Station AR-MI-1

Station AR-MI-1 is similar to previous stations with fine sandy mud and *Nephrops* burrows throughout (**Figure 3.18**). No visible surface macrofauna was recorded. The depth of the station was 40m. The habitat type can be assigned to the JNCC biotope 'SS.SMu.Omu - Offshore circalittoral mud' (EUNIS code MD6).

Figure 3.18: AR-MI-1 – Fine sandy mud containing *Nephrops* burrows.

3.1.13 Station ECR-1

Station ECR-1 was composed of slightly gravelly muddy sand with evidence of infaunal activity. The slightly rippled seabed is likely as a result of bottom currents. Razor clam shell debris was recorded throughout the station (**Figure 3.19**). The depth of the station was 7.3m. The habitat type can be assigned to the broadscale habitat 'SS.SSa.IMuSa - Infralittoral muddy sand (EUNIS code: MB52).

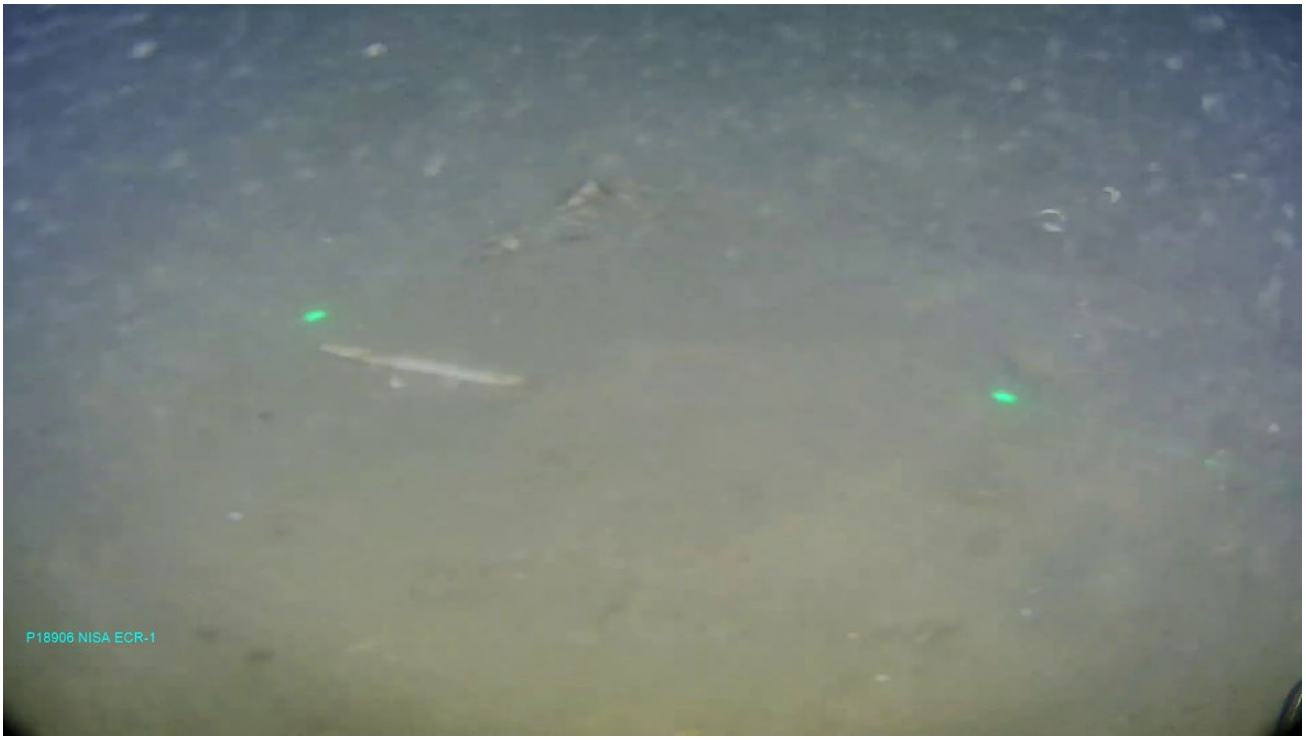

Figure 3.19: ECR-1 – Slightly gravelly muddy sand with slightly undulating surface. Discarded razor clam shells.

3.1.14 Station ECR-3

Station ECR-3 had a slightly gravelly muddy sand with shell debris. Notable macrofauna includes brittlestars, common starfish (*Asterias rubens*), and a crab (**Figure 3.20** and **Figure 3.23**). The depth of the station was 10m. The habitat type can be assigned to the JNCC biotope 'SS.SSa.CMuSa - Circalittoral muddy sand' (EUNIS code: MC52).

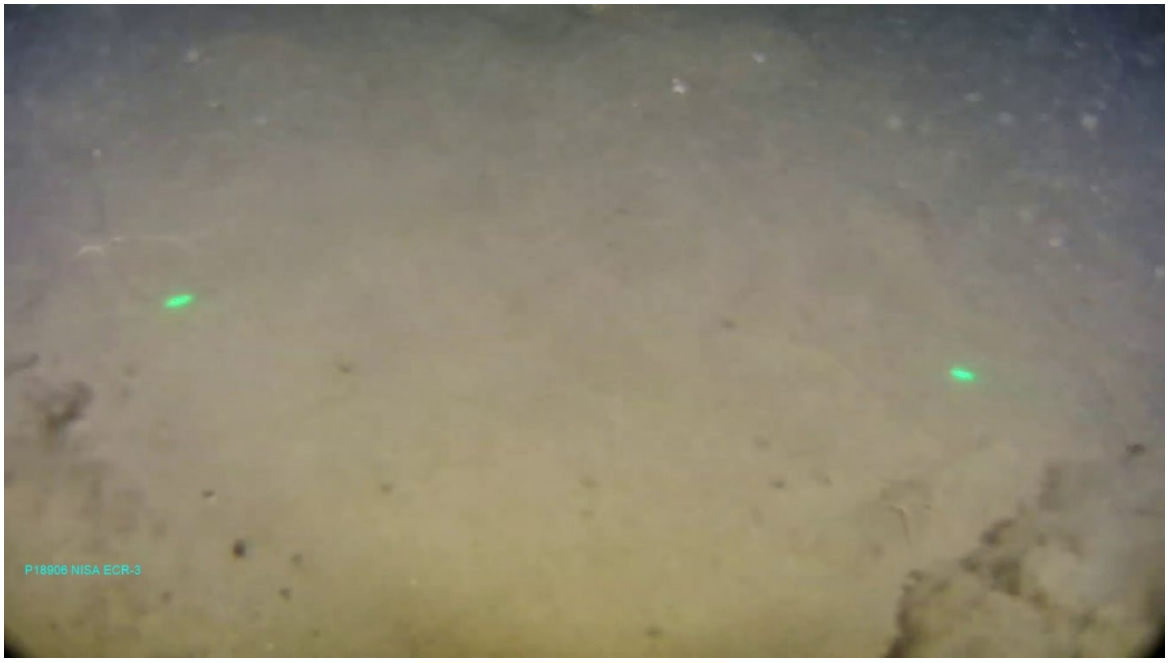

Figure 3.20: ECR-3 – Slightly gravelly muddy sand and brittle star.

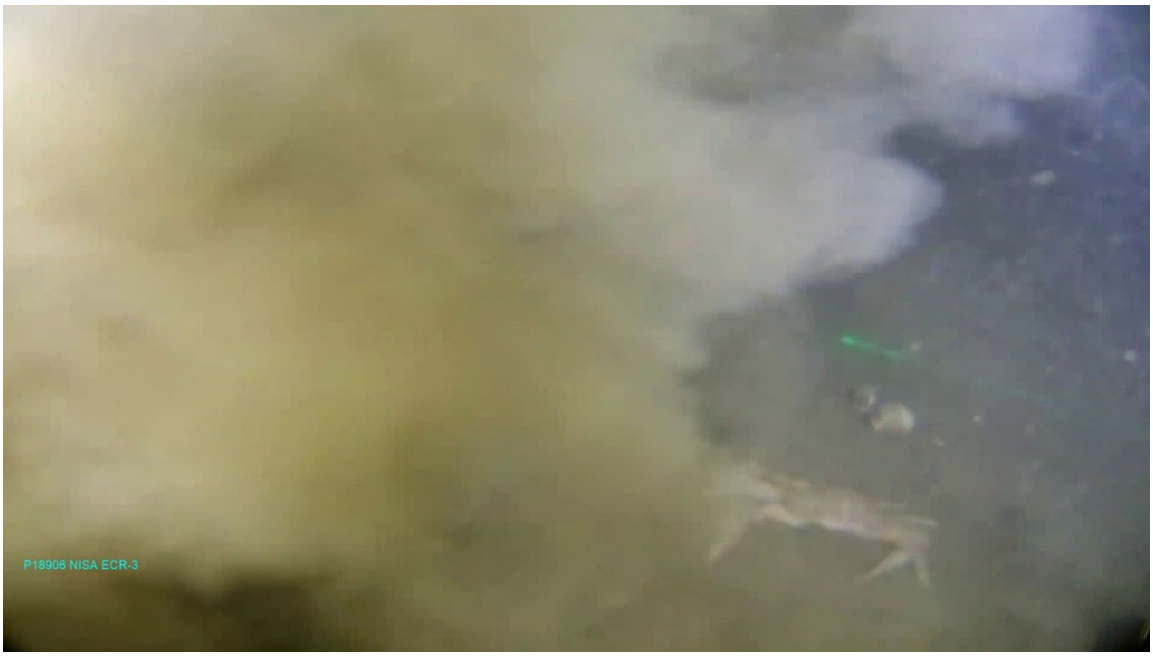

Figure 3.21: ECR-3 – Slightly gravelly muddy sand rich in shell material. Solitary crab in foreground.

Figure 3.22: ECR-3 – Slightly gravelly muddy sand with shell material and a common starfish (*Asterias rubens*)

Figure 3.23: ECR-3 – Slightly gravelly muddy sand with shell debris

3.1.15 Station ECR-8

Station ECR-8 was composed of slightly gravelly muddy sandy sediment with shell debris throughout. Notable fauna observed along the transect were brittlestars (Ophiuridae), and common starfish (*Asterias rubens*) (**Figure 3.24** and **Figure 3.26**). Clear images of macrofauna along the transect were difficult to obtain due to turbidity at the site. The depth of the station was 16.5m. The habitat type can be assigned to the broadscale habitat 'SS.SSa.CMuSa - Circalittoral muddy sand' (EUNIS code: MC52).

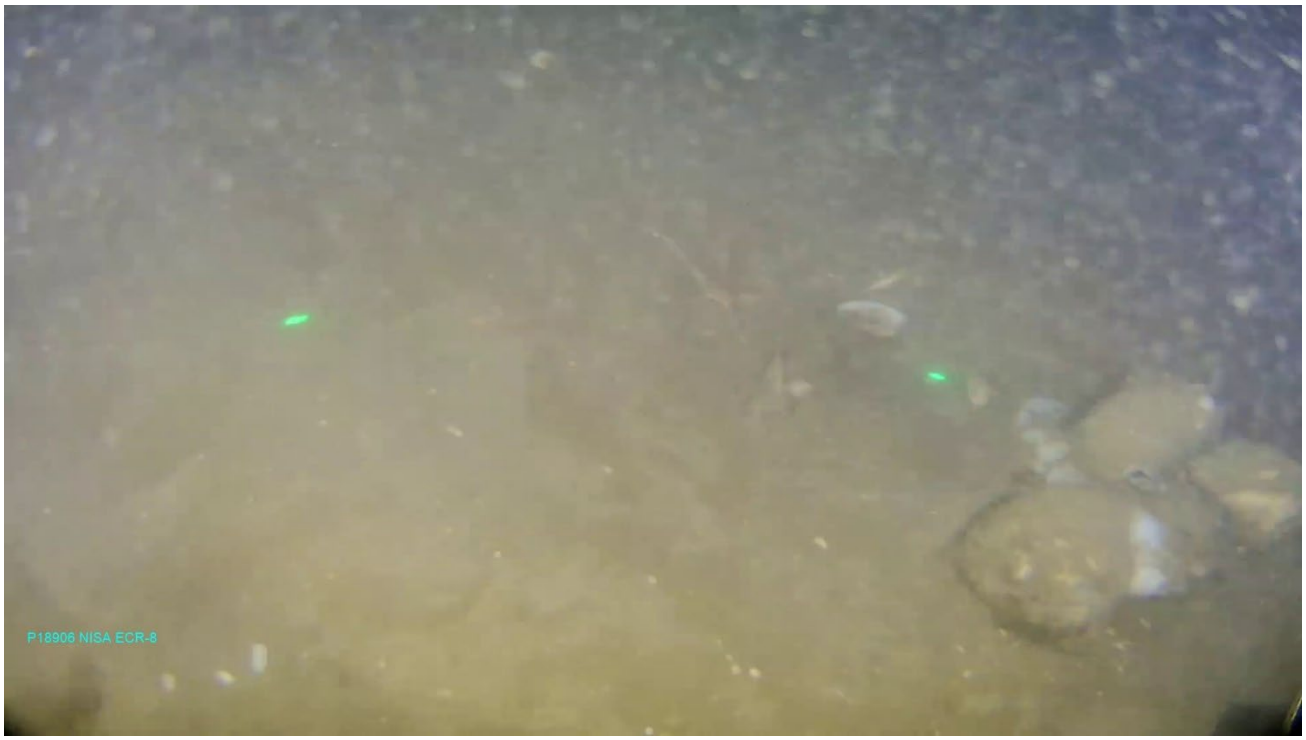

Figure 3.24: ECR-8 – Slightly gravelly muddy sand with shell debris throughout. A group of common whelks (*Buccinum undatum*) was observed.

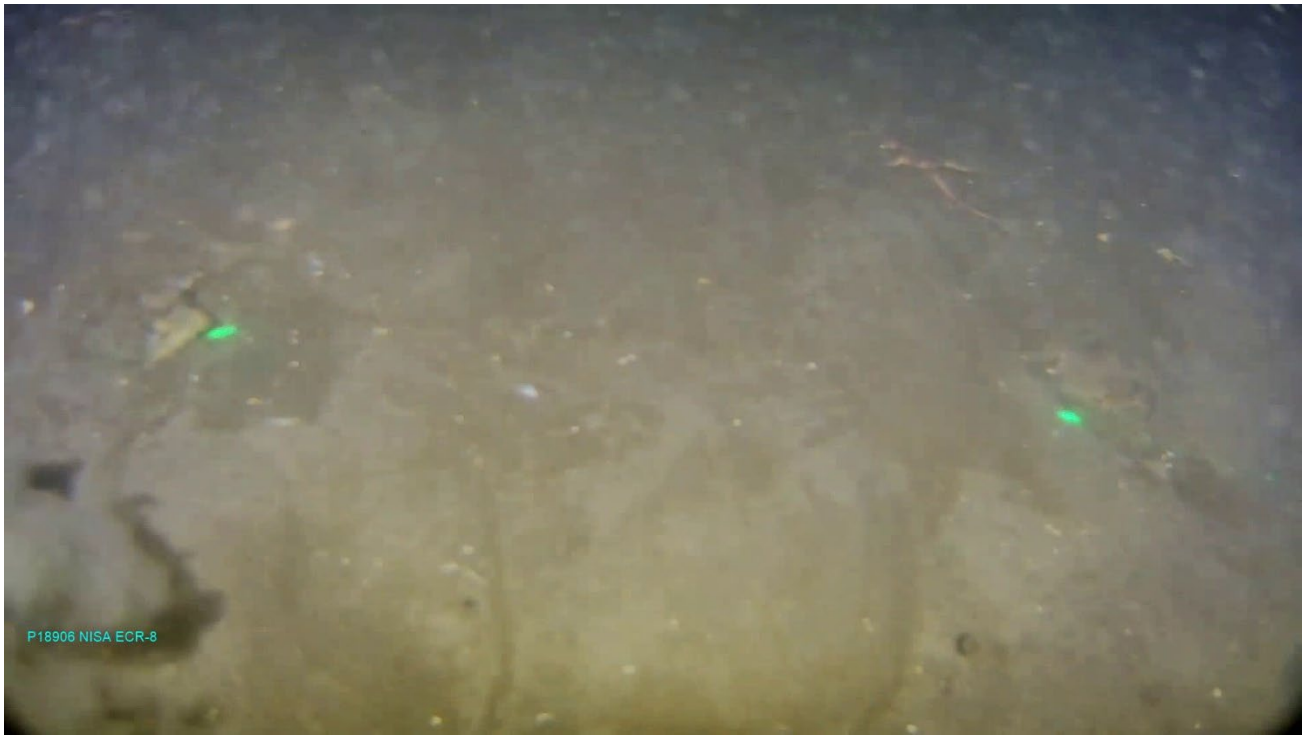

Figure 3.25: ECR-8 – Substrate of slightly gravelly muddy sand with shell fragments. Lone brittle star (*Ophiura* sp.) in view.

