

# Inch Cape Offshore Wind Farm

New Energy for Scotland

Offshore Environmental Statement:  
**VOLUME 2D**  
**Appendix 12C: Benthic Ecology**  
**Baseline Offshore Export Cable**  
**Corridor**



# Report for Inch Cape Offshore Limited







## Appendix 12C

### Benthic Ecology Baseline Offshore Export Cable Corridor Technical Report



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## **12C Benthic Ecology Characterisation**

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### **12C.1 Introduction**

#### **12C.1.1 Background of the Study**

Inch Cape Offshore Limited (ICOL) commissioned a series of detailed technical studies to support a consent application and associated Environmental Statement (ES) for the Inch Cape Offshore Wind Farm and Offshore Export Cable Corridor. Information derived from these studies will be used to inform the Environmental Impact Assessment (EIA), with respect to predicted effects of the construction, operation and decommissioning of the Wind Farm and Offshore Export Cable and to assist in the development of mitigation measures where agreed and appropriate. This will aid in the development of the ES in support of the consent application.

To address these aspects, EMU Limited (EMU) was commissioned to undertake a subtidal benthic ecological characterisation survey of the Offshore Export Cable Corridor, to be installed within the outer Firth of Forth, and a series of intertidal surveys at the cable landfall options at Cockenzie and Seton Sands. Both types of surveys included the collection of specific information to describe the distribution of subtidal and intertidal seabed habitats and associated communities within the Offshore Export Cable Corridor and surrounding areas to help inform the EIA process. Accordingly, this document presents the survey methods used, the data collected and a characterisation of the benthic ecology within and around the Offshore Export Cable Corridor including the landfall options. Subtidal benthic ecology surveys within and around the Inch Cape Offshore Wind Farm Development Area have been undertaken and reported separately (Appendix 12A Benthic Ecology Baseline – Development Area).

As a preliminary stage in informing the subtidal and intertidal ecology surveys, described here, an important component of the data acquisition process is clarification of the existing benthic ecology using pre-existing research and commercial reports. In relation to this work, a data review was undertaken identifying previous studies, data sources and gaps. This included a review of the recent pre-application work completed as part of the neighbouring proposed Neart na Gaoithe (NnG) Offshore Wind Farm ES located in the outer Firth of Forth.

Subsequent to the review, point sampling within and around the Inch Cape Offshore Export Cable Corridor was undertaken, the results of which are presented below.

#### **12C.1.2 Study Aims**

The principal aim of the study was:

- to provide a characterisation of the benthic ecology specific to the Offshore Export Cable Corridor including landfall options.

### 12C.1.3 Overview of the Study

The Inch Cape Offshore Wind Farm Development Area lies in the outer Firth of Tay approximately 15-22 km to the east of the Angus coastline and covers an area of about 150 km<sup>2</sup>. The Wind Farm is expected to consist of up to 213 wind turbines. The Offshore Export Cable Corridor, to which this Appendix relates, will run from the Development Area, up the Firth of Forth, to land at either Cockenzie or Seton Sands, East Lothian (Figure 12C.1).

Marine Scotland (MS) provided a response to a request for a scoping opinion relating to the Project under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000. This highlighted that checks for the presence of Biodiversity Action Plan (BAP) habitats, Priority Marine Features (PMF) and Annex I habitats should be undertaken during the benthic ecology surveys and that biotope maps should be presented to inform the final Wind Farm and associated Offshore Transmission Works (OfTW) design. Habitat survey work in respect to cable landfalls was also recommended. In relation to these recommendations, a campaign of intertidal and subtidal survey in the Offshore Export Cable Corridor was designed and undertaken to ensure sufficient coverage and interpretation of these aspects.

## 12C.2 Regional Context

Tidal current speeds within the Firth of Forth are regarded as generally low (typically < 0.5 metres / second) (Eleftheriou *et al.*, 2004). The flood tide currents are stronger on the north side of the Firth whilst stronger ebb tides occur on the southern shore. Consequently, there is a drift towards the west in the northern and central estuary, with an eastward flow along the southern shore. Water depth close to the shores is relatively shallow, typically less than 20 m and increases to around 40 m towards the mouth of the Firth of Forth. Temperature maxima and minima are 13.0°C in the summer and 5.5 – 6.0°C in the winter respectively (Dales and Gilbert, 1997).

### 12C.2.1 Intertidal Benthic Ecology

The Firth of Forth encompasses a diverse range of intertidal habitats, including exposed bedrock platforms, sandy bays, mobile cobbles and shingle, boulders, areas of mixed substrate and occasional patches of mud. Most of the Firth is moderately exposed to wave action, becoming sheltered towards the Forth Rail Bridge. This variation in wave action, together with the range of substrates which exist in the intertidal zone, plays a key role in determining the types of biotopes present within the Firth (Posford Haskoning, 2002).

The southern coast of the outer Firth within the general area of the cable landfall options comprises a series of sediment embayments and bedrock. Sediment shores are characterised by the lugworm *Arenicola marina* on the mid shore with occasional patches of the sand mason worm *Lanice conchilega* on lower shores and shallow sublittoral. Sediment habitats range from impoverished mobile, drying upper shore sands to rich muddy sand supporting a diverse invertebrate assemblage including amphipods, *Bathyporeia pelagica*, *Haustorius arenarius*, *Pontocrates arenarius* and the isopod *Eurydice pulchra*, together with the polychaetes *Nephtys cirrosa*, *Spio filicornis*, *Paraonis fulgens*, *Scolecopsis squamata* and *Ophelia rathkei* and the bivalve *Angulus (Tellina) tenuis* (Irving, 1997). Posford Haskoning (2002) reported two soft sediment infaunal communities characterised by polychaetes and the common cockle *Cerastoderma edule* in fine sand and muddy sand, with burrowing amphipods and polychaetes (often with *A. marina*) in clean sand.

Hard and mixed substrates supported communities characterised by fucoid algae, barnacles, mussels, limpets and gastropods. Areas of supralittoral rock are characterised by an upper zone of yellow and grey lichens with an extensive band of *Verrucaria maura* below. *Laminaria digitata* communities are present below the low water mark. On the upper shore, rockpools host communities of *Enteromorpha* spp. and *Cladophora* spp. Calcareous algae *Corallina officinalis* and crustose algae are present on the lower shore. Boulders and groyne are colonised by ephemeral algae (*Enteromorpha* spp. and *Porphyra* spp.), barnacles (*Elminius modestus*, *Chthamalus* spp.) limpets (*Patella vulgata*) and occasionally blue mussels (*Mytilus edulis*). Artificial structures e.g. those associated with harbour walls show distinct algal zonation in more sheltered locations, with bands of *Pelvetia canaliculata*, *Fucus spiralis* and *F. vesiculosus* from upper to lower shore. Eulittoral mixed substrates are colonised by barnacles, limpets, mussels and periwinkles *Littorina littorea* with *F. vesiculosus*. There are also extensive areas of barren substrate (Posford Haskoning, 2002).

Previous biotope mapping survey at Cockenzie (EMU, 2010) (Figure 12C.2) identified a number of rocky and sediment biotopes considered to be typical of the region.

Cockenzie intertidal comprised a largely modified shore with sea defences, ranging from small to significant boulders, backing the upper shore. Coarse cobbles and boulder substrates were exposed during low water, together with an extended area of flat, coarse black sand with numerous areas of freshwater flow to the south of the survey area. Six biotopes and two sub-biotopes were identified supporting 59 species of flora and fauna. No rare or geographical restricted habitats or species were identified.

Typical zonation patterns were observed and included a zone of cobbles/small boulders below the boulder sea defence which graded into large boulders, moving northwards. This area was dominated by barnacle species typical of more exposed sites, i.e. *Chthalamus* spp. Typical upper shore species such as lichen *V. maura*, furoid algae *F. spiralis* and *P. canaliculata*, often formed a distinct band together with the ephemeral green alga *Enteromorpha* spp. A zone of dense *M. edulis* on mixed substrata was present below the *Chthalamus* spp. dominated area, bordering a *Chondrus crispus* dominated area which gave way to the kelp zone.

At the southern end of the Cockenzie landfall option, the upper shore consisted of afaunal coarse sand with pebbles, typical of more exposed shores subjected to a high degree of sediment disturbance. In the mid-lower shore an area of wet coarse sand was present, dissected by multiple freshwater channels, and hosting an amphipod-dominated community. This bordered the low shore sand which was, in turn, polychaete-dominated by *L. conchilega*, with numerous *Ensis* spp. present. The latter habitat and associated faunal community extended in the sublittoral.

### 12C.2.2 The sublittoral Benthic Ecology

Substrates in the Forth estuary are mainly sedimentary with species diversity increasing with increasing salinity and depth offshore. Figure 12C.3 shows predicted Mapping European Seabed Habitats (MESH) habitats overlaid with the Offshore Export Cable Corridor. This shows deep circalittoral sand and deep circalittoral mud habitats intersecting the Offshore Export Cable Corridor for the majority of its length together with circalittoral sandy mud or circalittoral fine mud, infralittoral sandy mud or fine muds coinciding with the Offshore Export Cable Corridor closer inshore. A number of other broad-scale habitat types are also represented within the Offshore Export Cable Corridor including circalittoral rock and circalittoral and infralittoral fine muddy sand.

Studies of sublittoral sediments and macrofaunal communities have been undertaken with regard to the effect of sewage sludge disposal in the vicinity of Bell Rock and St. Abb's Head (Eleftheriou *et al.*, 2004), to the north and south of the Offshore Export Cable Corridor respectively. The sediment around these areas consisted of fine to medium grained sands supporting over 300 species (Irving, 1997). Macrofaunal communities were characteristic of the Boreo-Mediterranean *Amphiura* community of Thorson with the typical polychaete-dominated, low abundance/high diversity structure found in many unpolluted benthic communities (Eleftheriou *et al.*, 2004). Dominant species at Bell Rock included the

polychaetes *Galathowenia oculata*, *Spiophanes bombyx*, *Pholoe inornata*, and *Lumbrineris* spp. and bivalves *Nucula tenuis*, *Myrella bidentata* and *Abra* spp. Occasional opportunistic species included *Chaetozone setosa* and a few *Capitella* spp. Benthic communities from St. Abb's Head were characterised by polychaetes including *Spiophanes bombyx*, *Galathowenia* spp., *Diplocirrus glaucus*, *Prionospio fallax*, *Levensenia (Paradoneis) gracilis* and *Owenia fusiformis*, amphipods such as *Harpinia* spp., and bivalves *Thyasira* spp. and *M. bidentata* (Eleftheriou *et al.*, 2004).

Broad scale small beam trawl surveys (Jennings *et al.*, 1999) found a characteristic epibenthos within the general area including a range of colonial sessile fauna such as the erect bryozoan or hornwrack *Flustra foliacea*, the hydroid *Hydrallmania falcata*, and the soft coral or dead man's fingers *Alcyonium digitatum* together with a typical mobile assemblage comprising the common starfish *Asterias rubens*, the brown shrimp *C. allmanni*, the hermit crab *Pagurus bernhardus* and the spider crab *Hyas coarctatus*.

EMU (2010) interpreted a number of different types of sediment / faunal associations in the outer Firth of Forth during EIA investigations relating to the Neart na Gaoithe wind farm application and following multivariate analyses in PRIMER (Clarke & Warwick, 2001). The dominant association (represented by PRIMER Group G in Figure 12C.4) was slightly muddy sand characterised by the brittlestar, *Amphiura filiformis*, the polychaetes *Spiophanes bombyx*, *Galathowenia oculata* and *Lumbrineris gracilis* and the bivalves *Myrella bidentata* and *Thyasira flexuosa* and corresponded with the **SS.SMu.CSaMu.AfilNten** biotope classification (Connor *et al.*, 2004). However, video data collected at the same time also revealed additional conspicuous species in this area including the sea pens *Pennatula phosphorea* and *Virgularia mirabilis* together with *Nephrops norvegicus*. These species together with the muddy sand substrate offered an additional interpretation to the habitat considered to match the **SS.SMu.CSaMu.SpnMeg** biotope. This habitat is a component of the UKBAP 'mud habitat in deep water' and the Scottish PMF "burrowed mud".

The other dominant sediment / faunal association identified during previous study in the Firth of Forth (EMU, 2010) comprised slightly gravelly muddy sand and muddy sand is (see PRIMER Group F in Figure 12C.4). Characteristic species included the bivalves *Abra nitida* and *Thyasira flexuosa*, the polychaetes *Scalibregma inflatum*, *Nephtys hombergii*, *Chaetozone setosa*, *Spiophanes bombyx* and *Spiophanes kroyeri* and the amphipods *Ampelisca tenuicornis* and *Harpinia antennaria*. The seabed imagery recorded the squat lobster *Munida rugosa* and burrows of *Nephrops norvegicus* and confirmed the absence of seapen species. This habitat type and associated species corresponded with the **SS.SMu.CSaMu.AfilMysAnit** biotope classification describing *Amphiura filiformis*, *Myrella bidentata* and *Abra nitida* in circalittoral sandy mud.

The other faunal groupings present only comprised one or a few samples only and were mostly located along the inshore section of the Offshore Export Cable Corridor. These smaller groupings reflected the mixed substrate habitats and associated faunal communities present at this location and included coarser sediment types such as gravelly muddy sand and sandy gravel (Groups B and E) with associated encrusting and attaching fauna i.e. barnacles Cirripedia and

*Verruca stroemi*, encrusting worms *Pomatoceros lamarcki* and sea squirts Ascidiacea. Other mixed sand and gravel sediments such as those within Group D were also characterised by attaching and encrusting species including sea squirts and mussels Mytilidae together with a wide range of other infaunal species including the polychaetes *Scoloplos armiger*, *Lanice conchilega*, *Galathowenia oculata*, *Lumbrineris gracilis*, the bivalve *Fabulina fabula* and the amphipod *Ampelisca brevicornis*.

Muddy sand sediments (Group A) were characterised by the polychaete *Nephtys incisa*, the horseshoe worm *Phoronis* sp. and the bivalve *Abra* sp. but in areas of reduced silt content (Group C) the fauna comprised typical sand species such as the polychaetes *Magelona johnstoni* and *M. filiformis* and the bivalves *Fabulina fabula* and *Chamelea striatula*.

Juvenile specimens of the PMF species *Arctica islandica* were frequently recorded at grab sample stations throughout the outer Firth (EMU, 2010). Adult specimens were not recorded. These typically burrow deep within seabed sediments and so may under-represented by grab sampling.

The Isle of May is situated at the entrance to the Firth of Forth approximately 8 km southeast of Anstruther and 17 km northeast of North Berwick. Its coastline is typically rocky with littoral bedrock continuing sublittorally onto boulder slopes and eventually boulder-cobble plains on shell gravel; occasional pockets of sediment are confined to sheltered bays. The Isle of May is designated a Special Areas of Conservation (SAC) under international statute and the rocky reef habitats are cited as an interest feature for which the SAC is designated. Although outside of the boundaries of the Offshore Export Cable Corridor, these features may be considered to have particular sensitivity as a function of their conservation status.

Moore *et al.* (2009) identified 34 biotopes during a video survey of the Isle of May, of which 30 were reef biotopes. The reef biotopes were found to be widely distributed throughout the sublittoral area from the shore to a depth of 33 m. Five of the island's shores were surveyed by transect line, with 70 to 102 taxa being recorded along transects at the five sites. The authors reported kelp biotopes confined to a narrow coastal band, with recorded depths ranging from 8 m on the west coast to 11 m on the east coast. Beyond the coastal kelp fringe most of the surveyed area was characterised by mixed substrates comprising varying proportions of boulders, cobbles and pebbles on coarse sand, with bedrock outcrops and predominantly sandy areas. In general, the more stable reef surfaces supported low diversity communities dominated by algal and faunal crusts occasionally with the addition of dense *Pomatoceros* spp. or *A. digitatum*. In the northern, southern and eastern regions of the surveyed area, brittlestar beds covered extensive areas of the rocky substrata. The five shores surveyed were mostly exposed or moderately exposed and dominated by barnacle/*Fucus vesiculosus* mosaics but included a barnacle dominated vertical cliff and a sheltered *Ascophyllum* shore.

### 12C.2.3 Sediment Contaminants

Table 12C.1 compares levels of sediment contaminants previously found along the corridor of the Offshore Export Cable (EMU, 2010) with Cefas sediment action levels and with Canadian Interim Sediment Quality Guidelines (ISQGs) and Probable Effect Levels (PELs). The Cefas levels are used to help assess the potential environmental effects of the disposal of sediments at sea whilst ISQGs and PELs can assist in evaluating levels of contaminants in sediments in terms of their potential ecotoxicological effects on benthos.

Concentrations of the majority of the metal sediment contaminants fell within Cefas lower values but exceeded the more stringent Canadian values. Upper Cefas and Canadian guidelines were not however breached with the exception of levels of lead which were higher than the Canadian guideline at a limited number of inshore sample locations. Hydrocarbons were found at concentrations in excess of guideline levels at one historic sample location along the export cable corridor.

**Table 12C.1: Summary Results of the Sediment Contaminant Analyses at Historic Sampling Sites (Source: EMU, 2010)**

Site	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)	Mercury (mg/kg)	Total PAH EPA 16 (ng/kg)	Total Hydrocarbons (µg/kg)
61	5.1	1.2	26.3	17.9	15.9	11.4	30.8	0.018	80.4	10324.8
105	5.1	1.3	34.2	21.1	20.1	13.8	36.1	0.031	299.2	30707.5
106	18.1	1.2	76.2	47.9	117.2	104.1	135.8	<0.1	318.9	41857.5
112	23.0	1.8	107.7	90.9	297.2	160.1	162.3	<0.1	1615.2	148082.9
116	39.0	1.4	149.0	58.5	215.1	114.0	114.7	<0.1	341.2	53395.8
Cefas Action Level 1	20.0	0.4	40.0	40.0	50.0	20.0	130.0	0.3	~	100000
Cefas Action Level 2	100	5.0	400.0	400.0	500.0	200.0	800.0	3	~	1000000
Canadian TEL	7.2	0.7	52.3	18.7	30.2	~	124.0	0.13	~	~
Canadian PEL	41.6	4.2	160.0	108.0	112.0	~	271.0	0.7	~	~

### 12C.3 Nature Conservation Designations

Chapter 9 of the ES provides a detailed account of nature conservation designations relevant to current proposals. The following provides a brief account of local designated sites and species in the vicinity of the Offshore Export Cable Corridor including cable landfall options. Where there is potential for indirect impacts on designating features of a European site, other than benthic ecology interests, these are considered in *Chapter 13*, *Chapter 14: Marine Mammals* and *Chapter 15: Ornithology*.

### **12C.3.1 Special Areas of Conservation (SAC)**

The Isle of May has been designated as a SAC under the EC Habitats Directive (92/43/EEC) based largely based on the large breeding colony of the grey seal *Halichoerus grypus* present. In addition, the rocky 'reefs' that fringe approximately 90 per cent of the coastline of the island are an Annex I habitat and represent an additional qualifying feature for SAC designation. A number of other SACs detailed in Chapter 9 cite Annex I habitats as their qualifying conservation interests, including the Firth of Tay and Eden Estuary, the Moray Firth and the River Tay. However, there is no potential connectivity with these SACs and the Project relating to Benthic Ecology or Annex I habitat interests.

### **12C.3.2 Priority Marine Features (PMF) and Scottish Marine Protected Areas (MPA)**

Burrowed mud habitats, defined by the biotope **SS.SMu.CFiMu.SpnMeg**, and the bivalve *Arctica islandica* are listed on the Scottish draft list of PMF as a consideration for marine planning and licensing. Both features have been recorded during previous sampling in the outer Firth of Forth and within the vicinity of the Offshore Export Cable Corridor landfall options (EMU, 2010) although with respect to *A. islandica*, only juveniles were found. JNCC and SNH have identified one potential nature conservation Marine Protected Area in the vicinity of the Development Area, the Firth of Forth Banks Complex. *Arctica islandica* has been identified as a PMF in this location.

### **12C.3.3 Sites of Special Scientific Interest (SSSI)**

The Firth of Forth Site of Special Scientific Interest covers large areas of the Firth of Forth (including the Offshore Export Cable landfall options, at Cockenzie and Seton Sands) with the marine Notified Natural Features of mudflats and saltmarsh within its boundary. None of these Notified Natural Features are present at the landfall options and as such, no impacts to these features are predicted.



## 12C.4 Methods

### 12C.4.1 Intertidal Biotope Mapping Survey

A broad scale biotope mapping survey of the intertidal area was carried out at both of the Offshore Export Cable Corridor landfall options: Cockenzie and Seton Sands (Figure 12C.5). Each survey encompassed the region from the splash/lichen zone (supra-littoral) to the sub-littoral fringe, within the area the Offshore Export Cable Corridor landfall. The methodology employed followed the Joint Nature Conservation Committee (JNCC) procedural guidelines for intertidal mapping (Davies *et al.*, 2001) and were agreed with Marine Scotland prior to mobilisation to ensure all statutory concerns would be addressed. Biotopes identified were classified on the basis of the Marine Habitat Classification System (Connor *et al.*, 2004). The intertidal survey field logs are presented in Annex 12C.1.

The surveys were conducted over low spring tides occasions to permit access to the lowest reaches of the shore and to maximise working time. The entire survey took place over three days and was carried out between 18 and 21 August 2012.

Base maps derived from aerial photography and ordnance survey were annotated in the field, with total species inventories where possible. The boundaries of each intertidal habitat were located using a Garmin 48 hand held Global Positioning System (GPS) unit, accurate <5 m and represented on the field maps as discrete polygons. Polygon boundaries were identified by a change in the dominance or occurrence of conspicuous species or communities in combination with changes in physical characteristics of the habitat.

For each habitat polygon the following information was noted:

- Physical characteristics, such as substrate type and topographic features (sand ripples, areas of standing water etc.); and
- Details of specimen samples taken from sites within the polygon.

Digital photographs were taken during the survey in order to illustrate each habitat and the location of polygon boundaries in relation to adjacent polygons. The position of each photograph was determined using GPS.

The biotope maps were augmented with target notes including features too small (<25 m<sup>2</sup>) to be accurately portrayed on a map, features on vertical faces, and found under boulders or overhangs. Target notes are also used to describe human activities, such as outfalls, coastal protection measures and other man made features that are potential habitat modifiers.

In addition to the biotope mapping, quantitative sampling was conducted where particulate sediments dominated. Sampling was consistent with the methods provided in the JNCC Procedural Guideline 3-6 (Davies *et al.*, 2001).

Sediment samples were collected at six locations corresponding to high, mid and low shore levels at the Cockenzie Cable Landfall using a 0.01 m<sup>2</sup> sediment corer to 20 cm depth for analysis for faunal invertebrate content and particle size distribution (PSD) analysis at EMU's accredited marine biology and sediment laboratories, Portsmouth.

#### 12C.4.2 Intertidal Biotope Mapping Production

Biotope classification was based on the most recent version (v04.05) system for marine biotopes (Connor *et al.*, 2004) and mapped over aerial photographs to allow area wide interpolation of the data.

The biotope maps were produced at a scale of 1:8315 for Cockenzie and 1:5330 for Seton Sands, which gives sufficient level of detail to portray the variety and distribution of the characterising biotopes of the Offshore Export Cable Corridor landfall options.

The boundaries of each biotope were digitised and incorporated within an ArcGIS and overlaid onto the base-mapping layer as a series of polygons. Each polygon (biotope) was attributed with the biotope classification. Target notes were also overlaid onto the base map.

#### 12C.4.3 Subtidal Survey

Collaboration between ICOL and the proposed Neart na Gaoithe (NnG) Wind Farm developers identified a series of benthic ecological datasets relevant to the subtidal portion of the Inch Cape Offshore Export Cable Corridor. These had been collected by NnG in 2009 (EMU, 2010) as part of preliminary investigations to explore transmission options to landfall at Cockenzie. NnG are no longer considering the Cockenzie landfall option, but have nevertheless provided relevant data in support of the current proposals of the Project. This revealed that considerable survey coverage of the Offshore Export Cable Corridor had already been achieved and that only a limited campaign of new seabed video sampling to infill spatial gaps was required to fully characterise the benthic ecology of the Offshore Export Cable Corridor. Accordingly, an infill survey using seabed video and limited grab sampling was proposed to ensure full coverage of predicted habitats and impact types associated with the Inch Cape Offshore Export Cable Corridor for EIA purposes. Figure 12C.6 shows the sampling locations for the Offshore Export Cable Corridor together with the previous sampling points that were used for the NnG wind farm.

The survey design and rationale were agreed with Marine Scotland and followed the methods used during the previous NnG survey to ensure data compatibility and to allow combining of existing and current datasets for comprehensive ecological characterisation for EIA. Both the current and existing surveys were conducted in July (2012 and 2009 respectively) to mitigate for any possible seasonal variations. Field survey and subsequent laboratory analyses were conducted in accordance with Cefas guidelines (Cefas, 2004), Ware and Kenny, 2011) and JNCC MESH Recommended Operating Guidelines (Coggan *et al.*, 2007).

The new sampling locations were investigated by a drop down video (DDV) and a small number of sediment samples for particle size distribution and sediment contaminants analysis were also collected by grab techniques. Rocky habitats associated with the Isle of May were also investigated via extended seabed video transects to acquire information on potentially sensitive receptors here, including potential Annex I geogenic reefs and associated sessile epifaunal communities.

Table 12C.2 summarises the sampling effort of the current survey. The subtidal survey field logs are presented in Annex 12C.2.

**Table 12C.2: Summary of Sampling Effort for the Inch Cape Benthic Ecology Subtidal Survey**

Sampling Techniques	No. Stations	Purpose
Seabed digital video and stills photography	22	Collection of seabed images to inform habitat and epifaunal community assessment.
Seabed digital video and stills photography	11	Extended video transects for the collection of seabed images to inform habitat and epifaunal community assessment over rocky and heterogeneous ground.
0.04 m <sup>2</sup> Shipek grab	11	Collection of sediment samples for determination of sediment contaminants.
0.04 m <sup>2</sup> Shipek grab	13	Collection of sediment samples for determination of particle size distribution (PSD).
Historic video sampling data	37	Selected seabed data collected during previous benthic ecology survey relating to the NnG Offshore Wind Farm ES.

#### 12C.4.4 Site Positioning and Sampling

All survey work was undertaken on board a local commercial fishing vessel, FV Shamariah, on charter from the Scottish Fishermen's Federation (SFF) (see Figure 12C.7).

Sample positioning was achieved using EMU's Hemisphere Crescent V110 DGPS which has a stated horizontal accuracy of <0.6 m (95 per cent confidence). Navigation and position recording was achieved using Trimble's HYDROPro software version 2.30.844.

A list of target site positions was used to guide the vessel to the planned sampling locations. At each site, the actual position of each sampling event was recorded at the moment the winch wire went slack, indicating that the sampling device reached the seabed.

All proposed sites were successfully sampled with the exception of one location close inshore at Seton Sands. Access to this sampling site was not permitted due to the presence of dense static gears and was therefore re-located (Site 23).

##### ***Seabed Video and Stills Photography***

At each video sample station, the digital video camera was deployed (Figure 12C.8) and a minimum of five minutes' seabed video footage plus a minimum of five photographic stills were collected. Longer deployments of up to 28 minutes were undertaken to document heterogeneous sediment and potentially sensitive habitats, such as the rocky reef habitats within the vicinity of the Isle of May. Positions for the video survey were logged at the beginning and the end of each drop, and at each static image location, and overlaid on the video footage to ensure accurate geo-referencing. Observer records were collated throughout each deployment including substrate type and conspicuous epifauna

***Sediment Samples for Chemistry and Particle Size Distribution (PSD)***

Sampling of seabed sediments was carried out using a 0.04 m<sup>2</sup> Shipek Grab with stainless steel bucket in order to collect sediment for chemistry analysis.

Once on board the top two centimetres of sediment in each sample was collected for hydrocarbon samples and metals. The samples were subsequently submitted to a specialist UKAS accredited chemistry laboratory for analysis. The remaining sediment was transferred to a labelled plastic bag and returned to the UKAS accredited sediment laboratories at EMU Limited for PSD analysis.

## 12C.5 Data Analysis

### 12C.5.1 Video Data Analysis

Seabed video data collected in the field were reviewed upon return to EMU's office to identify and describe the characterising habitat types and associated epifauna for each transect.

Substrate types for each video station were recorded as per cent cover of the seabed whilst the species abundance was calculated using the industry standard SACFOR abundance scale (Table 12C.3); the SACFOR classification uses the average species size to classify the population. In addition, the digital still images were used to assist identification of species and improve habitat descriptions. Biotopes were classified based on the Marine Biotope Classification for Britain and Ireland Version 04.05 (Connor *et al*, 2004), and was aided by the use of the biotope decision support tool BioScribe (Hooper *et al.*, 2011).

**Table 12C.3: Marine Nature Conservation Review (MNCR) SACFOR Abundance Scale (After: Hiscock, 1996)**

**Key: S = Superabundant, A = Abundant, C = Common, F = Frequent, O = Occasional, R = Rare, P = Present (used when the abundance of an organism could not be estimated accurately)**

Growth Form			Size of individuals/colonies				Density
%cover	Crust /Meadow	Massive /Turf	<1 cm	1-3 cm	3-15 cm	>15 cm	
>80%	S		S				>1/0.001 m <sup>2</sup>
40-79%	A	S	A	S			1-9/0.001 m <sup>2</sup>
20-39%	C	A	C	A	S		1-9/0.01 m <sup>2</sup>
10-19%	F	C	F	C	A	S	1-9/0.1 m <sup>2</sup>
5-9%	O	F	O	F	C	A	1-9/1 m <sup>2</sup>
1-5% or density	R	O	R	O	F	C	1-9/10 m <sup>2</sup>
<1% density	R	R		R	O	F	1-9/100 m <sup>2</sup>
					R	O	1-9/1000 m <sup>2</sup>
						R	<1/1000 m <sup>2</sup>

**Assessment of Annex I Reef**

Cobble based areas may qualify as Annex I (EC Habitats Directive) stony reef (see Appendix 12D). Attributes of any stony and rocky substrates encountered were compared with existing criteria for defining reef for the purposes of Annex I of the EC Habitats Directive. Whilst the EU definition of reef has been subject to modification since adoption of the Directive, the most recent interpretation provided by the European Union in 2007 (EC, 2007) is as follows:

*“Reefs can be either biogenic concretions or of geogenic origin. They are hard compact substrata on solid and soft bottoms, which arise from the sea floor in the sublittoral and littoral zone. Reefs may support a zonation of benthic communities of algae and animal species as well as concretions and corallogenic concretions.”*

With regard to geogenic reef, the EU revised interpretation manual (EC, 2007) provides the following clarification:

- Geogenic origin means reefs formed by non-biogenic substrata;
- Hard compact substrata are rocks (including soft rock, e.g. chalk), boulders and cobbles (generally >64 mm in diameter);
- Arise from the sea floor means the reef is topographically distinct from the surrounding seafloor; and
- Sublittoral and littoral zone means the reefs may extend from the sublittoral uninterrupted into the intertidal (littoral) zone or may only occur in the sublittoral zone, including deep water areas such as the bathyal. Such hard substrata that are covered by a thin and mobile veneer of sediment are classed as reefs if the associated biota is dependent on the hard substratum rather than the overlying sediment. Where an uninterrupted zonation of sublittoral and littoral communities exists, the integrity of the ecological unit should be respected in the selection of sites. A variety of subtidal topographic features are included in this habitat complex such as: hydrothermal vent habitats, sea mounts, vertical rock walls, horizontal ledges, overhangs, pinnacles, gullies, ridges, sloping or flat bed rock, broken rock and boulder and cobble fields.

Additional clarification of geogenic reef as ‘stony reef’ under the Habitats Directive was attempted during an inter-agency workshop and subsequent discussions in 2008 (Irving, 2009). Several key parameters of ‘reefiness’ were proposed including the ones presented in (Table 12C.4). Using these criteria, a measure of the resemblance of the stony and rocky seabed habitats observed in the vicinity of the Offshore Export Cable Corridor with Annex I geogenic reef criteria has been attempted.

**Table 12C.4: Measure of Geogenic (Cobble) Reefiness**

Measure of 'reefiness'	NOT a REEF	LOW	MEDIUM	HIGH
<p><b>Composition Diameter of cobbles / boulders being greater than 64 mm.</b></p> <p>Percentage cover relates to a minimum area of 25 m<sup>2</sup>.</p> <p>This 'composition' characteristic also includes 'patchiness'.</p>	<10%	10-40% Matrix supported	40-95%	>95% Clast supported
<p><b>Elevation</b></p> <p><b>Minimum height (64 mm) relates to minimum size of constituent cobbles.</b></p> <p>This characteristic could also include 'distinctness' from the surrounding seabed.</p> <p>Note that two units (mm and m) are used here.</p>	Flat seabed	<64 mm	64 mm-5 m	>5 m
<b>Extent</b>	<25 m <sup>2</sup>	>25 m <sup>2</sup>		
<b>Biota</b>	Dominated by infaunal species			>80% of species present composed of epifaunal species

### 12C.5.2 Benthic Laboratory Processing

#### ***Particle Size Distribution (PSD) Samples***

PSD analysis was undertaken at EMU's sediment laboratory using in house methods based on BS1377: Parts 1 – 3: 1990 (dry sieving), and BS13320: 2009 (laser diffraction). The latter method was used when the fine fraction of sediment (<63 µm) comprised >5 per cent of the total sample by weight.

Representative sub-samples of each sediment sample were oven dried to constant weight at 105 ±5°C before routinely wet sieving to remove silt and clay-sized particles of <63 µm (unless there was no sample cohesion after drying, where dry sieve analysis only is undertaken). The remaining coarser material was again oven dried to constant weight at 105 ±5°C followed by dry sieving through a series of mesh apertures corresponding to units as described by the Wentworth scale. The weight of the sediment fraction retained on each mesh was subsequently measured and recorded and merged with the laser diffraction data where appropriate.

***Intertidal Macrofaunal Core Samples***

Macrofaunal samples collected during the intertidal survey were processed over a 0.5 mm aperture mesh to remove all remaining fine substrate material and fixative prior to taxonomic identification, enumeration and biomass analysis.