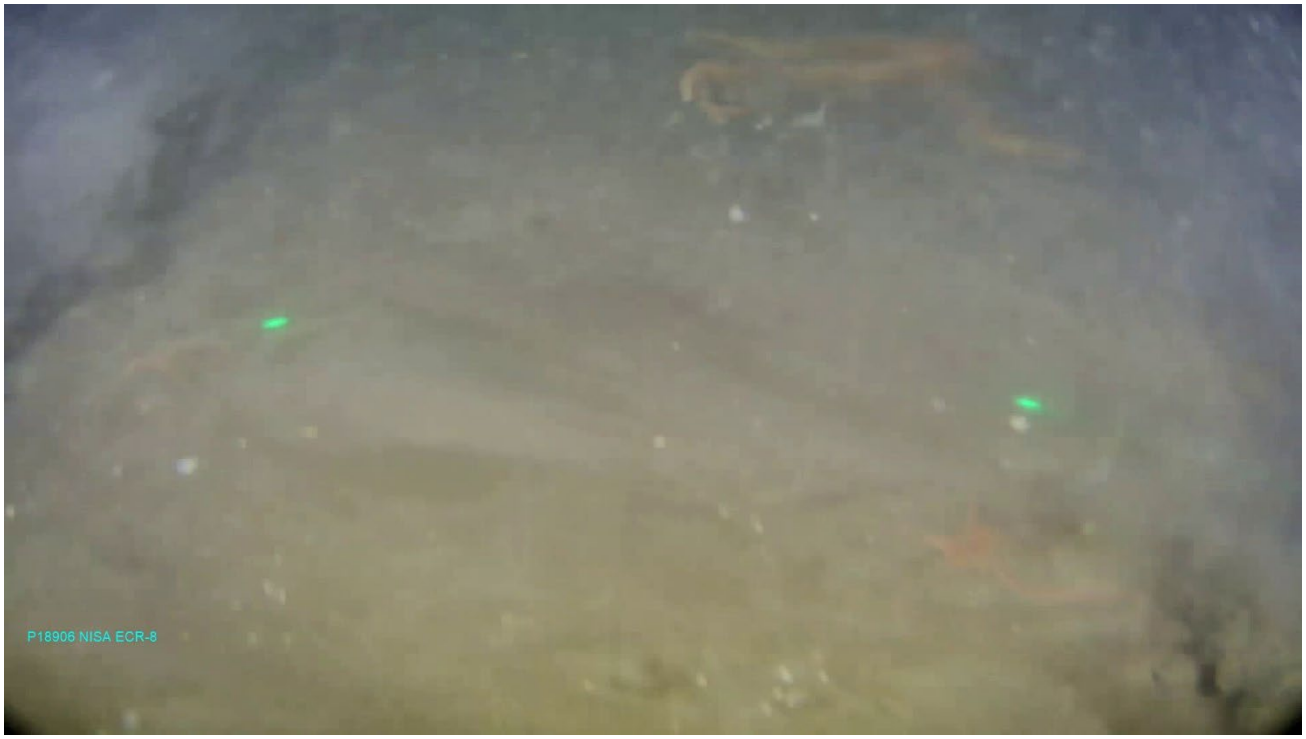

Figure 3.26: ECR-8 – Slightly gravelly muddy sandy sediment with shell fragments. Brittlestar and common starfish (*Asterias rubens*) in view.

3.1.16 Station ECR-10

Station ECR-10 was slightly gravelly muddy sand, and slightly coarser than previous stations with an increased in shell debris fraction. Auger shells (*Turritellinella tricarinata*) and brittlestars (*Ophiura ophiura*) were observed at multiple points along the transect, both of which are represented in **Figure 3.27**. The depth of the station was 20m. The habitat type can be assigned to the broadscale habitat 'SS.SSa.CMuSa - Circalittoral muddy sand (EUNIS code: MC52)

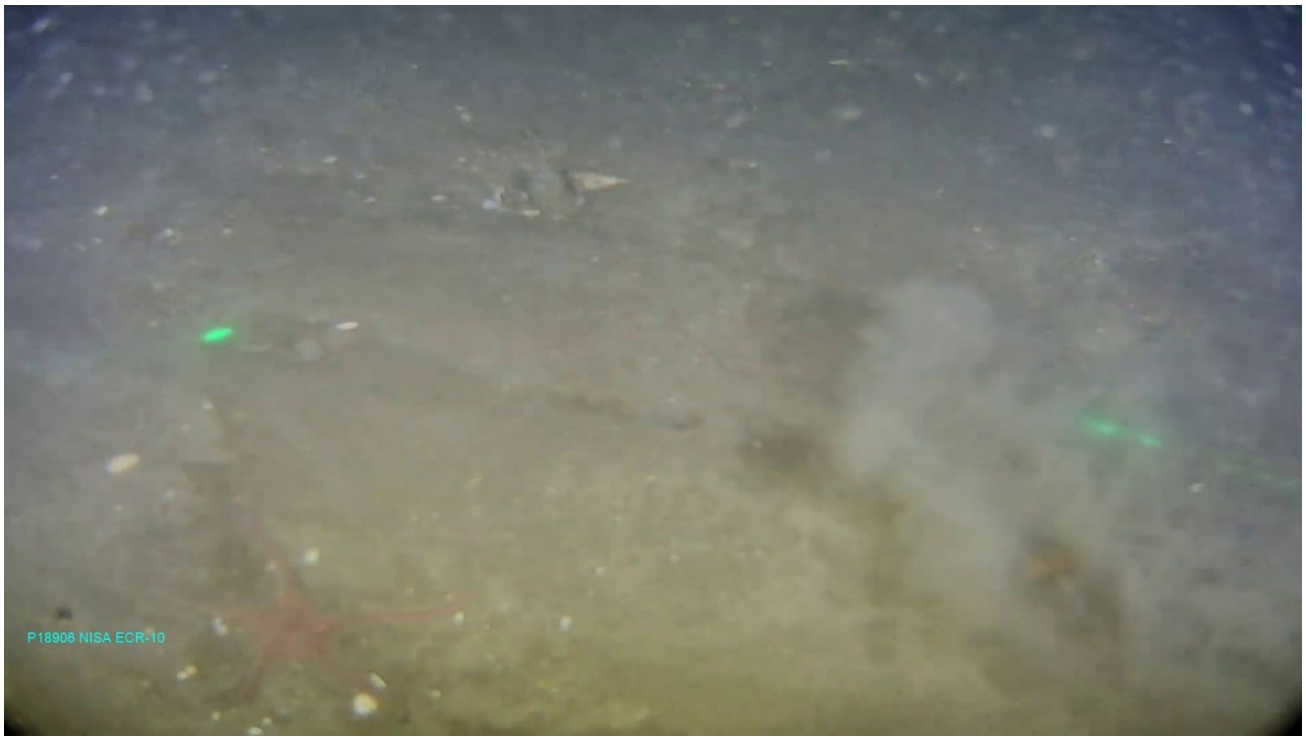

Figure 3.27: ECR-10 – Shell rich sandy sediment with auger shells on the surface. A solitary brittle star (*Ophiura ophiura*) was noted.

3.1.17 Station ECR-24

Station ECR-24 was characterised by slightly gravelly muddy sand with shell fragments and whole shells. Auger shells (*Turritellinella tricarinata*) were observed here, as with the previous station. Patches of branching bryozoans were noted at the time of the survey (**Figure 3.28** and **Figure 3.29**). The depth of the station was 26m. The habitat type can be assigned to the broadscale habitat 'SS.SSa.CMuSa - Circalittoral muddy sand' (EUNIS code: MC52).

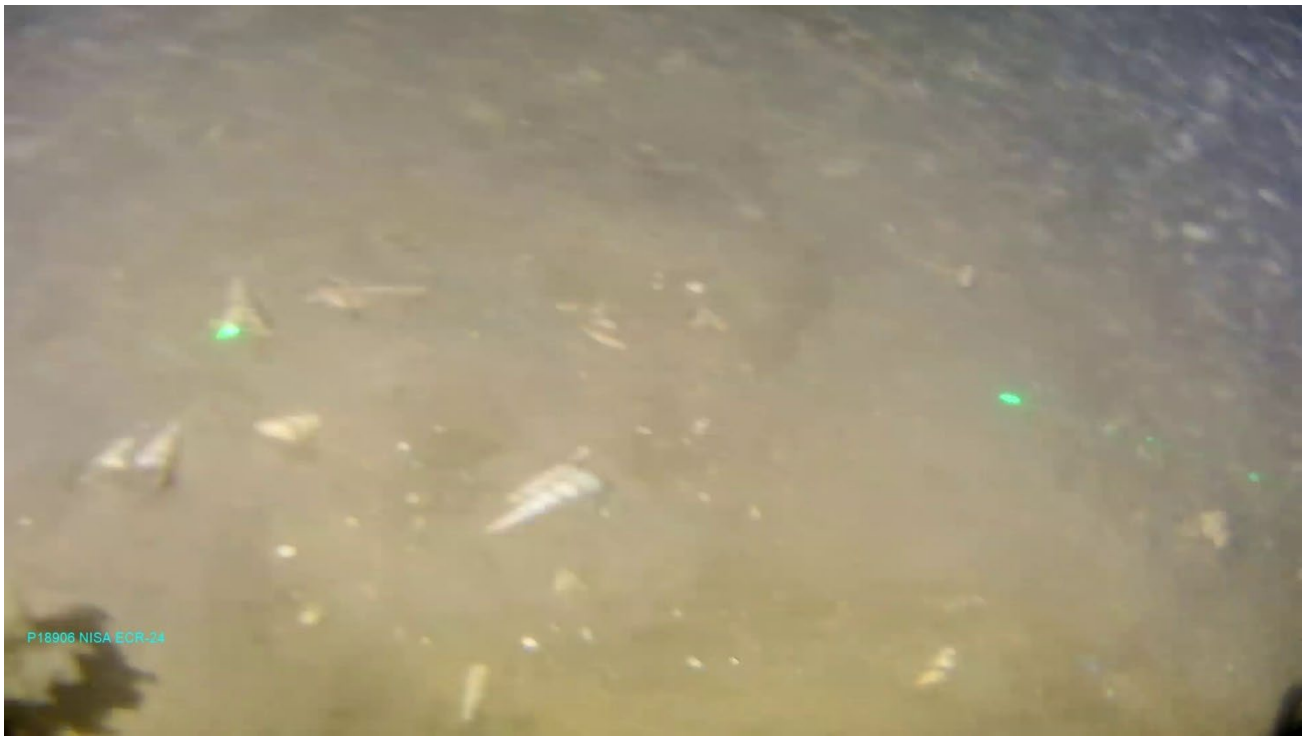

Figure 3.28: AR-18 – Slightly gravelly muddy sediment rich in *Nephrops* burrows and sparse shell material.

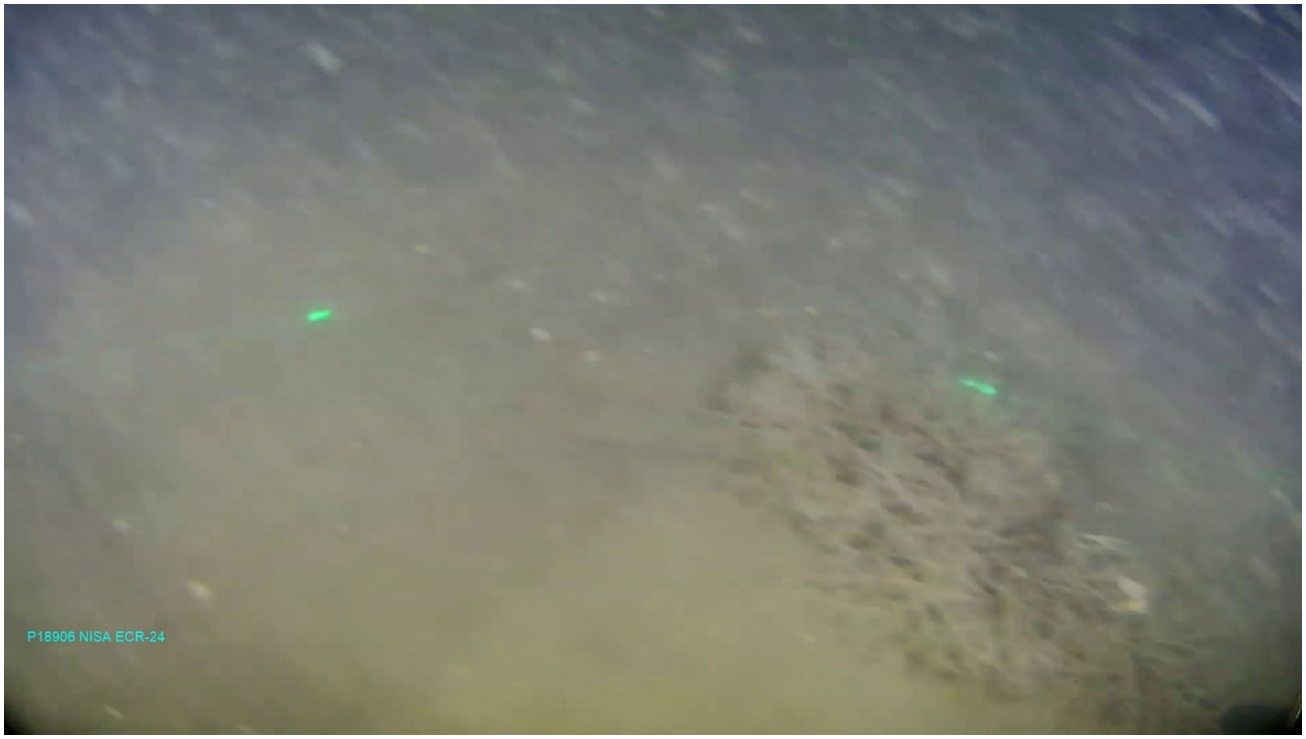

Figure 3.29: ECR-24 – Slightly gravelly muddy sandy sediment with a branching bryozoan.

3.1.18 Station ECR-26

Station ECR-26 has a slightly gravelly muddy sand substrate with shell debris. Auger shells were visible along the seabed and a gurnard (*Chelidonichthys*) was observed along the transect (**Figure 3.30** and **Figure 3.31).** The depth of the station was 32m. The habitat type can be assigned to the broadscale habitat 'SS.SSa.CMuSa - Circalittoral muddy sand (EUNIS code: MC52).

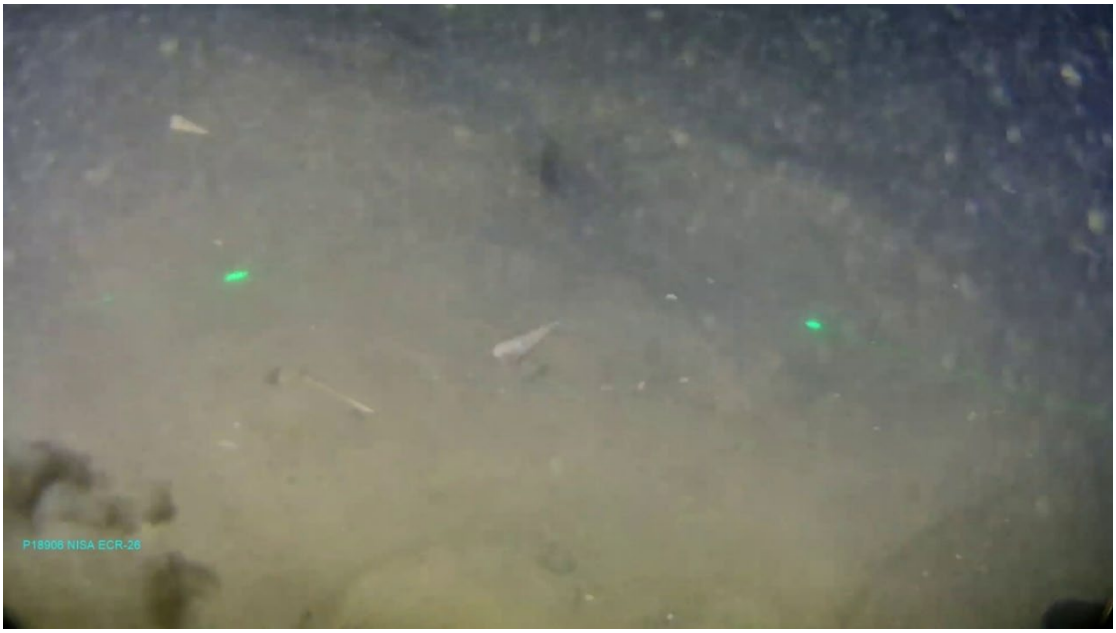

Figure 3.30: ECR-26 – Slightly gravelly muddy sand with *Nephrops* burrows and shell material (*Turritellinella tricarinata*).

Figure 3.31: ECR-26 – Slightly gravelly muddy sand with shell material. A gurnard was spotted along the seabed.

3.1.19 Station ECR-28

Station ECR-28 was turbid and capturing clear images from DDV was limited. Sediment along the transect appeared slightly gravelly muddy sand with *Nephrops* burrows throughout (**Figure 3.32**). A fish was observed as the sole macrofaunal representative captured at the time of survey; it can be seen in **Figure 3.33** at the edge of a *Nephrops* burrow. The depth of the station was 39m. The habitat type can be assigned to the broadscale habitat 'SS.SSa.CMuSa - Circalittoral muddy sand' (EUNIS code: MC52).

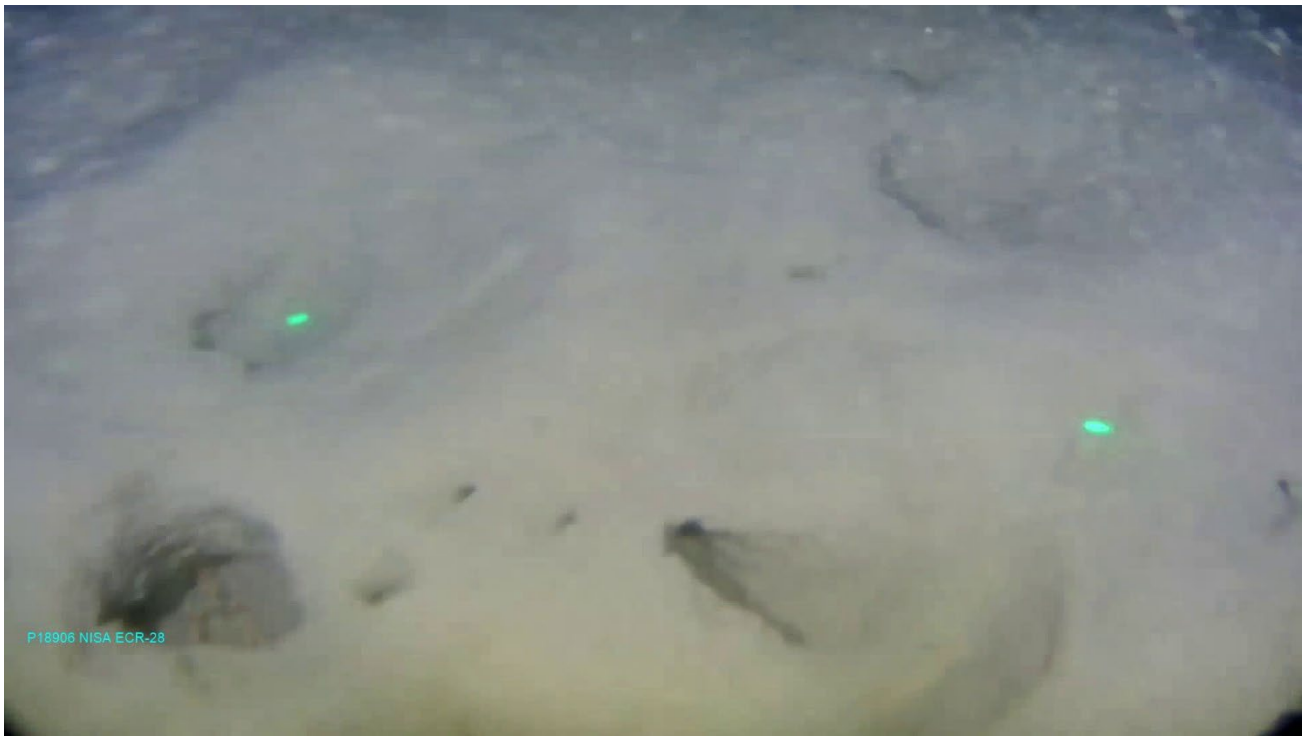

Figure 3.32: ECR-28 – Slightly gravelly muddy sand rich in *Nephrops* burrows.

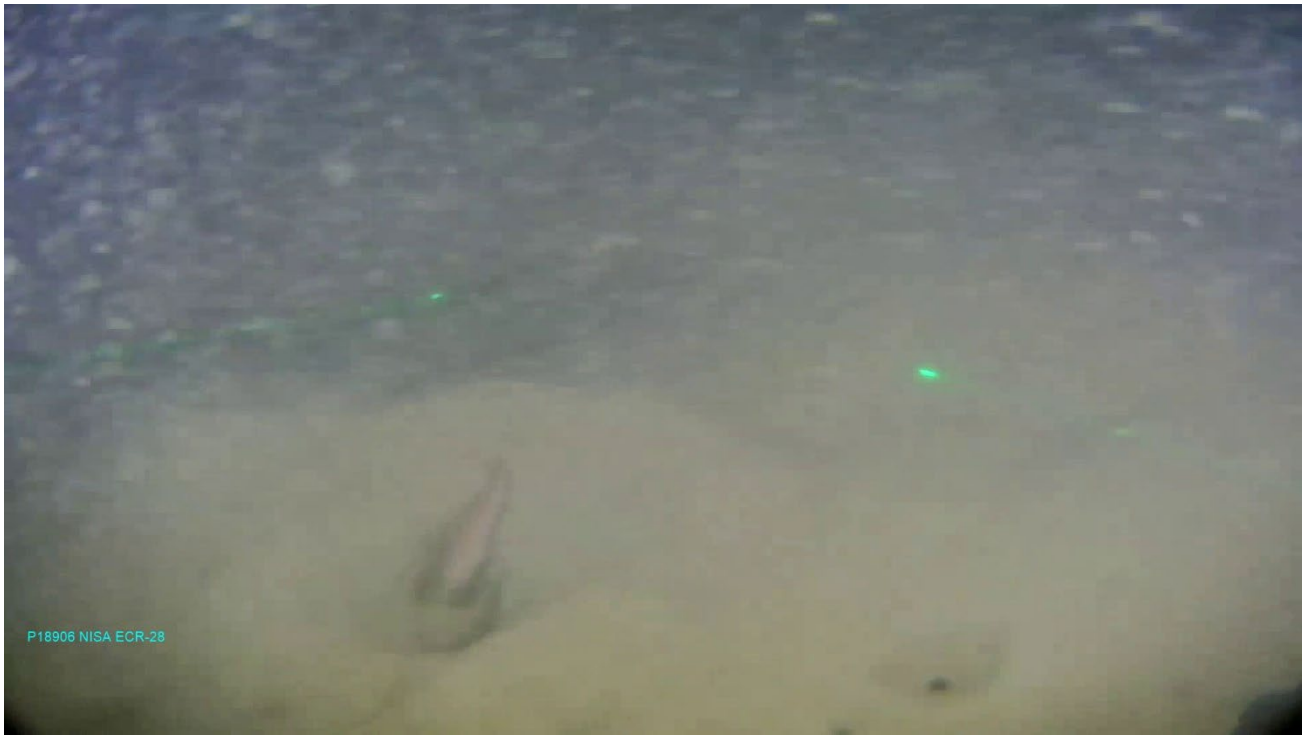

Figure 3.33: ECR-28 – Fish at entrance of *Nephrops* burrow.

3.1.20 Station ECR-29

Sediment along the transect at Station ECR-29 was slightly gravelly muddy sand with *Nephrops* burrows throughout (**Figure 3.34**). Visible surface fauna included one fish (**Figure 3.35**). The depth of the station was 38m. The habitat type can be assigned to the broadscale habitat 'SS.SSa.CMuSa - Circalittoral muddy sand' (EUNIS code: MC52).

Figure 3.34: ECR-29 – Slightly gravelly muddy sand rich in *Nephrops* burrows and sparse shell material.

Figure 3.35: ECR-29 – *Nephrops* burrows with small fish.

3.1.21 Station ECR-MI-1

The substrate at Station ECR-MI-1 was composed of slightly gravelly muddy sand with *Nephrops* burrows. Razor clams shell debris was present and visible macrofauna included brittlestars (*Ophiura* spp.) (**Figure 3.6** and **Figure 3.7**). The depth of the station was 6m. The habitat type can be assigned to the broadscale habitat 'SS.SSa.IMuSa - Infralittoral muddy sand (EUNIS code: MB52).

Figure 3.36: ECR-MI-1 – Slightly gravelly muddy sand with *Nephrops* burrows, razor clam shells and brittlestar (*Ophiura* sp.).

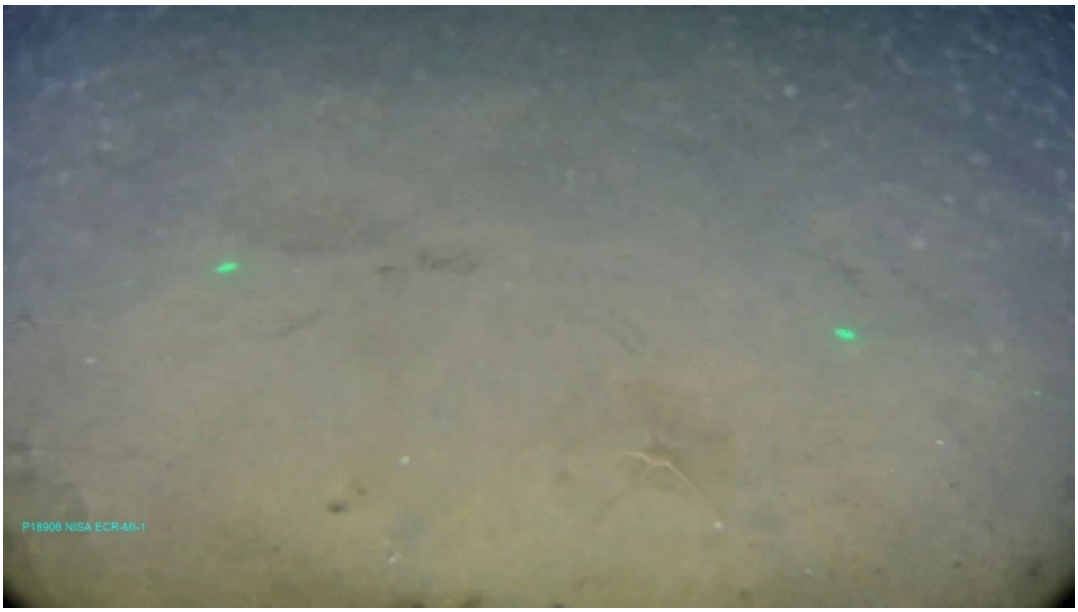

Figure 3.37: ECR-MI-1 – Slightly gravelly muddy sand with *Nephrops* burrows and a brittle star.

3.1.22 Station ECR-MI-2

Station ECR-MI-2 had slightly gravelly muddy sand. *Nephrops* burrows were present in muddy sediment with shell fragments throughout. Notable macrofauna includes a plaice (*Pleuronectes platessa*) which swam through view as the DDV approached the seabed (**Figure 3.8**). The depth of the station was 30m. The habitat type can be assigned to the broadscale habitat 'SS.SSa.CMuSa - Circalittoral muddy sand' (EUNIS code: MC52).

Figure 3.38: ECR-MI-2 – Slightly gravelly muddy sand with shell fragments. A plaice (*Pleuronectes platessa*) is in view.

3.2 Reef Assessment Results

Assessment of the surveyed stations against stony reef criteria indicates no reef-like habitats. At all stations, particle composition were less than 10% coarse substrate (particle size not in excess of 64 mm in diameter), with flat topography (elevation not exceeding 64 mm) and therefore show no resemblance to Annex I stony reef as per Irving (2009) criteria for Annex I stony reef and Goulding (2020) (see **Table 3.2**).

Table 3.2: Stony reef assessment within the array area and ECR of the proposed development site.

Station	Stony Reef Criteria (% particle >64 mm diameter)	Stony Reef Criteria (Elevation)	Stony Reef Criteria (Biota dominance)	Stony Reef Assessment
ECR-1	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
ECR-3	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
ECR-8	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
ECR-10	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
ECR-24	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
ECR-26	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
ECR-28	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
ECR-29	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
ECR-MI1	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
ECR-MI2	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-0	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-5	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-6	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-7	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-8	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-10	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-12	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-15	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-16	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-17	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-18	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef
AR-MI1	<10%	Flat Seabed	Dominated by Infauna	Not a stony reef

3.3 Benthic Fauna Results

The taxonomic identification of the benthic fauna across the Array and ECR areas surveyed within the the proposed development site had a total count of 187 taxa, comprising 3,831 individuals ascribed to nine phyla. Of the 189 taxa recorded, three were cnidarians (Actiniaria, octocorallia, *etc.*), one was a nematode (roundworm), one was a Platyhelminth (flat worm) two were nemertean (ribbon worms), 91 were annelids (segmented worms), 38 were arthropods (crabs, shrimps, *etc*.), 43 were molluscs (mussels, cockles, snails *etc.*), one was a phoronid (horseshoe worm), and eight were echinoderms (brittle stars, star fish, sea urchins, *etc.*).

Of the 187 taxa identified, 127 were identified to species level. The remaining 60 taxa could not be identified to species level because they were juveniles, damaged, or indeterminate. The full faunal abundance species list can be seen in **Appendix 1**.

3.3.1 Univariate Results

Univariate statistical analyses were carried out on the infaunal data (any epifaunal or colonial taxa were excluded). The following parameters were calculated and can be seen in **Table 3.3**: Total number of taxa, Total number of Individuals, Richness, Evenness, Shannon-Wiener diversity, Effective Number of Species (ENS), and Simpson's Diversity.

The total number of taxa ranged from 10 (AR-0) to 61 (ECR-3 & ECR-24). The number of individuals ranged from 17 (AR-0) to 694 (ECR-1). Species Richness ranged between 3.18 (AR-0) to 10.81 (ECR-24). Species Evenness ranged from 0.75 (ECR-3) to 0.98 (AR-18). Shannon-Wiener diversity index ranged from 2.15 (AR-0) to 3.37 (ECR-MI 2). Simpson's diversity ranged from 0.89 (AR-15) to 0.98 (AR-18). In terms of true diversity (Effective Number of Species), ENS ranged from 8.59 (AR-0) to 28.95 (ECR-MI 2). This indicates that ECR-MI 2 is approximately 3.4 times more diverse than AR-0. **Figure 3.39** displays these calculations in graphical form.

Table 3.3: Univariate measures of community structure.

Station	No. Taxa	No. Individuals	Richness	Evenness	Shannon-Wiener Diversity	Effective Number of Species	Simpson's Diversity
	S	N	d	J'	H'(loge)	EXP(H')	1-Lambda
ECR-1	58	694	8.71	0.79	3.20	24.54	0.94
ECR-3	61	563	9.47	0.75	3.07	21.46	0.92
ECR-8	59	373	9.79	0.81	3.29	26.95	0.94
ECR-10	54	295	9.32	0.80	3.19	24.24	0.93
ECR-24	61	258	10.81	0.81	3.31	27.38	0.93
ECR-26	48	170	9.15	0.86	3.34	28.29	0.95
ECR-28	24	51	5.85	0.94	2.98	19.61	0.96

ECR-29	33	173	6.21	0.81	2.82	16.79	0.91
ECR-MI1	58	608	8.89	0.82	3.32	27.79	0.95
ECR-MI2	42	163	8.05	0.90	3.37	28.95	0.96
AR-0	10	17	3.18	0.93	2.15	8.59	0.92
AR-5	19	42	4.82	0.90	2.64	14.04	0.93
AR-6	19	50	4.60	0.88	2.60	13.43	0.92
AR-7	15	34	3.97	0.87	2.35	10.49	0.90
AR-8	20	45	4.99	0.90	2.69	14.75	0.93
AR-10	19	38	4.95	0.93	2.73	15.29	0.94
AR-12	21	38	5.50	0.94	2.86	17.46	0.96
AR-15	14	28	3.90	0.87	2.29	9.92	0.89
AR-16	21	39	5.46	0.88	2.68	14.52	0.92
AR-17	27	92	5.75	0.84	2.76	15.84	0.92
AR-18	19	22	5.82	0.98	2.88	17.78	0.98
AR-MI1	22	35	5.91	0.94	2.90	18.16	0.96

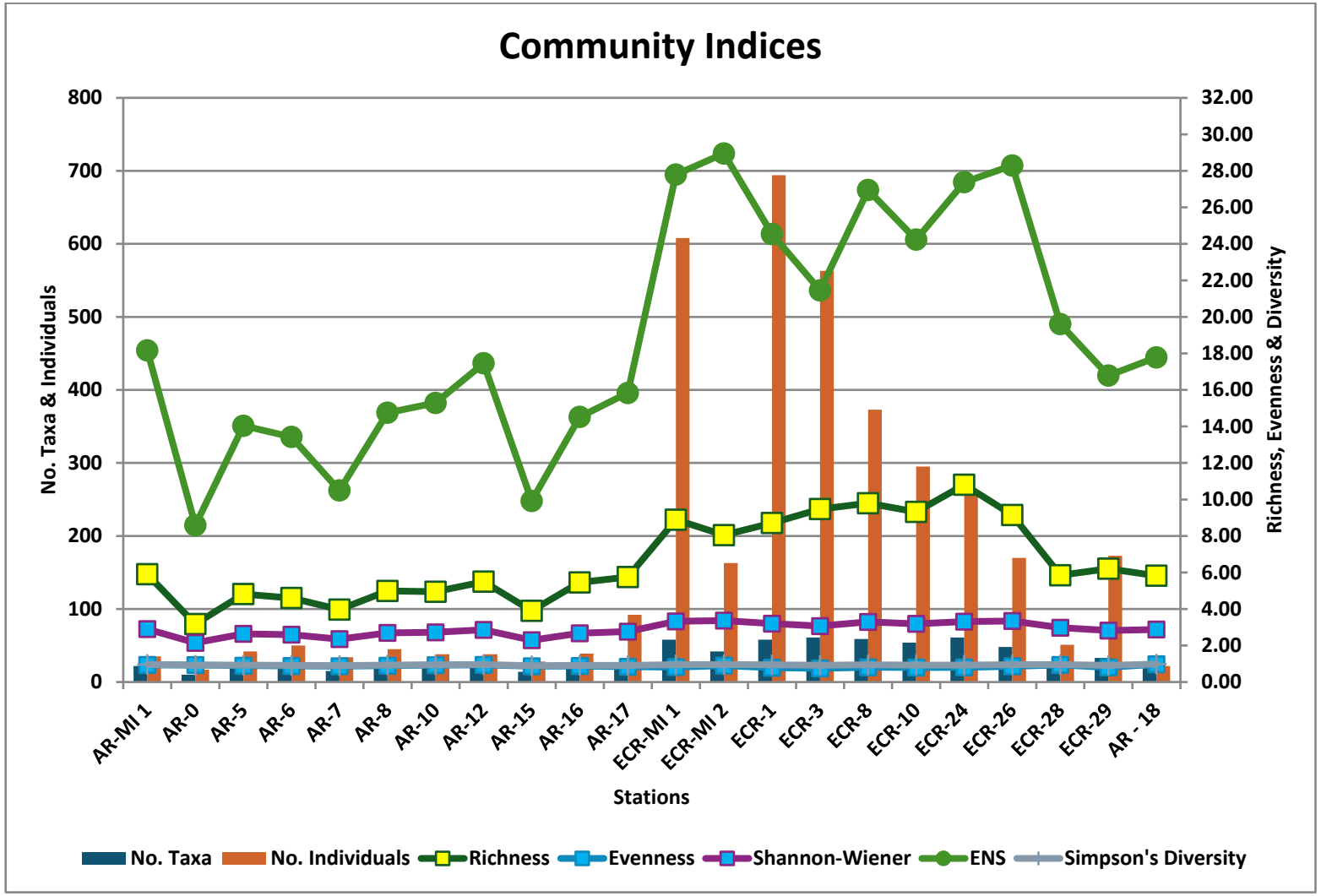

Figure 3.39: Graph of Univariate community structure. Diversity measured in Shannon-Wiener Diversity Index, Simpson's Diversity, and Effective Number of Species (ENS).