Faunal biomass analysis was based on a wet-blot method with estimates of ash-free dry weight made based on conversion factors indicated by (Eleftheriou and Basford, 1989).

All stages of the laboratory procedures have passed internal quality control procedure. EMU undertook QC checks on a representative number of whole samples, as well as the entire reference collection in compliance with internal analytical QC criteria.



## 12C.6 Intertidal Survey Results

Results of the particle size distribution analysis of intertidal samples are presented in Annex 12C.3. Results of the macrofaunal core sampling analysis, including species abundance and biomass for each proposed cable landfall option, are presented in Annex 12C.4.

### 12C.6.1 Cockenzie Potential Landfall Option

A total of 35 macrofaunal species, represented by 791 individuals, were recorded from the proposed Cockenzie landfall option. Table 12.5 shows the distribution of species, abundance and biomass amongst the principal macro-invertebrate taxonomic groups. The most conspicuous core sample species are presented in Table 12C.6.

**Table 12C.5: Summary of Numbers and Biomass (ash-free dry weight – AFDW) of Species in Each of Principal Phyla from Cockenzie Core Samples**

Taxonomic Group	Number of taxa	% of taxa	Number of individuals	% of individuals	AFDW (g)	% of AFDW
Annelida	12	34.3	183	23.1	0.0963	68.0
Crustacea	9	25.7	38	4.8	0.0017	1.2
Mollusca	9	25.7	508	64.2	0.0420	29.7
Echinodermata	2	5.7	3	0.4	0.0000	0.0
Others	3	8.6	59	7.5	0.0016	1.1

**Table 12C.6: Conspicuous Species from Cockenzie Core Samples**

Most abundant species	Abundance	Most frequently occurring species	Frequency (% of samples)
<i>Mytilus edulis</i> (juv)	370	<i>Mytilus edulis</i> (juv)	100.0
Enchytraeidae	115	Enchytraeidae	66.7
<i>Spisula</i> spp.	103	NEMERTEA	50.0
NEMERTEA	54	<i>Spisula</i> (juv)	33.3
<i>Stygocapitella subterranea</i>	37	<i>Rissoa parva</i>	33.3
<i>Rissoa parva</i>	19	<i>Pontocrates arenarius</i>	33.3

Table 12C.7 summarises the results of the sediment particle size distribution analysis. The sediments in the northern half of the Cockenzie intertidal survey area ranged from small boulders and cobbles in the south to large boulders and bedrock in the north. In the southern half of the Cockenzie intertidal survey area the sediments ranged from sand on the

low shore area in the vicinity of Site C3 to sandy gravels and cobbles for the rest of the southern half of the intertidal survey area.

**Table 12C.7: Cockenzie Sediment Samples Summary Statistics**

CORE SITES	C1	C2	C3	C4	C5	C6
TEXTURAL GROUP	Very coarse gravel	Very coarse gravel	Slightly very fine gravelly coarse sand	Sandy coarse gravel	Sandy medium gravel	Very coarse gravel
OBSERVED SEDIMENT TYPE	Gravelly sand and cobble	Gravelly sand	Medium to coarse sand	Gravelly sand	Gravelly sand	Coarse sand over cobbles

***Biotope Distribution at Cockenzie***

Figure 12C.9 presents the intertidal biotope map for the potential Cockenzie Cable Landfall. A total of nine biotopes were identified across the area as summarised in Table 12.8.

**Table 12C.8: Summary of Observed Biotopes Along the Intertidal within the Survey Area at Cockenzie**

Biotope Code	Name
LS.LSa.St.Tal	Talitrids on the upper shore and strand-line
LR.MLR.BF.PeIB	<i>Pelvetia canaliculata</i> and barnacles on moderately exposed littoral fringe rock
LR.HLR.MusB.Cht.Cht	<i>Chthamalus</i> spp. on exposed upper eulittoral rock
LR.MLR.BF.FspiB	<i>Fucus spiralis</i> on exposed to moderately exposed upper eulittoral rock
LS.LCS.Sh.BarS	Barren littoral shingle
LR.FLR.Eph.BLitX	Barnacles and <i>Littorina</i> spp. on unstable eulittoral mixed substrata
LR.LLR.F.Fspi.X	<i>Fucus spiralis</i> on full salinity upper eulittoral mixed substrata
LS.LSa.MuSa.Lan	<i>Lanice conchilega</i> in littoral sand
IR.MIR.KR.Ldig.Ldig	<i>Laminaria digitata</i> on moderately exposed sublittoral fringe bedrock

The surveyed area at Cockenzie intertidal could be divided into two distinct southern and northern areas. The southern half of the surveyed area was composed of mixed sediments (sand, gravel and cobble), backed by soil composite, maximum one metre in height. A typical strandline biotope (**LS.LSa.St.Tal**, Table 12C.9) occurred on an upper shore berm.

Below the strandline, the mixed sediment was composed of sand and gravel, providing a habitat for limited fauna (**LS.LCS.Sh.BarS**). Below the barren gravel shore, numerous freshwater runoffs provided nutrients to support an ephemeral green algal community (**LR.FLR.Eph.BLitX**) that persisted down to the lower shore but was covered by a furoid community on the mid to lower shore (**LR.FLR.F.Fspi.X**), where *Fucus spiralis* dominated. On the majority of the extreme low shore and extending into the infralittoral where hard substrata were present, the kelp biotope of **IR.MIR.KR.Ldig.Ldig** was recorded. An area of sandy sediment was also found in the extreme low shore, supporting a relatively diverse fauna dominated but characterised by the sand mason worm *Lanice conchilega* (**LS.LSa.MuSa.Lan**).



The northern half of the Cockenzie intertidal survey area was characterised by hard substrata, ranging from cobbles to boulders and bedrock. The majority of the upper shore fringe was backed by bare boulders occurring in the splash zone, forming part of the sea defense in the area. A sea wall was also present, extending over 200 m into the surveyed area and beyond the northern limit of the survey area. Below the sea wall, on the upper shore, a narrow area of large boulders supported a community characterised by the furoid, *Pelvetia canaliculata* (**LR.MLR.BF.PeIB**). Mixed with **LR.MLR.BF.PeIB** and occurring on the upper to mid shore where **LR.MLR.BF.PeIB** was not present, a sparse barnacle community of **LR.HLR.MusB.Cht.Cht** occurred. The barnacle community extended down the shore but was covered on the mid to lower shore by the furoid, *Fucus spiralis*, forming the **LR.MLR.BF.FSpiB** biotope. On the extreme low shore and extending into the infralittoral, the kelp biotope of **IR.MIR.KR.Ldig.Ldig** was recorded on boulders and bedrock.

The seawall extended beyond 500 m to the north, backing furoid dominated boulder communities on a steep, narrow intertidal zone. To the south of the Offshore Export Cable Corridor landfall, a concrete coastal path backed a series of rock outcrops, dominated by the barnacle, *Chthamalus*, and the furoid, *Fucus spiralis*.



None of the biotopes recorded were designated as a protective feature for the surveyed area. The biotopes **LR.MLR.BF.PeIB**, **LR.HLR.MusB.Cht.Cht**, **LR.MLR.BF.FSpiB**, and **IR.MIR.KR.Ldig.Ldig** are listed under the EC Habitats Directive under the Annex I reef habitat type (JNCC, 2010). Additionally **LR.FLR.F.Fspi.X** is a biotope classified as typical of the Annex I large shallow inlet and bay physiographic type. **LS.LSa.MuSa.Lan** is listed under the Annex I mudflats and sandflats not covered by seawater at low tide habitat type.

Table 12C.9 to Table 12C.17 below provide further detail for each of the intertidal biotopes observed at the proposed Cockenzie landfall.



**Table 12C.9: LS.LSa.St.Tal Observed Biotope at Cockenzie**

Broad Habitat:	LS	Littoral sediment
Habitat complex:	LSa	Littoral sand
Biotope complex:	St	Strandline
Biotope:	Tal	Talitrids on the upper shore and strand-line
		
View of biotope to the south (west)		View of biotope to the north (east) from Core Site C4, located below berm
<p><b>Description of observed biotope:</b> Upper shore shingle berm overlaid with drift seaweed and other debris, dominated by talitrid amphipods, lying below semi-terrestrial area of sand and gravel at base earth mounds. Earth mounds topped with grass. Berm ends (as does <b>LS.LSa.St.Tal</b> biotope) where it meets low coastal concrete path to south (west) and boulder sea defence to north (east).</p>		



**Table 12C.10: LR.MLR.BF.PelB Observed Biotope at Cockenzie**

Broad Habitat:	LR	Littoral rock (and other hard substrata)
Habitat complex:	MLR	Moderate energy littoral rock
Biotope complex:	BF	Barnacles and fucoids on moderately exposed shores
Biotope:	PelB	<i>Pelvetia canaliculata</i> and barnacles on moderately exposed littoral fringe rock
		
Overview of biotope to south		Close up of <i>Pelvetia canaliculata</i>
<p><b>Description of observed biotope:</b> <i>Pelvetia canaliculata</i> community on boulders and cobbles of upper shore below concrete and boulder sea defence. Noticable but sparse presence of <i>Nucella</i> and <i>Chthamalus</i>. The biotope was located at the north end of the Cockenzie intertidal survey area and was split by a beacon jetty.</p>		



**Table 12C.11: LR.HLR.MusB.Cht.Cht Observed Biotope at Cockenzie**

Broad Habitat:	LR	Littoral rock (and other hard substrata)
Habitat complex:	HLR	High energy littoral rock
Biotope complex:	MusB	Mussel and/or barnacle communities
Biotope	Cht	<i>Chthamalus</i> spp. on exposed eulittoral rock
Sub-Biotope	Cht	<i>Chthamalus</i> spp. on exposed upper eulittoral rock
		
Overview to north		Close-up of cobbles/boulders
<p><b>Description of observed biotope complex:</b> Biotope was located in the northern half of the Cockenzie intertidal survey area, divided by the beacon jetty. Positioned below a large boulder defence to the south and the <b>LR.MLR.BF.PeIB</b> biotope to the north, the biotope lies upshore of a sparse <i>Fucus spiralis</i> community.</p>		

**Table 12C.12: LR.MLR.BF.FSpiB Observed Biotope at Cockenzie**



Broad Habitat:	LR	Littoral rock (and other hard substrata)
Habitat complex:	MLR	Moderate energy littoral rock
Biotope complex:	BF	Barnacles and fucoids on moderately exposed shores
Biotope	FSpiB	<i>Fucus spiralis</i> on exposed to moderately exposed upper eulittoral rock
		
<p>Overview to south between upshore (<i>Chthamalus</i> community) and downshore (<i>Laminaria digitata</i> community)</p>		<p>Close-up of cobbles/boulders</p>
<p><b>Description of observed biotope complex:</b> This biotope complex was assigned to the <i>Fucus spiralis</i> community, with <i>Ulva</i>, located between the <i>Chthamalus</i> community on the upper shore and <i>Laminaria digitata</i> community on the lower shore, in the northern half of the Cockenzie intertidal survey area. The biotope was predominantly associated with small boulders and cobbles.</p>		

**Table 12C.13: LS.LCS.Sh.BarS Observed Biotope at Cockenzie**



Broad Habitat:	LS	Littoral sediment
Habitat complex:	LCS	Littoral coarse sediment
Biotope complex:	Sh	Shingle (pebble) and gravel shores
Biotope:	BarS	Barren littoral shingle
		
<p><b>Site C4.</b> Overview to south (west)</p>		<p>Close up of mixed sediment on upper shore section</p>
<p><b>Description of observed biotope:</b> The biotope is located along the stretch of mixed sediment (coarse sand and gravel) located in the southern half of the Cockenzie intertidal survey area, adjacent to and downshore of the berm.</p>		





**Table 12C.14: LR.FLR.Eph.BLitX Observed Biotope at Cockenzie**

Broad Habitat:	LR	Littoral rock (and other hard substrata)
Habitat complex:	FLR	Low energy littoral rock
Biotope complex:	Eph	Ephemeral green or red seaweed communities (freshwater or sand-influenced)
Biotope:	BLitX	Barnacles and <i>Littorina</i> spp. on unstable eulittoral mixed substrata
		
<p>Southern overview of boundary between <b>LS.LCS.Sh.BarS</b> and <b>LR.FLR.Eph.BLitX</b> biotopes</p>		
<p><b>Description of observed biotope:</b> This biotope was located on the mid to lower shore of the southern half of the Cockenzie intertidal survey area. The sediment was a mix of sandy gravel with cobbles and numerous freshwater runoffs were noted across the full length of the mixed sediment area.</p>		



**Table 12C.15: LR.FLR.F.Fspi.X Observed Biotope at Cockenzie**

Broad Habitat:	LR	Littoral rock (and other hard substrata)
Habitat complex:	FLR	Low energy littoral rock
Biotope complex:	F	Fucoids on sheltered marine shores
Biotope:	FSpi	<i>Fucus spiralis</i> on sheltered upper eulittoral rock
Sub-biotope:	X	<i>Fucus spiralis</i> on full salinity upper eulittoral mixed substrata
		
<b>Site C6:</b> Northerly overview during flooding tide		<b>Site C6:</b> Close up of surface
<p><b>Description of observed biotope:</b> The biotope was located downshore of the <b>LR.FLR.Eph.BLitX</b> biotopes and on similar mixed sediment, down to the low shore where the predominately freshwater influenced <i>Ulva</i> community was covered by a higher dominance of the brown algal species <i>Fucus spiralis</i>.</p>		

**Table 12C.16: LS.LSa.MuSa.Lan Observed Biotope at Cockenzie**

Broad Habitat:	LS	Littoral sediment
Habitat complex:	LSa	Littoral sand
Biotope complex:	MuSa	Polychaete/bivalve-dominated muddy sand shores
Biotope:	Lan	<i>Lanice conchilega</i> in littoral sand
		
<p><b>Site C3:</b> Upshore overview during flooding tide</p>		<p><b>Site C3:</b> Close up of sediment surface and <i>Lanice</i> tubes</p>
<p><b>Description of observed biotope:</b> The biotope was located on an area of soft (sandy) sediment that was exposed only on the extreme low spring tide. The area was dominated by the tubes of the sand mason worm, <i>Lanice conchilega</i>, though the presence of the lugworm <i>Arenicola marina</i> was also noted.</p>		

**Table 12C.17: IR.MIR.KR.Ldig.Ldig Observed Biotope at Cockenzie**

Broad Habitat:	IR	Infralittoral rock (and other hard substrata)
Habitat complex:	MIR	Moderate energy infralittoral rock
Biotope complex:	KR	Kelp and red seaweeds (moderate energy infralittoral rock)
Biotope:	Ldig	<i>Laminaria digitata</i> on moderately exposed sublittoral fringe rock
Sub-biotope:	Ldig	<i>Laminaria digitata</i> on moderately exposed sublittoral fringe bedrock
		
Overview north of the beacon jetty		Overview south of the beacon jetty
<p><b>Description of observed biotope:</b> The biotope was located on the extreme low shore and infralittorally throughout the survey area apart from the soft sediment area with the biotope <b>LS.LSa.MuSa.Lan</b>. Though <i>Laminaria digitata</i> was recorded on the low shore of the southern intertidal survey area on cobbles and boulders, bedrock was likely present throughout the majority of the adjacent infralittoral, as recorded to the south of the survey area and in the north of survey area.</p>		

### 12C.6.2 Seton Sands Potential Landfall Site

A total of 37 macrofaunal species, represented by 134 individuals, were recorded from the Seton Sands landfall core sample array. Table 12C.18 shows the distribution of species numbers, abundance and biomass amongst the principal macro-invertebrate taxonomic groups. Conspicuous core sample species are presented in Table 12C.19.

**Table 12C.18: Summary of Numbers and Biomass (ash-free dry weight – AFDW) of Species in Each of Principal Phyla from Core Samples**

Taxonomic Group	Number of taxa	% of taxa	Number of individuals	% of individuals	AFDW (g)	% of AFDW
Annelida	12	32.4	23	17.2	0.1153	70.3
Crustacea	15	40.5	73	54.5	0.0077	4.7
Mollusca	8	21.6	33	24.6	0.0401	24.5
Echinodermata	1	2.7	2	1.5	0.0000	0.0
Others	1	2.7	3	2.2	0.0007	0.5

**Table 12C.19: Conspicuous Species Recorded in Core Samples at Seton Sands**

Most abundant species	Abundance	Most frequently occurring species	Frequency (% of samples)
<i>Urothoe poseidonis</i>	24	<i>Bathyporeia</i>	83.3
<i>Tellina fabula</i>	12	<i>Urothoe poseidonis</i>	50.0
<i>Tanaissus lilljeborgi</i>	8	<i>Pontocrates arenarius</i>	50.0
<i>Bathyporeia</i>	8	<i>Mytilus edulis</i> (juv)	50.0
<i>Spisula</i>	6	NEMERTEA	50.0
<i>Periculodes longimanus</i>	5	<i>Spio martinensis</i>	50.0
<i>Pontocrates arenarius</i>	5	<i>Tellina fabula</i> , <i>Tanaissus lilljeborgi</i> , <i>Spisula</i> , <i>Periculodes longimanus</i> , <i>Cardiidae</i> (juv), <i>Gammaridae</i> , <i>Magelona</i> , <i>Nephtys cirrosa</i> , <i>Scolelepis squamata</i> , <i>Rissoa parva</i> , <i>Angulus tenuis</i> , OPHIUROIDEA (juv)	33.3
<i>Bathyporeia guilliamsoniana</i>	5		
<i>Cumopsis goodsir</i>	5		
<i>Cardiidae</i> (juv)	5		

Table 12C.20 presents a summary of the particle size distribution analysis for each location sampled at Seton Sands landfall and indicates the dominance of intertidal sand habitats at this cable landfall option.

**Table 12C.20: Seton Sands Sediment Samples Summary Statistics**

CORE SITES	S1	S2	S3	S4	S5	S6
TEXTURAL GROUP	Very fine gravelly fine sand	Slightly medium gravelly fine sand	Slightly very fine gravelly fine sand	Slightly very fine gravelly fine sand	Slightly very fine gravelly fine sand	Slightly very fine gravelly fine sand
OBSERVED SEDIMENT TYPE	Fine sand	Fine shelly sand	Fine sand	Fine shelly sand	Fine sand over shelly sand	Fine sand

#### ***Biotope Distribution at Seton Sands***

Figure 12C.10 presents the intertidal biotope map for the proposed Seton Sands landfall option. A total of five biotopes were identified and mapped as summarised in Table 12C.21. Two of the biotopes present were found as a biotope mosaic. This is where more than one biotope is considered present in a particular area, and there is no discernable boundary between those considered as part of the mosaic.

**Table 12C.21: Summary of Observed Biotopes at Seton Sands**

Biotope Code	Name
LS.LSa.MoSa.AmSco.Sco	Scolecopsis spp. in littoral mobile sand
LS.LSa.FiSa.Po (Arenicola)	<i>Polychaetes</i> in littoral fine sand
LR.FLR.Eph.EphX	Ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata
LS.LSa.FiSa.Po (Arenicola and Lanice)	<i>Polychaetes</i> in littoral fine sand
LS.LSa.FiSa.Po.Aten (Arenicola and Lanice)	<i>Polychaetes</i> and <i>Angulus tenuis</i> in littoral fine sand
LS.LSa.FiSa.Po/LR.LLR.F.Fsip.FS	<i>Polychaetes</i> in littoral fine sand/ <i>Fucus spiralis</i> on full salinity sheltered upper eulittoral rock

The Seton Sands intertidal survey area was backed by a small area of low lying sand dune system on which marram grass was growing; this was in turn backed by a fully terrestrial wooded area. Two tidal streams, each emerging at the western and eastern borders of the survey area influenced the intertidal zone with numerous branching runoffs down the shore. A prominent berm was present above a relatively steep back shore profile (classified as **LS.LSa.MoSa.AmSco.Sco**) and, though weed and debris were present and a strandline

population of Talitrid crustaceans were likely present, the biotope **LS.LSa.St.Tal** could not be assigned as a tractor was raking the upper shore berm at the time of sampling.

A series of mobile sandbanks were present on the upper to mid shore, classified as **LS.LSa.MoSa.AmSco.Sco**, and the upper shore areas between the sand banks were influenced by organic inputs from freshwater runoffs, allowing a population of the lugworm, *Arenicola marina*, to become established. The biotope **LS.LSa.FiSa.Po** was ascribed to the *Arenicola* populated areas, which continued down to the low shore. A population of the sand mason worm *Lanice conchilega* was present on the mid to low shore but was merged with the *Arenicola* population and thus the biotope remained **LS.LSa.FiSa.Po**. Both populations of *Arenicola* and *Lanice* remained prominent down to the extreme low shore but a large population of the bivalve mollusc, *Angulus tenuis*, was present in sufficient numbers on the extreme low shore to assign the biotope **LS.LSa.FiSa.Po Aten**.

A mosaic biotope of **LS.LSa.FiSa.Po/LR.LLR.F.Fspi.FS** was also present on the upper shore, in the south west corner of the survey area. Small to large boulders and emergent bedrock were present amongst fine sand sediment, on which *Fucus spiralis* was growing, as well as *Ulva* and *Porphyra*.

None of the biotopes recorded were designated as a protective feature for the surveyed area. The biotopes **LS.LSa.MoSa.AmSco.Sco**, **LS.LSa.FiSa.Po** and **LS.LSa.FiSa.Po.Aten** are listed under the EC Habitats Directive under the Annex I mudflats and sandflats not covered by seawater at low tide habitat type (JNCC, 2010). **LR.FLR.F.Fspi.FS** is listed under the EC Habitats Directive under the Annex I reef habitat type (JNCC, 2010).



In conjunction with illustrative photographs and reasons for their allocation, Tables 12C.22 to Table 12C.27, present further detail of the observed biotopes across the Seton Sands survey area.

**Table 12C.22: LS.LSa.MoSa.AmSco.Sco Observed Biotope at Seton Sands**



Broad Habitat:	LS	Littoral sediment
Habitat complex:	LSa	Littoral sand
Biotope complex:	MoSa	Barren or amphipod-dominated mobile sand shores
Biotope:	AmSco	Amphipods and <i>Scolelepis</i> spp. in littoral medium-fine sand
Sub-Biotope	Sco	<i>Scolelepis</i> spp. in littoral mobile sand
		
Western overview of back shore profile		Western overview of upper shore bank (to right of picture)
		
Western overview of sandbank		Downshore overview of sandbank
<p><b>Description of observed biotope:</b> The fine sand biotope was present on the back shore profile and two sandbanks on the upper to mid-shore, extending across the majority of the survey area from east to west. Sporadic records of the polychaete spionid worm <i>Scolelepis</i> allowed the ascribing of the biotope <b>LS.LSa.MoSa.AmSco.Sco</b>.</p>		





**Table 12C.23: LS.LSa.FiSa.Po Observed Biotope at Seton Sands**

Broad Habitat:	LS	Littoral sediment
Habitat complex:	LSa	Littoral sand
Biotope complex:	FiSa	Fine Sand
Biotope:	Po	Polychaeta in littoral fine sand
		
Site S4: Western overview		Eastern overview of lower shore
<p><b>Description of observed biotope:</b> The <b>LS.LSa.FiSa.Po</b> biotope was ascribed to the majority of the survey area and it was impossible to further classify the biotope but, a shift between the population of <i>Arenicola</i> and <i>Lanice</i> required the biotope to be divided into separate polygons in Figure 12C.10. The upper shore area of was populated by the lugworm, <i>Arenicola</i>, likely due to organic input from two tidal streams to the east and west of the survey area, the runoffs from which cross the shore. The <i>Arenicola</i> community was also present lower down the shore, in the mid to lower shore.</p>		

**Table 12C.24: LR.FLR.Eph.EphX Observed Biotope at Seton Sands**

Broad Habitat:	LR	Littoral rock
Habitat complex:	FLR	Features of littoral rock
Biotope complex:	Eph	Ephemeral green or red seaweed communities (freshwater or sand-influenced)
Biotope:	EphX	Ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata
		
Eastern overview		Close of substratum
<p><b>Description of observed biotope:</b> The biotope occurred in a small area above the lower shore sand bank where a collection of oyster shells (from an historic fishery) were exposed in a runoff influenced area. The ephemeral green alga grew on the oyster shells and sand.</p>		



**Table 12C.25: LS.LSa.FiSa.Po (*Arenicola* and *Lanice*) Observed Biotope at Seton Sands**

Broad Habitat:	LS	Littoral sediment
Habitat complex:	LSa	Littoral sand
Biotope complex:	FiSa	Fine Sand
Biotope:	Po	Polychaeta in littoral fine sand
		
Downshore overview		Close-up of sediment and <i>Lanice</i> tubes
<p><b>Description of observed biotope:</b> The biotope was the same as that previously ascribed for polygons but the high density of the sand mason worm <i>Lanice chonchilega</i> warranted separation. The biotope classification <b>LS.LSa.MuSa.Lan</b> would be applicable were it was not for the equally high density in most of the polygon of lugworm (<i>Arenicola</i>).</p>		

**Table 12C.26: LS.LSa.FiSa.Po Aten Observed Biotope at Seton Sands**

Broad Habitat:	LS	Littoral sediment
Habitat complex:	LSa	Littoral sand
Biotope complex:	FiSa	Fine Sand
Biotope:	Po	Polychaeta in littoral fine sand
Sub-biotope	Aten	Polychaetes and <i>Angulus tenuis</i> in littoral fine sand
		
Western overview		Close-up of sediment
		
Close up of <i>Angulus tenuis</i> specimens		
<p><b>Description of observed biotope:</b> The biotope was found across the extreme low shore of the survey area. The biota were very similar to the biotope the <b>LS.LSa.FiSa.Po</b> recorded upshore and, although specimens of the bivalve mollusc, <i>Angulus tenuis</i> were found further up the shore, they were present in sufficient quantities to ascribe the biotope of <b>LS.LSa.FiSa.Po Aten</b>. However, the biotope was only tentatively ascribed to the polygon and could equally have been left at the classification of <b>LS.LSa.FiSa.Po</b> due the equally high densities of <i>Lanice</i> and <i>Arenicola</i> found throughout the mid to low shore survey area.</p>		

**Table 12C.27: LR.LLR.F.Fsip.FS Observed Biotope at Seton Sands**

Broad Habitat:	LR	Littoral rock
Habitat complex:	LLR	Low energy littoral rock
Biotope complex:	F	Fucoids on sheltered marine shores
Biotope:	Fsip	<i>Fucus spiralis</i> on sheltered upper eulittoral rock
	FS	<i>Fucus spiralis</i> on full salinity sheltered upper eulittoral rock
		
Upshore overview (south)		Western overview from Core Site 4
<p><b>Description of observed biotope:</b> The biotope was present in the upper shore, south west corner of the survey area. The biotope <b>LR.LLR.F.Fsip.FS</b> formed a mosaic biotope with <b>LS.LSa.FiSa.Po</b> as it was attributed to boulders and small areas of emergent bedrock within a fine sand area characterised mostly by the presence of the lugworm, <i>Arenicola</i>. The boulders and bedrock were colonised chiefly by <i>Fucus spiralis</i> with a presence of <i>Ulva</i> and some <i>Porphyra</i>.</p>		

## **12C.7 Subtidal Survey Results**

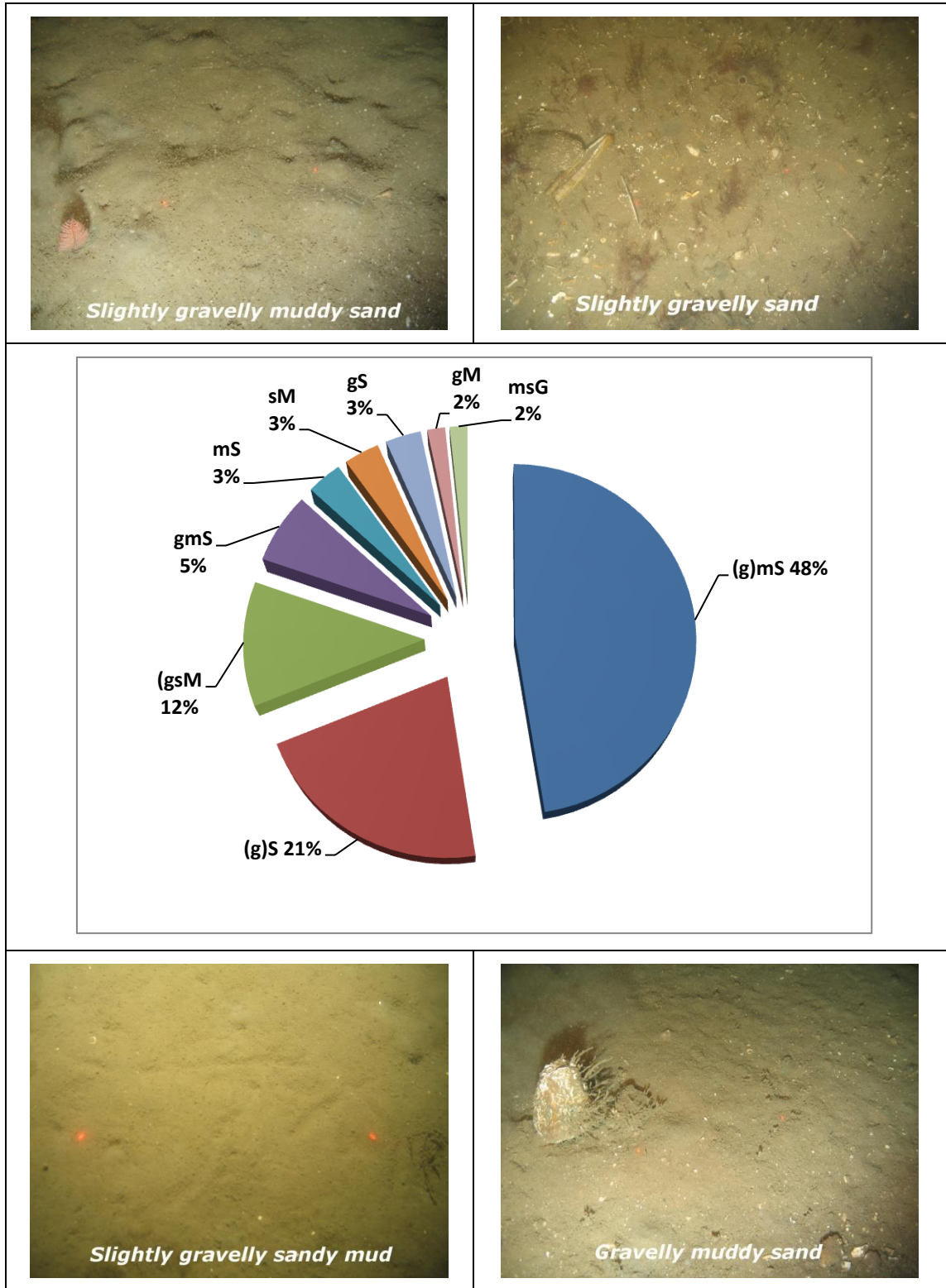
### **12C.7.1 Sediment Analysis**

Results of the sediment particle size analysis of the 13 newly acquired grab samples, including fractional weight and percentage data and Folk sediment classifications, are presented in Annex 12C.5.

Together with results of the historic sediment sampling, a total of nine different Folk sediment classifications have been recorded along the subtidal cable corridor, the relative proportions of which are presented in Table 12C.28. The dominant fraction was slightly gravelly muddy sand ((g)mS) (the gravel component comprising fine shell material) which accounted for 47 per cent of the results (27 sites), followed by slightly gravelly sand ((g)S), which accounted for 22 per cent (13 sites). Another 12 per cent was the fraction slightly gravelly sandy mud ((g)sM) (7 sites).

Figure 12C.11 shows the distribution of the Folk sediment classifications. Figure 12C.12 shows the distribution of principal sediment components (per cent mud, per cent sand, per cent gravel).

**Table 12C.28: The Proportions of Folk Sediment Classification from the Sediment Samples for Inch Cape Offshore Export Cable Corridor. Slightly Gravelly Muddy Sand ((g)mS), Slightly Gravelly Sand ((g)gS), Slightly Gravelly Sandy Mud ((g)sM), Gravelly Muddy Sand (gmS), Muddy Sand (mS), Sandy Mud (sM), Gravelly Sand (gS), Gravelly Mud (gM), Muddy Sandy Gravel (msG)**



### 12C.7.2 Seabed Video Data

Annex 12C.6 presents the results of the analysis of the seabed video data (combined 2009 and 2012 data) including descriptions of sediment habitat, conspicuous fauna and biotope classifications. SACFOR abundance of fauna recorded at each video site is presented in Annex 12C.7. Figure 12C.13 summarises the distribution of seabed types interpreted from the video survey.

The results support the findings of the PSD analyses above and highlight the dominance of muddy sand and sandy mud sediment habitats along the Offshore Export Cable Corridor. In addition, the video survey recorded coarser mixed sediment with boulders and cobbles and exposed bedrock around the Isle of May.

Figure 12C.15 presents the distribution of biotopes identified from both the current survey and from the previous benthic ecology survey on behalf of NnG at the landfall. Table 12C.29 shows some selected images of the main representative biotopes present along the Offshore Export Cable Corridor.

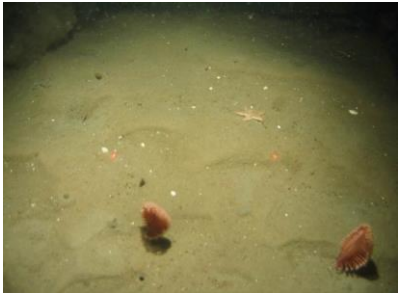
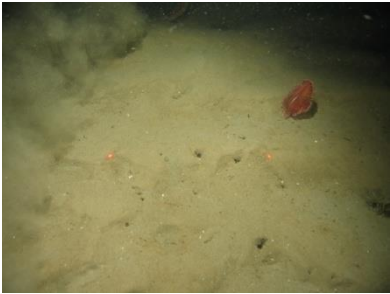


The dominant mud/sand substrates areas were associated with burrows and holes, including the burrows of the prawn *Nephrops norvegicus*, together with sea pens *Pennatula phosphorea* and *Virgularia mirabilis* and sediment mounds produced by megafauna. This association corresponded with the **SS.SMu.CSaMu.SpnMeg** biotope which is a component of the UKBAP ‘mud habitat in deep water’ and the Scottish PMF “burrowed mud”. Coarser substrates with cobble and boulders generally occurred as patches within the wider muddy sand plains and consistent with observations described in Appendix 12D.