Multivariate Analysis

The same data set used above for the univariate analyses was also used for the multivariate analyses. The dendrogram and the MDS plot can be seen in **Figure 3.40** and **Figure 3.41,** respectively. The stress value of the multi-directional scaling (MDS) was 0.1 which indicates a Good representation, with no real prospect of misinterpretation overall structure, but very fine detail may be misleading in compact subgroups. SIMPROF analysis revealed six statistically significant groupings between the 22 stations (the groupings of sampling stations joined by red lines in **Figure 3.40** could not be statistically differentiated from each other).

There is a clear separation between the stations sampled in the array area (Group a - AR-0, AR-5, AR-6, AR-7, AR-8, AR-10, AR-12, AR-15, AR-16, and AR-18) and those from the ECR area: Group b (ECR-3), Group c (ECR-1 and ECR-MI 1), Group e (ECR-8 and ECR-10) and Group f (ECR-24, ECR-26, ECR-29, and ECR-MI 2) with minor exceptions for stations transitioning between the two areas (Group a - ECR-28 and Group d - AR-17).

Group a (AR-0, AR-5, AR-6, AR-7, AR-8, AR-10, AR-12, AR-15, AR-16, AR-18, AR-MI 1, and ECR-28) separated from all other groups at dissimilarity level of 85.81% and had a within group similarity level of 39.85%. This group contained 69 taxa comprising 439 individuals. Of the 69 taxa, 32 were present twice or less. Seven taxa accounted for almost 49% of the faunal abundance of this group: the amphipod *Ampelisca tenuicornis* (55 individuals, 12.53% abundance), the polychaetes *Abyssoninoe hibernica* (55 individuals, 9.57% abundance), *Nephtys incisa* (41 individuals, 9.34% abundance), *Magelona minuta* (26 individuals, 5.92% abundance), and *Scolelepis* sp. (13 individuals, 2.96% abundance), and the bivalves *Abra* sp. (22 individuals, 5.01% abundance) and *Varicorbula gibba* (16 individuals, 3.64% abundance). SIMPER revealed similar characterising taxa. *Ampelisca tenuicornis* and *Magelona minuta* are very sensitive to organic enrichment and are present in unpolluted conditions. *Abyssoninoe hibernica* and *Nephtys incisa* are indifferent to enrichment and are typically present in low densities with non-significant variations over time. *Abra* sp. and *Scolelepis* sp. are tolerant to excess organic matter enrichment, occurring under normal conditions but their populations are stimulated by organic enrichment. *Varicorbula gibba* is a second order opportunistic species present in slight to pronounced unbalanced conditions.

The faunal community can be assigned to the JNCC biotope 'SS.SMu.OMu.LevHet' - *Levinsenia gracilis* and *Heteromastus filifirmis* in offshore circalittoral mud and sandy mud (De-Bastos *et al.,* 2025a) (EUNIS code: MD6217). Other characterising species specific to the Irish Sea benthic community in this area such as *Litocorsa stemma*, *Glycera unicornis*, *Ancistrosyllis gronelandica,* and *Levinsenia gracilis* have also been recorded within this group.

Group b (ECR-3) separated from Groups c, d, e, and f at 73.96% dissimilarity level. Group b contained 61 taxa comprising 563 individuals. Of the 61 taxa, 35 were present twice or less. Eight of the taxa accounted for

67.50% of the faunal abundance within this group: the bivalves *Nucula* sp. (115 individuals, 20.43% abundance), *Nucula nitidosa* (51 individuals, 9.06% abundance), *Phaxas pellucidus (*47 individuals, 8.35% abundance), *Thracia phaseolina* (35 individuals, 6.22% abundance), *Abra alba* (25 individuals, 4.44%), and *Varicorbula gibba* (43 individuals, 7.64% abundance), and the brittlestars Amphiuridae (37 individuals, 6.57% abundance) and *Ophiura* sp. (27 individuals, 4.80% abundance). SIMPER analysis was not carried out as there was only one station in this group. *Nucula* sp., *Nucula nitidosa*, *Phaxas pellucidus*, and *Thracia phaseolina are* very sensitive to organic enrichment and are present in unpolluted conditions. Amphiuridae and *Ophiura* sp. are indifferent to enrichment and are typically present in low densities with non-significant variations over time. *Abra* sp. is tolerant to excess organic matter enrichment, occurring under normal conditions but their populations are stimulated by organic enrichment. *Varicorbula gibba* is a second order opportunistic species present in slight to pronounced unbalanced conditions. The faunal community at station ECR-3 can be assigned to the JNCC biotope 'SS.SSa.CMuSa.AalbNuc' - *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (Tillin *et al.,* 2023) (EUNIS code: MC5214).

Group c (ECR-1 and ECR-MI 1) separated from Groups d, e, and f at 73.96% dissimilarity level and had an in-group similarity of 72.98%. Group c contained 76 taxa comprising 1,302 individuals. Of the 76 taxa, 32 were present twice or less. Eight of the taxa accounted for 57.30% of the faunal abundance within this group: the polychaete *Spiophanes bombyx* (131 individuals, 10.06% abundance), the bivalves Tellinidae (114 individuals, 8.76% abundance), *Nucula* sp. (88 individuals, 6.76% abundance), *Nucula nitidosa* (86 individuals, 6.61%), *Thracia phaseolina*. (68 individuals, 5.22% abundance), and *Varicobula gibba* (88 individuals, 6.76% abundance) and the brittlestar *Ophiura* sp. (100 individuals, 7.68% abundance). SIMPER analysis was not carried out as there were only two stations in this group. Tellinidae*, Nucula* sp.*, Thracia phaseolina* are very sensitive to organic enrichment and are present in unpolluted conditions. *Ophiura* sp. is indifferent to enrichment and are typically present in low densities with non-significant variations over time. *Spiophanes bombyx* and *Melinna palmata* are tolerant to excess organic matter enrichment, occurring under normal conditions but their populations are stimulated by organic enrichment. *Varicorbula gibba* is a second order opportunistic species present in slight to pronounced unbalanced conditions. Other characterising taxa considered important within Group C include *Fabulina fabula* and *Chamelea striatula*, typical of shallow *Venus* community. The faunal community can be assigned to the JNCC biotope 'SS.SSa.IMuSa.FfabMag' - *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (Tillin and Rayment, 2023) (EUNIS code: MB5236).

Group d (AR-17) separated from Groups e and f at 67.05% dissimilarity level. Group d contained 27 taxa comprising 92 individuals. Of the 27 taxa, 18 were present twice or less. Seven of the taxa accounted for 68.48% of the faunal abundance within this group: the molluscs *Cylichna cylindracea* (17 individuals, 18.48%),

Turritellinella tricarinata (13 individuals, 14.13%), and *Chaetoderma nitidulum* (6 individuals, 6.52%), the polychaetes *Scalibregma inflatum* (14 individuals, 15.22%) and *Diplocirrus glaucus* (4 individuals, 4.35%), and the amphipods *Harpinia antennaria* (5 individuals, 5.43%) and *Abludomelita obtusata* (4 individuals, 4.35%). SIMPER analysis was not carried out as there was only one station in this group. *Harpinia antennaria* and *Diplocirrus glaucus* are very sensitive to organic enrichment and are present in unpolluted conditions. *Cylichna cylindracea, Turritellinella tricarinata,* and *Chaetoderma nitidulum* are indifferent to enrichment and are typically present in low densities with non-significant variations over time. *Scalibregma inflatum* and *Abludomelita obtusata* are tolerant to excess organic matter enrichment, occurring under normal conditions but their populations are stimulated by organic enrichment. The species identified within Group d do not represent a specific biotope.

Group e (ECR-8 and ECR-10) had an in-group similarity of 62.73%. Group e separated from Group f at 58.96% dissimilarity level. Group e contained 78 taxa comprising 668 individuals. Of the 78 taxa, 43 were present twice or less. Seven of the taxa accounted for 56.14% of the faunal abundance within this group: the bivalves *Kurtiella bidentata* (82 individuals, 12.28% abundance), *Varicorbula gibba* (70 individuals, 10.48% abundance), *Nucula* sp. (61 individuals, 9.13% abundance), *Nucula nitidosa* (28 individuals, 4.19% abundance), *Thracia phaseolina*. (41 individuals, 6.13% abundance), and Veneridae (35 individuals, 5.24% abundance), and the brittlestar *Amphiura filiformis* (58 individuals, 8.68% abundance). SIMPER analysis was not carried out as there were only two stations in this group. The bivalves *Nucula* sp., *Nucula nitidosa*, *Thracia phaseolina,* and Veneridae are very sensitive to organic enrichment and are present in unpolluted conditions. *Amphiuria filiformis* is indifferent to enrichment and are typically present in low densities with non-significant variations over time. *Kurtiella bidentata* is tolerant to excess organic matter enrichment, occurring under normal conditions but their populations are stimulated by organic enrichment. *Varicorbula gibba* is a second order opportunistic species present in slight to pronounced unbalanced conditions. The faunal community can be assigned to the JNCC biotope 'SS.SMu.CSaMu.AfilKurAnit' - *Amphiura filiformis*, *Kurtiella bidentata* and *Abra nitida* in circalittoral sandy mud (De-Bastos *et al.,* 2025b) (EUNIS code: MC6211).

Group f (ECR-24, ECR-26, ECR-29, and ECR-MI 2) separated from Group e at 58.96% dissimilarity level and had an in-group similarity of 50.07%. Group e contained 90 taxa comprising 764 individuals. Of the 90 taxa, 44 were present twice or less. Ten of the taxa accounted for 54.97% of the faunal abundance within this group: the molluscs *Turritellinella tricarinata* (82 individuals, 10.73% abundance), *Cylichna cylindracea* (66 individuals, 8.64% abundance), , *Chamelea striatula* (73 individuals, 9.55% abundance), *Varicobula gibba* (32 individuals, 4.19% abundance), *Nucula nitidosa* (18 individuals, 2.36% abundance), and *Chaetoderma nitidulum* (18 individuals, 2.36% abundance), the polychaetes *Diplocirrus glaucus* (50 individuals, 6.54% abundance), *Scalibregma inflatum* (37 individuals, 4.84% abundance), and *Magelona alleni* (37 individuals, 4.84%

abundance), and the horseshoe worm *Phoronis* (28 individuals, 3.66% abundance). SIMPER analysis revealed two additional characterising taxa namely Amphiuridae and *Abra* sp. *Chamelea striatula, Nucula nitidosa, Diplocirrus glaucus,* and *Magelona alleni* are very sensitive to organic enrichment and are present in unpolluted conditions. Amphiuridae, *Cylichna cylindracea, Turritellinella tricarinata,* and *Chaetoderma nitidulum* are indifferent to enrichment and are typically present in low densities with non-significant variations over time. *Scalibregma inflatum* and *Abra* are tolerant to excess organic matter enrichment, occurring under normal conditions but their populations are stimulated by organic enrichment. The faunal community can be described as a mosaic of two JNCC biotopes 'SS.SMu.CSaMu.AfilKurAnit - *Amphiura filiformis*, *Kurtiella bidentata* and *Abra nitida* (De-Bastos *et al.,* 2025b) (EUNIS code: MC6211) and overlapping with 'SS.SSa.CMuSa.AalbNuc' - *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment in circalittoral sandy mud (Tillin *et al.,* 2023) (EUNIS code: MC5214).

The distribution of the biotopes identified across the sampling stations within the array area and the ECR is shown in **Figure 3.42**.

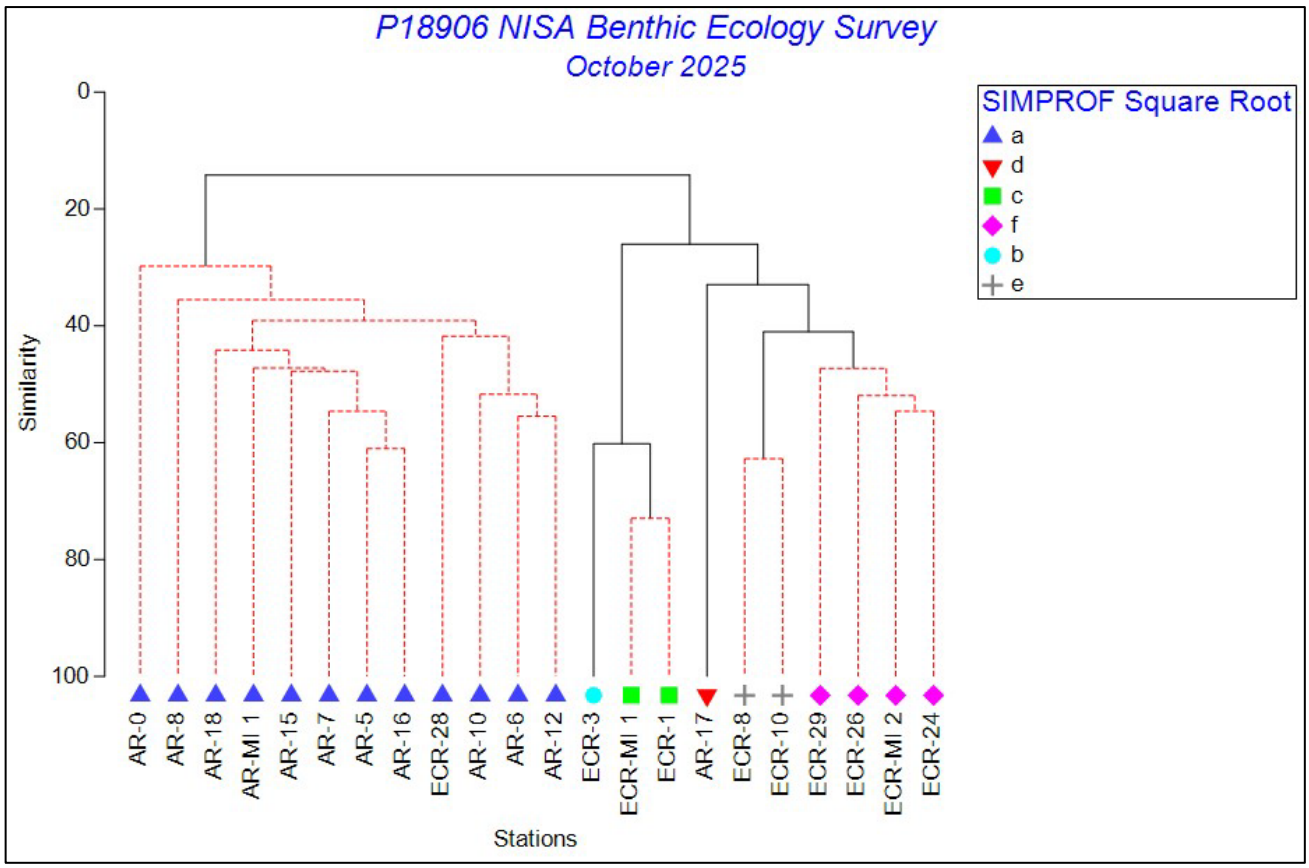

Figure 3.40: Dendrogram produced from Cluster analysis, within the proposed development site.