Sediments were more locally heterogeneous close to the shore and in shallower waters and were classified as IMx and CMx derived biotopes, describing infralittoral and circalittoral mixed sediments respectively. Coarser sediments were often found supporting *Alcyonium digitatum* and hydroid/bryozoan turf species with *Flustra foliacea* and some *Hydrallmania falcata* together with queen scallop *Aequipecten opercularis*. This sediment/faunal association matched the **SS.SMx.CMx.FluHyd** biotope classification (describing *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment). Other conspicuous species associated with this sediment habitat type included the rugose squat lobster *Munida rugosa* and the echinoderms *Asterias rubens* and *Astropecten irregularis*. Note that for mapping and assessment purposes, biotopes associated with the coarse sediment, including rocky and stony reef habitats, were incorporated under the this biotope classification (see Appendix 12D).

Shallow, inshore areas (Sites N117 and N119) close to Seton Sands were characterised by the polychaetes *Sabella pavanina*, *Lanice conchilega* and red seaweeds (Rhodophyceae). The biotope assigned to this habitat was **SS.SMX.CMx**.







**Table 12C.29: Selected Seabed Images of Representative Biotopes. Description of All Sites, Including the ones Selected from 2009 Survey in the Area, is Provided in Annex 12C.6**

<b>Representative Image of the Main Biotopes Identified</b>	
	
<b>SS.SMu.CFiMu.SpMmeg</b> - Seapens and burrowing megafauna in circalittoral fine mud	
	
Patches of <b>SS.SSa.CMuSa</b> in between impoverished <b>SS.SMx.CMx.FluHyd</b>	<b>SS.SMx.CMx.FluHyd</b>

Patches of cobbles and boulders recorded at four video transect sites (sites V1, V2, V7 and V11) were assessed in terms of their resemblance to Annex I stony reef criteria (Irving, 2009). These were also identified in Appendix 12D Biotope Mapping. The location of these sites can be seen in Figure 12C7. A full assessment of the attributes of these substrates is provided in Annex 12C.8. Table 12C.30 summarises the results of this assessment.

**Table 12C.30: Summary of the Measure of Reefiness of Rocky Substrates Encountered within the Vicinity of the Inch Cape Offshore Export Cable Corridor. Full Assessment Presented in Annex 12C.8**

Site	Seabed description	Reef	Representative Image	Biotope
V1	80% cobbles and/or boulders/bedrock	Medium		CR.MCR.EcCr.FaAlCr.Bri
V2	60% cobbles and/or boulders/bedrock	Medium		Mosaic of: CR.MCR.EcCr.FaAlCr.Adig and CR.MCR.EcCr.FaAlCr.Pom
V7	40% cobbles and/or boulders/bedrock	Low		SS.SMx.CMx.FluHyd
V11	40% Boulders	Low		SS.SMu.CFiMu.SpnMeg becoming:- SS.SMx.CMx.FluHyd with occasional patches of:- SS.SMx.CMx.CIoMx.Nem

As indicated in Table 12C.30, (above), the cobble and boulder substrates at Sites V1 and V2 were considered to have medium resemblance to Annex I geogenic reef. The former comprised a boulder reef, possibly on bedrock rising very steeply towards the shore at Isle of May. The latter comprised a coarse mixed sediment plain, with the density of boulders generally increasing with decreasing distance to shore of the Isle of May. These features lie outside of the current boundaries of the Offshore Export Cable Corridor and are therefore unlikely to be directly affected by installation activities.

The features recorded at Transects V7 and V11 were considered to have low resemblance to Annex I reef criteria. These were found to comprise patches of boulders and cobbles within a wider matrix of consolidated ground of bedrock or muddy sand/sandy mud areas. Transects V7 and V11 are located on and just outside the northern boundary of the Offshore Export Cable Corridor in the vicinity of the Isle of May.

Typical fauna associated with the rocky and stony habitats included encrusting and sessile species (e.g. Corallinaceae, *Pomatoceros*, *Alcyonium digitatum*, *Urticina/Stomphia*, *Flustra foliacea*, Hydroid/Bryozoan turf species) but also grazers (*Echinus esculentus*) and mobile fauna (e.g. *Asterias rubens*, *Cancer pagurus*, *Liocarcinus depurator*, *Luidia ciliaris*). Dense aggregations of the epifaunal brittlestar *Ophiothrix fragilis* were observed on cobbles and boulders.

The associated biotopes were present as mosaics, reflecting the local substrate heterogeneity. These included **CR.MCR.EcCr.FaAlCr.Bri** (brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock), **CR.MCR.EcCr.FaAlCr.Adig** (*Alcyonium digitatum*, *Pomatoceros triqueter*, algal and bryozoan crusts on wave-exposed circalittoral rock), **CR.MCR.EcCr.FaAlCr.Pom** (faunal and algal crusts with *Pomatoceros triqueter* and sparse *Alcyonium digitatum* on exposed to moderately wave-exposed circalittoral rock) and **SS.SMx.CMx.FluHyd** (*Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment) potentially mixed with occasional patches of **SS.SMx.CMx.CiloMx.Nem** (*Cerianthus lloydii* with *Nemertesia* spp. and other hydroids in circalittoral muddy mixed sediment).

### 12C.7.3 Seabed Contaminants

Contaminant samples for the analysis of total polycyclic aromatic hydrocarbon (PAH), metals and organotin (TBT) compounds were taken at 11 locations in the survey area during July 2012 (Grab Sites 1, 3, 6, 7, 8, 10, 14, 15, 17, 20 and 23). The results of these analyses are presented in Annex 12C.9 and are compared against Effects Range Low (ER-L)<sup>1</sup> levels and Effects Range Medium (ER-M)<sup>2</sup> levels. These levels are guidelines for assessment used by OSPAR, Cefas action levels (CEFAS, 2003) and Clean Seas Environment Monitoring Programme (CSEMP) guidelines (NJDEP, 2009, CSEMP, 2012). Concentrations below the ERL are evaluated as rarely causing adverse effects in marine organisms while those above the ER-M will cause adverse effects in some marine organisms in 50 per cent of case studies (OSPAR, 2009).

#### PAHs

Total PAH levels were between <0.103-3.66 mg/kg, therefore well below the available Cefas action level of 100 mg/kg. Most of the single PAH concentrations were below the ER-L guideline levels. Concentrations at Site 23, located in the near-shore approaching the

<sup>1</sup> Effects Range Low (ER-L) is the concentration at which adverse benthic impacts are found in approximately 10% of the studies (NJDEP, 2009). Adverse effects on organisms are rarely observed when concentrations fall below the ER-L levels (OSPAR, 2009).

<sup>2</sup> Effects Range Medium (ER-M) is the concentration above which adverse benthic impacts were found in more than 50% of the case studies (NJDEP, 2009)

proposed Cockerzie Cable Landfall option, were found above ER-L for anthracene, benzo(a)anthracene, benzo(ghi)perylene, Indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene and acenaphthene. Concentrations of fluorene were also found above ER-L at Sites 14 and 10, whilst concentrations of acenaphthene were found above ER-L at Sites 14, 10 and 8.

### **Metals**

The majority of the metals concentrations were below the guideline levels with the exception of mercury and nickel. Mercury concentrations were generally low offshore but exhibited a gradient of increasing concentrations with decreasing distance to the landfall options at Cockerzie and Seton Sand (see Figure 12C.15). Nickel, concentrations, however, showed no distributional pattern with comparatively elevated levels occurring at both offshore and near-shore locations.

A summary of the concentrations of other metals is illustrated in Figure 12C.16. This shows that levels were generally well below the ER-M.

### **Organotins**

Levels of organotins (Table 12.31) fell within Class B and C of the OSPAR reference levels OSPAR (2009) (Table 12C.32). This is a six class assessment scheme for TBT-specific biological effects in dogwhelks and other gastropods. The classes are described by a coloured scale which indicates if the Ecological Quality Objectives (EcoQOs) are met (green) providing an indication of the effects that concentration levels of TBT may have on the reproductive capability of sensitive key species (OSPAR, 2009).

**Table 12C.31: Results of TBT in Sediments**

Site	Tributyl Tin (TBT) : Dry Wt as Cation ( $\mu\text{g}/\text{kg}$ )	Class
Site 15	<5	C
Site 17	<7	C
Site 20	<4	C
Site 3	<4	C
Site 7	<4	C
Site 6	<4	C
Site 1	<4	C
Site 23	<6	C
Site 14	7	C
Site 10	<5	C
Site 8	<5	C

**Table 12C.32: Assessment Classes for TBT (OSPAR, 2009).**

Assessment Class	TBT sediment ( $\mu\text{g TBT} / \text{kg dw}$ )
A	n.d.
B	< 2
C	2 - <50
D	50-<200
E	200 -500
F	>500

## 12C.8 Discussion

This study characterises the intertidal and subtidal benthic habitats and associated macrofaunal and macroalgal communities within the potential influences of the construction and operation of the ICOL Offshore Export Cable and attempts to provide a wider ecological context, within which these characterisations can be set. The survey specific and wider context data will inform the EIA and subsequent ES.

With regard to impact assessment, the key outputs of this study are the series of intertidal biotope maps showing the variety, extent and distribution of the benthic habitats and characterising communities present within and around the Offshore Export Cable Corridor including landfall options. Biotopes encompass both habitat and species components and so represent convenient biological units for which high quality and peer reviewed sensitivity data exist via the Marine Life Information Network ([www.MarLIN.ac.uk](http://www.MarLIN.ac.uk)). This means that biotopes are particularly useful for environmental assessment purposes and can be used as important tools for assessing the potential effects of the Project on benthic ecology in the subsequent EIA.

A map of the subtidal biotopes has not been provided in this occasion although biotopes have been classified to facilitate assessment. A new habitat interpretation of the Offshore Export Cable Corridor has been developed separately in relation to similar studies at the Development Area (see Appendix 12D).

### 12C.8.1 Intertidal Environment

Cockenzie was divided into two main areas, one classified as hard substratum and one by mixed substrata. The mixed substrate in the south of the surveyed area ranged from sandy gravel on the upper to mid shore, to sandy gravel and cobbles on the mid to lower shore, with small boulders present on the extreme low shore and subtidal. Algal growth was prevalent on the mid to lower shore with the presence of the biotope **LR.FLR.Eph.BLitX** likely influenced by freshwater runoffs, whilst further down the shore fucoids became more prevalent due to increased tidal submergence time. The fucoid biotope of **LR.LLR.F.FspiX** was thus present. The hard substrata in the northern half of the Cockenzie survey area showed typical zonation for a rocky shore. The fucoid *Pelvetia canaliculata* was present on the upper shore in the biotope **LR.MLR.BF.PeIB**, whilst sparse fucoid cover was found amongst barnacles on the mid shore (**LR.HLR.MusB.Cht.Cht**) and fucoids returned on the mid to lower shore (**LR.MLR.BF.FspiB**) leading to the kelp biotope of **IR.MIR.KR.Ldig.Ldig** on the extreme low shore. *Laminaria digitata* was also present in the southern half of the survey area, likely due to the presence of larger cobbles and bedrock. There was also an area of soft sediment on the extreme low shore, classified as **LS.LSa.MuSa.Lan**.

None of the biotopes or fauna/flora found within the Cockenzie survey area were deemed to be of significant conservation value but, some of the biotopes could be classified under the Annex I habitat of reef (**LR.MLR.BF.PeIB**, **LR.HLR.MusB.Cht.Cht**, **LR.MLR.BF.FspiB**, and **IR.MIR.KR.Ldig.Ldig**) or mudflats and sandflats not covered by seawater at low tide (**LS.LSa.MuSa.Lan**). Additionally **LR.FLR.F.FspiX** is a biotope classified as typical of the Annex I large shallow inlet and bay physiographic type.

Seton Sands survey area consisted predominantly of fine sand habitats, though a small area of hard substrata classified as **LR.LLR.F.Fspi.FS** occurred within a fine sand biotope on the upper shore. A series of upper to mid shore mobile sand banks (**LS.LSa.MoSa.AmSco.Sco**) led to a large mid to low shore polychaete dominated biotope (**LS.LSa.FiSa.Po**). Polychaete worms were present in large numbers down into the low shore but the bivalve mollusc, *Angulus tenuis*, was present in sufficient numbers on the extreme low shore for the **LS.LSa.FiSa.Po** biotope to be further classified to **LS.LSa.FiSa.Po.Aten**.

None of the biotopes or fauna/flora found within the Seton Sands survey area were deemed to be of significant conservation value but, some of the biotopes could be classified under the Annex I habitat of mudflats and sandflats not covered by seawater at low tide (**LS.LSa.MoSa.AmSco.Sco**, **LS.LSa.FiSa.Po** and **LS.LSa.FiSa.Po.Aten**) or reef (**LR.FLR.F.Fspi.FS**). **LR.FLR.F.Fspi.FS** is also classified as typical of the Annex I large shallow inlet and bay physiographic type.

### 12C.8.2 Subtidal Benthic Ecology

Current data support the findings of earlier investigations describing relatively homogeneous muddy sand substrates throughout the majority of the offshore areas of the Offshore Export Cable Corridor characterised by seapens, burrowing megafauna. Grab sampling in 2009 (EMU, 2010) showed that this habitat type supported a relatively rich and diverse infauna (413 species) characterised by the infaunal brittlestar *Amphiura filiformis*, the polychaetes *Spiophanes bombyx*, *Lumbrineris gracilis*, *Galathowenia oculata*, *Spiophanes kroyeri* and bivalves *Mysella bidentata* and *Thyasira flexuosa*. As discussed at the time (EMU, 2010), this combination of sediment type and faunal attributes suggested a stable, low energy environment corresponding with the UKBAP ‘mud habitat in deep water’ and Scottish draft “burrowed mud” PMF and represented by the **SS.SMu.CSaMu.SpnMeg** biotope classification. This study has confirmed this initial interpretation and has shown that this biotope is more extensive along the Offshore Export Cable Corridor than previously assessed (EMU, 2010). This study has therefore extended the likely range of burrowed mud PMF in the Firth of Forth and supports a widespread distribution throughout the region.

Seapens and burrowing megafauna were generally not recorded at the most offshore extremities of the Export Cable Corridor. This may relate to relative changes in depth, exposure (current streams and associated bed stresses) and / or sediment composition resulting in unfavourable habitat conditions for colonisation by the key species such as seapens and larger burrowing crustaceans such as *N. norvegicus*. Biotope classification for these offshore areas was therefore attenuated at **SS.SMu.CSaMu** (circalittoral sandy mud sediments).

Comparatively coarser and more mixed sediment biotope types including (**CCS** and **CMx**) were recorded close inshore reflecting the mixed substrate habitats and associated faunal communities present at these locations. Previous sampling (EMU, 2010) recorded mixed gravelly muddy sand and sandy gravel with associated encrusting and attaching fauna i.e. barnacles Cirripedia and *Verruca stroemi*, encrusting worms *Pomatoceros lamarcki* and sea squirts Ascidiacea and mussels Mytilidae together with a wide range of other infaunal species including the polychaetes *Scoloplos armiger*, *Janice conchilega*, *Galathowenia oculata*,

*Lumbrineris gracilis* and abundant *Melinna palmata* in places, the bivalves *Abra alba*, *Fabulina fabula* together with *Aequipecten opercularis* and the amphipod *Ampelisca brevicornis*. Shallow water sand sediments matched the **SS.SSA.IMuSa.FfabMag** biotope classification (describing the bivalve *Fabulina fabula* and the polychaete *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand) and broadly corresponded with the **SS.SCS.IC.SLan** classification (dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand and mixed gravelly sand). This latter biotope was also recorded during the intertidal surveys and so may be continuous with coastal habitats.

Hard seabed habitat was, in comparison, was only infrequently observed during the current survey. This included patches of mixed muddy coarse sediment, cobbles and boulders possibly representing exposed Wee Bankie formation within or close to the boundaries of the Offshore Export Cable Corridor. In addition, larger cobbles and exposed bedrock habitat was noted around the Isle of May and are likely to be continuous with the intertidal rocky reefs here. These habitat types supported a variety of typical attaching and encrusting species including soft corals, bryozoans, hydroids, calcareous tube worms, anemones and barnacles. Further, the upper surfaces of cobbles and boulders supported dense populations of the epifaunal brittlestar *Ophiothrix fragilis* where presumably the presence of relatively stronger tidal current streams facilitates filter feeding. The squat lobster *Munida rugosa* was also frequently observed sheltering under larger stones, cobbles and boulders. Hard seabed habitats were locally very variable and these substrates are likely to represent a mosaic of biotopes. For mapping and assessment purposes, coarse and stony and rocky biotopes were combined under the **SS.SMxCMx.FluHyd** biotope classification (Appendix 12D).

Subtidal biotopes recorded during the current study are summarised in Table 12C.33 below. Some of these relate to habitats of potential nature conservation importance.

**Table 12C.33: Summary of Biotopes Identified within the Offshore Export Cable Corridor for Inch Cape**

Biotope	Name	Related habitat	Importance
<b>SS.SMu.CFiMu.SpnMeg</b>	Circalittoral muddy sand with seapens and burrowing megafauna	Burrowed mud.	Scottish Priority Marine Feature (PMF).
<b>SS.SMx.CMx</b> <b>SS.SMx.CMx.FluHyd</b> <b>SS.SMx.CMx.OphMx</b> <b>CR.MCR.EcCr.FaAlCr</b> <b>CR.MCR.EcCr.FaAlCr.Bri</b> <b>CR.MCR.EcCr.FaAlCr.Pom</b> <b>CR.MCR.EcCr.FaAlCr.Adig</b> <b>SS.SCS.CCS</b>	Circalittoral and infralittoral coarse sediment, cobbles, boulders and rock with sessile epifaunal and algal communities	Stony and rocky reef	EC Habitats Directive Annex I (geogenic reef) habitat.



Important habitats identified included “burrowed mud”. This is currently on the Scottish draft list of PMF for which Marine Protected Areas (MPAs) will be recommended. This type of habitat (represented here by the **SpnMeg** biotope) covered extensive areas of the Offshore Export Cable Corridor and is likely to occur widely throughout the region. Only a very small proportion of this habitat is likely to be temporarily affected by the cable proposals at the regional level. This will be subject to detailed assessment in the ES.

Cobbles, boulders and rocky outcroppings around the Isle of May were regarded as having moderate to low resemblance to Annex I (EC Habitats Directive) stony and rocky geogenic reef. As mentioned above, biotopes associated with stoney and rocky reefs were incorporated under the SS.SMx CMx.FluHyd classification for mapping and assessment purposes (Appendix 12D).

### 12C.8.3 Seabed Contaminants

Contaminants concentration higher than ER-L levels were compared against values recorded at a national level and available in EcoSystem (ICES, 2012), the ICES database containing a variety of field data, including contaminants data collected between the years 1877 to 2012 and Marine Environment Monitoring and Assessment National database (MERMAN). The latter includes monitoring stations within the Firth of Forth obtained under the Clean Seas Environmental Monitoring Programme (CSEMP); the MERMAN database is accessible via British Oceanographic Data Centre (BODC, 2012).

As discussed below, results from this investigation reflect the environmental status of the Firth of Forth, as evident by the comparison with the data held in the CSEMP database (CSEMP, 2012). With the exception of nickel (Ni), metals show higher concentrations in sediments located in the near-shore part of the Offshore Export Cable Corridor. The trendline indicates greater concentrations inshore compared to offshore.

#### **PAH**

PAHs in the marine environment have both natural and anthropogenic sources (OSPAR, 2009). Anthracene, Benzo(a)anthracene, Benzo(ghi)perylene, Fluorene, Indeno(1,2,3-c,d)pyrene, Naphthalene, Phenanthrene and Acenaphthene were detected as being above ER-L levels. All the sites showing PAH values above ER-L levels are located in the near-shore part of the Offshore Export Cable Corridor survey. Site 23, where most of the values exceed the assessment criteria, is located in the part of the Offshore Export Cable approaching the Cockenzie Cable Landfall. All the values are well below the ER-M.

Concentrations of anthracene from the Firth of Forth, recorded between 2004 and 2006, ranged between 44.9-87 µg/kg moving east to west, suggesting that concentrations increase into the inner firth and approaching the coastal area. Values over 150 µg/kg were also recorded at Site 23, within the Export Cable Corridor close to the Cockenzie shore. Concentrations in sediment recorded during monitoring between 2003-2007 shows concentrations above ER-L and background levels in the Firth of Forth for anthracene (OSPAR, 2009 – Annex 3).

Concentrations above the ER-L level for benzo(a)anthracene were recorded for the Firth of Forth between 2003-2007 (OSPAR, 2009 – Annex 3). The only site where the concentration is above ER-L in the present investigation is Site 23.

Records of concentrations for benzo(ghi)perylene in the area indicate that this component has always been detected in high concentrations in the area around the sites where the levels exceeded ER-L levels. Values recorded intermittently since 1999 and including 2006 data range between 130-280 µg/kg, values which are well above the ER-L levels. Therefore the values detected during the present investigation (see Annex 12C.9) are in line with the values recorded for the area. Concentrations in sediment recorded during monitoring between 2003 – 2007 have been detected as being above ER-L and background levels in the Firth of Forth for benzo(ghi)perylene (OSPAR, 2009 – Annex 3).

Concentrations in sediment recorded during monitoring between 2003 – 2007 show levels above ER-L and background levels in the Firth of Forth for phenanthrene (OSPAR, 2009 – Annex 3; CSEMP, 2012).

The concentrations of fluorene, acenaphthene and naphthalene are generally comparable to the concentrations records in CSEMP (2012). The values which differ slightly are those on or aligned to the Cockenzie Cable Landfall option.

#### **Metals**

Records in the CSEMP database (CSEMP, 2012) show that levels on nickel and mercury in the Firth of Forth are above CSEMP ER-M levels at the monitoring stations in proximity of the Offshore Export Cable Corridor. Levels of the other metals were found to be above CSEMP ER-L but below the CSEMP ER-M. The CSEMP database (CSEMP, 2012) provides evidence that high concentrations of chromium (Cr), copper (Cu), zinc (Zn), lead (Pb) have been recorded in the area. Elevated concentrations of cadmium in UK waters are found around the estuaries of large rivers (OSPAR, 2009).

#### **Organotins**

High concentrations of TBT are known to be problematic for sensitive gastropods (OSPAR, 2009). All concentrations of TBT found during the contaminants analysis fall in Class C (where concentrations range from 2 µg/kg to <50 µg/kg) with a concentration very close to the lower end of the range (see Table 12C.31). The historic data of concentrations of TBT in sediments (EMU, 2010) fall in Class B (where values at all sites being <2 µg / kg) (OSPAR, 2009, Table 12C.32).

As stated by OSPAR (2009), the large majority of the concentrations from both coastal and offshore locations, used to calculate the levels presented in Table 12C.32 fall into assessment classes B and C, and as such the concentrations detected during the present study would not be expected to affect the reproductive capability of sensitive key gastropod species. The concentrations of TBT found from the samples collected during the present investigation are therefore unlikely to present a problem in this respect.

## 12C.9 Conclusions

This study, in combination with data acquired from previous similar investigations, has characterised the benthic habitats and associated epifaunal communities within the Inch Cape Offshore Export Cable Corridor. These data are intended to inform the associated ES to be provided in support of the development application.

Areas along the Offshore Export Cable Corridor were found to be dominated by stable, homogeneous muddy sand/sandy mud sediment habitats supporting sea pens and burrowing megafauna. This association of sediment and fauna matched the UKBAP 'mud habitat in deep water' habitat and the 'burrowed mud' habitat listed on the Scottish draft list of PMF.

Habitats elsewhere along the Offshore Export Cable Corridor were predominantly composed of mixed sand and gravel sediments supporting a range of typical sessile epifauna.

Larger cobbles and exposed bedrock habitat was noted around the Isle of May and is likely to be continuous with the intertidal rocky reefs of the island. Their resemblance to establish criteria for Annex I stony and rocky reefs (EC Habitats Directive Annex I habitat) was been assessed as being medium to low.

Juvenile specimens of the the PMF species *Arctica islandica*, have been recored during previous survey throughout the outer Firth of Forth.

Concentrations of sediment contaminants were generally above the ER – L, but below the ER-M and found to be aligned with typical leveles detected in the area by other investigations.

Figure 12C.1: ICOL Development Area and Offshore Export Cable Corridor

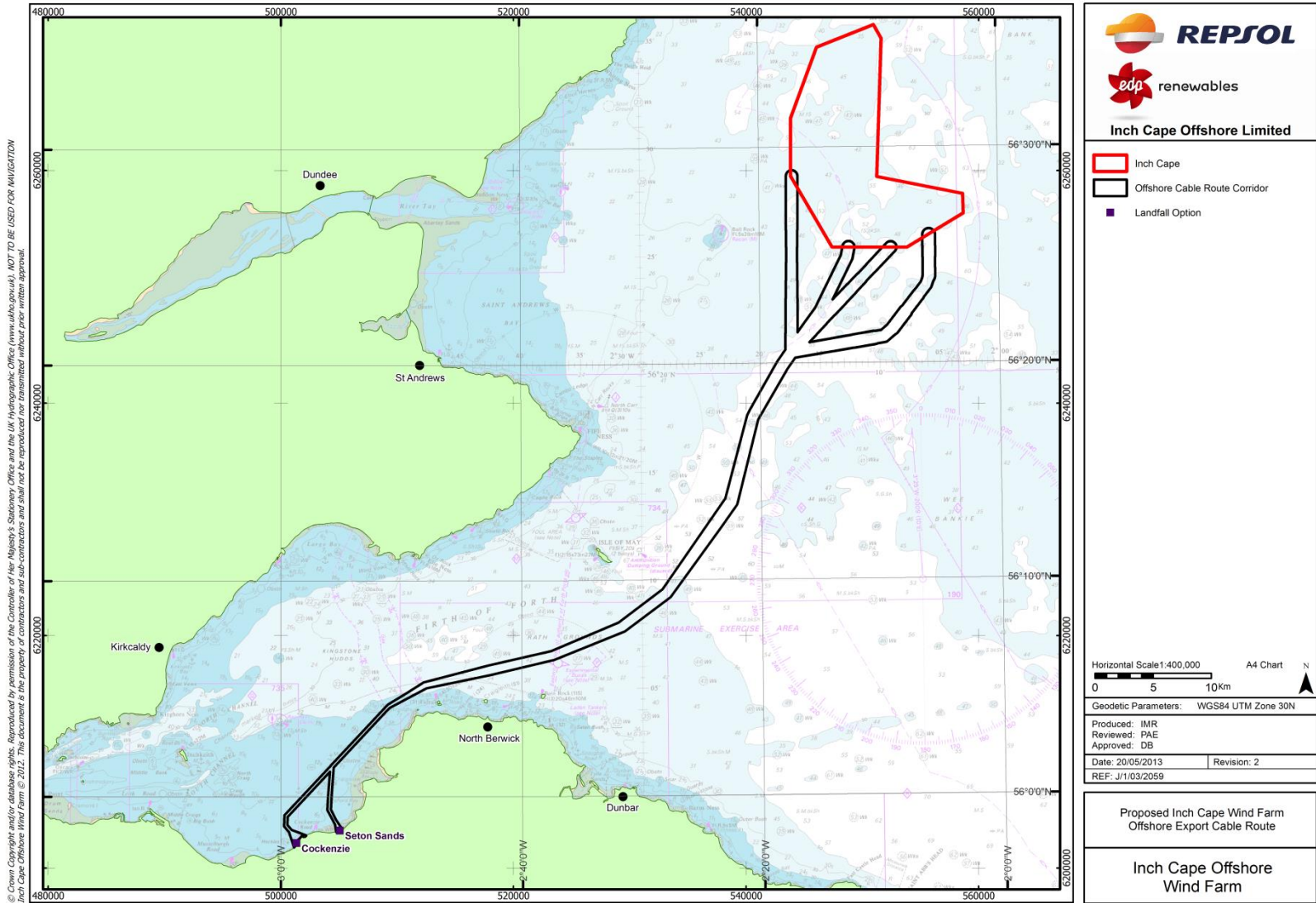


Figure 12C.2: Cockenzie Cable Landfall Intertidal Biotope Map (Source: EMU, 2010)



Figure 12C.3: Inch Cape Offshore Export Cable Corridor Overlaid onto Broad-Scale Predicted MESH Habitats

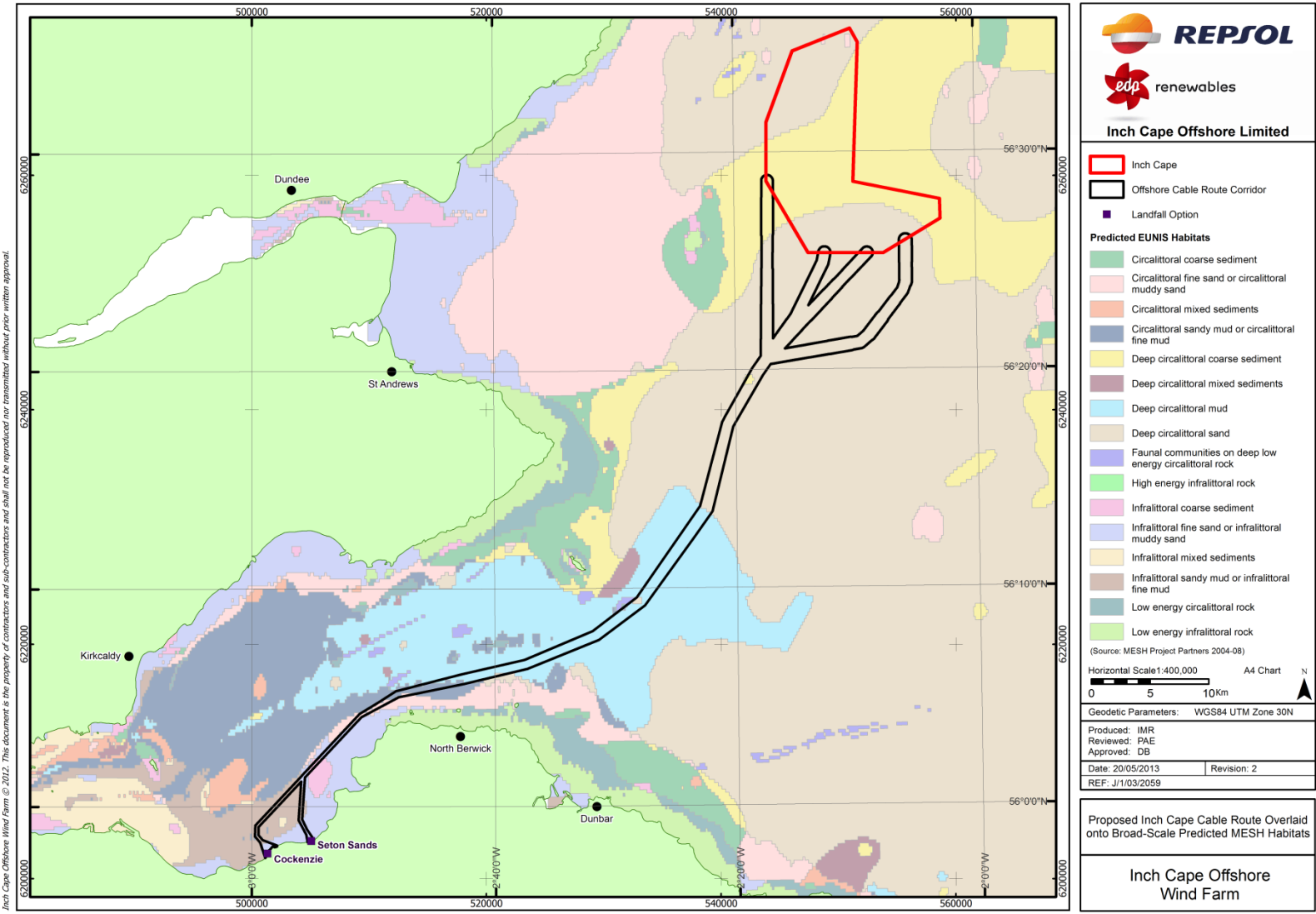


Figure 12C.4: Primer Interpretation of Sediment Faunal Association (Source: EMU, 2010)