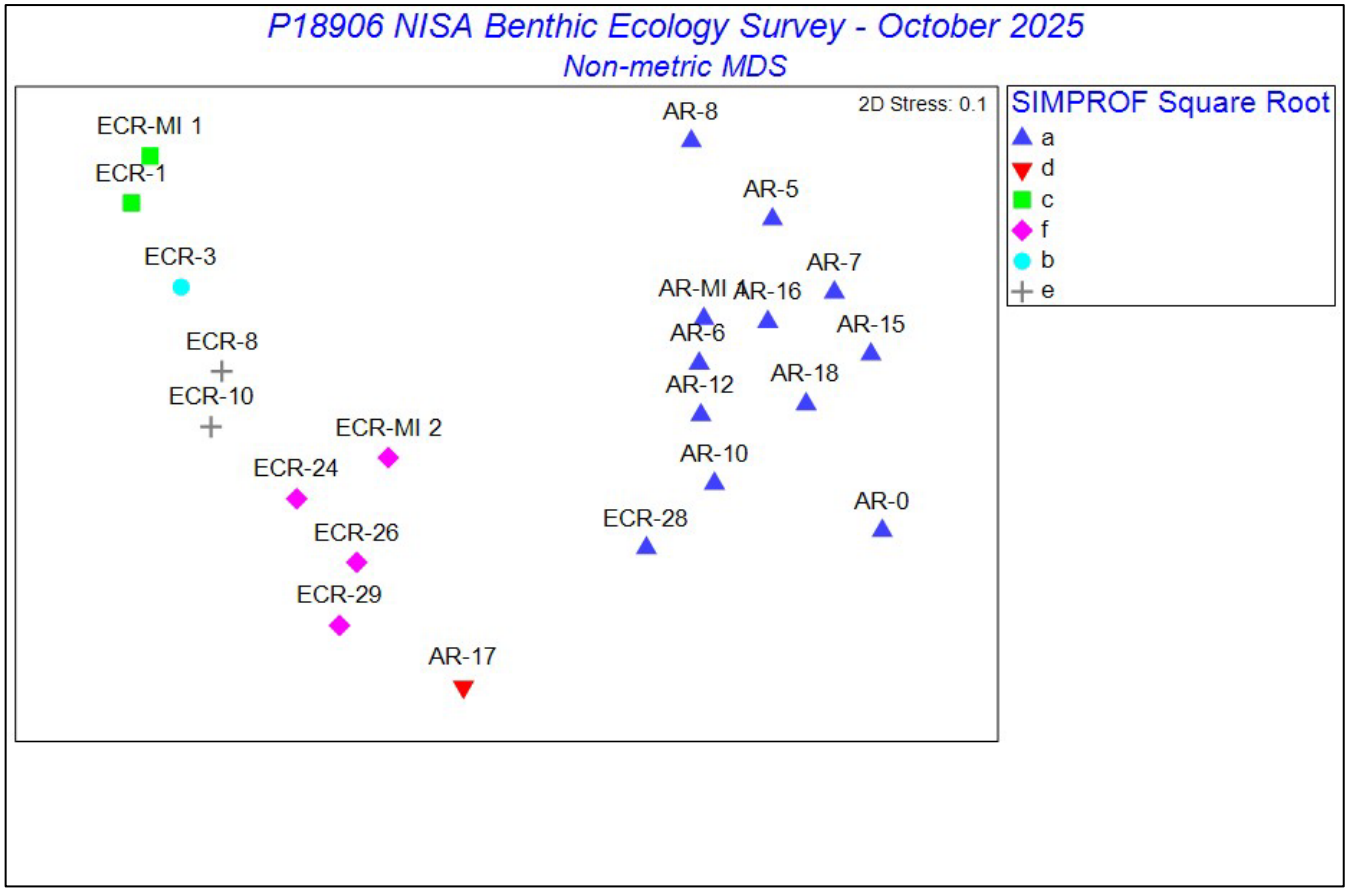

Figure 3.41: MDS plot for stations sampled at the proposed development site.

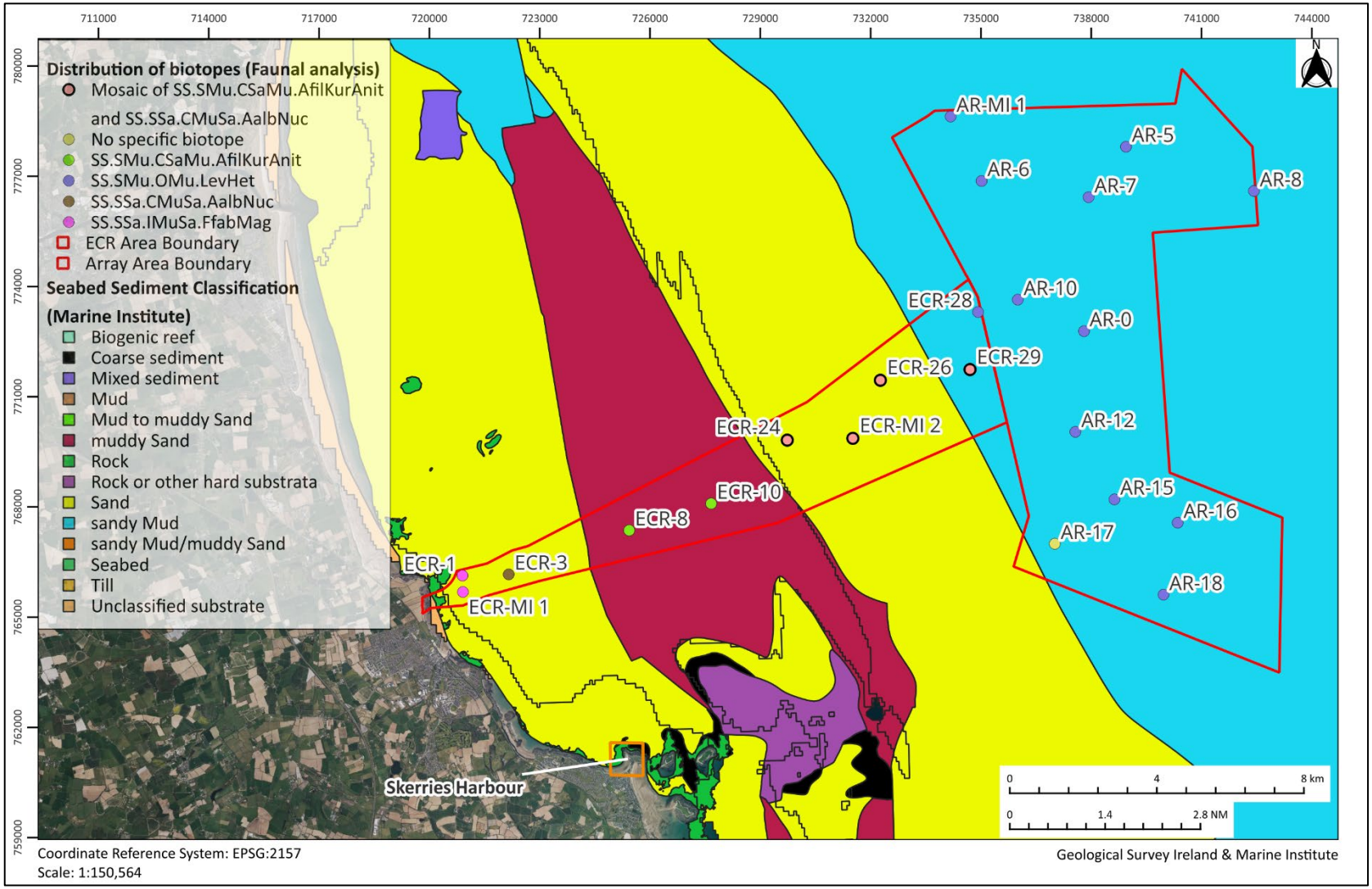

Figure 3.42: Biotope distribution based on the faunal analysis of the sampling sites.

3.3.2 Biomass Results

Biomass was dominated by annelids and molluscs, reflecting the prevalence of muddy sand and sandy mud habitats (see **Figure 3.43)**. See full biomass data in **Appendix 2**.

Dominant taxa by biomass included:

- Annelids: *Abyssoninoe hibernica, Nephtys incisa*, and *Magelona minuta* contributed significantly to biomass in offshore circalittoral mud biotopes.
- Molluscs: *Varicorbula gibba, Nucula nitidosa*, and *Thracia phaseolina* were major contributors in sandy mud stations (ECR groups).
- Echinoderms: Brittlestars (Amphiuridae) and *Ophiura* spp. added notable biomass in ECR stations with higher diversity.

In term of spatial trends, the Array Stations (AR): Biomass was generally lower, consistent with low diversity and dominance of burrowing species (*Nephrops* presence). ECR Stations (ECR): Biomass was higher and more evenly distributed among functional groups, correlating with greater habitat heterogeneity and shell content.

The functional composition of the area was characterised by suspension-feeding bivalves and deposit-feeding polychaetes were the primary contributors, indicating stable sedimentary conditions with moderate organic input.

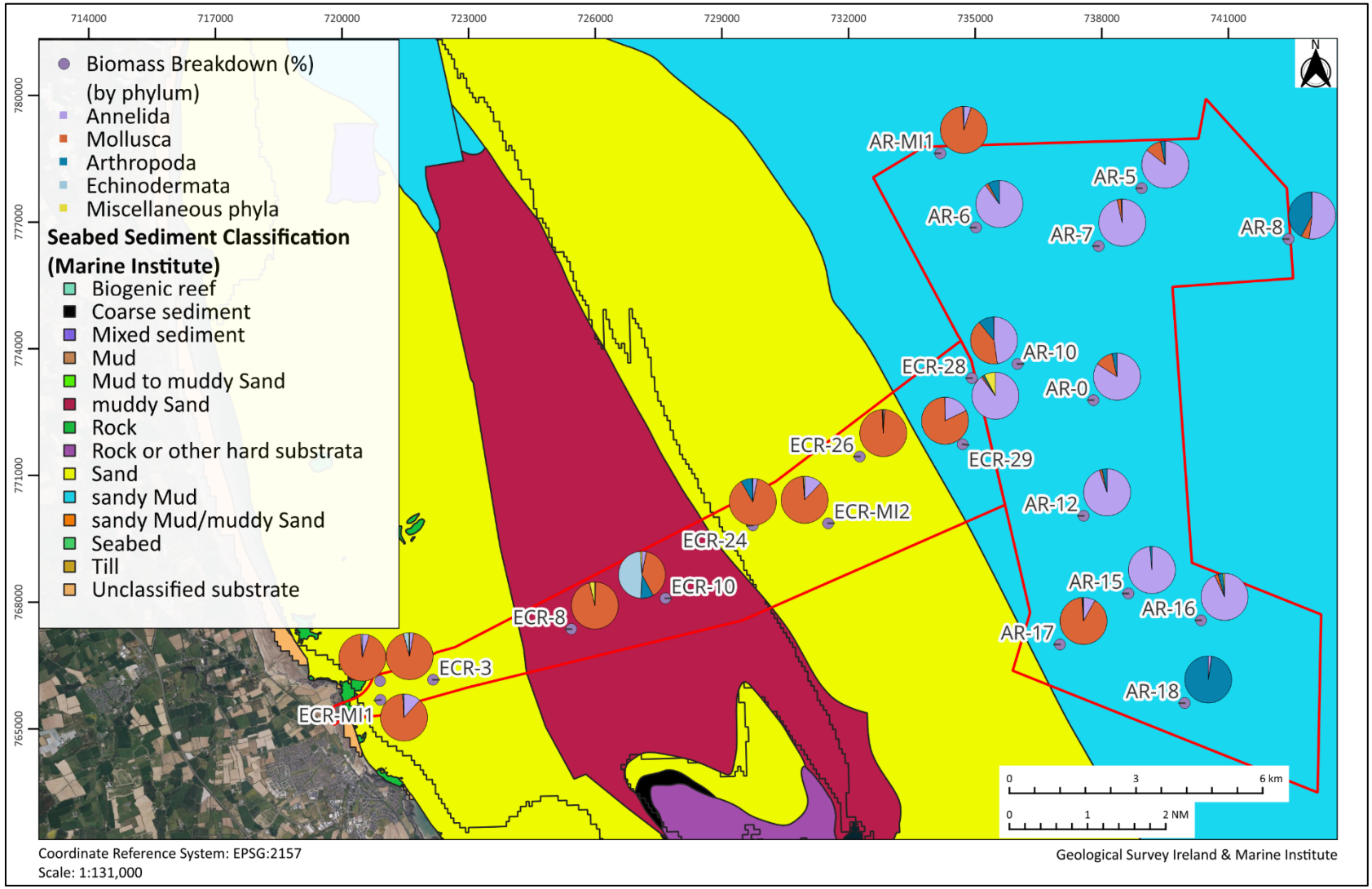

Figure 3.43: Biomass breakdown of faunal groups (phylum).

3.4 Sediment Chemistry Results

This section will deal with the results of the sediment chemistry analysis. The full laboratory report from SOCOTEC UK Ltd is available in **Appendix 3**.

3.4.1 Visual Analysis

Table 3.4 shows the visual inspection information provided by SOCOTEC UK Ltd, which includes colour and sediment type.

Table 3.4: Visual analysis of sediment.

Station	Visual description
AR-0	Brown grey slightly sandy CLAY
AR-5	Brown grey slightly sandy CLAY
AR-6	Brown grey slightly sandy CLAY
AR-7	Brown grey slightly sandy CLAY
AR-8	Brown grey slightly sandy CLAY
AR-10	Brown grey slightly sandy CLAY
AR-12	Brown grey slightly sandy CLAY
AR-15	Brown grey silty CLAY
AR-16	Brown grey slightly sandy CLAY
AR-17	Brown grey slightly sandy CLAY
AR-18	Brown grey slightly sandy CLAY
AR-MI1	Brown grey slightly sandy CLAY
ECR-1	Brown and grey slightly gravelly silty SAND
ECR-3	Brown grey slightly gravelly sandy SILT
ECR-8	Brown grey slightly sandy slightly gravelly silty CLAY
ECR-10	Brown grey slightly gravelly silty SAND

Station	Visual description
ECR-24	Brown and grey slightly clayey slightly gravelly SILT
ECR-26	Brown and grey SILT
ECR-28	Grey brown silty CLAY
ECR-29	Grey and brown silty CLAY
ECR-MI1	Brown grey slightly gravelly SAND
ECR-MI2	Brown grey slightly gravelly sandy SILT

3.4.2 Physico-chemical Analysis

The physico-chemical parameters analysed by SOCOTEC are displayed in **Table 3.5**. Within the array area, the water content of the samples ranged from 31.9% (AR-16) to 46.3% (AR-5). Particle density within the array area ranged from 2.66 mg/m^3 (AR-0, AR-10, and AR-18) to 2.69 mg/m^3 (AR-8). Within the export cable route (ECR) area, the water content of the samples ranged from 28.0% (ECR-10) to 33.5% (ECR-29). Particle density within the array area ranged from 2.65 mg/m^3 (ECR-26) to 2.67 mg/m^3 (ECR-24, ECR-28, ECR-29, and ECR-MI 1).

Granulometry results were broken down into % gravel (>2mm), sand (63-2000µm), and silt (<63µm). Gravel within the array area sampled were not recorded. Sand ranged from 28.0% (AR-5) to 59.2% (AR-17), and Silt ranged from 40.8% (AR-17) to 77.0% (AR-8) within the array area sampled. Within the ECR area, Gravel ranged from 0.0% (ECR-28) to 0.9% (ECR-24). Sand ranged from 56.9% (ECR-28) to 85.5% (ECR-MI 1). Silt ranged from 14.7% (ECR-MI1) to 43.13% (ECR-28).

The Total Organic Carbon (TOC) within the array area ranged from 0.40% m/m (AR-17) to 0.69% m/m (AR-8) while values within the ECR area ranged from 0.20% m/m (ECR-MI1) to 0.64% m/m (ECR-29).

The Carbonate Equivalent values (%) within the array area ranged from 6.00% m/m in AR-8 to 7.86% m/m (AR-0) while values within the ECR area ranged from 4.51% m/m at ECR-10 to 8.18% m/m (ECR-27).

The full laboratory results are available in **Appendix 3.**

Table 3.5: Physico-chemical results at the sampling stations.

Station	Total Moisture @120°C %	Total Solids	Particle Density mg/m^3	Gravel (>2mm) %	Sand (63-2000 µm) %	Silt (<63 µm) %	TOC % m/m	Carbonate Equivalent (% CO_3) % m/m
AR-0	38.0	62.0	2.66	0.0	46.7	53.3	0.56	7.86
AR-5	46.3	53.7	2.67	0.0	28.0	72.0	0.68	6.19
AR-6	34.8	65.2	2.67	0.0	49.8	50.2	0.56	7.14
AR-7	41.0	59.0	2.68	0.0	34.9	65.1	0.62	7.23
AR-8	43.8	56.2	2.69	0.0	23.0	77.0	0.69	6.00
AR-10	35.8	64.2	2.66	0.0	43.5	56.5	0.55	7.14
AR-12	37.5	62.5	2.67	0.0	48.8	51.2	0.53	7.45
AR-15	39.1	60.9	2.67	0.0	44.2	55.8	0.56	7.23
AR-16	31.9	68.1	2.67	0.0	46.2	53.8	0.55	6.53
AR-17	32.1	67.9	2.67	0.0	59.2	40.8	0.40	7.20
AR-18	35.1	64.9	2.66	0.0	53.7	46.4	0.46	7.59

AR-MI1	38.1	61.9	2.67	0.0	44.8	55.2	0.55	7.31
ECR-1	30.2	69.8	2.66	0.1	77.2	22.7	0.24	5.56
ECR-3	31.7	68.3	2.66	0.3	68.6	31.1	0.31	6.39
ECR-8	30.5	69.5	2.66	0.2	66.0	33.8	0.35	6.69
ECR-10	28.0	72.0	2.66	0.4	74.1	25.4	0.33	4.51
ECR-24	32.3	67.7	2.67	0.90	70.03	29.06	0.44	7.32
ECR-26	29.9	70.1	2.65	0.40	69.09	30.51	0.36	7.65
ECR-28	32.8	67.2	2.67	0.00	56.87	43.13	0.53	8.18
ECR-29	33.5	66.5	2.67	0.04	61.47	38.49	0.64	7.13
ECR-MI1	30.6	69.4	2.67	0.1	85.5	14.4	0.20	5.05
ECR-MI2	31.4	68.6	2.66	0.3	65.8	33.9	0.36	7.84

Table 3.6 shows a more in depth look at the granulometry analysis carried out for each station and provides the Folk classification assigned. The sediment sampled within the study area was classified as Sandy Mud (sM), Muddy Sand (mS), and Slightly Gravelly Muddy Sand ((g)mS).