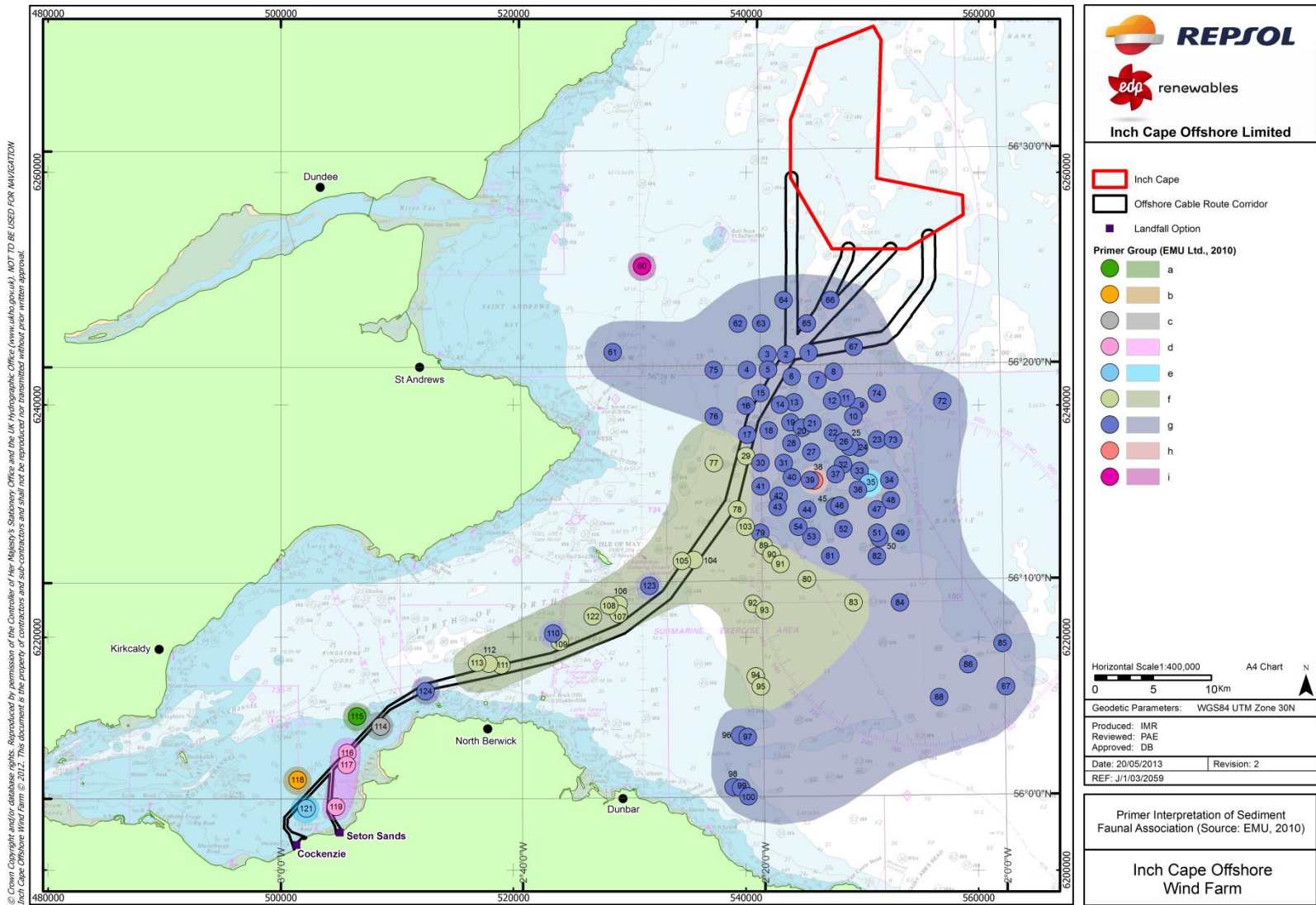


Figure 12C.5: Intertidal Survey Areas at the Proposed Landfall Options Cockenzie and Seaton Sands

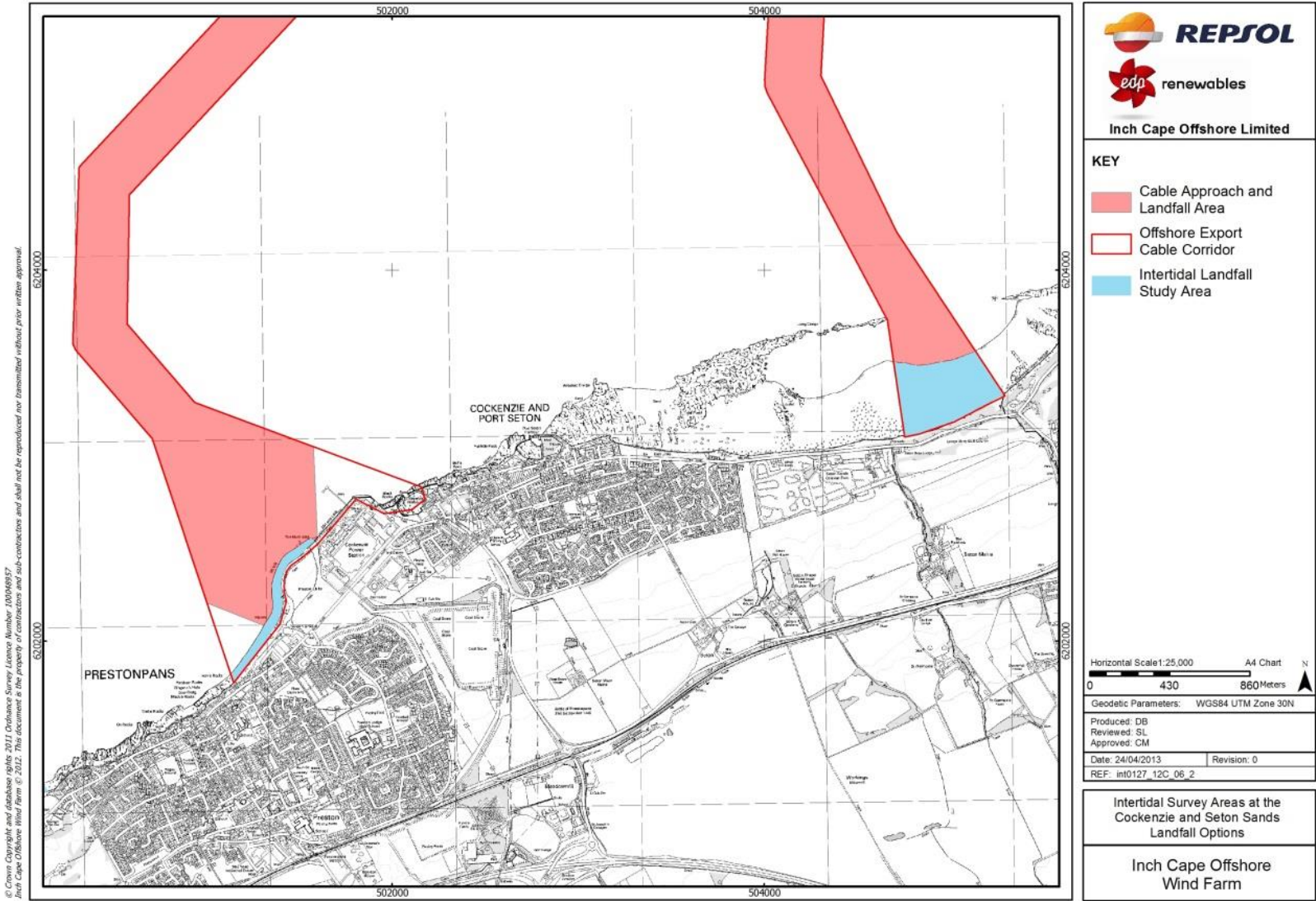




Figure 12C.6: Subtidal Survey Array Including Historic Sampling Sites

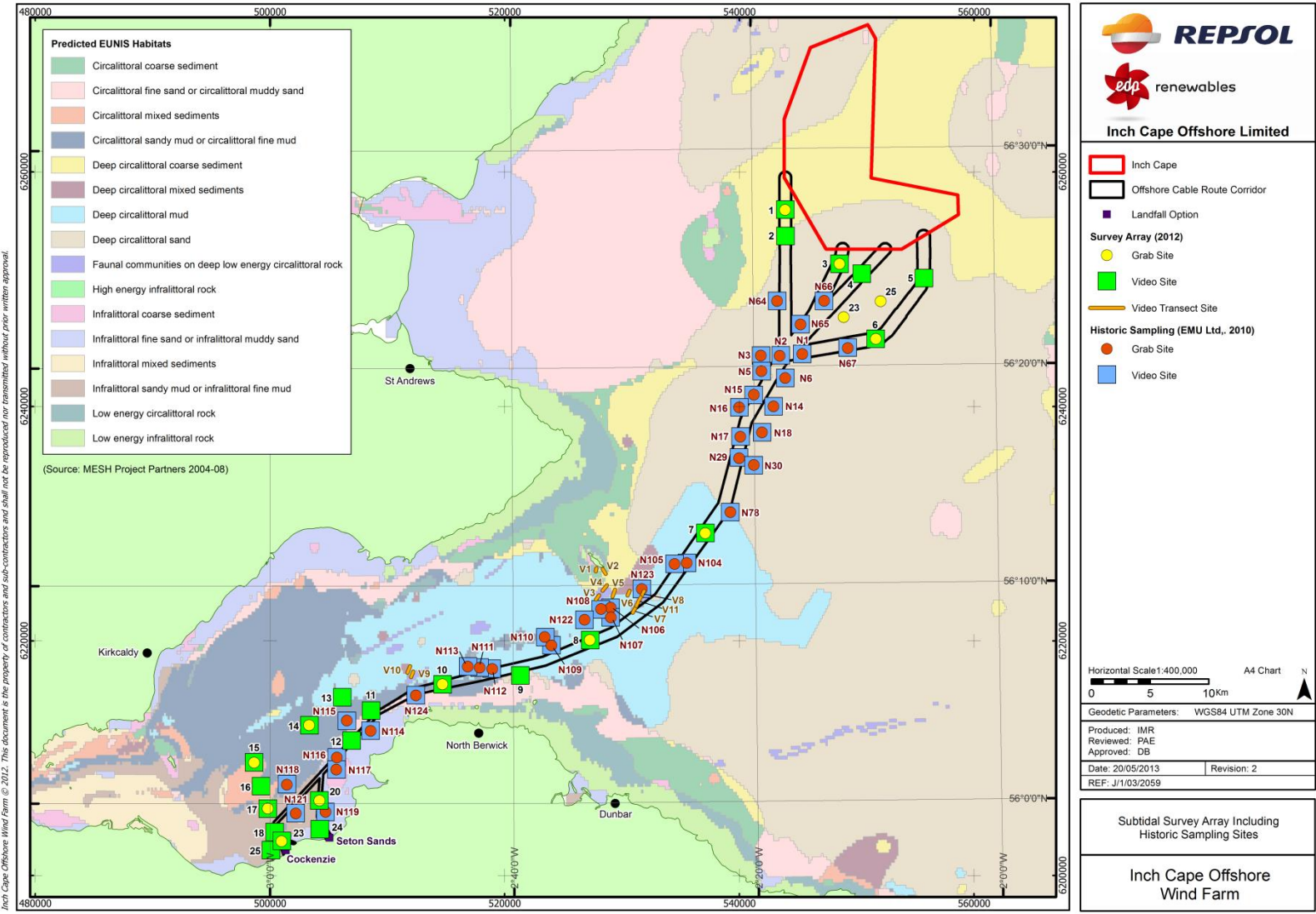


Figure 12C.6a: Subtidal Survey Array Including Historic Sampling Sites (near Development Area)

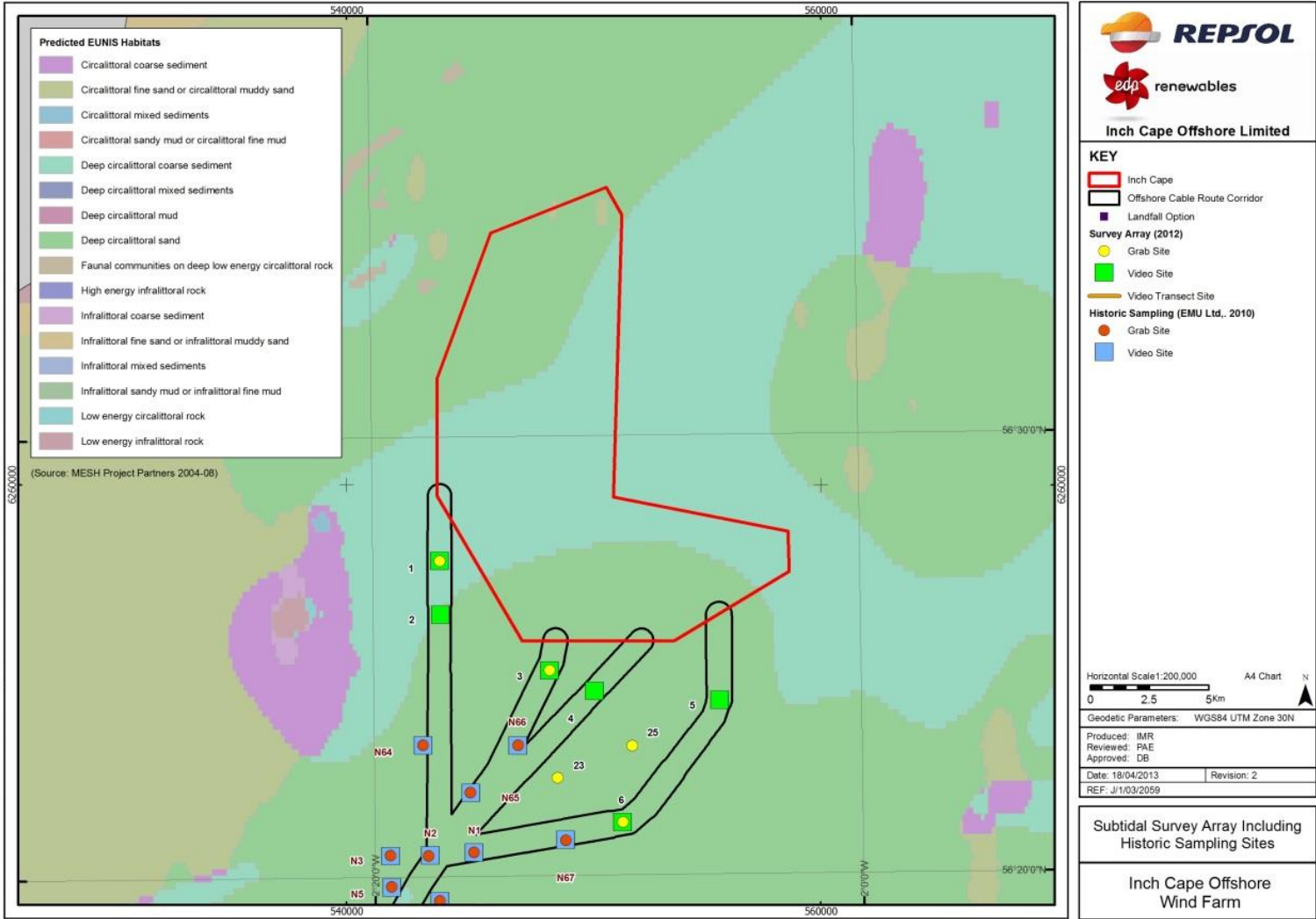


Figure 12C.6b: Subtidal Survey Array Including Historic Sampling Sites (Mid-section)

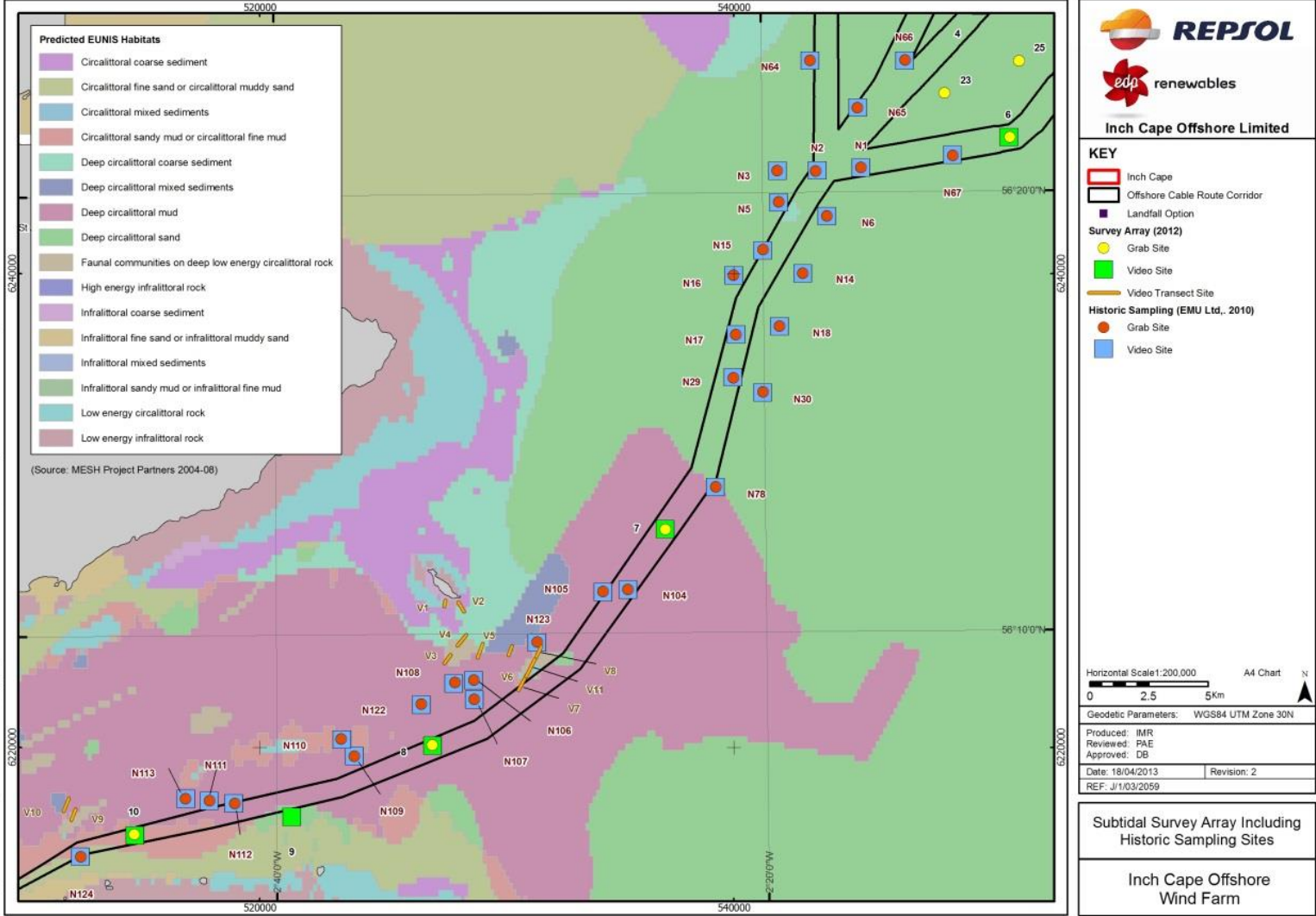
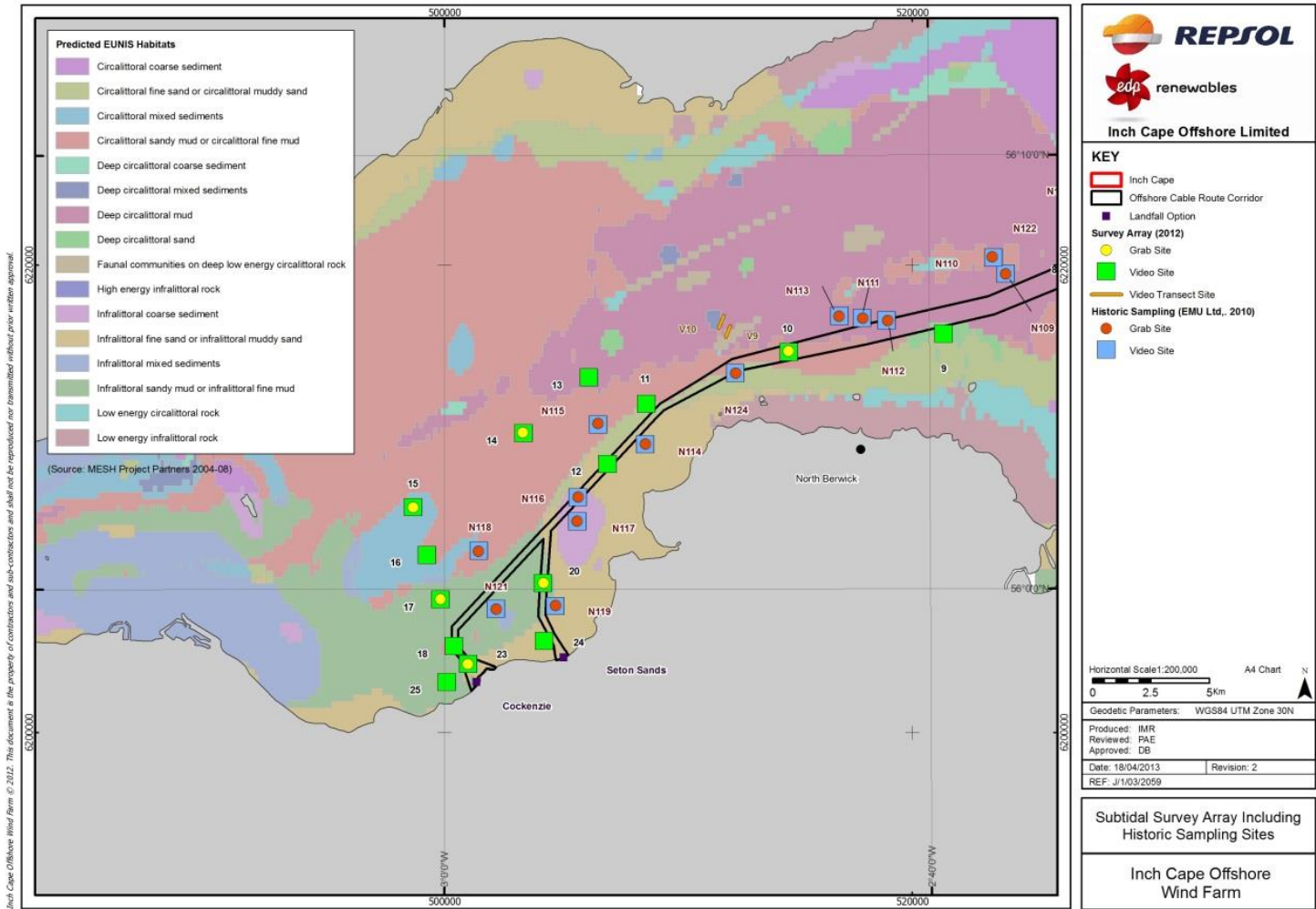



Figure 12C.6c: Subtidal Survey Array Including Historic Sampling Sites (Near-shore)



**Figure 12C.7: Summary Specifications of the FV Shamariah**

<b>FV Shamariah</b>	
	
<b>Call Sign</b>	MLRM2
<b>LOA</b>	22.07 m
<b>Beam</b>	6.68 m
<b>Draft</b>	3.44 m
<b>Gross Tonnage</b>	140 t
<b>Speed (cruising)</b>	9 knots
<b>Mobilisation Port</b>	Fraserburgh
<b>Fraserburgh</b>	Montrose

**Figure 12C.8: Drop Down Video Frame**

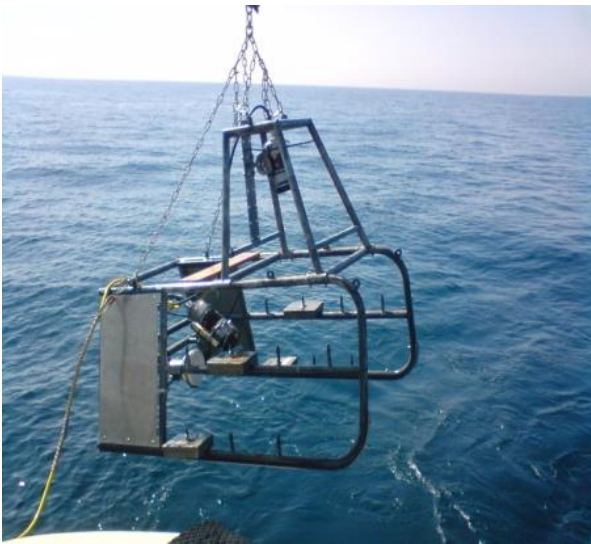
	<p><b>Video system:</b></p> <ul style="list-style-type: none"> <li>● Kongsberg OE14-208 new generation digital stills colour camera;</li> <li>● drop down/towed video frame with adjustable weight system;</li> <li>● subsea camera telemetry cable system (200 m);</li> <li>● two 150W LED lights providing illumination;</li> <li>● Two laser pointers positioned either side of the camera, 10 cm apart, providing an indication of scale.</li> </ul>
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Figure 12C.9: Intertidal Biotope Map for the Proposed Cockenzie Cable Landfall



Figure 12C.10: Intertidal Biotope Map for the Proposed Seton Sands Cable Landfall

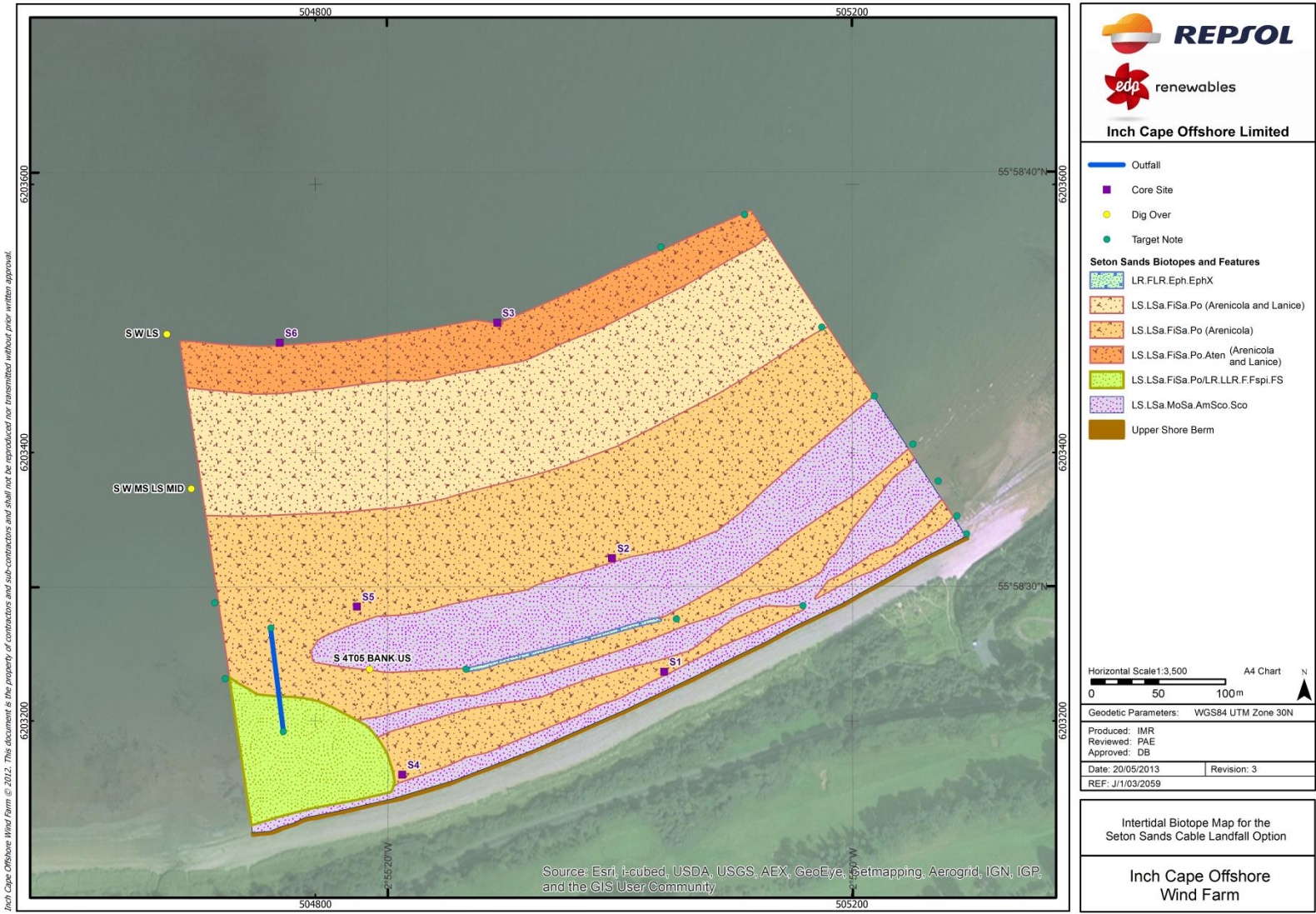
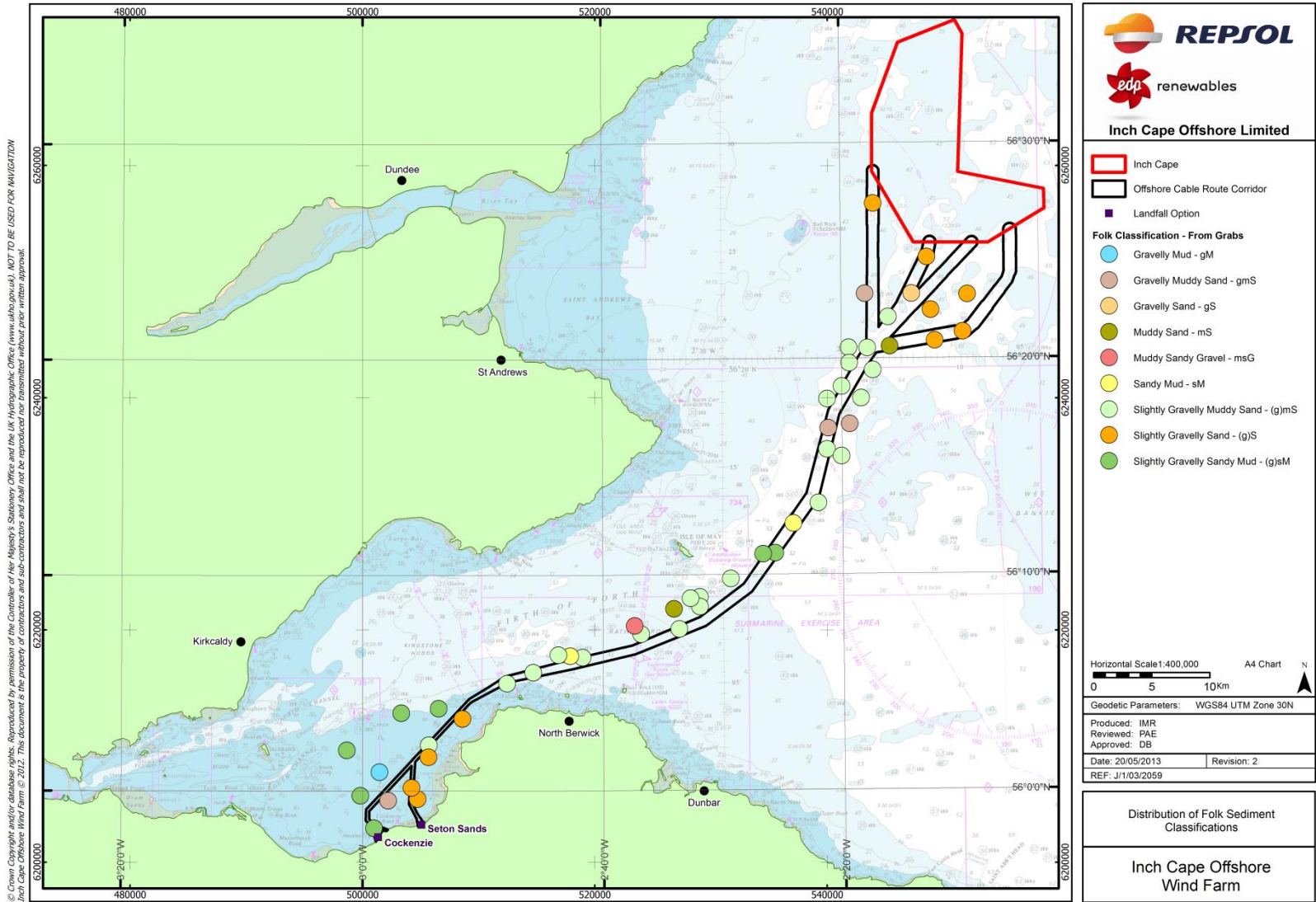


Figure 12C.11: Distribution of Folk Sediment Classifications



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Figure 12C.12: Distribution of Principal Sediment Components

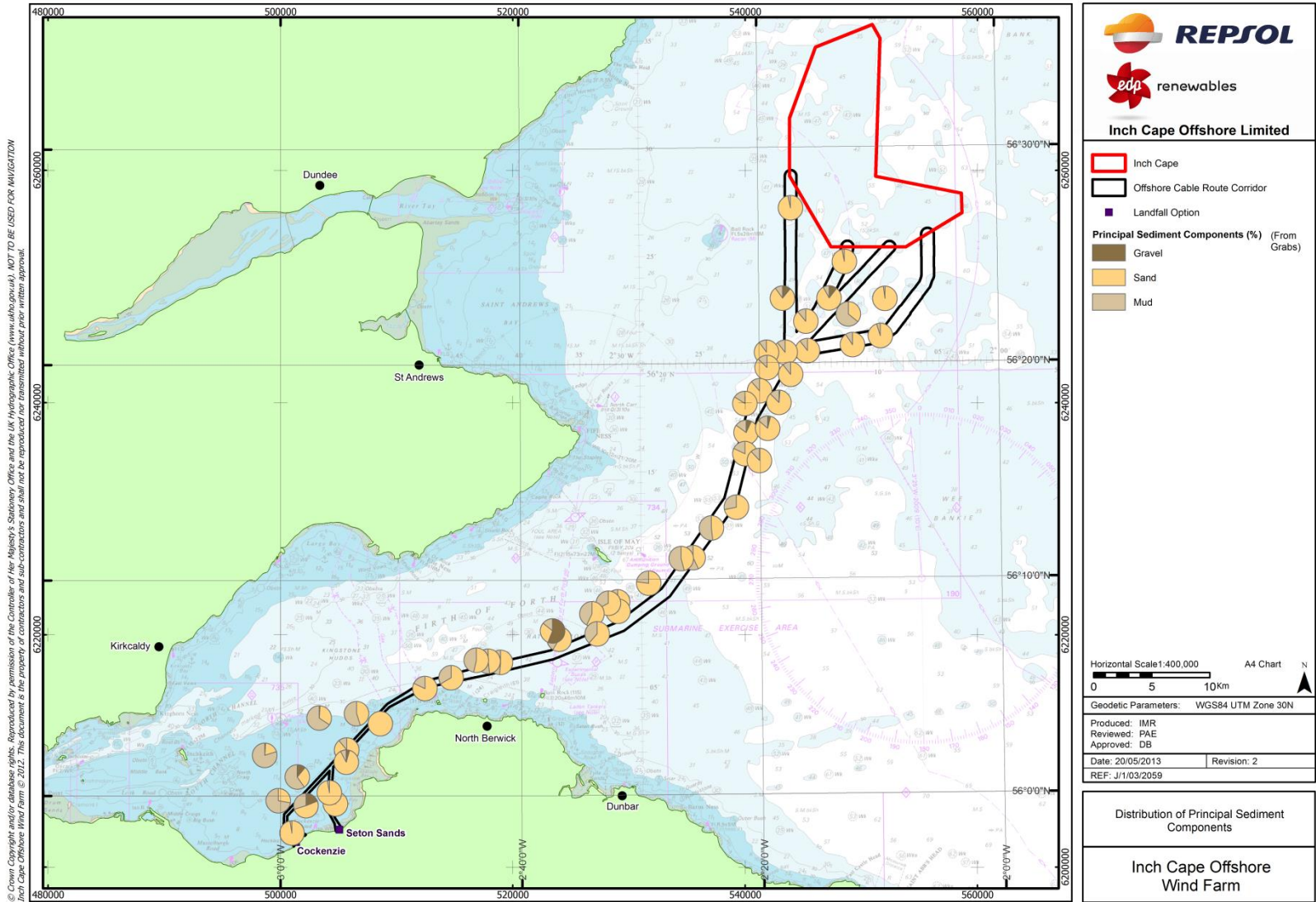


Figure 12C.13: Distribution of Seabed Sediment Types Described from the Video Data

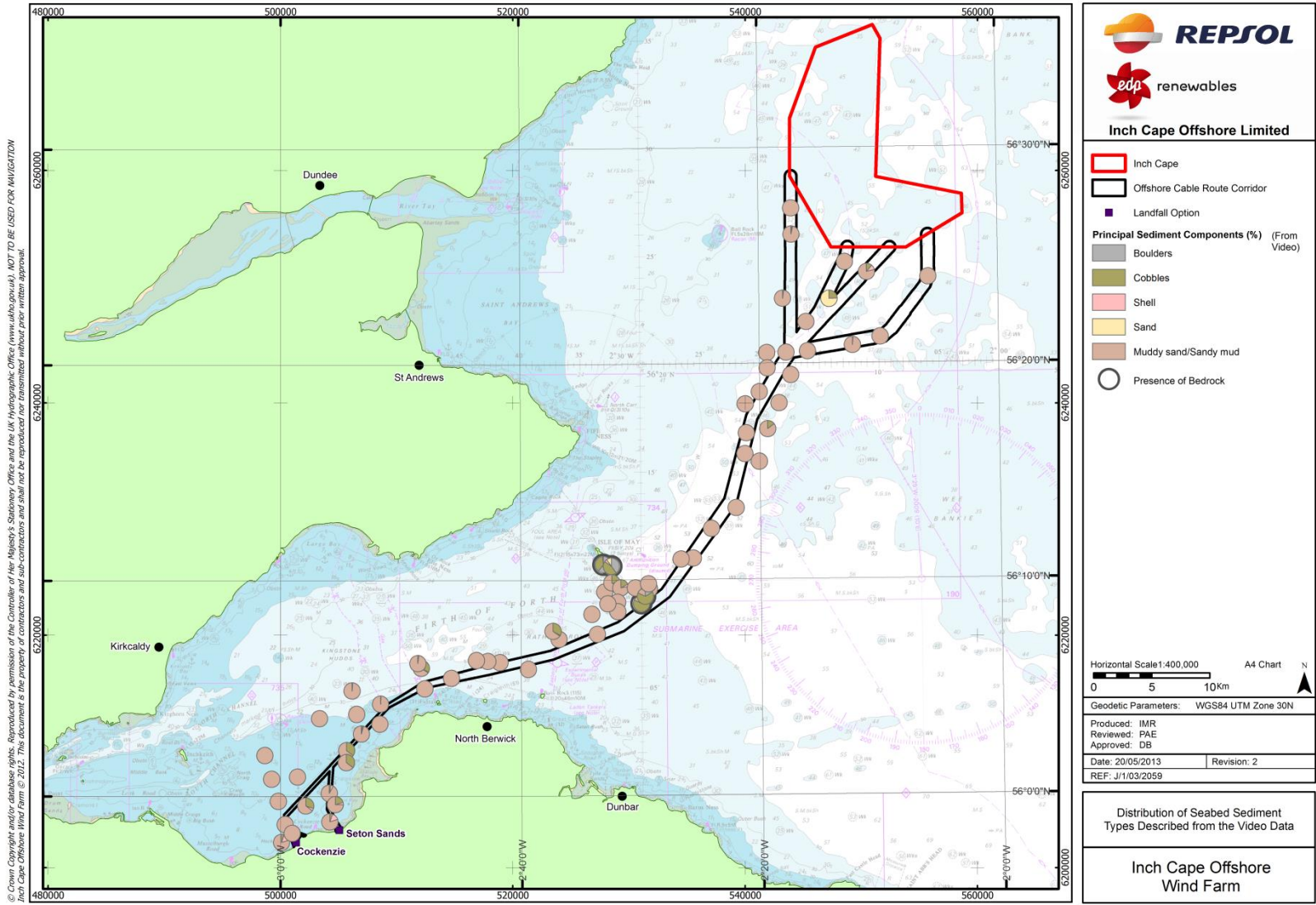
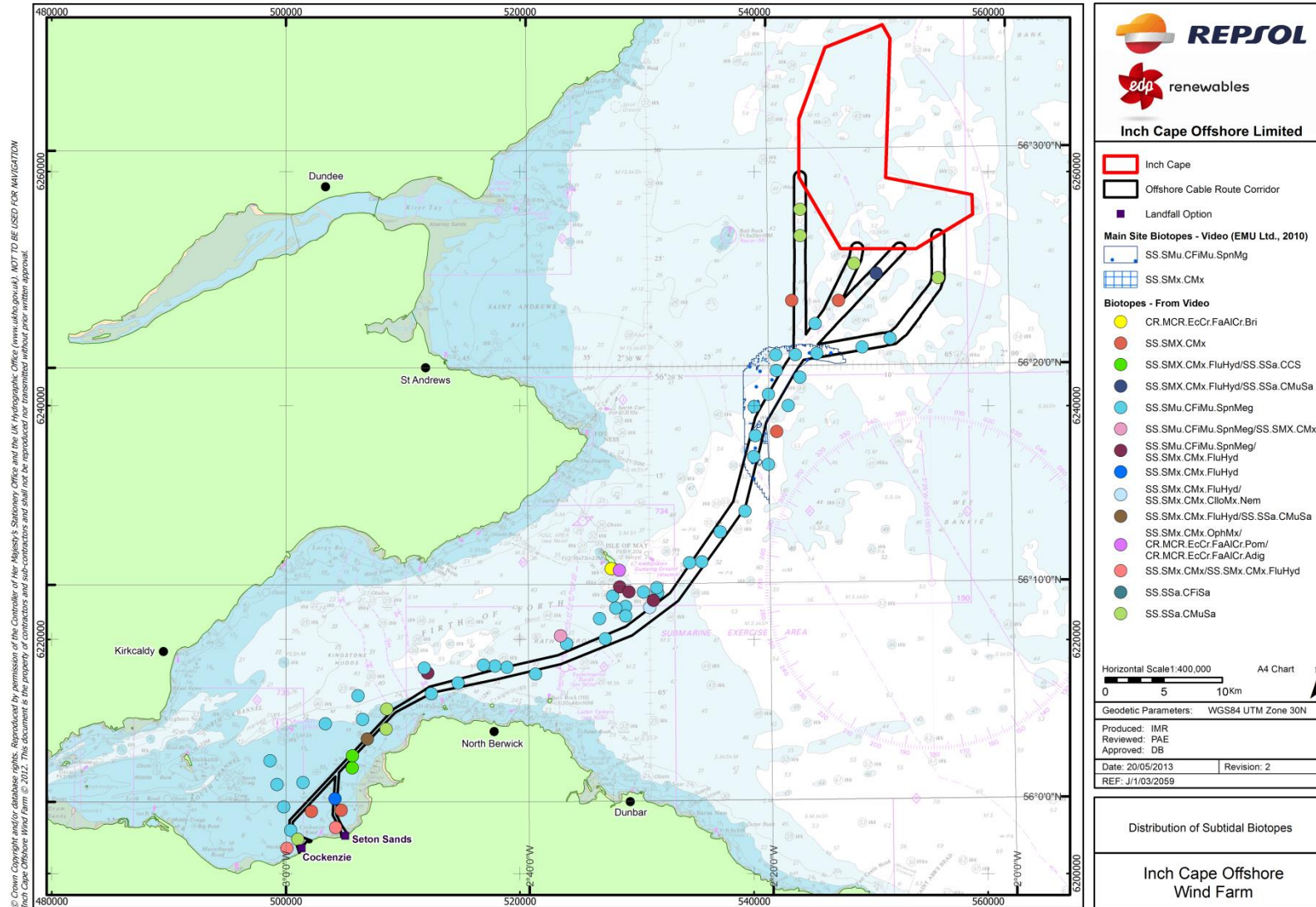
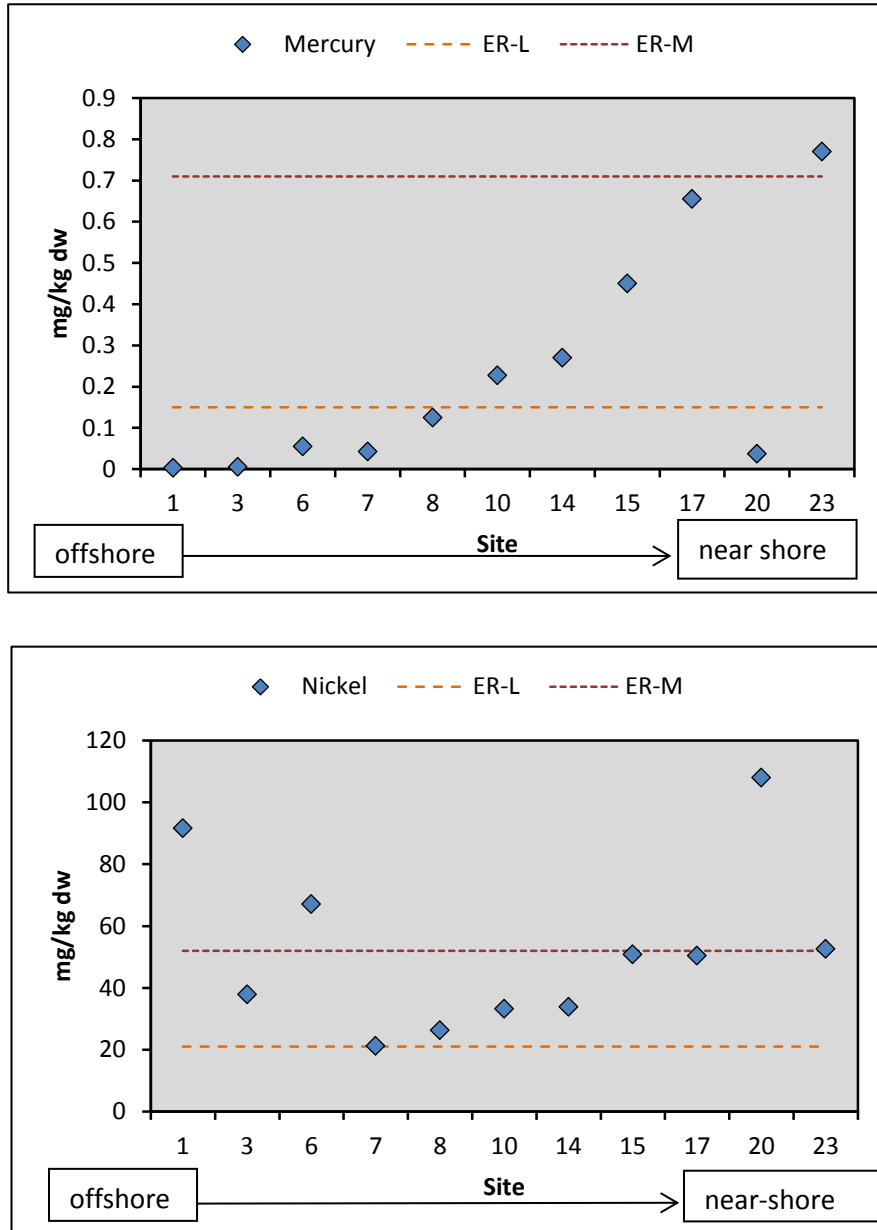


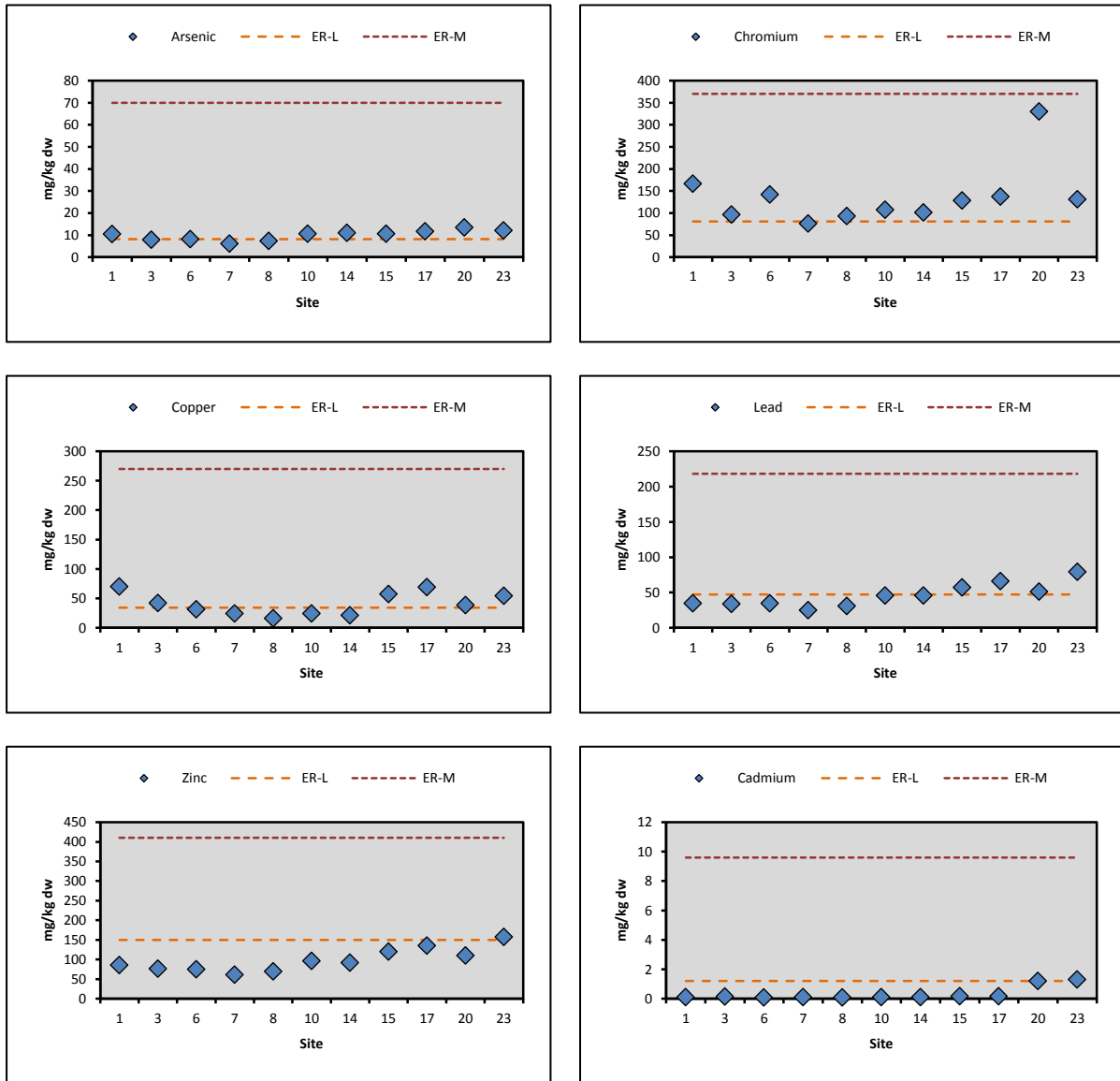
Figure 12C.14: Distribution of Subtidal Biotopes



**Figure 12C.15: Concentration of Mercury and Nickel at the Sites along the Offshore Export Cable Corridor. The Two Metals were Found to Exceed the ER-M levels at 1 and 3 Sites Respectively**



**Figure 12C.16: Concentrations of Arsenic (As), Chromium (Cr), Copper (Cu), Lead (Pb), Zinc (Zn) and Cadmium (Cd)**



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## **12C ANNEXES**

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## ANNEX 12C.1 – INTERTIDAL SURVEY FIELD LOGS 2012

Annex Table 12C.1.1: Intertidal Survey Field Logs 2012

Site	WP No	Date	UTM WGS84 Z30N		Comments	Associated Photo No.
			Eastings	Northings		
Cockenzie	C 2 MS	19/08/2012	501378	6202142	Transect C1-C3 MS	8507-8510
Cockenzie	C 5 MS	19/08/2012	501259	6201938	Transect C4-C6 MS	8499-8502
Cockenzie	C Ulva US1	19/08/2012	501259	6201938	Uppershore edge of <i>Ulva</i> at C4-C6 transect	-
Cockenzie	C US Of	19/08/2012	501207	6201849	Uppershore shore emerging outfall	-
Cockenzie	C LS Of	19/08/2012	501200	6201862	Lowershore end of outfall	-
Cockenzie	C US Berm E	19/08/2012	501395	6202105	Uppershore edge of the east end of the Berm and rock sea defence begins to the W	8447-8449
Cockenzie	C E Mx US	19/08/2012	501408	6202179	East end uppershore edge of mixed substrate (gravel and sand)	8450-8452
Cockenzie	C E Border MX 1	19/08/2012	501389	6202146	East end edge border of the mixed substrate	8453-8445
Cockenzie	C E Border Mx MS	19/08/2012	501376	6202144	East end border of the mixed substrate at mid shore	-
Cockenzie	C E Border Mx MS 1	19/08/2012	501379	6202132	East end border of the mixed substrate at mid shore	-
Cockenzie	C E Border Mx MS 2	19/08/2012	501383	6202121	East end border of the mixed substrate at mid shore	-
Cockenzie	C E Border Mx MS 3	19/08/2012	501362	6202088	East end border of the mixed substrate at mid shore	-
Cockenzie	C E Border Mx MS 4	19/08/2012	501349	6202082	East end border of the mixed substrate at mid shore	-
Cockenzie	C US Of 1	19/08/2012	501375	6202114	Uppershore point of emerging outfall 1	-
Cockenzie	C LS Of 1	19/08/2012	501356	6202125	Lowershore end of emerging outfall 1	-
Cockenzie	C US Of 2 / Stud	19/08/2012	501362	6202132	Uppershore point of emerging outfall 2 / stud	-
Cockenzie	C BeaconSlip US	19/08/2012	501534	6202509	Uppershore end of beacon slipway	-
Cockenzie	C Beacon	19/08/2012	501500	6202541	Waypoint under the beacon	8456-8458
Cockenzie	C BeaconSlip LS	19/08/2012	501508	6202531	On lowshore, near end of slip, number of <i>Patella</i> on LS end of slip	8459-8462
Cockenzie	<i>C Mastocarpus</i>	19/08/2012	501538	6202504	WP on rocks, occurrence matches with previous biotope map	8463-8471
Cockenzie	C 3	19/08/2012	501354	6202160	Border of boulder and sand <i>Lanice</i> biotope	-
Cockenzie	C 3 LS	19/08/2012	501322	6202186	Border of boulder and sand <i>Lanice</i> biotope	8472-8475
Cockenzie	C W End LS <i>Lan</i>	19/08/2012	501297	6202056	West lowshore end of <i>Lanice</i> bordering cobbles and boulders	8476-8477
Cockenzie	C 6 LS	19/08/2012	501241	6201947		8483-8487

Site	WP No	Date	UTM WGS84 Z30N		Comments	Associated Photo No.
			Eastings	Northings		
Cockenzie	C 4-6 US of <i>Fucus</i>	19/08/2012	501242	6201938	Uppershore height of <i>Fucus spiralis</i> zone, above which is <i>Ulva</i> on cobbles and boulders	-
Cockenzie	C 4-6 US of <i>Lam</i>	19/08/2012	501237	6201943	Upper west end of the <i>Lam</i> biotope	-
Cockenzie	C <i>Fucus</i> US 1	19/08/2012	501197	6201876		-
Cockenzie	C <i>Fucus</i> US 2	19/08/2012	501167	6201839		-
Cockenzie	C West LS	19/08/2012	501132	6201800		8488-8490
Cockenzie	C West <i>Ulva</i> US	19/08/2012	501136	6201793		8491-8492
Cockenzie	C <i>Ulva</i> US 1	19/08/2012	501259	6201938		-
Cockenzie	C <i>Ulva</i> US 2	19/08/2012	501196	6201845	Section of rock beside outfall	-
Cockenzie	C <i>Ulva</i> US 3	19/08/2012	501211	6201860		-
Cockenzie	C <i>Ulva</i> US 4	19/08/2012	501268	6201934		8493-8495
Cockenzie	C <i>Ulva</i> US 5	19/08/2012	501315	6202012		-
Cockenzie	C <i>Ulva</i> US 6	19/08/2012	501341	6202066		-
Cockenzie	C <i>Ulva</i> US 7	19/08/2012	501353	6202081	Meets the mixed substrate zone	-
Cockenzie	C US Berm 1	19/08/2012	501280	6201925		8496-8498
Cockenzie	C US Berm W	19/08/2012	501176	6201787	Berm meets the wall, which is 5m high until the end, above the berm is splash zone and barren sand	-
Cockenzie	C ConcretePath E	19/08/2012	501219	6201826	East end of concrete path	-
Cockenzie	C 4 US	19/08/2012	501284	6201930		8503-8506
Cockenzie	C2 MS	19/08/2012	501378	6202142		8507-8510
Cockenzie	C 1	19/08/2012	501401	6202151		8511-8514
Cockenzie	C US Cht 1	19/08/2012	501403	6202214		8515-8518
Cockenzie	C US Cht <i>Fucus</i>	19/08/2012	501399	6202262	Sparse fucoide cover	8519-8521
Cockenzie	C US Cht <i>Fucus</i> 1	19/08/2012	501401	6202314	Denser fucoide cover	8522-8523
Cockenzie	C W End Seawall	19/08/2012	501403	6202333	End of the seawall	8524-8525
Cockenzie	C Seawall 5	19/08/2012	501425	6202388	West end of the seawall	-
Cockenzie	C Seawall 4	19/08/2012	501436	6202405	Edges of the seawall	-
Cockenzie	C Seawall 3	19/08/2012	501458	6202424	Edges of the seawall	-
Cockenzie	C Seawall 1	19/08/2012	501478	6202437	Edges of the seawall	-
Cockenzie	C Seawall 2	19/08/2012	501536	6202481	Edges of the seawall	-

Site	WP No	Date	UTM WGS84 Z30N		Comments	Associated Photo No.
			Eastings	Northings		
Cockenzie	C Masto US	19/08/2012	501532	6202485	Uppershore end of <i>Mastocarpus</i>	8526-8529
Seton Sands	S W MS	21/08/2012	504725	6203289		8637-8641
Seton Sands	S 4to5 Bank US	21/08/2012	504841	6203239	S 5 MS is on the periphery of the bank	-
Seton Sands	S <i>Ulva</i> Upper W	21/08/2012	504913	6203239	West end of the <i>Ulva</i> cover on oyster shells and occasional cobbles, within runoff system, <i>Arenicola</i> (1-3 per m <sup>2</sup> )	8642-8647
Seton Sands	S Wreck	21/08/2012	505137	6203358	Wreck covered in <i>Ulva</i> and sparse <i>Fucus spiralis</i>	8648-8649
Seton Sands	S E MS	21/08/2012	505217	6203443	Sparse <i>Arenicola</i> (1-9 per 10 m <sup>2</sup> ), continue in sparse density until 50m to the west, juvenile <i>Carcinus</i> seen on surface, 3 cm anoxic layer	8650-8655
Seton Sands	S E Bank Upper	21/08/2012	505245	6203406	½ m rise of bank from runoff, sloping towards S E MS, high ridge continues upto in line with the wreck	8656-8659
Seton Sands	S E Upper US Bank	21/08/2012	505265	6203378	Rocks to the east	8660-8663
Seton Sands	S E ProfileBase	21/08/2012	505279	6203352	Beach backing profile	-
Seton Sands	S E US Berm	21/08/2012	505286	6203339	Berm, behind which is a tidal creek	8665-8669
Seton Sands	S E Lan Height	21/08/2012	505178	6203493	From S E MS to S E Lan Height, <i>Arenicola</i> (1-9 per m <sup>2</sup> ); at S E Lan Height, <i>Lanice</i> (1-2 per m <sup>2</sup> ) <i>Arenicola</i> (2-3 per m <sup>2</sup> )	-
Seton Sands	S E LS	21/08/2012	505120	6203577	<i>Arenicola</i> (1 per m <sup>2</sup> ), <i>Lanice</i> (2-3 per m <sup>2</sup> )	8671-8675
Seton Sands	S E LS Runoff	21/08/2012	505058	6203552	<i>Arenicola</i> and <i>Lanice</i> cover varies but stays at 1-9 per m <sup>2</sup>	-
Seton Sands	S 3 LS	21/08/2012	504936	6203497	Anoixa at 4-5 cm	8676-8680
Seton Sands	S 6 LS	21/08/2012	504774	6203482	<i>Arenicola</i> (<5 per m <sup>2</sup> ), <i>Lanice</i> (upto 1-9 per m <sup>2</sup> , with 1-9 per 0.1 m <sup>2</sup> in patches), fine sand, no defined anoxic layer but patch in core photo	8681-8685
Seton Sands	S W LS	21/08/2012	504690	6203489	Site similar to S 6 LS, <i>Arenicola</i> (~5 per m <sup>2</sup> , with patches of 1-9 per 0.1 m <sup>2</sup> )	8686-8691
Seton Sands	S W MS LS mid	21/08/2012	504708	6203374	Midway between midshore and lowershore, same sediment as previous but with more shell fragments	8692-8698
Seton Sands	S W MS	21/08/2012	504725	6203289		8699-8702

<u>Site</u>	<u>WP No</u>	<u>Date</u>	<u>UTM WGS84 Z30N</u>		<u>Comments</u>	<u>Associated Photo No.</u>
			<u>Eastings</u>	<u>Northings</u>		
Seton Sands	S LS of Rock	21/08/2012	504733	6203231	Sparse rock outcrops and possible bedrock, level with flattened out banks due to US tidal runoff, <i>Arenicola</i> extends upto rock, rocks covered by <i>Ulva</i> and <i>Fucus spiralis</i>	8703-8706
Seton Sands	S W	21/08/2012	504756	6203099	Cutting through rock between boulders is a barren gravelly sand zone, to the west is an emerging tidal creek, above the zone is the beginning of a sand zone	8707-8710
Seton Sands	S 4	21/08/2012	504855	6203127	Above the upper bermmarks the eastern end of the rock lower down the shore	-
Seton Sands	S Of Upper	21/08/2012	504776	6203192	Uppershore end of the outfall	8711-8714
Seton Sands	S Of Lower	21/08/2012	504767	6203268	Lowershore end of the outfall	-
Seton Sands	S 5 MS	21/08/2012	504831	6203285	Same sediment surface as S 2 MS, 5 cm anoxic layer, fine sand / shelly sand	8720-8722
Seton Sands	S 2 MS	21/08/2012	505022	6203320	<1 cm anoxic layer, fine shelly sand	8715-8719
Seton Sands	S 4 US	21/08/2012	504865	6203161	5 cm anoxic layer, fine shelly sand, site moved east to be more representative of the shore to the east, marks the eastern edge oif the rocky outcrops and boulders	8723-8731
Seton Sands	S US <i>Ulva</i> E	21/08/2012	505070	6203276	Eastern boundary of the <i>Ulva</i>	
Seton Sands	S US Bank met US Run	21/08/2012	505163	6203285	Above the upper shore bank, <i>Arenicola</i> exist until the base of the back beach	
Seton Sands	S 1 US	21/08/2012	505060	6203237	Juvenile <i>Arenicola</i> (1-9 per 0.1 m <sup>2</sup> ), no anoxia, fine sand	8732-8735

## ANNEX 12C.2 – SUBTIDAL SURVEY VIDEO LOGS, UNDERWATER STATIC IMAGES AND GRAB LOGS 2012

Annex Table 12C.2.1: Subtidal Survey Grab Log

Site	Date	Start Time (GMT)	Start Depth (m BCD)	WGS84 UTM Z30N			
				Start Position		End Position	
				Eastings	Northings	Eastings	Northings
1	21/07/2012	14:43	55.3	543913.4	6256732.2	543915.6	6256836.4
2	21/07/2012	14:19	51.4	543905.2	6254461.9	543969.5	6254599.3
3	21/07/2012	13:39	57.1	548535.0	6252122.0	548553.1	6252219.0
4	21/07/2012	13:05	53.4	550395.8	6251239.2	550480.9	6251384.5
5	21/07/2012	12:24	55.3	555697.6	6250884.0	555747.1	6250994.7
6	21/07/2012	11:14	60.2	551633.0	6245843.7	551606.9	6245694.2
7	21/07/2012	08:53	61.3	537138.8	6229279.1	537070.2	6229134.9
8	19/07/2012	07:53	41.3	527166.1	6220066.0	527409.0	6220089.4
9	19/07/2012	08:53	42.9	521326.5	6216957.4	521354.9	6217166.3
10	19/07/2012	09:41	34.8	514683.7	6216235.6	514760.3	6216342.9
11	19/07/2012	10:31	20.0	508532.2	6214051.7	508704.7	6214080.1
12	19/07/2012	12:45	15.0	506894.4	6211487.4	507044.2	6211517.8
13	19/07/2012	11:14	52.1	506057.7	6215208.3	506275.7	6215194.2
14	19/07/2012	12:09	24.1	503302.5	6212812.3	503434.1	6212821.2
15	19/07/2012	18:46	18.5	498728.9	6209640.6	498588.6	6209654.1
16	19/07/2012	18:14	16.4	499298.0	6207646.2	499192.9	6207568.0
17	19/07/2012	17:37	13.8	499874.0	6205743.4	499767.8	6205658.7
18	19/07/2012	17:02	13.6	500452.7	6203704.5	500356.3	6203702.9
20	19/07/2012	13:30	20.1	504124.9	6206376.8	504286.0	6206415.8
21	19/07/2012	14:42	8.1	504180.8	6203932.2	504331.8	6203940.7
22	19/07/2012	16:06	10.3	500108.9	6202098.7	500088.9	6202239.7
23	19/07/2012	15:41	12.3	501077.5	6202935.5	500951.6	6202954.6
V01	20/07/2012	13:22	30.6	527773.7	6225946.9	527822.8	6226194.7
V02	20/07/2012	14:10	51.6	528609.8	6225723.9	528365.4	6226129.0
V03	20/07/2012	14:52	53.0	527779.6	6223547.3	528046.8	6223901.5
V04	20/07/2012	15:22	55.7	528343.5	6224285.4	528716.9	6224745.0
V05	20/07/2012	16:10	53.4	529192.2	6223781.4	529413.2	6224374.5
V06	20/07/2012	17:37	60.3	530643.0	6224267.4	530480.6	6223876.2
V07	20/07/2012	18:59	43.4	531273.4	6223074.1	530909.1	6222412.8
V08	20/07/2012	18:25	55.4	531882.5	6224250.5	531645.9	6223756.0
V09	20/07/2012	10:52	42.6	512031.6	6216919.7	512218.7	6217377.9
V10	20/07/2012	11:40	48.9	511715.9	6217293.4	511934.1	6217831.7
V11	21/07/2012	07:34	52.1	531600.9	6223731.3	531225.9	6222986.8

Annex Table 12C.2.2: Underwater Static Images

Site	Stills PICT No.	Date	UTM WGS84 Z30N	
			Eastings	Northings
1	D035	21/07/2012	543913.5	6256740.0
1	D036	21/07/2012	543912.3	6256747.4
1	D037	21/07/2012	543899.0	6256767.9
1	D038	21/07/2012	543895.0	6256783.3
1	D039	21/07/2012	543891.5	6256799.5
1	D040	21/07/2012	543908.9	6256829.8
2	D029	21/07/2012	543908.3	6254475.5
2	D030	21/07/2012	543902.0	6254490.3
2	D031	21/07/2012	543901.0	6254514.8
2	D032	21/07/2012	543905.4	6254529.2
2	D033	21/07/2012	543965.0	6254597.9
3	D023	21/07/2012	548532.1	6252144.6
3	D024	21/07/2012	548534.6	6252153.5
3	D025	21/07/2012	548540.2	6252174.0
3	D026	21/07/2012	548542.7	6252190.0
3	D027	21/07/2012	548549.3	6252213.1
4	D014	21/07/2012	550403.6	6251270.6
4	D015	21/07/2012	550402.8	6251278.6
4	D016	21/07/2012	550398.2	6251283.5
4	D017	21/07/2012	550395.5	6251305.4
4	D018	21/07/2012	550399.4	6251314.3
4	D019	21/07/2012	550407.9	6251331.8
4	D020	21/07/2012	550419.3	6251351.5
4	D021	21/07/2012	550437.2	6251372.0
5	D007	21/07/2012	555697.7	6250887.0
5	D008	21/07/2012	555694.9	6250896.0
5	D009	21/07/2012	555696.7	6250916.2
5	D010	21/07/2012	555707.3	6250929.7
5	D011	21/07/2012	555739.9	6250955.5
5	D012	21/07/2012	555747.4	6250985.8
6	C005	21/07/2012	551635.5	6245826.9
6	C006	21/07/2012	551638.9	6245810.0
6	C007	21/07/2012	551641.9	6245777.4
6	C008	21/07/2012	551638.6	6245762.4
6	C009	21/07/2012	551622.5	6245724.9
6	C010	21/07/2012	551616.8	6245709.8
6	C011	21/07/2012	551609.9	6245698.5
7	C208	21/07/2012	537125.3	6229268.3
7	C209	21/07/2012	537119.2	6229244.6
7	C210	21/07/2012	537110.8	6229229.0
7	C211	21/07/2012	537092.6	6229203.8
7	C001	21/07/2012	537086.9	6229188.6
7	C002	21/07/2012	537078.3	6229168.2
7	C003	21/07/2012	537070.2	6229140.3
8	A006	19/07/2012	527178.2	6220074.7
8	A007	19/07/2012	527189.1	6220081.9
8	A008	19/07/2012	527207.2	6220083.0
8	A009	19/07/2012	527228.6	6220086.2