Figure 3.44 shows the breakdown of sediment composition at each station and **Figure 3.45** illustrates the sediment type according to Folk (1954).

Table 3.6: Sediment characteristics of the benthic subtidal faunal stations sampled.

Station	Gravel (%)	Sand (%)	Mud (%)	Folk Sediment Classification (1954)
AR-0	0.00%	46.69%	53.31%	sM: Sandy Mud
AR-5	0.00%	28.02%	71.98%	sM: Sandy Mud
AR-6	0.00%	49.77%	50.23%	sM: Sandy Mud
AR-7	0.00%	34.86%	65.14%	sM: Sandy Mud
AR-8	0.00%	23.03%	76.97%	sM: Sandy Mud
AR-10	0.00%	43.47%	56.53%	sM: Sandy Mud
AR-12	0.00%	48.84%	51.16%	sM: Sandy Mud
AR-15	0.00%	44.21%	55.79%	sM: Sandy Mud
AR-16	0.00%	46.22%	53.78%	sM: Sandy Mud
AR-17	0.00%	59.24%	40.76%	mS: Muddy Sand
AR-18	0.00%	53.65%	46.35%	mS: Muddy Sand
AR-MI1	0.00%	44.84%	55.16%	sM: Sandy Mud
ECR-1	0.10%	77.20%	22.69%	(g)mS: Slightly Gravelly Muddy Sand
ECR-3	0.29%	68.57%	31.14%	(g)mS: Slightly Gravelly Muddy Sand
ECR-8	0.23%	66.00%	33.77%	(g)mS: Slightly Gravelly Muddy Sand
ECR-10	0.44%	74.12%	25.43%	(g)mS: Slightly Gravelly Muddy Sand
ECR-24	0.90%	70.03%	29.06%	(g)mS: Slightly Gravelly Muddy Sand
ECR-26	0.40%	69.09%	30.51%	(g)mS: Slightly Gravelly Muddy Sand
ECR-28	0.00%	56.87%	43.13%	(g)mS: Slightly Gravelly Muddy Sand
ECR-29	0.04%	61.47%	38.49%	(g)mS: Slightly Gravelly Muddy Sand
ECR-MI1	0.13%	85.51%	14.36%	(g)mS: Slightly Gravelly Muddy Sand
ECR-MI2	0.33%	65.75%	33.92%	(g)mS: Slightly Gravelly Muddy Sand

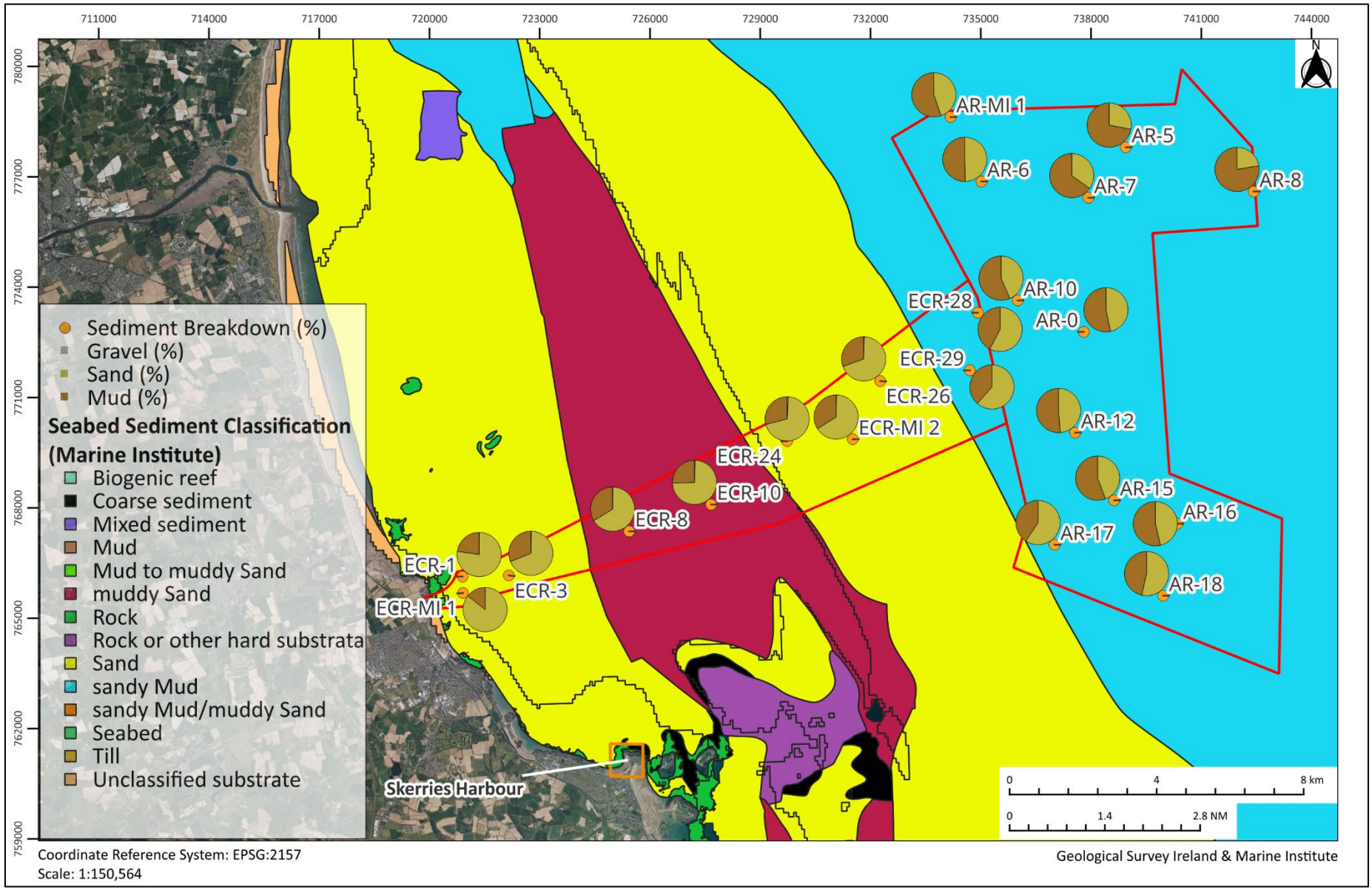

Figure 3.44: A breakdown of sediment type fraction (%) at each of the station sampled.

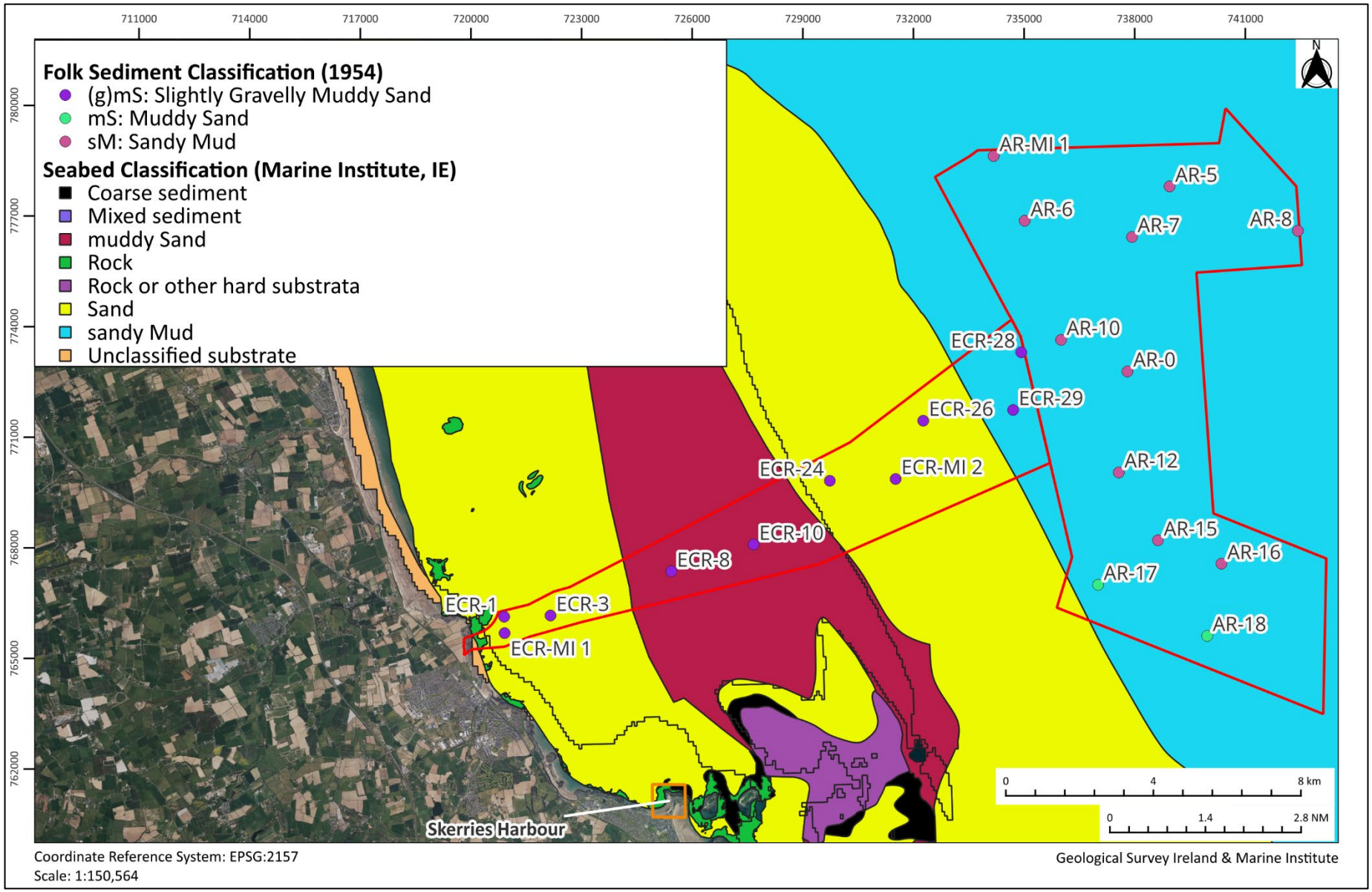

Figure 3.45: Sediment Classification (2025) across stations sampled according to Folk (1954).

3.4.3 Contaminant Groups

All sediments tested, were below the lower and upper-level guidance values outlined in Cronin *et al*. (2006). See sections below for details.

3.4.3.1 Trace Metals

Table 3.7 and **Table 3.8** shows the metal results, along with the upper and lower guidance values for Annex I metals (Cronin *et al*., 2006). Lower-level limits for Arsenic (20 mg/kg) and Nickel (40 mg/kg) have been updated to reflect the guideline addendum (Cronin *et al.,* 2019).

No exceedances were recorded at any stations.

3.4.3.2 Organochlorines and PCBs

Table 3.9 and **Table 3.10** show the organochlorines including ɣ-HCH (Lindane) and PCB results, along with the upper and lower guidance values for Annex I organochlorines and PCBs (Cronin *et al.,* 2006).

All PCBs, HCB and ɣ-HCH were below the guidance level at all stations.

3.4.3.3 Total Extractable hydrocarbons

Table 3.11 and **Table 3.12** shows the total extractable hydrocarbon results, along with the lower guidance values for Hydrocarbons (Cronin *et al.,* 2006). All were below the lower guidance level.

3.4.3.4 Tributylin (TBT) and Dibutylin (DBT)

Table 3.13 and **Table 3.14** shows the TBT and DBT results, along with the Annex I upper and lower guidance values for sum of DBT and TBT (Cronin *et al.,* 2006).

Sum of DBT and TBT was below the limits of detection and the lower-level limit for all stations.

3.4.3.5 Polycyclic Aromatic Hydrocarbons

Table 3.15 and **Table 3.16** shows the PAH results and Annex I lower guidance values for sum of 16 PAH's.

Sum of 16 PAH's was below the lower limit for all stations.

Table 3.7: Metal results (Array Area) and guidance values.

Determinant mg/kg	Lower Level	Upper Level	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17	AR-18	AR-MI1
Al	N/A	N/A	42000	60100	41800	58500	59000	47800	42200	50000	45400	35300	36700	39000
Cd	0.7	4.2	0.08	0.10	0.11	0.09	0.09	0.09	0.09	0.09	0.10	0.09	0.09	0.10
Hg	0.2	0.7	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
As	20	70	10.5	11.1	11	11.1	10.2	10.3	10.8	10.2	15.7	8.4	8.8	9.7
Cr	120	370	38.7	45.1	40.3	42.2	46.3	38.6	39.2	37.9	41.5	31.0	34.4	44.2
Cu	40	110	7.1	8.8	7.5	8.2	9.3	7.3	7.3	7.5	9.2	5.6	6.2	7.9
Pb	60	218	18.4	19.7	18.3	19.2	20.6	17.6	17.3	18.3	21.1	14.3	14.7	19
Ni	40	60	15.3	19.3	16.2	17.7	20.2	15.6	15.7	15.7	17.4	11.4	12.6	16.9
Zn	160	410	50.2	70.3	55	68.1	69.1	57.3	49.7	52.4	91.6	42.2	45.9	57.1

Table 3.8: Metal results (ECR Area) and guidance values.

Determinant mg/kg	Lower Level	Upper Level	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	ECR-MI1	ECR-MI2
Al	N/A	N/A	25100	21300	23800	25600	30200	30900	38900	38800	21900	28200
Cd	0.7	4.2	0.10	0.12	0.09	0.08	0.10	0.09	0.10	0.11	0.09	0.08
Hg	0.2	0.7	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
As	20	70	7.7	7.9	8.4	5.6	11.3	10.5	9.3	9.7	8.4	7.0
Cr	120	370	27.5	34.8	37	27.2	30.5	32.9	42.0	39.9	37.0	30.9
Cu	40	110	4.3	5.0	4.9	5.6	6.2	6.3	8.0	10.8	4.9	11.7
Pb	60	218	10.8	12.7	11.7	17.1	17.5	16.4	19.0	18.7	11.7	13.4
Ni	40	60	9.6	10.9	9.5	11.4	12.0	12.2	15.6	15.4	9.5	10.1
Zn	160	410	30.6	33.4	30.7	42.3	39.8	38.4	55.5	56.6	30.7	40.6

Table 3.9: Organochlorine and PCB results (Array Area) and guidance values.

Determinant µg/kg	Lower Level	Upper Level	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17	AR-18	AR-MI1
AHCH	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
BHCH	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	0.44	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
GHCH	0.3	1	<0.1	<0.1	<0.1	<0.1	<0.1	0.19	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DIELDRIN	N/A	N/A	<0.1	0.10	<0.1	<0.1	<0.1	0.40	0.14	<0.1	<0.1	<0.1	0.16	0.13
HCB	0.3	1	<0.1	<0.1	<0.1	<0.1	<0.1	0.07	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DDE	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	0.43	<0.1	<0.1	<0.1	<0.1	<0.1	0.12
DDT	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	0.91	<0.1	<0.1	<0.1	<0.1	<0.1	0.01
DDD	N/A	N/A	<0.1	0.23	0.13	0.19	0.18	1.19	0.11	<0.1	0.16	0.11	0.13	0.16
PCB28	1	180	0.10	0.10	0.10	0.11	0.11	0.23	<0.08	0.09	0.09	<0.08	<0.08	0.09
PCB52	1	180	<0.08	<0.08	<0.08	<0.08	<0.08	0.22	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
PCB101	1	180	<0.08	<0.08	<0.08	<0.08	<0.08	0.31	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
PCB118	1	180	<0.08	0.11	0.09	0.13	0.19	0.51	0.09	0.13	<0.08	<0.08	<0.08	0.09
PCB138	1	180	0.09	0.11	0.09	0.09	0.14	0.43	0.15	0.13	0.10	<0.08	<0.08	<0.08
PCB153	1	180	0.08	0.12	0.08	0.11	0.09	0.42	0.15	0.08	<0.08	<0.08	0.09	0.09
PCB180	1	180	<0.08	<0.08	<0.08	<0.08	<0.08	0.38	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

Table 3.10: Organochlorine and PCB results (ECR Area) and guidance values.

Determinant µg/kg	Lower Level	Upper Level	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	ECR-MI1	ECR-MI2
AHCH	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	0.24	<0.1	<0.1	<0.1	<0.1
BHCH	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	0.29	<0.1	<0.1	<0.1	<0.1
GHCH	0.3	1	<0.1	<0.1	<0.1	<0.1	<0.1	0.34	<0.1	<0.1	<0.1	<0.1
DIELDRIN	N/A	N/A	<0.1	<0.1	0.11	<0.1	<0.1	0.61	<0.1	<0.1	<0.1	<0.1
HCB	0.3	1	<0.1	<0.1	<0.1	<0.1	<0.1	0.17	<0.1	<0.1	<0.1	<0.1
DDE	N/A	N/A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.46	0.10	<0.1	<0.1
DDT	N/A	N/A	<0.1	<0.1	<0.1	0.16	<0.1	<0.1	0.45	<0.1	<0.1	<0.1
DDD	N/A	N/A	<0.1	<0.1	0.11	0.14	<0.1	<0.1	0.98	0.21	<0.1	<0.1
PCB28	1	180	<0.08	<0.08	<0.08	0.10	<0.08	<0.08	0.31	<0.08	<0.08	<0.08
PCB52	1	180	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.29	<0.08	<0.08	<0.08
PCB101	1	180	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.33	<0.08	<0.08	<0.08
PCB118	1	180	<0.08	<0.08	<0.08	0.08	<0.08	0.08	0.55	0.10	<0.08	0.09
PCB138	1	180	<0.08	<0.08	<0.08	<0.08	0.20	<0.08	0.44	0.12	<0.08	<0.08
PCB153	1	180	<0.08	<0.08	<0.08	0.09	0.19	<0.08	0.38	0.10	<0.08	<0.08
PCB180	1	180	0.10	<0.08	<0.08	<0.08	0.16	<0.08	0.30	<0.08	<0.08	<0.08

Table 3.11: Total Extractable Hydrocarbon results (Array Area) and guidance values.