## Appendix 12C: Benthic Ecology Baseline Offshore Export Cable Corridor

Site	Stills PICT No.	Date	UTM WGS84 Z30N	
			Eastings	Northings
8	A010	19/07/2012	527235.7	6220087.0
8	A011	19/07/2012	527243.8	6220085.9
8	A012	19/07/2012	527259.9	6220085.5
8	A013	19/07/2012	527284.2	6220081.7
8	A014	19/07/2012	527310.4	6220076.5
8	A015	19/07/2012	527324.6	6220081.8
8	A016	19/07/2012	527346.4	6220085.3
8	A017	19/07/2012	527356.6	6220083.8
8	A018	19/07/2012	527369.9	6220087.5
9	A020	19/07/2012	521321.6	6216981.0
9	A021	19/07/2012	521312.4	6217003.9
9	A022	19/07/2012	521307.8	6217018.9
9	A023	19/07/2012	521303.4	6217040.7
9	A024	19/07/2012	521301.7	6217071.0
9	A025	19/07/2012	521307.5	6217095.3
9	A026	19/07/2012	521312.9	6217108.3
9	A027	19/07/2012	521324.1	6217128.5
9	A028	19/07/2012	521336.8	6217144.9
9	A029	19/07/2012	521348.7	6217159.7
10	A031	19/07/2012	514683.7	6216252.3
10	A032	19/07/2012	514679.0	6216268.7
10	A033	19/07/2012	514679.2	6216287.7
10	A034	19/07/2012	514704.4	6216327.2
10	A035	19/07/2012	514712.5	6216331.3
10	A036	19/07/2012	514722.1	6216336.5
10	A037	19/07/2012	514735.1	6216342.1
10	A038	19/07/2012	514745.0	6216341.1
10	A039	19/07/2012	514754.6	6216340.8
11	A041	19/07/2012	508544.8	6214059.1
11	A042	19/07/2012	508551.1	6214064.3
11	A043	19/07/2012	508575.7	6214070.1
11	A044	19/07/2012	508609.1	6214067.5
11	A045	19/07/2012	508620.8	6214067.0
11	A046	19/07/2012	508639.3	6214071.4
11	A047	19/07/2012	508659.2	6214083.0
11	A048	19/07/2012	508684.2	6214086.6
11	A049	19/07/2012	508699.8	6214083.4
12	A077	19/07/2012	506907.5	6211483.2
12	A078	19/07/2012	506915.6	6211482.4
12	A079	19/07/2012	506933.5	6211486.7
12	A080	19/07/2012	506980.0	6211477.8
12	A081	19/07/2012	506992.9	6211480.2
12	A082	19/07/2012	507001.0	6211484.2
12	A083	19/07/2012	507009.0	6211489.8
12	A084	19/07/2012	507035.6	6211509.1
13	A051	19/07/2012	506092.7	6215209.2
13	A052	19/07/2012	506100.9	6215209.9
13	A053	19/07/2012	506110.6	6215209.9
13	A054	19/07/2012	506127.7	6215212.7
13	A055	19/07/2012	506136.1	6215215.0



## Appendix 12C: Benthic Ecology Baseline Offshore Export Cable Corridor

Site	Stills PICT No.	Date	UTM WGS84 Z30N	
			Eastings	Northings
13	A056	19/07/2012	506144.6	6215219.4
13	A057	19/07/2012	506160.0	6215226.6
13	A058	19/07/2012	506170.2	6215230.8
13	A059	19/07/2012	506182.3	6215233.2
13	A060	19/07/2012	506213.0	6215233.5
13	A061	19/07/2012	506226.5	6215231.7
13	A062	19/07/2012	506237.6	6215226.2
13	A063	19/07/2012	506246.3	6215217.0
13	A064	19/07/2012	506257.1	6215203.7
13	A065	19/07/2012	506267.6	6215198.5
14	A067	19/07/2012	503311.9	6212821.3
14	A068	19/07/2012	503328.1	6212831.8
14	A069	19/07/2012	503342.7	6212831.9
14	A070	19/07/2012	503366.1	6212826.9
14	A071	19/07/2012	503371.9	6212821.7
14	A072	19/07/2012	503378.4	6212817.1
14	A073	19/07/2012	503392.7	6212811.9
14	A074	19/07/2012	503409.6	6212813.0
14	A075	19/07/2012	503423.3	6212818.3
15	A146	19/07/2012	498699.6	6209639.9
15	A147	19/07/2012	498667.4	6209631.6
15	A148	19/07/2012	498639.9	6209640.9
15	A149	19/07/2012	498605.8	6209652.4
15	A150	19/07/2012	498597.5	6209653.2
16	A137	19/07/2012	499287.3	6207637.2
16	A138	19/07/2012	499279.4	6207633.5
16	A139	19/07/2012	499269.1	6207630.3
16	A140	19/07/2012	499247.2	6207622.1
16	A141	19/07/2012	499238.8	6207618.1
16	A142	19/07/2012	499208.2	6207597.4
16	A143	19/07/2012	499198.3	6207585.0
16	A144	19/07/2012	499193.8	6207573.3
17	A129	19/07/2012	499856.2	6205729.3
17	A130	19/07/2012	499842.5	6205721.7
17	A131	19/07/2012	499818.9	6205713.8
17	A132	19/07/2012	499808.1	6205703.1
17	A133	19/07/2012	499788.1	6205680.1
17	A134	19/07/2012	499779.6	6205670.5
17	A135	19/07/2012	499771.7	6205663.2
18	A122	19/07/2012	500442.9	6203696.8
18	A123	19/07/2012	500436.5	6203694.5
18	A124	19/07/2012	500425.5	6203692.9
18	A125	19/07/2012	500399.1	6203693.2
18	A126	19/07/2012	500379.9	6203696.9
18	A127	19/07/2012	500361.1	6203701.3
20	A086	19/07/2012	504140.8	6206376.4
20	A087	19/07/2012	504165.4	6206376.1
20	A088	19/07/2012	504199.5	6206382.0
20	A089	19/07/2012	504213.3	6206384.1
20	A090	19/07/2012	504224.6	6206385.9

## Appendix 12C: Benthic Ecology Baseline Offshore Export Cable Corridor

Site	Stills PICT No.	Date	UTM WGS84 Z30N	
			Eastings	Northings
20	A091	19/07/2012	504255.9	6206391.5
20	A092	19/07/2012	504270.7	6206399.9
20	A093	19/07/2012	504283.3	6206412.7
21	A095	19/07/2012	504198.8	6203936.6
21	A096	19/07/2012	504211.2	6203936.7
21	A097	19/07/2012	504218.2	6203936.3
21	A098	19/07/2012	504230.1	6203934.8
21	A099	19/07/2012	504245.4	6203935.4
21	A100	19/07/2012	504259.9	6203936.8
21	A101	19/07/2012	504278.0	6203939.6
21	A102	19/07/2012	504291.3	6203942.1
21	A103	19/07/2012	504325.2	6203941.3
22	A114	19/07/2012	500111.8	6202121.4
22	A115	19/07/2012	500112.2	6202132.0
22	A116	19/07/2012	500108.4	6202166.3
22	A117	19/07/2012	500098.1	6202188.6
22	A118	19/07/2012	500089.8	6202212.4
22	A119	19/07/2012	500088.4	6202223.6
22	A120	19/07/2012	500088.2	6202232.1
23	A105	19/07/2012	501063.5	6202935.8
23	A106	19/07/2012	501051.7	6202938.8
23	A107	19/07/2012	501025.9	6202949.7
23	A108	19/07/2012	501014.7	6202951.0
23	A109	19/07/2012	501000.7	6202955.1
23	A110	19/07/2012	500984.1	6202957.6
23	A111	19/07/2012	500975.9	6202956.4
23	A112	19/07/2012	500963.6	6202953.9
V01	B044	20/07/2012	527785.4	6225967.9
V01	B045	20/07/2012	527788.4	6225976.2
V01	B046	20/07/2012	527790.9	6226003.7
V01	B047	20/07/2012	527790.0	6226012.5
V01	B048	20/07/2012	527787.7	6226020.5
V01	B049	20/07/2012	527784.3	6226030.5
V01	B050	20/07/2012	527780.8	6226038.6
V01	B051	20/07/2012	527773.7	6226050.2
V01	B052	20/07/2012	527763.8	6226064.5
V01	B053	20/07/2012	527760.0	6226073.3
V01	B054	20/07/2012	527772.5	6226116.2
V01	B055	20/07/2012	527799.3	6226170.5
V01	B056	20/07/2012	527804.4	6226175.9
V01	B057	20/07/2012	527817.4	6226187.5
V02	B059	20/07/2012	531703.5	6223883.4
V02	B060	20/07/2012	531675.8	6223812.9
V02	B061	20/07/2012	531665.0	6223776.0
V02	B062	20/07/2012	531645.9	6223756.0
V02	B063	20/07/2012	531273.4	6223074.1
V02	B064	20/07/2012	531252.3	6223048.1
V02	B065	20/07/2012	531241.7	6223039.5
V02	B066	20/07/2012	531233.9	6223029.4
V02	B067	20/07/2012	531232.0	6223021.8

## Appendix 12C: Benthic Ecology Baseline Offshore Export Cable Corridor

Site	Stills PICT No.	Date	UTM WGS84 Z30N	
			Eastings	Northings
V02	B068	20/07/2012	531232.6	6223015.8
V02	B069	20/07/2012	531234.9	6223003.8
V02	B070	20/07/2012	531191.0	6222953.1
V02	B071	20/07/2012	531189.8	6222928.8
V02	B072	20/07/2012	531188.8	6222919.4
V02	B073	20/07/2012	531156.8	6222891.1
V02	B074	20/07/2012	531140.4	6222873.7
V02	B075	20/07/2012	531133.7	6222836.1
V02	B076	20/07/2012	531125.9	6222823.6
V03	B078	20/07/2012	527805.5	6223559.1
V03	B079	20/07/2012	527809.6	6223593.1
V03	B080	20/07/2012	527824.9	6223607.4
V03	B081	20/07/2012	527833.7	6223612.2
V03	B082	20/07/2012	527853.6	6223635.2
V03	B083	20/07/2012	527855.5	6223660.2
V03	B084	20/07/2012	527868.1	6223668.3
V03	B085	20/07/2012	527898.3	6223685.9
V03	B086	20/07/2012	527937.8	6223740.2
V03	B087	20/07/2012	527944.2	6223759.6
V03	B088	20/07/2012	527948.3	6223780.8
V03	B089	20/07/2012	527981.4	6223809.8
V03	B090	20/07/2012	528025.3	6223863.1
V04	B091	20/07/2012	528366.1	6224308.1
V04	B092	20/07/2012	528369.5	6224312.4
V04	B093	20/07/2012	528373.9	6224318.0
V04	B094	20/07/2012	528385.6	6224331.5
V04	B095	20/07/2012	528403.9	6224348.9
V04	B096	20/07/2012	528426.6	6224375.5
V04	B097	20/07/2012	528444.3	6224397.7
V04	B098	20/07/2012	528462.9	6224422.6
V04	B099	20/07/2012	528473.6	6224437.8
V04	B100	20/07/2012	528497.7	6224467.9
V04	B101	20/07/2012	528545.2	6224528.4
V04	B102	20/07/2012	528579.8	6224585.5
V04	B103	20/07/2012	528616.2	6224620.0
V04	B104	20/07/2012	528648.6	6224663.7
V04	B105	20/07/2012	528667.3	6224696.1
V04	B106	20/07/2012	528675.9	6224707.8
V04	B107	20/07/2012	528706.9	6224739.0
V05	B109	20/07/2012	529204.5	6223820.9
V05	B110	20/07/2012	529207.0	6223842.1
V05	B111	20/07/2012	529210.6	6223852.4
V05	B112	20/07/2012	529244.0	6223891.5
V05	B113	20/07/2012	529253.0	6223904.3
V05	B114	20/07/2012	529253.6	6223910.8
V05	B115	20/07/2012	529256.1	6223930.2
V05	B116	20/07/2012	529277.3	6223978.0
V05	B117	20/07/2012	529275.1	6224001.7
V05	B118	20/07/2012	529292.0	6224065.4
V05	B119	20/07/2012	529297.4	6224085.1

## Appendix 12C: Benthic Ecology Baseline Offshore Export Cable Corridor

Site	Stills PICT No.	Date	UTM WGS84 Z30N	
			Eastings	Northings
V05	B120	20/07/2012	529333.3	6224154.0
V05	B121	20/07/2012	529354.8	6224217.8
V05	B122	20/07/2012	529369.8	6224249.1
V05	B123	20/07/2012	529372.6	6224254.5
V05	B124	20/07/2012	529385.0	6224283.6
V05	B125	20/07/2012	529385.5	6224299.5
V05	B126	20/07/2012	529403.2	6224355.0
V05	B127	20/07/2012	531094.7	6222740.6
V06	B129	20/07/2012	530632.5	6224253.6
V06	B130	20/07/2012	530609.7	6224218.6
V06	B131	20/07/2012	530553.6	6224077.3
V06	B132	20/07/2012	530545.0	6224063.7
V06	B133	20/07/2012	530539.6	6224050.4
V06	B134	20/07/2012	530533.6	6224023.8
V06	B135	20/07/2012	530526.4	6224001.7
V06	B136	20/07/2012	530509.9	6223951.9
V06	B137	20/07/2012	530503.3	6223945.6
V06	B138	20/07/2012	530492.1	6223927.2
V06	B139	20/07/2012	530482.8	6223887.2
V06	B140	20/07/2012	530479.9	6223880.8
V06	B141	20/07/2012	530479.4	6223879.1
V07	B149	20/07/2012	531252.3	6223048.1
V07	B150	20/07/2012	531241.7	6223039.5
V07	B151	20/07/2012	531233.9	6223029.4
V07	B152	20/07/2012	531232.0	6223021.8
V07	B153	20/07/2012	531232.6	6223015.8
V07	B154	20/07/2012	531234.9	6223003.8
V07	B155	20/07/2012	531191.0	6222953.1
V07	B156	20/07/2012	531189.8	6222928.8
V07	B157	20/07/2012	531188.8	6222919.4
V07	B158	20/07/2012	531156.8	6222891.1
V07	B159	20/07/2012	531140.4	6222873.7
V07	B160	20/07/2012	531133.7	6222836.1
V07	B161	20/07/2012	531125.9	6222823.6
V07	B162	20/07/2012	531094.7	6222740.6
V07	B163	20/07/2012	530928.5	6222546.6
V07	B164	20/07/2012	530921.8	6222494.1
V07	B165	20/07/2012	530924.0	6222484.0
V07	B166	20/07/2012	530932.0	6222464.9
V08	B143	20/07/2012	531873.2	6224238.1
V08	B144	20/07/2012	531856.4	6224220.9
V08	B145	20/07/2012	531751.4	6223976.2
V08	B146	20/07/2012	531703.5	6223883.4
V08	B147	20/07/2012	531675.8	6223812.9
V08	B148	20/07/2012	531665.0	6223776.0
V09	B003	20/07/2012	512062.9	6216957.7
V09	B004	20/07/2012	512072.5	6216971.8
V09	B005	20/07/2012	512078.3	6216994.9
V09	B006	20/07/2012	512111.5	6217024.3
V09	B007	20/07/2012	512127.2	6217064.7

## Appendix 12C: Benthic Ecology Baseline Offshore Export Cable Corridor

Site	Stills PICT No.	Date	UTM WGS84 Z30N	
			Eastings	Northings
V09	B008	20/07/2012	512139.7	6217089.9
V09	B009	20/07/2012	512146.3	6217178.4
V09	B010	20/07/2012	512161.0	6217195.7
V09	B011	20/07/2012	512171.8	6217213.8
V09	B012	20/07/2012	512182.7	6217238.6
V09	B013	20/07/2012	512190.0	6217258.3
V09	B014	20/07/2012	512197.6	6217275.6
V09	B015	20/07/2012	512202.9	6217309.0
V09	B016	20/07/2012	512205.8	6217328.2
V09	B017	20/07/2012	512214.4	6217348.5
V09	B018	20/07/2012	512215.4	6217352.3
V09	B019	20/07/2012	512216.8	6217356.9
V09	B020	20/07/2012	512219.0	6217373.6
V10	B025	20/07/2012	511796.7	6217423.3
V10	B026	20/07/2012	511818.9	6217440.0
V10	B027	20/07/2012	511822.5	6217456.3
V10	B028	20/07/2012	511824.8	6217468.6
V10	B029	20/07/2012	511832.3	6217489.2
V10	B030	20/07/2012	511845.3	6217504.9
V10	B031	20/07/2012	511859.6	6217543.7
V10	B032	20/07/2012	511851.2	6217567.5
V10	B033	20/07/2012	511854.0	6217598.8
V10	B034	20/07/2012	511869.0	6217626.0
V10	B035	20/07/2012	511870.3	6217631.6
V10	B036	20/07/2012	511873.8	6217658.9
V10	B037	20/07/2012	511882.2	6217680.0
V10	B038	20/07/2012	511886.7	6217684.9
V10	B039	20/07/2012	511897.4	6217691.0
V10	B040	20/07/2012	511897.2	6217720.1
V10	B041	20/07/2012	511905.5	6217770.5
V10	B042	20/07/2012	511911.0	6217787.8
V11	C180	21/07/2012	531589.9	6223708.2
V11	C181	21/07/2012	531564.6	6223665.7
V11	C182	21/07/2012	531559.5	6223637.6
V11	C183	21/07/2012	531547.0	6223590.8
V11	C184	21/07/2012	531525.8	6223557.3
V11	C185	21/07/2012	531494.4	6223498.6
V11	C186	21/07/2012	531492.9	6223471.6
V11	C187	21/07/2012	531460.8	6223441.9
V11	C188	21/07/2012	531444.7	6223410.8
V11	C189	21/07/2012	531426.6	6223375.6
V11	C190	21/07/2012	531420.4	6223366.2
V11	C191	21/07/2012	531402.8	6223300.9
V11	C192	21/07/2012	531394.7	6223272.7
V11	C193	21/07/2012	531377.8	6223258.8
V11	C194	21/07/2012	531364.5	6223226.1
V11	C195	21/07/2012	531334.1	6223185.2
V11	C196	21/07/2012	531319.0	6223158.1
V11	C197	21/07/2012	531300.1	6223130.5
V11	C198	21/07/2012	531291.1	6223109.6

Site	Stills PICT No.	Date	UTM WGS84 Z30N	
			Eastings	Northings
V11	C199	21/07/2012	531285.6	6223094.2
V11	C200	21/07/2012	531281.0	6223087.5
V11	C201	21/07/2012	531276.9	6223077.1
V11	C202	21/07/2012	531274.1	6223067.4
V11	C203	21/07/2012	531270.6	6223059.5
V11	C204	21/07/2012	531258.9	6223041.5
V11	C205	21/07/2012	531235.8	6223000.6
V11	C206	21/07/2012	531231.6	6222995.9

Annex Table 12C.2.3: Subtidal Survey Grab Log

Site No.	Date	Time (GMT)	Depth (m BCD)	UTM WGS84 Z30 N		<i>In-situ</i> sediment description	Sediment features (includes: burrows, tubes, casts, smell)	Sediment anoxia (includes: None, streaks, patches, layers, depth of layer)
				Eastings	Northings			
1	21/07/12	15:01	55.6	543903.8	6256775.8	Slightly muddy sand	None	None
3	21/07/12	15:53	57.1	548539.9	6252162.8	Muddy sand	None	None
6	21/07/12	11:32	59.4	551642.6	6245773.3	Sandy mud	None	None
7	21/07/12	09:14	61.0	537098.0	6229204.1	Sandy mud	None	None
8	21/07/12	06:35	44.8	527265.4	6220082.3	Sandy mud	None	None
10	20/07/12	10:10	36.8	514694.1	6216310.5	Sandy mud	None	Streaks
14	20/07/12	09:03	26.1	503338.0	6212831.4	Slightly sandy mud	None	Streaks
15	19/07/12	19:17	18.6	498651.7	6209626.5	Sandy mud	None	None
17	20/07/12	06:34	14.0	499814.1	6205710.9	Sandy mud	None	None
20	20/07/12	07:47	15.7	504220.8	6206399.4	Muddy sand	None	None
23	20/07/12	07:09	12.0	500990.8	6202928.1	Sandy mud	None	None
24	21/07/12	16:46	59.3	552039.4	6248981.8	Muddy sand	None	None
25	21/07/12	17:12	54.2	548885.9	6247630.8	Muddy sand	None	None

**ANNEX 12C.3 – INTERTIDAL PSA DATA RESULTS****Annex Table 12C.3.1: Cockenzie - Particle Size Distribution Via Wet and Dry Sieving (Mesh Aperture 64000 - < 63 µm @ 0.5 phi Intervals)**

<b>SAMPLE ID:</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C5</b>	<b>C6</b>
<b>Aperture (µm)</b>	<b>Class Weight Retained (%)</b>					
<b>64000</b>	0.00	0.00	0.00	0.00	0.00	63.40
<b>45255</b>	0.00	64.68	0.00	0.00	0.00	24.67
<b>32000</b>	28.06	0.00	0.00	0.00	0.00	0.00
<b>22627</b>	11.07	4.19	0.00	10.61	0.00	0.00
<b>16000</b>	6.62	4.43	0.00	10.60	7.68	0.00
<b>11314</b>	5.00	4.75	0.00	7.54	14.73	1.83
<b>8000</b>	9.21	3.09	0.00	9.84	7.09	0.82
<b>5657</b>	6.18	2.56	0.00	9.16	7.02	1.26
<b>4000</b>	7.35	2.89	0.00	7.14	5.47	0.83
<b>2828</b>	6.50	2.42	0.39	4.32	8.43	0.76
<b>2000</b>	4.33	2.11	0.13	3.24	12.73	0.67
<b>1414</b>	3.67	2.27	0.76	3.88	18.79	0.74
<b>1000</b>	2.51	2.01	3.35	4.84	11.24	0.74
<b>707</b>	2.47	1.45	10.26	6.04	2.85	0.68
<b>500</b>	3.55	1.32	24.83	7.82	1.24	0.79
<b>354</b>	1.82	0.79	18.83	6.41	0.86	0.69
<b>250</b>	0.76	0.49	15.33	5.16	0.82	0.82
<b>177</b>	0.31	0.26	15.98	2.37	0.54	0.77
<b>125</b>	0.12	0.09	7.81	0.35	0.19	0.33
<b>88</b>	0.06	0.04	1.01	0.08	0.09	0.13
<b>63</b>	0.04	0.02	0.17	0.04	0.05	0.06
<b>&lt; 63</b>	0.38	0.15	1.14	0.55	0.18	0.01
<b>Total %</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>



**Annex Table 12C.3.2: Cockenzie - GRADISTAT Statistics Output - Particle Size Distribution Via Wet, Dry Sieving and (64000 - < 63 µm @ 0.5 phi Intervals)**

SAMPLE ID:	C1	C2	C3	C4	C5	C6
<b>SAMPLE TYPE:</b>	Trimodal, Poorly Sorted	Unimodal, Poorly Sorted	Bimodal, Moderately Sorted	Trimodal, Very Poorly Sorted	Bimodal, Poorly Sorted	Unimodal, Poorly Sorted
<b>FOLK (1954 ORIGINAL):</b>	Gravel	Gravel	Slightly Gravelly Sand	Sandy Gravel	Sandy Gravel	Gravel
<b>% GRAVEL (64000 - 2000 µm):</b>	84.32	91.12	0.52	62.45	63.16	94.24
<b>% SAND (&lt; 2000 - 63 µm):</b>	15.30	8.73	98.33	37.00	36.66	5.75
<b>% MUD (&lt; 63 µm):</b>	0.38	0.15	1.14	0.55	0.18	0.01
<b>% V COARSE GRAVEL:</b>	28.06	64.68	0.00	0.00	0.00	88.07
<b>% COARSE GRAVEL:</b>	17.70	8.62	0.00	21.21	7.68	0.00
<b>% MEDIUM GRAVEL:</b>	14.21	7.84	0.00	17.38	21.82	2.66
<b>% FINE GRAVEL:</b>	13.53	5.45	0.00	16.31	12.49	2.09
<b>% V FINE GRAVEL:</b>	10.83	4.53	0.52	7.56	21.17	1.43
<b>% V COARSE SAND:</b>	6.18	4.29	4.11	8.72	30.03	1.48
<b>% COARSE SAND:</b>	6.02	2.77	35.09	13.86	4.09	1.47
<b>% MEDIUM SAND:</b>	2.58	1.28	34.16	11.57	1.68	1.51
<b>% FINE SAND:</b>	0.43	0.34	23.79	2.73	0.73	1.10
<b>% V FINE SAND:</b>	0.10	0.05	1.18	0.12	0.14	0.19
<b>% V COARSE SILT:</b>	0.04	0.02	0.12	0.06	0.02	0.00
<b>% COARSE SILT:</b>	0.04	0.02	0.12	0.06	0.02	0.00
<b>% MEDIUM SILT:</b>	0.04	0.02	0.12	0.06	0.02	0.00
<b>% FINE SILT:</b>	0.04	0.02	0.12	0.06	0.02	0.00
<b>% V FINE SILT:</b>	0.04	0.02	0.12	0.06	0.02	0.00
<b>% CLAY:</b>	0.17	0.07	0.53	0.25	0.08	0.01

**Annex Table 12C.3.3: Seton Sands - Particle Size Distribution via Wet and Dry Sieving  
(Mesh Aperture 64000 - < 63  $\mu\text{m}$  @ 0.5 phi Intervals)**

SAMPLE ID:	S1	S2	S3	S4	S5	S6
Aperture ( $\mu\text{m}$ )	Class Weight Retained (%)					
64000	0.00	0.00	0.00	0.00	0.00	0.00
45255	0.00	0.00	0.00	0.00	0.00	0.00
32000	0.00	0.00	0.00	0.00	0.00	0.00
22627	0.00	0.00	0.00	0.00	0.00	0.00
16000	0.00	0.00	0.00	0.00	0.00	0.00
11314	0.00	0.00	0.00	0.00	0.00	0.00
8000	0.30	1.29	0.00	0.31	0.00	0.00
5657	0.87	0.00	0.00	1.20	0.00	0.00
4000	0.77	0.47	0.13	0.76	0.24	0.00
2828	1.47	0.29	0.16	1.23	0.15	0.00
2000	1.82	0.14	0.04	1.50	0.35	0.00
1414	2.65	0.32	0.06	1.75	0.32	0.02
1000	2.64	0.28	0.03	1.64	0.43	0.01
707	2.41	0.27	0.04	1.61	0.57	0.02
500	3.34	0.40	0.03	2.11	1.23	0.04
354	4.73	0.92	0.07	3.21	1.88	0.08
250	13.33	3.67	0.21	10.34	6.52	0.16
177	38.58	17.70	1.22	44.31	24.73	0.81
125	24.96	57.70	77.95	28.37	46.35	75.50
88	1.40	15.22	18.47	0.98	15.76	21.58
63	0.07	0.19	0.45	0.08	0.22	0.54
< 63	0.67	1.12	1.15	0.62	1.24	1.25
<b>Total %</b>	100	100	100	100	100	100

**Annex Table 12C.3.4: Seton Sands - GRADISTAT Statistics Output - Particle Size Distribution via Wet, Dry Sieving (64000 - < 63 µm @ 0.5 phi Intervals)**

Site No.	S1	S2	S3	S4	S5	S6
<b>SAMPLE TYPE:</b>	Unimodal, Poorly Sorted	Unimodal, Well Sorted	Unimodal, Very Well Sorted	Unimodal, Moderately Sorted	Unimodal, Moderately Well Sorted	Unimodal, Very Well Sorted
<b>FOLK (1954 ORIGINAL):</b>	Gravelly Sand	Slightly Gravelly Sand	Slightly Gravelly Sand	Slightly Gravelly Sand	Slightly Gravelly Sand	Slightly Gravelly Sand
<b>% GRAVEL (64000 - 2000 µm):</b>	5.22	2.20	0.33	4.99	0.74	0.00
<b>% SAND (&lt; 2000 - 63 µm):</b>	94.11	96.68	98.51	94.39	98.02	98.75
<b>% MUD (&lt; 63 µm):</b>	0.67	1.12	1.15	0.62	1.24	1.25
<b>% V COARSE GRAVEL:</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>% COARSE GRAVEL:</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>% MEDIUM GRAVEL:</b>	0.30	1.29	0.00	0.31	0.00	0.00
<b>% FINE GRAVEL:</b>	1.64	0.47	0.13	1.96	0.24	0.00
<b>% V FINE GRAVEL:</b>	3.29	0.43	0.20	2.72	0.50	0.00
<b>% V COARSE SAND:</b>	5.29	0.60	0.08	3.38	0.76	0.03
<b>% COARSE SAND:</b>	5.75	0.68	0.07	3.72	1.81	0.06
<b>% MEDIUM SAND:</b>	18.06	4.60	0.27	13.56	8.40	0.24
<b>% FINE SAND:</b>	63.54	75.40	79.17	72.68	71.09	76.31
<b>% V FINE SAND:</b>	1.47	15.41	18.91	1.05	15.97	22.11
<b>% V COARSE SILT:</b>	0.07	0.12	0.12	0.07	0.13	0.13
<b>% COARSE SILT:</b>	0.07	0.12	0.12	0.07	0.13	0.13
<b>% MEDIUM SILT:</b>	0.07	0.12	0.12	0.07	0.13	0.13
<b>% FINE SILT:</b>	0.07	0.12	0.12	0.07	0.13	0.13
<b>% V FINE SILT:</b>	0.07	0.12	0.12	0.07	0.13	0.13
<b>% CLAY:</b>	0.31	0.52	0.53	0.29	0.57	0.58

**ANNEX 12C.4 – INTERTIDAL FAUNAL ABUNDANCE AND BIOMASS RESULTS****Annex Table 12C.4.1: Cockenzie – Abundance**

Species Directory Code	TaxonName	C1	C2	C3	C4	C5	C6
F0002	TURBELLARIA	4					
G0001	NEMERTEA	2	48				4
HD0001	NEMATODA		2				
P0025	Polynoidae (juv)			1			
P0122	Hesionura elongata			9			
P0145	Phyllodoce mucosa						1
P0163	Eumida (juv)			8			
P0421	Exogone hebes			2			
P0498	Nephtys cirrosa			2			
P0677	Aricidea minuta (?)			1			
P0860	Stygocapitella subterranea		37				
P0919	Mediomastus fragilis					1	
P1195	Lanice conchilega			4			
P1501	Enchytraeidae	76	18		19	2	
P1524	Grania			2			
Q0054	ACARIFORMES		1				
R0001	CRUSTACEA (larva)	1					
R0142	COPEPODA	3	2	298			
S0112	Calliopius laeviusculus						5
S0135	Pontocrates arenarius			5			1
S0412	Atylus swammerdamei			2			3
S0464	Gammaridae						1
S0464	Gammaridae (juv)						1
S0550	Microprotopus maculatus			8			
S1183	CUMACEA			2			
S1183	CUMACEA (juv)			2			
S1184	Bodotriidae (juv)			2			
S1235	Monopseudocuma gilsoni			1			
	Pseudocumatidae			1			
S1236	Pseudocuma longicorne						2
S1276	BRACHYURA (juv)	1					
	MYRIAPODA	1					
	DIPTERA (larva)				1		
	COLLEMBOLA		2				
W0140	Trochidae (juv)						1
W0294	Littorina	1					
W0324	Rissoidae (juv)						4
W0328	Rissoa parva				1		18
W1560	BIVALVIA (juv)			3			1
W1695	Mytilus edulis (juv)	83	47	34	1	35	170

Species Directory Code	TaxonName	C1	C2	C3	C4	C5	C6
W1906	Kurtiella bidentata						1
W1938	Cardiidae (juv)			1			1
W1973	Spisula (juv)			85			2
W1977	Spisula solida			16			
W2012	Angulus tenuis			1			
W2058	Abra (juv)						1
W2231	Thracia phaseolina						1
ZB0105	OPHIUROIDEA (juv)						2
ZB0181	ECHINOIDEA (juv)				1		

**Annex Table 12C.4.2: Cockenzie - Biomass (gr.) - Data Presented as Unconverted Blot Dry Weight**

TaxonName	C1.1	C2.1	C3.1	C4.1	C5.1	C6.1
<b>Other taxa</b>	0.0013	0.0084	0.0000	0.0008	0.0000	nr
<b>Crustaceans</b>	0.0012	nr	0.0027	0.0000	0.0000	0.0037
<b>Molluscs</b>	0.0362	0.0272	0.2762	0.0004	0.0209	0.1337
<b>Echinoderms</b>	0.0000	0.0000	0.0000	nr	0.0000	nr
<b>Oligochaetes</b>	0.0265	0.0068	nr	0.0047	nr	0.0000
<b>Polychaetes</b>	0.0000	0.0001	0.5803	0.0000	0.0012	0.0016

**Annex Table 12C.4.3: Seton Sands – Abundance**

Species Directory Code	TaxonName	S1	S2	S3	S4	S5	S6
G0001	NEMERTEA		1		1		1
P0104	Sigalion mathildae			1			
P0118	Eteone longa (agg)					2	
P0145	Phyllodoce mucosa		1				
P0462	Hediste diversicolor	2					
P0498	Nephtys cirrosa					1	2
P0776	Pygospio elegans	3					
P0783	Scolelepis squamata	1			1		
P0791	Spio martinensis		1			1	1
P0803	Magelona	1					
P0805	Magelona filiformis						1
P0807	Magelona mirabilis						2
P0931	Arenicola marina	1					
P1098	Owenia fusiformis			1			
S0131	Perioculodes longimanus			1			4
S0135	Pontocrates arenarius	1		2			2
S0246	Urothoe					1	
S0250	Urothoe poseidonis			15		2	6
S0412	Atylus swammerdamei					1	
S0451	Bathyporeia				2		1
S0451	Bathyporeia (juv)	1	1	1			
S0452	Bathyporeia elegans			1			
S0454	Bathyporeia guilliamsoniana			5			
S0455	Bathyporeia nana			1			1
S0464	Gammaridae (juv)					3	
	Echinogammarus marinus	1					
S0489	Megaluropus agilis						3
S0550	Microprotopus maculatus		1				
S0651	Pariambus typicus					1	
S1169	Tanaissus lilljeborgi					1	7
S1188	Cumopsis goodsir		5				
S1235	Monopseudocuma gilsoni						1
S1276	BRACHYURA	1					
W0328	Rissoa parva	1	1				
W1691	Mytilidae (juv)					1	
W1695	Mytilus edulis (juv)	2		1			
W1938	Cardiidae (juv)		3			2	
W1973	Spisula (juv)			3			1
W1978	Spisula subtruncata			2			
W1991	Solenioidea (juv)						1
W2012	Angulus tenuis			1		1	

Species Directory Code	TaxonName	S1	S2	S3	S4	S5	S6
W2019	Tellina fabula			5			7
W2041	Donax vittatus (juv)						1
ZB0001	ECHINODERMATA				P		
ZB0105	OPHIUROIDEA (juv)			1			1

**Annex Table 12C. 4.4: Seton Sands - Biomass (gr.) - Data Presented as Unconverted Blot Dry Weight**

TaxonName	S1.1	S2.1	S3.1	S4.1	S5.1	S6.1
<b>Other taxa</b>	0.0000	0.0012	0.0000	0.0004	0.0000	0.0032
<b>Crustaceans</b>	0.0023	0.0020	0.0173	nr	0.0009	0.0119
<b>Molluscs</b>	0.0009	0.0021	0.2432	0.0000	0.1000	0.1258
<b>Echinoderms</b>	0.0000	0.0000	nr	nr	0.0000	nr
<b>Oligochaetes</b>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<b>Polychaetes</b>	0.4535	nr	0.2138	0.0008	0.0154	0.0605

**ANNEX 12C.5 – GRAB SURVEY 2012 RESULTS****Annex Table 12C.5.1: Particle Size Distribution via Wet and Dry Sieving (64000 - < 63  $\mu\text{m}$  @ 0.5 phi Intervals)**

<b>SAMPLE ID:</b>	<b>1</b>	<b>3</b>	<b>20</b>	<b>24</b>	<b>25</b>
<b>Aperture (<math>\mu\text{m}</math>)</b>	<b>Class Weight Retained (%)</b>				
<b>64000</b>	0.00	0.00	0.00	0.00	0.00
<b>45255</b>	0.00	0.00	0.00	0.00	0.00
<b>32000</b>	0.00	0.00	0.00	0.00	0.00
<b>22627</b>	0.00	0.00	0.00	0.00	0.00
<b>16000</b>	0.00	0.00	0.00	0.00	0.00
<b>11314</b>	0.00	0.00	0.00	0.00	0.00
<b>8000</b>	0.00	0.00	0.00	0.00	0.00
<b>5657</b>	0.00	0.00	0.00	0.00	0.00
<b>4000</b>	0.00	0.00	0.10	0.00	0.04
<b>2828</b>	0.03	0.13	0.09	0.05	0.02
<b>2000</b>	0.04	0.01	0.15	0.04	0.09
<b>1414</b>	0.04	0.04	0.17	0.08	0.07
<b>1000</b>	0.11	0.08	0.13	0.11	0.19
<b>707</b>	0.56	0.58	0.10	0.63	0.60
<b>500</b>	3.17	2.91	0.17	3.51	2.70
<b>354</b>	9.19	8.97	0.36	8.75	7.55
<b>250</b>	17.78	19.24	2.18	15.41	19.14
<b>177</b>	36.63	34.86	13.29	32.09	33.13
<b>125</b>	24.89	24.37	43.03	26.79	27.05
<b>88</b>	3.45	4.49	34.06	8.53	6.14
<b>63</b>	0.76	1.07	3.28	1.40	1.02
<b>&lt; 63</b>	3.35	3.25	2.87	2.60	2.24
<b>Total %</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>



**Annex Table 12C.5.2: Particle Size Distribution via Wet and Dry Sieving (64000 - < 63 µm @ 0.5 phi Intervals)**

Site No.	1	3	20	24	25
<b>SAMPLE TYPE:</b>	Unimodal, Moderately Well Sorted	Unimodal, Moderately Well Sorted	Unimodal, Well Sorted	Unimodal, Moderately Sorted	Unimodal, Moderately Well Sorted
<b>FOLK (1954 ORIGINAL):</b>	Slightly Gravelly Sand	Slightly Gravelly Sand	Slightly Gravelly Sand	Slightly Gravelly Sand	Slightly Gravelly Sand
<b>SEDIMENT NAME:</b>	Slightly Very Fine Gravelly Fine Sand	Slightly Very Fine Gravelly Fine Sand	Slightly Very Fine Gravelly Fine Sand	Slightly Very Fine Gravelly Fine Sand	Slightly Very Fine Gravelly Fine Sand
<b>% GRAVEL (64000 - 2000 µm):</b>	0.07	0.14	0.35	0.09	0.15
<b>% SAND (&lt; 2000 - 63 µm):</b>	96.59	96.61	96.78	97.31	97.61
<b>% MUD (&lt; 63 µm):</b>	3.35	3.25	2.87	2.60	2.24
<b>% V COARSE GRAVEL:</b>	0.00	0.00	0.00	0.00	0.00
<b>% COARSE GRAVEL:</b>	0.00	0.00	0.00	0.00	0.00
<b>% MEDIUM GRAVEL:</b>	0.00	0.00	0.00	0.00	0.00
<b>% FINE GRAVEL:</b>	0.00	0.00	0.10	0.00	0.04
<b>% V FINE GRAVEL:</b>	0.07	0.14	0.24	0.09	0.11
<b>% V COARSE SAND:</b>	0.15	0.12	0.30	0.19	0.27
<b>% COARSE SAND:</b>	3.73	3.49	0.27	4.15	3.30
<b>% MEDIUM SAND:</b>	26.97	28.21	2.54	24.16	26.70
<b>% FINE SAND:</b>	61.52	59.23	56.33	58.88	60.18
<b>% V FINE SAND:</b>	4.21	5.57	37.34	9.93	7.16
<b>% V COARSE SILT:</b>	0.36	0.35	0.31	0.28	0.24
<b>% COARSE SILT:</b>	0.36	0.35	0.31	0.28	0.24
<b>% MEDIUM SILT:</b>	0.36	0.35	0.31	0.28	0.24
<b>% FINE SILT:</b>	0.36	0.35	0.31	0.28	0.24
<b>% V FINE SILT:</b>	0.36	0.35	0.31	0.28	0.24
<b>% CLAY:</b>	1.54	1.50	1.33	1.20	1.04

**Annex Table 12C.5.3: Particle Size Distribution via Wet, Dry Sieving and Laser Diffraction (64000 - < 0.35 µm @ 0.5 phi Intervals)**

Site No.	6	7	8	10	14	15	17	23
Aperture (µm)	Class Weight Retained (%)							
64000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45255	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22627	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11314	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5657	0.00	0.00	0.00	0.00	0.00	0.44	0.39	0.00
4000	0.00	0.00	0.00	0.00	0.45	0.00	0.00	0.09
2828	0.00	0.00	0.07	0.00	0.43	0.22	0.37	0.11
2000	0.00	0.00	0.00	0.04	0.22	0.45	0.14	0.21
1414	0.01	0.00	0.00	0.06	0.06	0.46	0.27	0.35
1000	0.04	0.00	0.03	0.02	0.07	0.39	0.23	0.24
707	0.26	0.03	0.04	0.04	0.06	0.39	0.19	0.30
500	0.95	0.09	0.05	0.07	0.11	0.38	0.22	0.33
354	1.92	0.16	0.09	0.12	0.24	0.43	0.26	0.51
250	6.26	0.21	0.23	0.21	0.51	0.70	0.39	0.76
177	28.14	0.25	0.45	1.34	1.03	1.06	0.61	1.00
125	37.01	0.75	0.93	8.15	2.15	1.78	1.68	2.71
88	17.78	11.97	7.66	39.32	6.69	2.96	10.26	13.15
63	2.61	34.82	52.00	17.19	22.14	10.48	13.41	16.28
44	0.25	9.06	5.96	3.84	6.83	6.30	4.11	3.21
31	0.35	8.44	5.41	4.66	8.59	9.16	6.98	5.52
22	0.46	6.53	4.38	4.69	9.06	10.73	9.23	7.74
16	0.56	5.15	3.81	4.23	8.57	10.77	9.94	8.95
11	0.61	4.50	3.56	3.53	7.41	9.53	9.07	8.58
7.8	0.59	4.01	3.25	2.84	5.99	7.80	7.49	7.14
5.5	0.53	3.42	2.82	2.29	4.75	6.27	6.03	5.66
3.9	0.45	2.78	2.36	1.89	3.81	5.08	4.90	4.55
2.8	0.35	2.17	1.91	1.54	3.04	4.07	3.94	3.67


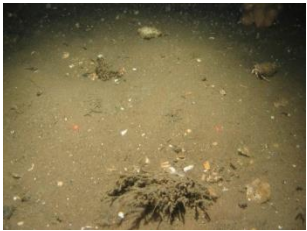

Site No.	6	7	8	10	14	15	17	23
Aperture (µm)	Class Weight Retained (%)							
<b>2.0</b>	0.26	1.60	1.44	1.18	2.31	3.10	2.98	2.78
<b>1.4</b>	0.18	1.12	1.02	0.84	1.63	2.17	2.07	1.89
<b>1.0</b>	0.14	0.85	0.77	0.64	1.23	1.63	1.51	1.34
<b>0.69</b>	0.12	0.82	0.71	0.54	1.08	1.38	1.35	1.18
<b>0.49</b>	0.09	0.76	0.64	0.44	0.93	1.13	1.19	1.04
<b>0.35</b>	0.05	0.46	0.38	0.25	0.54	0.65	0.71	0.63
<b>&lt; 0.35</b>	0.01	0.06	0.05	0.03	0.07	0.08	0.09	0.08
<b>Total %</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>





**Annex Table 12C.5.4: GRADISTAT Statistics Output - Particle Size Distribution via Wet, Dry Sieving and Laser Diffraction (64000 - < 0.35  $\mu\text{m}$  @ 0.5 phi Intervals)**



<b>SAMPLE ID:</b>	6	7	8	10	14	15	17	23
<b>SAMPLE TYPE:</b>	Unimodal, Moderately Well Sorted	Unimodal, Poorly Sorted	Unimodal, Poorly Sorted	Unimodal, Poorly Sorted	Bimodal, Poorly Sorted	Bimodal, Very Poorly Sorted	Bimodal, Very Poorly Sorted	Bimodal, Very Poorly Sorted
<b>FOLK (1954 ORIGINAL):</b>	Slightly Gravelly Sand	Sandy Mud	Slightly Gravelly Muddy Sand	Slightly Gravelly Muddy Sand	Slightly Gravelly Sandy Mud	Slightly Gravelly Sandy Mud	Slightly Gravelly Sandy Mud	Slightly Gravelly Sandy Mud
<b>SEDIMENT NAME:</b>	Slightly Very Fine Gravelly Fine Sand	Very Fine Sandy Very Coarse Silt	Slightly Very Fine Gravelly Very Coarse Silty Very Fine Sand	Slightly Very Fine Gravelly Coarse Silty Very Fine Sand	Slightly Very Fine Gravelly Very Fine Sandy Coarse Silt	Slightly Very Fine Gravelly Very Fine Sandy Coarse Silt	Slightly Very Fine Gravelly Very Fine Sandy Coarse Silt	Slightly Very Fine Gravelly Very Fine Sandy Coarse Silt
<b>% GRAVEL (64000 - 2000 <math>\mu\text{m}</math>):</b>	0.00	0.00	0.07	0.04	1.10	1.11	0.90	0.40
<b>% SAND (&lt; 2000 - 63 <math>\mu\text{m}</math>):</b>	95.00	48.27	61.47	66.52	33.05	19.03	27.50	35.62
<b>% MUD (&lt; 63 <math>\mu\text{m}</math>):</b>	5.00	51.73	38.46	33.44	65.85	79.86	71.60	63.97
<b>% V COARSE GRAVEL:</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>% COARSE GRAVEL:</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>% MEDIUM GRAVEL:</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>% FINE GRAVEL:</b>	0.00	0.00	0.00	0.00	0.45	0.44	0.39	0.09
<b>% V FINE GRAVEL:</b>	0.00	0.00	0.07	0.04	0.65	0.67	0.51	0.32
<b>% V COARSE SAND:</b>	0.05	0.00	0.03	0.08	0.12	0.85	0.50	0.59
<b>% COARSE SAND:</b>	1.21	0.12	0.09	0.11	0.17	0.77	0.41	0.63
<b>% MEDIUM SAND:</b>	8.19	0.37	0.32	0.33	0.76	1.12	0.64	1.27
<b>% FINE SAND:</b>	65.15	1.00	1.37	9.49	3.18	2.85	2.29	3.71
<b>% V FINE SAND:</b>	20.40	46.78	59.67	56.51	28.83	13.43	23.67	29.43
<b>% V COARSE SILT:</b>	0.59	17.50	11.37	8.50	15.42	15.46	11.10	8.73
<b>% COARSE SILT:</b>	1.02	11.68	8.19	8.92	17.63	21.50	19.17	16.69
<b>% MEDIUM SILT:</b>	1.20	8.51	6.81	6.37	13.40	17.32	16.56	15.72
<b>% FINE SILT:</b>	0.98	6.20	5.18	4.18	8.56	11.35	10.93	10.22
<b>% V FINE SILT:</b>	0.62	3.77	3.35	2.72	5.35	7.17	6.92	6.44
<b>% CLAY:</b>	0.59	4.07	3.57	2.75	5.48	7.06	6.92	6.17


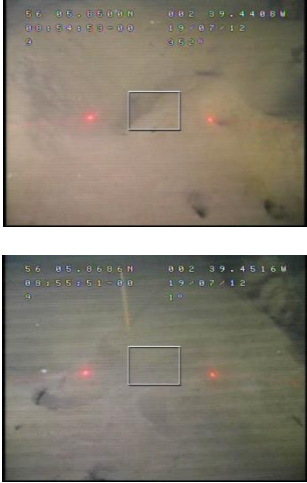
## ANNEX 12C.6 – RESULTS OF THE SEABED VIDEO ANALYSIS

Table 12C.6.1: Results of the Seabed Video Analysis

Site Number	Sediment Description	Species	Biotope and Representative Image
Inch Cape Subtidal 2012 Site 1	<p>Muddy sand.</p> <p>Slightly shelly muddy sand with a few burrows and holes. Substrate with a very fine easily disturbed surface silt fraction. Ripples present.</p> <p>Two species of starfish present throughout, <i>Asterias rubens</i> and <i>Astropecten irregularis</i>. Very occasional <i>Urticina/Stomphia</i> sp.. Sparse <i>Alcyonium digitatum</i>, and one <i>Metridium senile</i>. Sparse outcrops of hydroid/bryozoan</p>	<p><i>Alcyonium digitatum</i></p> <p><i>Asterias rubens</i></p> <p><i>Astropecten irregularis</i></p> <p>Burrows/holes</p> <p><i>Hydrallmania falcata</i></p> <p>Hydroid/Bryozoan turf species</p> <p><i>Metridium senile</i></p> <p><i>Munida rugosa</i></p> <p><i>Urticina/Stomphia</i></p>	 <p>SS.SSa.CMuSa Circalittoral muddy sand</p>
Inch Cape Subtidal 2012 Site 2	<p>Muddy sand.</p> <p>Slightly gravelly/pebbly, slightly shelly muddy sand with a few burrows and holes. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>A few outcrops of hydroid/bryozoan turf species, including sparse <i>Flustra foliacea</i> and <i>Securiflustra securifrons</i>. Clusters of <i>Alcyonium digitatum</i> common throughout. <i>Asterias rubens</i> and <i>Urticina/Stomphia</i> sp. regularly seen. <i>Munida rugosa</i> present.</p>	<p><i>Alcyonium digitatum</i></p> <p><i>Asterias rubens</i></p> <p><i>Astropecten irregularis</i></p> <p>Burrows/holes</p> <p><i>Cancer pagurus</i></p> <p><i>Flustra foliacea</i></p> <p>Hydroid/Bryozoan turf species</p> <p><i>Munida rugosa</i></p> <p>Paguridae</p> <p><i>Pagurus bernhardus</i></p> <p><i>Securiflustra securifrons</i></p> <p><i>Urticina/Stomphia</i></p>	 <p>SS.SSa.CMuSa Circalittoral muddy sand</p>
Inch Cape Subtidal 2012 Site 3	<p>Muddy sand.</p> <p>Slightly shelly muddy sand with a few burrows and holes. Ripples present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Sparse fauna of a few outcrops of hydroid/bryozoan turf species. Occasional clusters of <i>Alcyonium digitatum</i>. Two species of starfish present, <i>Asterias rubens</i> and <i>Astropecten irregularis</i>. One <i>Munida rugosa</i>. Bivalve siphons</p>	<p><i>Alcyonium digitatum</i></p> <p><i>Asterias rubens</i></p> <p><i>Astropecten irregularis</i></p> <p>Burrows/holes</p> <p>Hydroid/Bryozoan turf species</p> <p><i>Munida rugosa</i></p>	 <p>SS.SSa.CMuSa Circalittoral muddy sand</p>



Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Site 4</p>	<p>Muddy sand with coarse mixed sediment.</p> <p>Variable substrate along the transect. Patches of silty/muddy sand with occasional pebbles, followed by more consolidated coarse sediment mixed with muddy sand. Coarse sediment appearing to comprise shell debris with small pebbles. Cobbles rare, and a few small boulders present. Patches of silty sand dominate in places but may be a veneer over a more consistent coarse mixed substrate.</p> <p>Relatively large <i>Alcyonium digitatum</i> present throughout the transect. Small clusters of hydroid/bryozoan turf species, with <i>Flustra foliacea</i> and some <i>Hydrallmania falcata</i> recognizable on a cobble. A few <i>Pecten maximus</i> noted. The squat lobster <i>Munida rugosa</i> seen around larger pebbles and cobbles. A few <i>Asterias rubens</i> and one <i>Crossaster papposus</i> present. Small colonies of <i>Alcyonidium diaphanum</i>.</p>	<p><i>Agonus cataphractus</i>  <i>Alcyonidium diaphanum</i>  <i>Alcyonium digitatum</i>  <i>Asterias rubens</i>  <i>Atelecyclus rotundatus</i>  Callionymidae  <i>Chaetopterus variopedatus</i> tubes  <i>Crossaster papposus</i>  <i>Flustra foliacea</i>  <i>Hydrallmania falcata</i>  Hydroid/Bryozoan turf species  Inachinae  <i>Munida rugosa</i>  <i>Pagurus bernhardus</i>  <i>Pecten maximus</i></p>	  <p>SS.SMx.CMx.FluHyd</p> <p><i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment</p> <p>Impoverished form of the biotope, with patches of</p>  <p>SS.SSa.CMuSa  Circalittoral muddy sand</p>
<p>Inch Cape Subtidal 2012</p> <p>Site 5</p>	<p><b>Muddy sand.</b></p> <p>Slightly shelly muddy sand with a few burrows and holes. Notably rippled. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>A few outcrops of hydroid/bryozoan turf species, notably the hydroid <i>Sertularia</i> sp.. A few starfish present, both <i>Asterias rubens</i> and <i>Astropecten irregularis</i>. The large brittlestar, <i>Ophiura ophiura</i> seen and small patches of <i>Alcyonidium diaphanum</i>. <i>Alcyonium digitatum</i> occurring patchily throughout.</p>	<p><i>Alcyonidium diaphanum</i>  <i>Alcyonium digitatum</i>  <i>Asterias rubens</i>  <i>Astropecten irregularis</i>  Burrows/holes  Hydroid/Bryozoan turf species  Inachinae  <i>Ophiura ophiura</i>  <i>Sertularia</i></p>	 <p>SS.SSa.CMuSa  Circalittoral muddy sand</p> <p>Presence of coarse mixed sediment very small and not observed in a large enough quantity to allow the biotope, SS.SMx.CMx.FluHyd to be allocated.</p>



Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012 Site 6</p>	<p><b>Sandy mud.</b> Muddy sand/sandy mud with burrows and holes. Substrate with a very fine easily disturbed surface silt fraction. The presence of easily disturbed silt made continuous observation of the seabed difficult.  Burrows expected to hold <i>Nephrops norvegicus</i> but none seen along the transect. Very dense numbers of the sea pen <i>Pennatula phosphorea</i>, and notable amounts of starfish, mostly recognisable as <i>Astropecten irregularis</i>. Small amounts of <i>Alcyonium digitatum</i>, one hermit crab, and very small patches of hydroid/bryozoan turf species.</p>	<p><i>Alcyonium digitatum</i> <i>Astropecten irregularis</i> Burrows/holes Hydroid/Bryozoan turf species <i>Pagurus bernhardus</i> <i>Pennatula phosphorea</i></p>	 <p>SS.SMu.CFiMu.SpNMeg Seapens and burrowing megafauna in circalittoral fine mud</p>
<p>Inch Cape Subtidal 2012 Site 7</p>	<p><b>Sandy mud.</b> Muddy sand/sandy mud densely burrowed. Substrate with a very fine easily disturbed surface silt fraction. The presence of easily disturbed silt made continuous observation of the seabed difficult.  Burrows with <i>Nephrops norvegicus</i>, regularly seen along the transect. Small fish seen at times.</p>	<p>Burrows/holes Gobiidae <i>Nephrops norvegicus</i> OSTEICHTHYES</p>	 <p>SS.SMu.CFiMu.SpNMeg Seapens and burrowing megafauna in circalittoral fine mud</p> <p>Even though seapens not seen on this occasion, substrate consistent with those where seen and holes suggestive of seapen presence. Biotope therefore considered appropriate.</p>

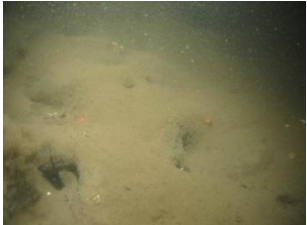
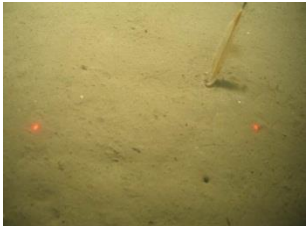
Site Number	Sediment Description	Species	Biotope and Representative Image
Inch Cape Subtidal 2012 Site 8	<p><b>Sandy mud</b></p> <p>Muddy sand/sandy mud densely burrowed. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Fauna comprising the regularly seen sea pen, <i>Virgularia mirabilis</i>. Burrows expected to contain <i>Nephrops norvegicus</i> but none seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p> <p>One set of bivalve siphon tubes clearly seen, and one very small hydroid/bryozoan turf species observed.</p>	Bivalve siphons Burrows/holes Hydroid/Bryozoan turf species <i>Virgularia mirabilis</i>	 <p>SS.SMu.CFiMu.SpMmeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p> <p>Even though <i>N.norvegicus</i> not seen on this occasion, substrate consistent with those where seen and holes suggestive of presence. Biotope therefore considered appropriate.</p>
Inch Cape Subtidal 2012 Site 9	<p><b>Sandy mud.</b></p> <p>Muddy sand/sandy mud densely burrowed. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Fauna comprising the regularly seen sea pen, <i>Virgularia mirabilis</i>. Burrows expected to contain <i>Nephrops norvegicus</i> but none seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p> <p>Very rare view of a hydroid/bryozoan turf species, two crabs and one small fish seen within the silt.</p>	Burrows/holes Hydroid/Bryozoan turf species <i>Virgularia mirabilis</i> DECAPODA <i>Liocarcinus</i> OSTEICHTHYES	 <p>SS.SMu.CFiMu.SpMmeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p> <p>Even though <i>N.norvegicus</i> not seen on this occasion, substrate consistent with those where seen and holes suggestive of presence. Biotope therefore considered appropriate.</p>

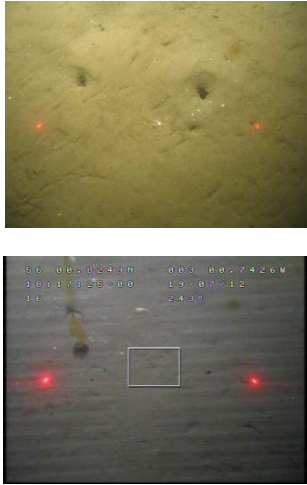
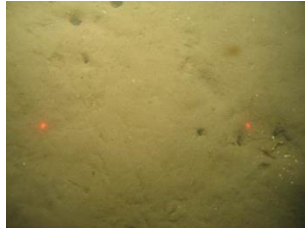




Appendix 12C: Benthic Ecology Baseline Offshore Export Cable Corridor

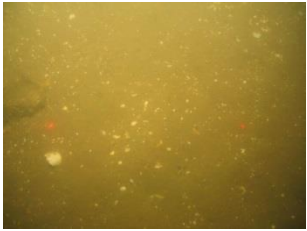
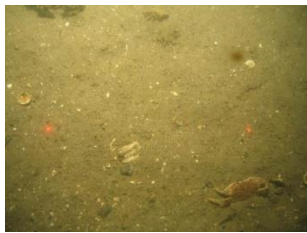
Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012 Site 10</p>	<p>Slightly shelly muddy sand/sandy mud. Area densely burrowed. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows expected to contain <i>Nephrops norvegicus</i> but none seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p> <p>Very rare view of a hydroid/bryozoan turf species, and a couple of small fish seen within the silt.</p>	<p>Burrows/holes Callionymidae Hydroid/Bryozoan turf species OSTEICHTHYES</p>	 <p>SS.SMu.CFiMu.SpNMeg Seapens and burrowing megafauna in circalittoral fine mud</p> <p>Even though <i>N.norvegicus</i> and seapens not seen on this occasion, substrate consistent with those where seen and holes suggestive of presence. Biotope therefore considered appropriate.</p>
<p>Inch Cape Subtidal 2012 Site 11</p>	<p><b>Muddy sand.</b></p> <p>Slightly shelly sandy mud/muddy sand. Burrows and holes present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows expected to contain <i>Nephrops norvegicus</i> but none seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p> <p>Occasional occurrence of hydroid/bryozoan turf species, a few small colonies of <i>Alcyonium digitatum</i>, and a few <i>Metridium senile</i>. <i>Virgularia mirabilis</i> present, and small crabs regularly seen, predicted to be <i>Liocarcinus</i> sp., but the presence of dense silt preventing species confirmation. Two starfish seen, again difficult to confirm species due to silt, but either <i>Asterias rubens</i> or <i>Astropecten irregularis</i>.</p>	<p><i>Alcyonium digitatum</i> ASTEROIDEA Burrows/holes DECAPODA Hydroid/Bryozoan turf species <i>Liocarcinus</i> <i>Metridium senile</i> <i>Pagurus bernhardus</i> <i>Virgularia mirabilis</i></p>	 <p>SS.SSa.CMuSa</p> <p>Circalittoral muddy sand</p> <p>Presence of coarse mixed sediment very small. Potentially SS.SMu.CFiMu.SpNMeg but substrate less densely burrowed. Decision made that not quite enough evidence to support the more specific designation.</p>

Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012 Site 12</p>	<p><b>Muddy sand</b></p> <p>Slightly gravelly, slightly shelly sandy mud/muddy sand. Holes present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Large patches of hydroid/bryozoan turf species, a few small colonies of <i>Alcyonium digitatum</i>, and one <i>Metridium senile</i>. Small crabs regularly seen, predicted to be <i>Liocarcinus</i> sp., but the presence of silt preventing species confirmation. Starfish seen, again difficult to confirm species due to silt, but believed to be <i>Astropecten irregularis</i>. A few erect tubes, believed to be <i>Chaetopterus variopedatus</i>. Where substrate clearly seen, the brittle star, <i>Ophiura albida</i> very common. Sporadic view of a burrowing anemone, <i>Cerianthus lloydii</i>.</p>	<p><i>Agonus cataphractus</i> <i>Alcyonium digitatum</i> <i>Astropecten irregularis</i> Burrows/holes <i>Cerianthus lloydii</i> <i>Chaetopterus</i> tubes Gobiidae <i>Hydrallmania falcata</i> Hydroid/Bryozoan turf species <i>Liocarcinus</i> <i>Metridium senile</i> <i>Ophiura albida</i> OSTEICHTHYES <i>Pagurus bernhardus</i> <i>Sertularia</i></p>	<p>SS.SSa.CMuSa Circalittoral muddy sand</p> <p>With potential to be considered, in places, an impoverished form of:-</p>  <p>SS.SMx.CMx.FluHyd <i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment</p>
<p>Inch Cape Subtidal 2012 Site 13</p>	<p><b>Sandy mud.</b></p> <p>Slightly shelly sandy mud/muddy sand. Burrows and holes present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows expected to contain <i>Nephrops norvegicus</i> and one seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p> <p>Occasional occurrence of hydroid/bryozoan turf species, Small crabs regularly seen, predicted to be <i>Liocarcinus</i> sp., but the presence of dense silt preventing species confirmation. Prawns regularly seen throughout the transect. Brief glimpse of a large sand eel, two small flat fish and one <i>Agonus cataphractus</i>. One small patch of <i>Lanice conchilega</i>.</p>	<p><i>Agonus cataphractus</i> Ammodytidae Burrows/holes CARIDEA DECAPODA Hydroid/Bryozoan turf species <i>Lanice conchilega</i> <i>Liocarcinus</i> <i>Nephrops norvegicus</i> PLEURONECTIFORMES</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p> <p><i>N.norvegicus</i> seen but seapens not obvious. However, substrate consistent with those where previously seen and holes suggestive of presence. Biotope therefore considered appropriate.</p>

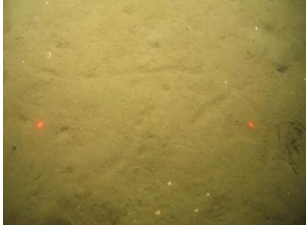
Site Number	Sediment Description	Species	Biotope and Representative Image
Inch Cape Subtidal 2012 Site 14	<p><b>Sandy mud.</b></p> <p>Slightly shelly sandy mud/muddy sand. Burrows and holes present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows expected to contain <i>Nephrops norvegicus</i> but none seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p> <p>Occasional occurrence of hydroid/bryozoan turf species, Small crabs occasionally seen, predicted to be <i>Liocarcinus</i> sp., but the presence of dense silt preventing species confirmation. <i>Virgularia mirabilis</i> seen sporadically.</p>	<p>Burrows/holes DECAPODA Hydroid/Bryozoan turf species OSTEICHTHYES <i>Virgularia mirabilis</i></p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p> <p><i>N.norvegicus</i> not seen but substrate consistent with those where previously observed and holes suggestive of presence. Biotope therefore considered appropriate.</p>
Inch Cape Subtidal 2012 Site 15	<p><b>Sandy mud.</b></p> <p>Slightly shelly sandy mud/muddy sand. Burrows and holes present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows expected to contain <i>Nephrops norvegicus</i> but none seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p> <p>Small crabs regularly seen, <i>Liocarcinus</i> sp.. The sea pen, <i>Virgularia mirabilis</i> seen, and a few <i>Metridium senile</i>. Occasional small fish.</p>	<p>Burrows/holes Gobiidae <i>Liocarcinus</i> <i>Metridium senile</i> OSTEICHTHYES PLEURONECTIFORMES <i>Virgularia mirabilis</i></p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p> <p><i>N.norvegicus</i> not seen but substrate consistent with those where previously observed and holes suggestive of presence. Biotope therefore considered appropriate.</p>






Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012 Site 16</p>	<p><b>Sandy mud.</b></p> <p>Slightly shelly sandy mud/muddy sand. Burrows and holes present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows expected to contain <i>Nephrops norvegicus</i> but none seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p> <p>Small crabs regularly seen, <i>Liocarcinus</i> sp.. The sea pen, <i>Virgularia mirabilis</i> seen, and one <i>Metridium senile</i>. Very small patches of hydroid/bryozoan turf species. One starfish seen, <i>Asterias rubens</i>.</p>	<p><i>Asterias rubens</i> Burrows/holes Gobiidae Hydroid/Bryozoan turf species <i>Liocarcinus</i> <i>Metridium senile</i> PLEURONECTIFORMES <i>Virgularia mirabilis</i></p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p> <p><i>N.norvegicus</i> not seen but substrate consistent with those where previously observed and holes suggestive of presence. Biotope therefore considered appropriate.</p>
<p>Inch Cape Subtidal 2012 Site 17</p>	<p><b>Sandy mud</b></p> <p>Slightly shelly sandy mud/muddy sand. Burrows and holes present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows expected to contain <i>Nephrops norvegicus</i> but none seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p> <p>Small crabs regularly seen, <i>Liocarcinus</i> sp.. The sea pen, <i>Virgularia mirabilis</i> seen throughout. One <i>Metridium senile</i>.</p>	<p>Burrows/holes Gobiidae <i>Liocarcinus</i> <i>Metridium senile</i> <i>Virgularia mirabilis</i></p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p> <p><i>N.norvegicus</i> not seen but substrate consistent with those where previously observed and holes suggestive of presence. Biotope therefore considered appropriate.</p>

Site Number	Sediment Description	Species	Biotope and Representative Image
Inch Cape Subtidal 2012 Site 18	<p><b>Sandy mud.</b></p> <p>Slightly shelly sandy mud/muddy sand. Burrows and holes present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows expected to contain <i>Nephrops norvegicus</i> but none seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p> <p>Small crabs regularly seen, <i>Liocarcinus</i> sp.. Two species of sea pens seen throughout, <i>Virgularia mirabilis</i> and <i>Pennatula phosphorea</i>.</p>	<p>Burrows/holes <i>Liocarcinus</i> <i>Pennatula phosphorea</i> <i>Virgularia mirabilis</i></p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p> <p><i>N.norvegicus</i> not seen but substrate consistent with those where previously observed and holes suggestive of presence. Biotope therefore considered appropriate.</p>
Inch Cape Subtidal 2012 Site 20	<p><b>Muddy sand</b></p> <p>Slightly gravelly, shelly muddy sand. Area largely a level plateau, with patches of more obviously coarse sediment mixed with the muddy sand. Dead <i>Ensis</i> shells particularly noticeable.</p> <p>Small patches of hydroid/bryozoan turf species, and variably sized outcrops of foliose red algae. <i>Lanice conchilega</i> forming sparse cover, with a few erect tubes of <i>Chaetopterus variopedatus</i>. A few crabs visible, <i>Liocarcinus</i> sp., plus another proving difficult to confidently identify. A few burrowing anemones visible, <i>Cerianthus lloydii</i>.</p>	<p><i>Asterias rubens</i> ASTEROIDEA <i>Cerianthus lloydii</i> <i>Chaetopterus</i> tubes DECAPODA Hydroid/Bryozoan turf species <i>Lanice conchilega</i> <i>Liocarcinus</i> <i>Pagurus bernhardus</i> RHODOPHYCEAE</p>	 <p>SS.SMx.CMx.FluHyd <i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment.</p> <p>Notably impoverished form of the allocated biotope.</p>