Determinant g/kg	Lower Level	Upper Level	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17	AR-18	AR-MI1
TEH	1	N/A	0.0176	0.0184	0.0173	0.01830	0.01980	0.0118	0.0125	0.0171	0.0186	0.0147	0.0143	0.0199

Table 3.12: Total Extractable Hydrocarbon results (ECR Area) and guidance values.

Determinant g/kg	Lower Level	Upper Level	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	ECR-MI1	ECR-MI2
TEH	1	N/A	0.0120	0.0224	0.01750	0.01830	0.0151	0.0173	0.01720	0.00856	0.00695	0.0119

Table 3.13: Tributylin and Dibutylin results (Array Area) and guidance values

Determinant mg/kg	Lower Level	Upper Level	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17	AR-18	AR-MI1
Dibutyltin (DBT)	N/A	N/A	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tributyltin (TBT)	N/A	N/A	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
∑DBT & TBT	0.1	0.5	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

Table 3.14: Tributylin and Dibutylin results (ECR Area) and guidance values.

Determinant mg/kg	Lower Level	Upper Level	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	ECR-MI1	ECR-MI2
Dibutyltin (DBT)	N/A	N/A	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tributyltin (TBT)	N/A	N/A	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
∑DBT & TBT	0.1	0.5	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010

Table 3.15: Polycyclic Aromatic Hydrocarbon (Array Area) and guidance values.

Determinant µg/kg	Lower Level	Upper Level	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17	AR-18	AR-MI1
Acenaphthene	N/A	N/A	2.77	3.43	3.92	3.11	3.02	2.06	1.79	3.06	4.07	2.55	3.03	3.05
Acenaphthylene	N/A	N/A	2.09	2.38	1.77	2.06	2.43	<1.00	2.55	2.40	2.14	<1.00	<1.00	2.18
Anthracene	N/A	N/A	3.73	5.06	4.28	3.81	5.12	3.13	3.51	3.53	5.15	6.87	3.42	4.15
Benzo (a) anthracene	N/A	N/A	16.60	20.60	16.10	17.30	23.50	10.80	19.10	15.40	18.30	38.60	13.90	16.60
Benzo (a) pyrene	N/A	N/A	20.90	26.30	20.80	22.40	28.00	14.10	27.70	19.60	22.20	40.30	16.70	22.00
Benzo (b) fluoranthene	N/A	N/A	42.50	55.20	37.50	48.40	57.50	29.00	39.60	39.00	43.10	46.80	31.90	43.60
Benzo (ghi) perylene	N/A	N/A	35.00	45.40	30.90	38.60	46.10	22.90	30.60	30.50	34.60	36.00	24.90	36.00
Benzo (k) fluoranthene	N/A	N/A	29.20	36.10	26.10	30.40	37.20	18.30	28.80	25.80	28.20	36.70	20.20	28.60
Chrysene	N/A	N/A	22.90	28.30	21.90	24.10	30.80	15.00	23.60	22.20	24.50	46.00	19.30	23.00
Dibenz (a,h) anthracene	N/A	N/A	7.30	9.22	6.64	7.75	10.10	4.63	6.83	6.66	7.21	8.60	5.41	7.66
Fluorene	N/A	N/A	7.69	9.14	6.66	7.69	8.87	5.07	4.92	7.91	8.06	5.82	6.37	7.76
Fluoranthene	N/A	N/A	28.90	35.60	29.30	31.10	41.40	18.70	24.00	28.50	37.00	76.30	27.70	28.20
Indeno (1,2,3–cd) pyrene	N/A	N/A	42.1	54.40	36.80	45.70	54.60	28.20	36.70	37.70	41.20	40.90	29.40	42.5
Naphthalene	N/A	N/A	13.80	19.40	11.60	18.40	17.10	11.10	11.30	16.70	14.90	11.30	14.20	17.10
Phenanthrene	N/A	N/A	26.8	33.10	26.70	29.30	34.00	18.00	18.70	26.90	31.80	33.90	24.50	28.00
Pyrene	N/A	N/A	23.90	29.40	26.10	25.60	32.90	16.10	21.30	23.10	31.0	74.70	22.80	24.80
∑ 16 PAH	4000	N/A	326.18	413.03	307.07	355.72	432.64	217.09	301.00	308.96	353.43	505.34	263.73	335.20

Table 3.16: Polycyclic Aromatic Hydrocarbon (ECR Area) and guidance values.

Determinant µg/kg	Lower Level	Upper Level	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	ECR-MI1	ECR-MI2
Acenaphthene	N/A	N/A	<1.00	4.77	2.00	<1.00	2.18	1.96	4.28	1.73	<1.00	1.71
Acenaphthylene	N/A	N/A	<1.00	1.69	<1.00	<1.00	<1	<1	1.61	1.59	<1.00	<1.00
Anthracene	N/A	N/A	2.21	6.13	2.35	1.77	2.92	2.64	4.05	2.00	2.25	2.20
Benzo (a) anthracene	N/A	N/A	6.84	23.5	7.43	6.39	9.07	9.75	14.0	7.59	5.56	8.08
Benzo (a) pyrene	N/A	N/A	6.93	27.0	8.01	8.24	11.5	12.6	18.7	9.71	6.71	9.89
Benzo (b) fluoranthene	N/A	N/A	11.5	34.4	17.9	15.6	21.2	25.7	36.6	22.2	8.75	21.0
Benzo (ghi) perylene	N/A	N/A	7.55	25.9	14.1	12.7	17.3	21.5	29.8	17.2	6.73	16.7
Benzo (k) fluoranthene	N/A	N/A	7.22	24.3	11.5	10.4	15.0	16.6	24.0	15.3	7.10	13.7
Chrysene	N/A	N/A	9.20	31.80	11.10	9.38	13.40	13.80	19.80	10.90	7.25	11.90
Dibenz (a,h) anthracene	N/A	N/A	1.88	6.64	3.24	3.04	3.91	4.33	6.02	3.57	1.75	3.48
Fluorene	N/A	N/A	2.39	7.43	4.14	3.37	4.37	5.18	6.48	4.36	1.86	4.41
Fluoranthene	N/A	N/A	10.1	50.0	14.1	11.8	18.6	17.7	26.1	14.7	12.1	15.1
Indeno (1,2,3–cd) pyrene	N/A	N/A	9.89	30.50	17.70	16.10	20.90	25.00	35.20	20.40	7.48	20.20
Naphthalene	N/A	N/A	4.18	12.20	9.29	6.94	7.35	9.54	11.80	8.72	3.28	9.98
Phenanthrene	N/A	N/A	7.47	36.1	12.9	10.8	19.6	17.5	24.1	14.5	8.01	14.9
Pyrene	N/A	N/A	9.75	44.5	12.9	9.32	15.5	14.4	22.2	12.8	11.0	12.3
∑ 16 PAH	4000	N/A	97.11	366.86	148.66	125.85	167.30	183.80	262.54	154.47	89.83	165.55

4. Discussion

The benthic survey confirmed that the array area and ECR of the proposed development are dominated by fine sediment habitats. Analysis of DDV footage and faunal data revealed a clear distinction between the array stations and those within the ECR, reflecting subtle variations in sediment composition and associated biological communities.

DDV Biotopes

Visual assessment from DDV transects identified three principal broadscale habitats across the study area:

- SS.SMu.OMu – Offshore circalittoral mud: This biotope was prevalent across the array stations (AR-stations except AR-17 and AR-18, located along the boundary between the array area and ECR area). These habitats were characterised by sandy mud substrates with extensive burrowing activity, primarily attributable to *Nephrops norvegicus*. Epifaunal presence was minimal, and no reef-like structures were observed, confirming the absence of Annex I reef habitats.
- SS.SSa.CMuSa - Circalittoral muddy sand: found at stations in the ECR area and stations AR 17 and AR-18. The habitat was characterised by slightly coarser sediment with shell fragments and supported a more diverse benthic community compared to the array area.
- SS.SSa.IMuSa - Infralittoral muddy sand: found at stations in the ECR area within the infralittoral zone (ECR-1 and ECR-MI1) defined by fine compacted muddy sand with typical shallow *Venus* community prevailing.

The DDV survey confirmed that sediment mobility and turbidity influenced visibility and species detection, but the classification of biotopes was robust when cross-referenced with PSA results and faunal community analysis.

Faunal Biotopes

Multivariate analysis of grab samples revealed six distinct faunal groupings, each corresponding to specific biotope classifications under JNCC guidelines:

- Group a (Array stations): Corresponded to 'SS.SMu.OMu.LevHet' in offshore circalittoral mud. The presence of *Levinsenia gracilis* and other species such as *Litocorsa stemma*, *Glycera unicornis*, *Ancistrosyllis gronelandica,* have also been recorded within the array area, and are indicative of this biotope. These communities were characterised by lower diversity and species tolerant of stable, fine sediments.
- Group c (ECR-1 and ECR-MI1): Classified as 'SS.SSa.IMuSa.FfabMag', reflecting compacted fine muddy sand conditions.
- Group e (ECR-8 and ECR-10): Corresponded to 'SS.SMu.CSaMu.AfilKurAnit', typical of sandy mud habitats with moderate organic enrichment.
- Group f (ECR-24, ECR-26, ECR-29, ECR-MI2): Represented a mosaic of 'SS.SMu.CSaMu.AfilKurAnit' and 'SS.SSa.CMuSa.AalbNuc', indicating transitional zones between sandy mud and muddy sand biotopes.

Sensitive species indicative of unpolluted conditions (*e.g., Nucula nitidosa*, *Thracia phaseolina*) were widespread, while opportunistic taxa such as *Varicorbula gibba* occurred at low densities, suggesting balanced ecological conditions across the site.

Key Observations

- No biogenic or geogenic reefs were detected following assessment of criteria for Annex I reef habitat.
- Faunal diversity was higher within ECR stations compared to the array, likely due to greater sediment heterogeneity and shell content.
- The presence of sensitive taxa and functional groups supports the classification of habitats as stable, with no evidence of significant anthropogenic disturbance or organic enrichment beyond natural variability.

Biomass distribution across the array area and ECR of the proposed development reflects the strong influence of sediment composition and associated biotope characteristics. Stations dominated by fine muddy substrates (classified as SS.SMu.OMu – Offshore circalittoral mud) exhibited relatively low biomass values. These habitats

are typically stable and low-energy environments, supporting infaunal assemblages dominated by polychaetes that are small-bodied deposit feeders, resulting in low overall biomass despite high numerical abundance.

Conversely, stations within the ECR where sediments were classified as SS.SMu.CSaMu – Circalittoral sandy mud and SS.SMu.SFiMu – Circalittoral fine mud recorded higher biomass. These biotopes are associated with greater sediment heterogeneity and shell content, which provide microhabitats for larger-bodied taxa such as bivalves (*Nucula nitidosa*, *Thracia phaseolina*, *Kurtiella bidentata*) and echinoderms (*Amphiura filiformis*, *Ophiura* spp.). The presence of these taxa significantly increases biomass values, even when species richness is comparable to offshore mud stations.

The highest biomass was observed in Group F stations (ECR-24, ECR-26, ECR-29, and ECR-MI2), which represent a mosaic of sandy mud and muddy sand biotopes. These areas support a mix of suspension-feeding bivalves and deposit-feeding polychaetes, alongside opportunistic species such as *Varicorbula gibba*. The structural complexity provided by shell fragments and mixed sediment fractions likely enhances food availability and habitat stability, promoting higher biomass accumulation.

In contrast, array stations (AR-series) showed consistently low biomass, reflecting the dominance of fine mud and the absence of coarse material or shell debris.

Key drivers of biomass variation:

- Sediment Grain Size: Coarser sediments and mixed fractions correlate with higher biomass due to the presence of larger-bodied suspension feeders (Pearce *et al.,* 2011).
- Biotope Type: muddy sand biotopes (SS.SMu.CSaMu and SS.SSa.IMuSa) support higher biomass than offshore mud biotopes (SS.SMu.OMu) (Connor *et al.,* 2006).
- Functional Traits: Biomass is concentrated in taxa with robust calcareous structures (bivalves, echinoderms) rather than small-bodied polychaetes typical of fine mud habitats (Pearce *et al.,* 2011).

Overall, biomass patterns align with the ecological expectations for circalittoral habitats: stable, fine mud environments favour high abundance but low biomass, while mixed and sandy mud habitats support fewer individuals but greater biomass due to the presence of larger-bodied species.

Sediment Characteristics

Sediment analysis across the array area and ECR of the proposed development confirms a predominance of fine-grained substrates, with variability in sand and mud fractions influencing habitat structure and associated benthic communities. Particle Size Analysis (PSA) classified sediments as Sandy Mud (sM) and Muddy Sand (mS) within the array stations and Slightly Gravelly Muddy Sand ((g)mS) within the ECR, following Folk's (1954) classification. This distinction reflects contrasting hydrodynamic regimes: the array area exhibits low-energy conditions conducive to mud deposition, while the ECR shows greater sediment heterogeneity and occasional shell fragments, indicative of moderate energy environments.

Granulometry and Organic Content:

Mud content within the array stations ranged from 40.8% to 77.0%, with sand fractions between 23.0% and 59.2%, confirming the dominance of cohesive fine sediments. In contrast, ECR stations displayed higher sand content (up to 85.5%) and minor gravel fractions (<1%), supporting the classification of mixed muddy sands. Total Organic Carbon (TOC) values were low overall, ranging from 0.20% to 0.69%, consistent with well-oxygenated circalittoral habitats and absence of significant organic enrichment (Pearce *et al.,* 2011).

Sediment Chemistry and Compliance – Dumping at Sea Application

Physico-chemical analysis revealed moisture content between 28.0% and 46.3%, particle density averaging 2.66–2.69 mg/m³, and carbonate equivalents ranging from 4.51% to 8.18%, typical of Irish Sea sediments (IAEA, 2019).

Sediment contaminant analysis was conducted in accordance with the relevant guidelines, and the results demonstrate that all measured concentrations of contaminants were below the threshold values established by Cronin *et al.* (2006) and addendum (Cronin *et al.,* 2019). These findings indicate that the sediment does not present a significant risk to marine ecosystems when disposed of at sea. Consequently, the material is considered to comply with the environmental quality standards required for a Dumping at Sea permit application. This conclusion is based on a comprehensive assessment of chemical parameters and aligns with best practice for marine disposal, ensuring that the proposed activity will not result in unacceptable environmental impacts.

5. Conclusion

The benthic survey confirmed that the array area and ECR of the proposed development are dominated by fine sediment habitats, primarily sandy mud, muddy sand and slightly gravelly muddy sand, with subtle variations in grain size influencing faunal composition and biomass. Sediment chemistry analysis demonstrated that all contaminant concentrations were well below the guidance thresholds set by Cronin *et al.* (2006) and addendum (Cronin *et al.,* 2019). The current findings so far confirm that the sediments pose no significant environmental risk and are suitable for disposal under a Dumping at Sea permit. Overall, the study supports the ecological stability of the area, with habitat and faunal patterns consistent with natural circalittoral conditions and no evidence of anthropogenic contamination.

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7. Appendices

Appendix 1 – Species/Fauna List (2025)

Taxon	AphiaID	AR-MI 1	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17
Virgularia mirabilis	128539											2
Actiniaria	1360											
Edwardsia claparedii	100880	1										
Platyhelminthes	793		1									
Nemertea	152391							1			Fragments	2
Tubulanus polymorphus	122637	1										
Nematoda	799							1				
Golfingiidae (juvenile)	2032											
Golfingia vulgaris	424332											
Aphrodita aculeata	129840											
Polynoidae	939											
Malmgrenia andreapolis	147008											
Malmgreniella	129499											
Harmothoe	129491	1			1						1	1
Pholoe	129439											
Pholoe baltica (sensu Petersen)	130599											2
Pholoe inornata (sensu Petersen)	130601											
Sigalion mathildae	131072											
Sthenelais	129595											
Sthenelais limicola	131077											
Phyllodocidae	931											
Eteone longa	130616											
Phyllodoce groenlandica	334506											
Phyllodoce rosea	334514											
Eumida bahusiensis	130641											
Glycera	129296		1					1			1	
Glycera alba	130116					1						1

Taxon	AphiaID	AR-MI 1	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17
Glycera unicornis	130131					1			1		1	1
Glycera tridactyla	130130	1										
Glycinde nordmanni	130136	1		3						3	1	
Goniada maculata	130140											
Nereimyra punctata	130185											
Oxydromus flexuosus	710680											
Podarkeopsis capensis	130195			1								
Ancistrosyllis groenlandica	130695	Frags		1	Frags		1	Frags	Frags	Frags	Frags	1
Glyphohesione klatti	130696			1		1				2		
Litocorsa stremma	130697			Frags		2	2	Frags				
Syllidae	948	Frags										
Exogone	129654											
Nephtys	129370											
Nephtys assimilis	130353											
Nephtys cirrosa	130357											
Nephtys hombergii	130359											
Nephtys incisa	130362	1		7	6	7	9	3	3	1	1	
Nephtys kersivalensis	130363											2
Lumbrineridae	967			1			1					
Lumbrineris	129337											
Lumbrineris cingulata	130240											
Abyssoninoe hibernica	146469	5	1	8	3	5	4		1	1	10	1
Protodorvillea kefersteini	130041											
Paraonidae	903											
Levinsenia gracilis	130578				1				1			
Paradoneis	129433											
Poecilochaetus serpens	130711											
Spionidae	913											
Prionospio cf. multibranchiata	131160							1	1			
Prionospio	129620	1		2		1			5	1	2	

Taxon	AphiaID	AR-MI 1	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17
Prionospio fallax	131157				3	1	1	2	1		1	
Pseudopolydora pulchra	131169											
Scolelepis	129623	1		2		3	3	1		1	1	
Spio symphyta	596189											
Spiophanes	129626				1							
Spiophanes bombyx	131187											
Spiophanes cf. kroyeri	131188				1		1	1				
Magelona	129341								4			
Magelona alleni	130266											1
Magelona filiformis	130268											
Magelona minuta	130270	2		4	3	1	1		2	7	5	
Magelona johnstoni	130269											
Cirratulidae	919											
Chaetozone gibber	129953											
Chaetozone setosa	129955											
Chaetozone christiei	152217											
Cirriformia tentaculata	129964											1
Tharyx killariensis	152269	1										
Diplocirrus glaucus	130100	1			1			3		1	1	4
Mediomastus fragilis	129892						1					
Notomastus	129220								1	1		
Maldanidae	923											Frags
Leiochone	146991											
Leiochone tricirrata	328694											
Leiochone leiopygos	559007											
Euclymene	129347											
Euclymene oerstedii	130294											1
Scalibregma inflatum	130980											14
Galathowenia oculata	146950											
Owenia	129427											

Taxon	AphiaID	AR-MI 1	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17
Amphictene auricoma	152448											
Lagis koreni	152367											
Ampharetidae	981											
Melinna palmata	129808						1					
Ampharete lindstroemi	129781											1
Terebellides	129717		1									
Lanice conchilega	131495											
Polycirrus	129710											
Tubificoides	137393											
Longipedia	115403											
Cylindroleberis mariae	238708											
Oedicerotidae	101400									1		
Perioculodes longimanus	102915											
Leucothoe lilljeborgi	102462								1			
Harpinia	101716										1	
Harpinia antennaria	102960					1		1	1	1	1	5
Metaphoxus simplex	102984											
Argissa hamatipes	102064	1										
Nototropis swammerdamei	488966											
Ampelisca	101445							2	2			
Ampelisca brevicornis	101891		2	1	3						2	
Ampelisca tenuicornis	101930	4	4	2	11	7		7	3	6	3	
Megaluropus agilis	102783											
Abludomelita obtusata	102788											4
Cheirocratus	101669											
Aoridae	101368				1		1	2				
Centraloecetes kroyeranus	1059646											
Pariambus typicus	101857											
Astacilla	118445											
Apseudes talpa	136285	1										

Taxon	AphiaID	AR-MI 1	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17
Cumopsis goodsir	110465											
Vaunthompsonia cristata	110467											1
Iphinoe serrata	110460											
Iphinoe trispinosa	110462											
Eudorella truncatula	110535				1	1		3	1			1
Monopseudocuma gilsoni	422916											
Diastylis bradyi	110472											
Diastylis cornuta	110474											
Diastylis laevis	110481											
Processa	107054											
Processa nouveli holthuisi	108344											1
Crangonidae	106782											
Nephrops norvegicus	107254						1					
Jaxea nocturna	107737	2		2	2		1	1	1		2	
Callianassidae	106800										1	
Goneplax rhomboides	107292											
Chaetoderma nitidulum	139106	1										6
Turritellinella tricarinata	1381415											13
Hyala vitrea	140129											3
Euspira nitida	151894											
Eulima bilineata	139800											
Eulima glabra	139805											
Villiersiella attenuata	1437106											
Sorgenfreispira brachystoma	847930											
Odostomia (juvenile)	138413											
Parthenina (juvenile)	565557											
Ondina (juvenile)	138414											
Turbonilla lactea	141072											
Acteon tornatilis	138691											
Cylichna cylindracea	139476	1			1			1	1		1	17

Taxon	AphiaID	AR-MI 1	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17
Philine quadripartita	574582											
Nucula (juvenile)	138262			2			4				1	
Nucula nitidosa	140589	1		1	1		3		1			
Mytilidae (juvenile)	211											
Myrtea spinifera	140287											
Thyasira (juvenile)	138552		1		1							
Thyasira flexuosa	141662											
Kurtiella bidentata	345281											1
Spisula solida	140301											
Spisula subtruncata	140302			1								
Ensis magnus	160539											
Phaxas pellucidus	140737								1			
Tellinidae (juvenile)	235											
Fabulina fabula	146907											
Gari (juvenile)	138388											
Gari fervensis	140870											
Abra (juvenile)	138474	3	2		6			1	3	1		3
Abra alba	141433											
Abra nitida	141435		3	1		1	1	4			1	
Veneridae (juvenile)	243						1			1		
Chamelea striatula	141908											
Dosinia (juvenile)	138636											
Dosinia lupinus	141912											
Mysia undata	140728	3										
Mya arenaria	140430											
Varicorbula gibba	378492	1	1	1	3	1	3	2	3		1	2
Hiatella arctica	140103											
Thracia phaseolina	152378			1								
Cochlodesma praetenue	181373											
Phoronis	128545										Frags	2

Taxon	AphiaID	AR-MI 1	AR-0	AR-5	AR-6	AR-7	AR-8	AR-10	AR-12	AR-15	AR-16	AR-17
Amphiuridae	123206											
Acrocnida brachiata	236130											
Amphiura filiformis	125080											
Ophiura (juvenile)	123574						5					
Ophiura ophiura	124929											
Echinocardium cordatum	124392											
Leptosynapta	123449											
Leptosynapta bergensis	124462											

Species/Fauna List 2025 (Continued)

Taxon	AphiaID	ECR-MI 1	ECR-MI 2	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	AR-18
Virgularia mirabilis	128539		3									
Actiniaria	1360				1							
Edwardsia claparedii	100880					1						
Platyhelminthes	793				1		2					
Nemertea	152391				3	3	5	12	4	1	Frags	
Tubulanus polymorphus	122637		3	2	2	2		2				
Nematoda	799	1						3				
Golfingiidae (juvenile)	2032							2				
Golfingia vulgaris	424332										1	
Aphrodita aculeata	129840					1						
Polynoidae	939				1							
Malmgrenia	147006										2	
Malmgrenia andreapolis	147008				1			2				
Malmgreniella	129499							1				
Harmothoe	129491											
Pholoe	129439							Frags				
Pholoe baltica (sensu Petersen)	130599				3	5	3	1			1	
Pholoe inornata (sensu Petersen)	130601	5		1	1							
Sigalion mathildae	131072	6		1	1							
Sthenelais	129595					1						
Sthenelais limicola	131077		4		2		1					
Phyllodocidae	931	1										
Eteone longa	130616			1								
Phyllodoce groenlandica	334506	1			1							
Phyllodoce rosea	334514	2		3	1							
Eumida bahusiensis	130641			1	2							
Glycera	129296	2			1			1		1	1	

Taxon	AphiaID	ECR-MI 1	ECR-MI 2	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	AR-18
Glycera alba	130116	2				1			2	1		
Glycera unicornis	130131							2		1		
Glycera tridactyla	130130	4		6								
Glycinde nordmanni	130136		1			1		1	2	2		
Goniada maculata	130140								1		1	
Nereimyra punctata	130185					1						
Oxydromus flexuosus	710680					1		1			1	
Podarkeopsis capensis	130195		1		1			2				
Ancistrosyllis groenlandica	130695		Frags						Frags	Frags	Frags	1
Glyphohesione klatti	130696											
Litocorsa stremma	130697											1
Syllidae	948											
Exogone	129654								2			
Nephtys	129370	11		7	6	5	3					
Nephtys assimilis	130353	2			1							
Nephtys cirrosa	130357	5										
Nephtys hombergii	130359	6	1		2	3	3	4				
Nephtys incisa	130362		2							2	3	1
Nephtys kersivalensis	130363		5	2			2		5		3	
Lumbrineridae	967							1			Frags	
Lumbrineris	129337					4						
Lumbrineris cingulata	130240					5	1	1				
Abyssoninoe hibernica	146469									3		1
Protodorvillea kefersteini	130041						1					
Paraonidae	903							1				
Levinsenia gracilis	130578											
Paradoneis	129433								1			
Poecilochaetus serpens	130711		1									
Spionidae	913			1					1		1	

Taxon	AphiaID	ECR-MI 1	ECR-MI 2	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	AR-18
Prionospio cf. multibranchiata	131160							2	4			1
Prionospio	129620		1			3	2	5				1
Prionospio fallax	131157			1	2	1	6			2		
Pseudopolydora pulchra	131169	5		5	3							
Scolelepis	129623	1										1
Spio symphyta	596189	1		4								
Spiophanes	129626											
Spiophanes cf. kroyeri	131188	58		73	9	1	1	1		1		
Magelona	129341											
Magelona alleni	130266		2		1	3	4	4	7	1	4	2
Magelona filiformis	130268	5		6			1					
Magelona minuta	130270					3		1	2			1
Magelona johnstoni	130269	13		6	2							
Cirratulidae	919				2		1					
Chaetozone gibber	129953					1						
Chaetozone setosa	129955	7					2		1			
Chaetozone christiei	152217		2									
Cirriformia tentaculata	129964											
Tharyx killariensis	152269											
Diplocirrus glaucus	130100	1	10	2	4	11	5	16	15	1	9	1
Mediomastus fragilis	129892											
Notomastus	129220			1		1						
Maldanidae	923							Frags				
Leiochone	146991	2		3								
Leiochone tricirrata	328694						1					
Leiochone leiopygos	559007	3		2								
Euclymene	129347									2		
Euclymene oerstedii	130294											
Scalibregma inflatum	130980		1			7	3	3	4		29	

Taxon	AphiaID	ECR-MI 1	ECR-MI 2	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	AR-18
Galathowenia oculata	146950				1			2	3		2	
Owenia	129427	12		30	8			1	1	2	2	
Amphictene auricoma	152448			1		2	1	1				
Lagis koreni	152367	2		1	15							
Ampharetidae	981	4				1						
Melinna palmata	129808	20	1	51	2	2	1	1				
Ampharete lindstroemi	129781	4		5								
Terebellides	129717	6		3	4							
Lanice conchilega	131495				1							
Polycirrus	129710							1				
Tubificoides	137393					1						
Longipedia	115403						1	1				
Cylindroleberis mariae	238708					1		1				
Oedicerotidae	101400											
Perioculodes longimanus	102915	2				1		1		1		
Leucothoe lilljeborgi	102462											
Harpinia	101716								1			
Harpinia antennaria	102960		3						6	5		
Metaphoxus simplex	102984					2						
Argissa hamatipes	102064				2				1			
Nototropis swammerdamei	488966	1	1									
Ampelisca	101445		1			1		2			2	
Ampelisca brevicornis	101891	3	2	14	3	1	2					1
Ampelisca tenuicornis	101930		6		1			1	2	5	2	3
Megaluropus agilis	102783			1						1		
Abludomelita obtusata	102788		2				1	1	2		8	
Cheirocratus	101669						1					
Aoridae	101368											
Centraloecetes kroyeranus	1059646									1		

Taxon	AphiaID	ECR-MI 1	ECR-MI 2	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	AR-18
Pariambus typicus	101857	4		6	1	2			1	3		
Astacilla	118445		1									
Apseudes talpa	136285											
Cumopsis goodsir	110465						1					
Vaunthompsonia cristata	110467											
Iphinoe serrata	110460							2				
Iphinoe trispinosa	110462	8		2					1			
Eudorella truncatula	110535		4	1		2	1	1	8	4		
Monopseudocuma gilsoni	422916		1	1							1	
Diastylis bradyi	110472			1								
Diastylis cornuta	110474	2										
Diastylis laevis	110481		1	1	1			1	2			
Processa	107054					1						
Processa nouveli holthuisi	108344											1
Crangonidae	106782						1					
Nephrops norvegicus	107254											1
Jaxea nocturna	107737											
Callianassidae	106800											
Goneplax rhomboides	107292						1	1	1		1	
Chaetoderma nitidulum	139106		4					3	8	1	2	1
Turritellinella tricarinata	1381415		5			10	2	27	29		21	
Hyala vitrea	140129						1				8	
Euspira nitida	151894							2	1			
Eulima bilineata	139800							1				
Eulima glabra	139805					5	12					
Villiersiella attenuata	1437106								1			
Sorgenfreispira brachystoma	847930		1					1	2		5	
Odostomia (juvenile)	138413			1								
Parthenina (juvenile)	565557	2										

Taxon	AphiaID	ECR-MI 1	ECR-MI 2	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	AR-18
Ondina (juvenile)	138414		8						2			
Turbonilla lactea	141072			1								
Acteon tornatilis	138691							2				
Cylichna cylindracea	139476		9		2	8	12	17	11	4	29	
Philine quadripartita	574582	1		1	1	2			1			
Nucula (juvenile)	138262	50	8	38	115	22	39	5				
Nucula nitidosa	140589	34	4	52	51	24	4	10	1		3	1
Mytilidae (juvenile)	211	1					1					
Myrtea spinifera	140287		1				1	4	1			
Thyasira (juvenile)	138552	2	2		9	5	9	2	5			1
Thyasira flexuosa	141662		6			3	1	6	2			
Kurtiella bidentata	345281			4	20	34	48	2	1		11	
Spisula solida	140301			1								
Spisula subtruncata	140302	3		2	1	2						
Ensis magnus	160539	1		2	1							
Phaxas pellucidus	140737	22		35	47	2	5	3	5		1	
Tellinidae (juvenile)	235	66		48	4							
Fabulina fabula	146907	24		18	6							
Gari (juvenile)	138388					1						
Gari fervensis	140870	1		1			1					
Abra (juvenile)	138474	6	6	14	5		1	2	3	5	1	1
Abra alba	141433	32		12	25		2					
Abra nitida	141435											1
Veneridae (juvenile)	243	25		24	3	26	9		1	1		
Chamelea striatula	141908	12	15	10	24	17	3	55	2		1	
Dosinia (juvenile)	138636	1	4	3		1	8	8	1			
Dosinia lupinus	141912					3	2	1				
Mysia undata	140728	1	2	2	2	2		5				
Mya arenaria	140430				1							

Taxon	AphiaID	ECR-MI 1	ECR-MI 2	ECR-1	ECR-3	ECR-8	ECR-10	ECR-24	ECR-26	ECR-28	ECR-29	AR-18
Varicorbula gibba	378492	21	9	67	43	57	13	3	8		12	
Hiatella arctica	140103							1	1			
Thracia phaseolina	152378	41		27	35	26	15	1				
Cochlodesma praetenue	181373			1								
Phoronis	128545		17		5	5	9	8			3	
Amphiuridae	123206	10	3	20	37	9	4	3	3		1	
Acrocnida brachiata	236130				2							
Amphiura filiformis	125080		2		1	24	34					
Ophiura (juvenile)	123574	39		61	27	2	1					
Ophiura ophiura	124929			3	2							
Echinocardium cordatum	124392	1			2	1	1					
Leptosynapta	123449					Frags		Frags			1	
Leptosynapta bergensis	124462								1			

Appendix 2 – Biomass Data (2025)

BIOMASS (grams ±0.0001)	PHYLUM				
Station No.	**Annelida**	**Mollusca**	**Arthropoda**	**Echinodermata**	**Miscellaneous**
ECR-1	0.4535	9.0261	0.0036	0.0945	0.0006
ECR-3	0.7067	22.3015	0.0020	0.8570	0.1599
ECR-8	0.1228	25.8885	0.0204	-	0.9786
ECR-10	0.4297	5.6173	1.2391	6.9072	0.1620
ECR-24	0.4170	11.2079	0.9868	0.0275	0.0241
ECR-26	0.1719	17.6807	0.0050	0.0349	0.0913
ECR-28	0.3745	0.0052	0.0056	-	0.0323
ECR-29	3.2572	14.9172	0.0068	-	0.0125
ECR-MI1	0.7882	5.8538	0.0030	0.0596	-
ECR-MI2	0.7690	5.5006	0.0044	0.0103	0.0569
AR-0	0.0820	0.0122	0.0033	-	<0.0001
AR-5	0.1716	0.0225	0.0062	-	-
AR-6	0.2267	0.0055	0.0203	-	-
AR-7	0.5404	0.0160	0.0034	-	-
AR-8	0.2287	0.0247	0.1842	0.0018	-
AR-10	0.0456	0.0394	0.0102	-	0.0003
AR-12	0.2167	0.0042	0.0081	-	-
AR-15	0.2395	<0.0001	0.0032		
AR-16	0.6698	0.0181	0.0243	-	0.0078
AR-17	0.7447	8.3236	0.0573	-	0.0406
AR-18	0.0824	0.0064	3.4263	-	-
AR-MI1	0.0658	1.2423	0.0099	-	<0.0001
TOTAL	10.8044	127.7137	6.0334	7.9928	1.5669

Appendix 3 – SOCOTEC UK Sediment Chemistry Report (2025)

Endnote

[1] Method 610: Polynuclear Aromatic hydrocarbons. Available from: https://www.epa.gov/sites/default/files/2015-10/documents/method_610_1984.pdf.

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