Site Number	Sediment Description	Species	Biotope and Representative Image
Inch Cape Subtidal 2012 Site 21	<p><b>Muddy sand.</b></p> <p>Shelly muddy sand with a gravel fraction and the occasional pebble. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Presence of easily disturbed silt, and an already high level of silt suspension within the water column, made continuous observation of the seabed very difficult.</p> <p>Very little fauna visible. Foliose red algae seen across the site, and rare glimpses of a large brown alga, <i>Laminaria</i> sp. A smattering of small barnacles seen on a rare large pebble.</p>	<p>CIRRIPEDIA LAMINARIALES RHODOPHYCEAE</p>	 <p>SS.SMx.CMx Circalittoral mixed sediment</p> <p>Poor visibility led to a lower level designation but is highly possible that this can be called an impoverished SS.SMx.CMx.FluHyd.</p>
Inch Cape Subtidal 2012 Site 22	<p><b>Muddy sand.</b></p> <p>Shelly muddy sand with a gravel fraction, appearing quite coarse in places. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Presence of easily disturbed silt, and an already high level of silt suspension within the water column, made continuous observation of the seabed very difficult.</p> <p>Very little fauna visible. Sparse amounts foliose red algae and hydroid/bryozoan turf species, small crabs present, <i>Liocarcinus</i> sp., and occasional presence of <i>Alcyonium digitatum</i>. Small goby seen and a large male cuckoo wrasse, <i>Labrus mixtus</i>.</p>	<p><i>Alcyonium digitatum</i> DECAPODA <i>Echinus esculentus</i> Gobiidae <i>Labrus mixtus</i> <i>Liocarcinus</i> RHODOPHYCEAE</p>	 <p>SS.SMx.CMx Circalittoral mixed sediment</p> <p>Poor visibility led to a lower level designation but is highly possible that this can be called an impoverished SS.SMx.CMx.FluHyd.</p>


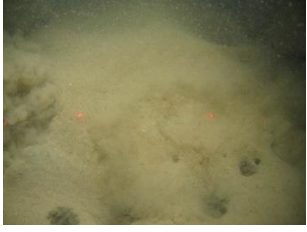
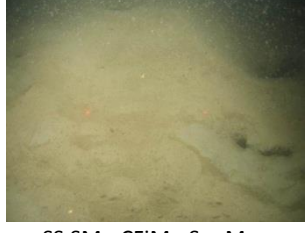
Appendix 12C: Benthic Ecology Baseline Offshore Export Cable Corridor


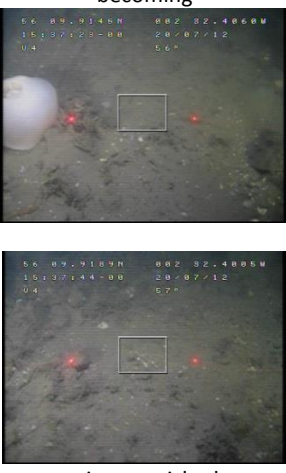
Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012 Site 23</p> <p>Created as a replacement for abandoned Site 19</p>	<p><b>Muddy sand.</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Presence of easily disturbed silt, and an already high level of silt suspension within the water column, made continuous observation of the seabed very difficult.</p> <p>Very little fauna visible. Occasional small holes seen. Small crabs regularly seen, <i>Liocarcinus</i> sp., and an occasional glimpse of <i>Metridium senile</i>. Rare views of <i>Chaetopterus variopedatus</i> tubes and sparse views of hydroid/bryozoan turf species.</p>	<p>Burrows/holes</p> <p><i>Chaetopterus</i> tubes</p> <p>Hydroid/Bryozoan turf species</p> <p><i>Liocarcinus</i></p> <p><i>Metridium senile</i></p>	 <p>SS.SSa.CMuSa Circalittoral muddy sand</p>



Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Video Transect 1</p>	<p><b>Bedrock and boulders with mixed sediment.</b></p> <p>Boulder reef, presumed to be on bedrock but none necessarily visible. Within the recesses, aggregations of cobbles and areas of coarse mixed sediment of slightly sandy, slightly gravelly cobbly pebbles. Boulder reef rises very steeply towards the shore. Closer to the shore, a more level open plain of slightly sandy gravelly pebbles with the occasional boulder appears, before rising again. Closer to shore again, large shell hash becomes more evident within the coarse mixed sediment and rock ledging begins to appear. Transect brought to an end due to loss of water depth required for the vessel.</p> <p>The majority of the substrate covered by a dense aggregation of the brittlestar <i>Ophiothrix fragilis</i>, mixed with lower quantities of <i>Ophiocomina nigra</i>. <i>Echinus esculentus</i> very common throughout, with <i>Alcyonium digitatum</i> present in large clusters, closer to the shore. Encrusting coralline algae visible on most rock surfaces seen, along with dense <i>Pomatoceros</i> tubes. <i>Asterias rubens</i> very common, with the occasional <i>Luidia ciliaris</i>. <i>Liocarcinus depurator</i> regularly present, along with <i>Necora puber</i> and the occasional <i>Cancer pagurus</i>.</p>	<p><i>Alcyonium digitatum</i>  <i>Asterias rubens</i>  <i>Cancer pagurus</i>                      CARIDEA                      Corallinaceae  <i>Echinus esculentus</i>                      Galatheidae                      Hydroid/Bryozoan turf species  <i>Liocarcinus depurator</i>  <i>Luidia ciliaris</i>  <i>Necora puber</i>  <i>Ophiocomina nigra</i>  <i>Ophiothrix fragilis</i>  <i>Pomatoceros</i>  <i>Urticina/Stomphia</i></p>  	   <p>CR.MCR.EcCr.FaAlCr.Bri</p> <p>Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock</p>




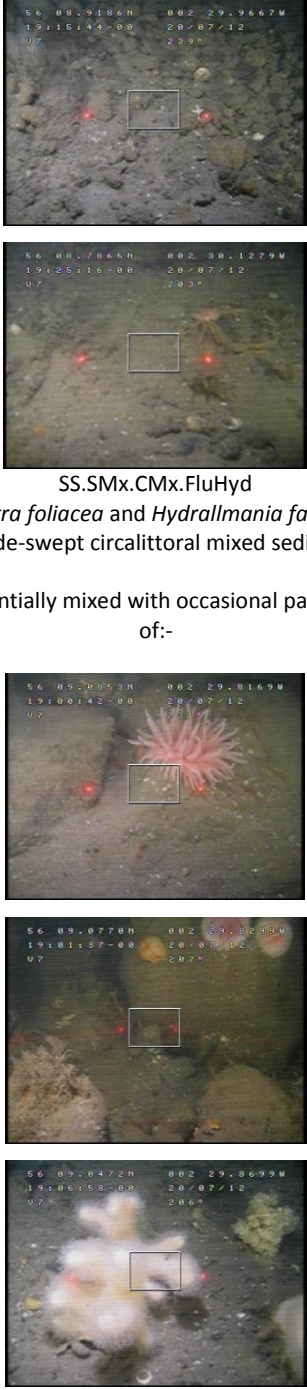
Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Video Transect 2</p>	<p>Start of transect a very coarse cobbly pebbly silty, slightly shelly sandy gravel with the occasional small boulder. Coarse mixed sediment plain extends for 2/3 of the transect. Substrate then becomes substantially coarser, a silty slightly sandy slightly shelly gravelly pebble plateau, with an increasing amount of cobbles as the transect progresses. A coarse gravelly sand overlay forms deposits over the site. Boulders being to increase within the coarse sediment, and finally becomes a steeply rising boulder and large cobble reef. Occasionally a more level plateau of bedrock, boulders and cobbles with a dense overlay of gravelly sand seen.</p> <p>The first 2/3 of the transect, comprising the coarse mixed sediment plain, predominantly covered with large forms of <i>Alcyonium digitatum</i>, within which, <i>Munida rugosa</i> were extremely common. Small patches of hydroid turf (<i>Thiura thuja</i>), a few <i>Asterias rubens</i>, occasional <i>Urticina/Stomphia</i>, and a few small <i>Liocarcinus depurator</i>.</p> <p>As the substrate coarsened, <i>Alcyonium digitatum</i> remained dense, but the larger sediment fraction became covered with <i>Pomatoceros</i> and <i>Echinus esculentus</i> became very frequent. A few patches of large hydroid turf were seen (<i>Abietinaria abietina</i>). Towards the end of the transect, small patches of <i>Ophiocomina nigra</i> appeared, and one small dense bed of <i>Ophiothrix fragilis</i>. The steeply rising boulder and cobble reef became more visibly covered with encrusting coralline algae, bryozoan crusts and <i>Pomatoceros</i> worms. <i>Echinus esculentus</i> continued to dominate the more exposed rock areas.</p>	<p><i>Abietinaria abietina</i>  <i>Alcyonium digitatum</i>  <i>Asterias rubens</i>                      BRYOZOA crust                      CARIDEA                      Caryophylliidae                      CIRRIPEDIA                      Corallinaceae  <i>Crossaster papposus</i>  <i>Echinus esculentus</i>                      Hydroid/Bryozoan turf species  <i>Liocarcinus depurator</i>  <i>Luidia ciliaris</i>  <i>Munida rugosa</i>  <i>Ophiocomina nigra</i>  <i>Ophiothrix fragilis</i>  <i>Pecten maximus</i>  <i>Pomatoceros</i>                      PORIFERA  <i>Thuiaria thuja</i>  <i>Urticina/Stomphia</i></p>   <p>CR.MCR.EcCr.FaAlCr.Adig  <i>Alcyonium digitatum</i>,  <i>Pomatoceros triqueter</i>,                      algal and bryozoan crusts                      on wave-exposed                      circalittoral rock</p>	 <p>SS.SMx.CMx.OphMx  <i>Ophiothrix fragilis</i> and/or <i>Ophiocomina nigra</i> brittlestar beds                      on sublittoral mixed sediment</p> <p>The beginning of the transect appears to be suitable for the above biotope, despite the complete lack of brittlestars along the early section. However the CMx root does not go far enough to describe the biotope. Therefore an impoverished form of the above biotope is suggested.</p> <p>Where the substrate changes to a mixture of bedrock, boulders and coarse sediment, the following two biotopes are suggested to form a mosaic in the area.</p>   <p>CR.MCR.EcCr.FaAlCr.Pom                      Faunal and algal crusts with <i>Pomatoceros triqueter</i> and sparse <i>Alcyonium digitatum</i> on exposed to moderately wave-exposed circalittoral rock</p>

Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Video Transect 3</p>	<p><b>Muddy sand.</b></p> <p>Sandy mud/muddy sand densely covered with burrows and holes. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows with <i>Nephrops norvegicus</i> and the seapen <i>Virgularia mirabilis</i> regularly seen. Small crabs present, <i>Liocarcinus</i> sp. and prawns seen occasionally.</p>	<p>Hydroid/Bryozoan turf species</p> <p><i>Virgularia mirabilis</i></p> <p>CARIDEA</p> <p><i>Nephrops norvegicus</i></p> <p><i>Liocarcinus</i></p> <p>PLEURONECTIFORMES</p>	   <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p>


Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Video Transect 4</p>	<p><b>Muddy sand becoming a muddy sand covered coarse mixed sediment.</b></p> <p>Slightly shelly sandy mud/muddy sand with burrows and holes. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>As the transect progressed to the north-east, the sediment became coarser, with gravel and pebbles becoming evident within the muddy sand. Approximately half way along the transect the ground becomes more obviously consolidated with patches of larger shell hash, some gravel, with cobbly pebble deposits and the occasional outcrop of large cobbles and small boulders.</p> <p>The start of the transect had lots of burrows and holes, with <i>Pennatula phosphorea</i> regularly seen. Small crabs, <i>Liocarcinus</i> sp., and prawns were also present. Hydroid/bryozoan turf species were sparse and in poor condition. <i>Asterias rubens</i> was very evident.</p> <p>As the ground became more coarse and compacted, small <i>Alcyonium digitatum</i> began to appear, and <i>Munida rugosa</i> were regularly observed. <i>Pennatula phosphorea</i> continued to be present. <i>Metridium senile</i> became visible in the last quarter of the transect, and formed small clusters on the occasional cobble and small boulder outcrop. Hydroid/bryozoan turf became more evident and formed more substantial aggregation. Species were largely unidentifiably due to the silt coverage but <i>Hydrallmania falcata</i> and <i>Sertularia</i> sp. were confirmed at times. One <i>Pecten maximus</i> was seen, and one <i>Cancer pagurus</i> where boulders afforded some protection.</p>	<p><i>Alcyonium digitatum</i>  <i>Asterias rubens</i>                      Burrows/holes                      Callionymidae  <i>Cancer pagurus</i>                      CARIDEA                      Gobiidae  <i>Hydrallmania falcata</i>                      Hydroid/Bryozoan  <i>turf species</i>  <i>Liocarcinus</i>  <i>Metridium senile</i>  <i>Munida rugosa</i>                      OSTEICHTHYES  <i>Pecten maximus</i>  <i>Pennatula phosphorea</i>                      PLEURONECTIFORMES  <i>Sertularia</i></p>	 <p>SS.SMu.CFiMu.SpnMeg                      Seapens and burrowing megafauna in circalittoral fine mud</p> <p>becoming</p>  <p>an impoverished:-                      SS.SMx.CMx.FluHyd</p> <p><i>Flustra foliacea</i> and <i>Hydrallmania falcata</i>                      on tide-swept circalittoral mixed sediment</p>


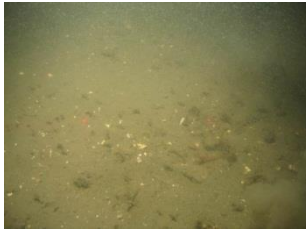


Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Video Transect 5</p>	<p><b>Muddy sand becoming a muddy sand covered coarse mixed sediment.</b></p> <p>Slightly shelly sandy mud/muddy sand with burrows and holes. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>In the latter 3/5 ths of the transect, the sediment became coarser, with gravel and pebble deposits becoming evident within the muddy sand in small patches. Burrows and holes still evident but in lower numbers.</p> <p>The start of the transect had lots of burrows and holes, with <i>Pennatula phosphorea</i> regularly seen. Small crabs, <i>Liocarcinus</i> sp., and prawns were also present. Hydroid/bryozoan turf species were sparse and in poor condition. <i>Asterias rubens</i> was very evident.</p> <p>Where coarser substrate became evident, hydroid/bryozoan turf species formed thicker clusters, with small outcrops of <i>Alcyonium digitatum</i>, and aggregations of <i>Munida rugosa</i>. <i>Urticina/Stromphia</i> seen in these areas, and the occasional <i>Pecten maximus</i>. <i>Metridium senile</i> also occurred sporadically. Hydroids largely unidentifiable due to the silt presence but <i>Hydrallmania falcata</i>, <i>Sertularia</i> sp., Plumulariidae, <i>Nemertesia</i> sp. and <i>Thuiaria thuja</i> identified at times. <i>Pennatula phosphorea</i> still visible within the coarser sediment areas.</p>	<p><i>Asterias rubens</i>                      Burrows/holes                      Callionymidae                      CARIDEA                      Gobiidae  <i>Hydrallmania falcata</i>                      Hydroid/Bryozoan turf species  <i>Liocarcinus</i>  <i>Metridium senile</i>  <i>Munida rugosa</i>                      NEMERTESIA                      OSTEICHTHYES  <i>Pecten maximus</i>  <i>Pennatula phosphorea</i>                      PLEURONECTIFORMES                      Plumulariidae  <i>Sertularia</i>  <i>Thuiaria thuja</i>  <i>Urticina/Stromphia</i></p>	 <p>SS.SMu.CFiMu.SpMg                      Seapens and burrowing megafauna in circalittoral fine mud</p> <p>with small patches of impoverished:-</p>  <p>SS.SMx.CMx.FluHyd  <i>Flustra foliacea</i> and <i>Hydrallmania falcata</i>                      on tide-swept circalittoral mixed sediment</p>

Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Video Transect 6</p>	<p><b>Sandy mud.</b></p> <p>Muddy sand/sandy mud very densely burrowed. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows regularly occupied by <i>Nephrops norvegicus</i>. Very occasional occurrence of <i>Asterias rubens</i>. One <i>Urticina/Stomphia</i> sp., one crab, <i>Liocarcinus</i> sp., and very rare small tufts of hydroid/bryozoan turf species.</p>	<p><i>Asterias rubens</i></p> <p>Burrows/holes</p> <p>Hydroid/Bryozoan turf species</p> <p><i>Liocarcinus</i></p> <p><i>Nephrops norvegicus</i></p> <p><i>Urticina/Stomphia</i></p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p> <p>Even though seapens not seen on this occasion, substrate consistent with those where seen and holes suggestive of presence. Biotope therefore considered appropriate.</p>


Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Video Transect 7</p>	<p><b>Bedrock and boulders with coarse mixed ground.</b></p> <p>Beginning of transect a very coarse boulder, cobble and mixed ground area, with boulders up to 1m across in places. Underlying substrate appearing to be bedrock or consolidated sediment, with a silty pebbly sand veneer. Silty sand appearing to be a veneer over much of the site. Large sediment fraction of boulders or pebbly cobble deposits, patchy across the site, interspersed with areas of low lying consolidated ground or bedrock, with cobbly gravelly pebble surface deposits with a muddy sand veneer. Some areas potentially a deeper deposit of sandy muddy coarse mixed sediment.</p> <p><i>Alcyonium digitatum</i> forms regular clumps across the various sediment sizes seen across the site. Occasional urchins, <i>Echinus esculentus</i> seen. Cobbles often with dense clusters of the hydroid <i>Abietinaria abietina</i>. The foliose bryozoan <i>Securiflustra securifrons</i> occurs sparsely but regularly throughout. <i>Munida rugosa</i> often seen within recesses. Further along the transect, poor quality clusters of hydroid/bryozoan turf seen with clusters of ascidians around the base (identification not possible but predict <i>Ascidella</i> sp.). One area appearing to have a dense aggregation of burrowing anemones, with the appearance of <i>Cerianthus lloydii</i>. The sea pen <i>Pennatula phosphorea</i> sporadic. Rare observation of <i>Pecten maximus</i>, <i>Maja squinado</i> and the edible crab, <i>Cancer pagurus</i>. The starfish <i>Asterias rubens</i> common across the site, with an occasional <i>Crossaster papposus</i>.</p>	<p><i>Abietinaria abietina</i>  <i>Alcyonium digitatum</i>                      ASCIDIACEA  <i>Asterias rubens</i>  <i>Bolocera tuediae</i>  <i>Cancer pagurus</i>  <i>Cerianthus lloydii</i>  <i>Crossaster papposus</i>                      DECAPODA  <i>Echinus esculentus</i>                      Hydroid/Bryozoan turf species  <i>Liocarcinus</i>  <i>Maja squinado</i>  <i>Microchirus variegatus</i>  <i>Munida rugosa</i>  <i>Nemertesia antennina</i>                      OSTEICHTHYES  <i>Pagurus bernhardus</i>  <i>Pecten maximus</i>  <i>Pennatula phosphorea</i>  <i>Securiflustra securifrons</i>  <i>Sertularia</i>  <i>Thuiaria thuja</i>  <i>Urticina/Stomphia</i></p>	 <p>SS.SMx.CMx.FluHyd  <i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment potentially mixed with occasional patches of:-</p> <p>SS.SMx.CMx.CIlOmx.Nem  <i>Cerianthus lloydii</i> with <i>Nemertesia</i> spp. and other hydroids in circalittoral muddy mixed sediment</p>




Appendix 12C: Benthic Ecology Baseline Offshore Export Cable Corridor

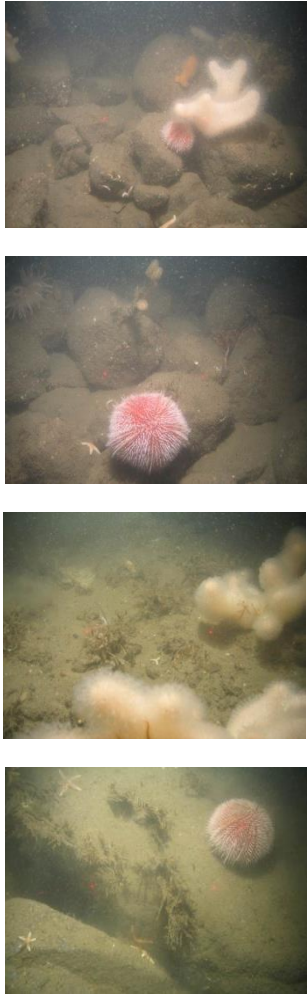
Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Video Transect 8</p>	<p><b>Muddy sand.</b></p> <p>Muddy sand/sandy mud very densely burrowed. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Nephrops norvegicus</i> occasionally seen. Very dense occurrence of <i>Pennatula phosphorea</i>. <i>Asterias rubens</i> and <i>Liocarcinus</i> sp. regularly seen. Very sparse presence of hydroid/bryozoan turf species. One outcrop of <i>Alcyonium digitatum</i>. Two <i>Munida rugosa</i> seen, one around an aggregation of coarse shell debris and one around the <i>A. digitatum</i>.</p>	<p><i>Alcyonium digitatum</i></p> <p><i>Asterias rubens</i></p> <p>Burrows/holes</p> <p>Callionymidae</p> <p><i>Cancer pagurus</i></p> <p>Hydroid/Bryozoan turf species</p> <p><i>Liocarcinus</i></p> <p><i>Munida rugosa</i></p> <p><i>Nephrops norvegicus</i></p> <p>OSTEICHTHYES</p> <p>Paguridae</p> <p><i>Pennatula phosphorea</i></p> <p>PLEURONECTIFORMES</p> <p><i>Sertularia</i></p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>



Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Video Transect 9</p>	<p><b>Muddy sand with coarse mixed sediment.</b></p> <p>Muddy sand/sandy mud with burrows and holes. Patches of coarse mixed sediment of gravelly pebbles with a few cobbles and rarely a small boulder. Substrate appears quite consolidated in places, and appears to be broken bedrock or raised ledging in one small area. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Nephrops norvegicus</i> seen in and out of the burrows, with <i>Pennatula phosphorea</i> also present. <i>Asterias rubens</i> and <i>Liocarcinus</i> sp. regularly seen. Hydroid/bryozoan turf species present in sparse patches. <i>Alcyonium digitatum</i> rare across the site. <i>Munida rugosa</i> present occasionally. As the transect progressed, the presence of <i>Metridium senile</i> and <i>Urticina/Stromphia</i> became very notable, along with small spherical examples of the orange sponge <i>Suberites</i> sp.</p>	<p><i>Alcyonium digitatum</i>  <i>Asterias rubens</i>  <i>Burrows/holes</i>  <i>Callionymidae</i>                      CARIDEA                      Gobiidae                      Hydroid/Bryozoan turf species  <i>Liocarcinus</i>  <i>Metridium senile</i>  <i>Munida rugosa</i>  <i>Nephrops norvegicus</i>  <i>Pennatula phosphorea</i>  <i>Sertularia</i>  <i>Suberites</i>  <i>Urticina/Stromphia</i></p>  <p><i>Nephrops norvegicus</i> within a burrow.</p>	<p>Area considered to be a mosaic of a coarse form of:-</p>   <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p> <p>mixed with an impoverished form of:-</p>  <p>SS.SMx.CMx.FluHyd</p> <p><i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment</p>









Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Inch Cape Subtidal 2012</p> <p>Video Transect 10</p>	<p><b>Muddy sand.</b></p> <p>Slightly shelly, slightly gravelly muddy sand/sandy mud very densely burrowed. Substrate with a very fine easily disturbed surface silt fraction. Small areas with the appearance of greater sediment consolidation.</p> <p><i>Nephrops norvegicus</i> occasionally seen. <i>Asterias rubens</i> rare but <i>Liocarcinus</i> sp. very evident. Very sparse presence of hydroid/bryozoan turf species. Prawns occasionally visible and a variety of small fish present.</p>	<p><i>Agonus cataphractus</i>  <i>Ammodytidae</i>  <i>Asterias rubens</i>                      Burrows/holes                      CARIDEA                      Hydroid/Bryozoan turf species  <i>Liocarcinus</i>  <i>Nephrops norvegicus</i></p>	 <p>SS.SMu.CFiMu.SpnMeg                      Seapens and burrowing megafauna in circalittoral fine mud</p> <p>Even though seapens not seen on this occasion, substrate consistent with those where seen and holes suggestive of presence. Biotope therefore considered appropriate.</p>




Site Number	Sediment Description	Species	Biotope and Representative Image
Inch Cape Subtidal 2012 Video Transect 11	<p>At the NE end of transect substrate: Sandy mud becoming: - Bedrock and boulders with coarse mixed ground.</p> <p>Beginning of the transect a muddy sand/sandy mud with burrows and holes. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Substrate soon went through a transition to a more consolidated sediment of hard ground with slightly shelly slightly gravelly cobbly pebbly mixed sediment. A silty sandy veneer was present over all varieties of substrate across the whole site. As transect continued, larger boulder and cobble deposits occurred, with boulders up to 1m across in places. Boulders and cobbly pebble sediments formed large deposits across the site, interspersed with areas of low lying consolidated ground or bedrock, with a thinner veneer of cobbly gravelly pebbles. Some areas potentially a deeper deposit of sandy muddy coarse mixed sediment.</p> <p>Transect 11 forms a linking transect between Sites 8 and 7, and was undertaken to review the extent of coarse hard ground. Approximate position at which softer sediment in Site 8, running into Site 11, changed to be more consistent with the substrate found in video Site 7 is :56o 09.3767 N, 002o 29.5184 W. Burrows common at the start of the transect, along with the sea pen <i>Pennatula phosphorea</i>. <i>Asterias rubens</i> and <i>Urticina/Stomphia</i> were also notable, with tiny outcrops of <i>Alcyonium digitatum</i>.</p>	<p><i>Abietinaria abietina</i> <i>Alcyonium digitatum</i> ASCIDIACEA <i>Asterias rubens</i> <i>Bolocera tuediae</i> Burrows/holes CARIDEA <i>Cerianthus lloydii</i> <i>Crossaster papposus</i> <i>Echinus esculentus</i> <i>Flustra foliacea</i> <i>Hydrallmania falcata</i> Hydroid/Bryozoan turf species <i>Liocarcinus</i> <i>Munida rugosa</i> <i>Ophiothrix fragilis</i> <i>Pecten maximus</i> <i>Pennatula phosphorea</i> PLEURONECTIFORMES Plumulariidae PORIFERA <i>Securiflustra securifrons</i> <i>Sertularia</i> <i>Thuiaria thuja</i> <i>Urticina/Stomphia</i></p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p> <p>becoming:-</p>  <p>SS.SMx.CMx.FluHyd <i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment</p> <p>potentially mixed with occasional patches of:-</p>  <p>SS.SMx.CMx.CIloMx.Nem <i>Cerianthus lloydii</i> with <i>Nemertesia</i> spp. and other hydroids in circalittoral muddy mixed sediment</p>




Site Number	Sediment Description	Species	Biotope and Representative Image
Inch Cape Subtidal 2012  Video Transect 11 (cont.)	<p>As the substrate became more coarse and consolidated, <i>Alcyonium digitatum</i> formed regular clumps across the various sediment sizes seen across the site. Hydroid/bryozoan turf species common, but poor quality and largely unidentifiable. <i>Echinus esculentus</i> seen in notable quantities on the larger boulders. Clusters of the hydroid <i>Abietinaria abietina</i> on a few boulders. The foliose bryozoan <i>Securiflustra securifrons</i> occurred sparsely but regularly throughout. <i>Munida rugosa</i> very common across the site. Clusters of ascidians seen occasionally (identification not possible but predict <i>Asciella</i> sp.). One small area appearing to have a patch of burrowing anemones, with the appearance of <i>Cerianthus lloydii</i>. The large anemone <i>Bolocera tueida</i> regularly visible. The bottle-brush hydroid <i>Thuiaria thuja</i> present further along the transect in small clusters. Rare observation of <i>Pecten maximus</i>, The starfish <i>Asterias rubens</i> common across the site, with a rare <i>Crossaster papposus</i>. <i>Urticina/Stomphia</i> present throughout.</p>		 <p>The images show a rocky seabed with various marine organisms. The top image shows a white, branching hydroid or bryozoan structure. The second image shows a prominent pink, spherical sea urchin. The third image shows a dense, yellowish, bushy hydroid. The bottom image shows another pink sea urchin on a rock, with a starfish visible in the background.</p>

Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Neart na Gaoithe 2009 Site 1</p>	<p>Muddy sand</p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows regularly seen and believed to be occupied by <i>Nephrops norvegicus</i>, although none seen. Very occasional occurrence of <i>Asterias rubens</i>. One <i>Microchirus variegatus</i> seen, one crab and very rare small tufts of hydroid/bryozoan turf species.</p> <p>Tubes of <i>Chaetoperus variopedatus</i> regularly seen as well as occasional soft worms tubes</p>	<p><i>Pennatula phosphorea</i> Hydroid/Bryozoan turf species <i>Asterias rubens</i> Burrows/holes Pisces <i>Microchirus variegatus</i> (?) <i>Ophiura ophiura</i> (?) Tubes <i>Liocarcinus</i> Ophiuridae <i>Flustra foliacea</i> DECAPODA <i>Chaetoperus variopedatus</i> tubes</p>	 <p>SS.SMu.CFiMu.SpMg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>
<p>Neart na Gaoithe 2009 Site 2</p>	<p>Muddy sand</p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows regularly seen and believed to be occupied by <i>Nephrops norvegicus</i>, although none seen. Very occasional occurrence of <i>Asterias rubens</i>. Very rare small tufts of hydroid/bryozoan turf species seen.</p> <p>One <i>Urticina/Stomphia</i> sp seen. Tubes of <i>Chaetoperus variopedatus</i> and occasional soft worms tubes occur</p>	<p><i>Pennatula phosphorea</i> Hydroid/Bryozoan turf species <i>Asterias rubens</i> Burrows/holes Ophiuridae Tubes <i>Liocarcinus</i> <i>Securiflustra securifrons</i> <i>Urticina/Stomphia</i></p>	 <p>SS.SMu.CFiMu.SpMg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>

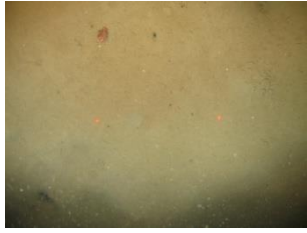


Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 3	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows regularly seen and believed to be occupied by <i>Nephrops norvegicus</i>, although none seen. Occasional occurrence of <i>Asterias rubens</i>. Very rare small tufts of hydroid/bryozoan turf species seen.</p> <p><i>Pennatula phosphorea</i> seen throughout</p>	<p><i>Pennatula phosphorea</i> <i>Asterias rubens</i> Ophiuridae <i>Liocarcinus</i> <i>Flustra/Securiflustra</i> DECAPODA Tubes Burrows/holes Hydroid/Bryozoan turf species</p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 4	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction</p> <p><i>Pennatula phosphorea</i> seen throughout. <i>Alcyonium digitatum</i> occasionally seen in one occasion associated with <i>Flustra foliacea</i>, which rarely occurred. soft worms tubes occur</p>	<p><i>Pennatula phosphorea</i> <i>Asterias rubens</i> Ophiuridae <i>Flustra foliacea</i> <i>Alcyonium digitatum</i> OSTEICHTHYES Soleidae <i>Stomphia/Urticina</i> Hydroid/Bryozoan turf species Burrows/holes Tubes</p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 5	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> was seen throughout. Very little mobile fauna except for one <i>Microchirus variegatus</i>. Soft worm tubes seen throughout.</p>	<p><i>Pennatula phosphorea</i> Hydroid/Bryozoan turf species <i>Asterias rubens</i> Burrows/holes Tubes <i>Flustra / Securiflustra</i> <i>Alcyonium digitatum</i> <i>Microchirus variegatus</i></p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>


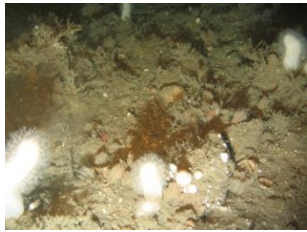


Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Neart na Gaoithe 2009</p> <p>Site 6</p>	<p><b>Muddy Sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Pennatula phosphorea was seen throughout. Burrows regularly seen and believed to be occupied by Nephrops norvegicus. Rarely occurring small tufts of hydroid/bryozoan turf species seen.</p>	<p><i>Pennatula phosphorea</i>  Hydroid/Bryozoan  turf species  <i>Asterias rubens</i>  <i>Ophiura ophiura</i>  <i>Urticina/Stomphia</i>  Paguridae  DECAPODA  Burrows/holes  <i>Nephrops norvegicus</i>  <i>Chaetopterus variopedatus</i> Tubes  OSTEICHTHYES</p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>
<p>Neart na Gaoithe 2009</p> <p>Site 14</p>	<p><b>Muddy Sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>The transect was characterised by the sea pen <i>Pennatula phosphorea</i>. A few <i>Nephrops norvegicus</i> in burrows were evident. Halfway through the transect a small boulder was seen (below) on which various sessile species were recorded.</p> 	<p><i>Pennatula phosphorea</i>  <i>Alcyonidium digitatum</i>  Soleidae  <i>Pecten maximus</i>  <i>Aequipecten opercularis</i>  HEXACORALLIA  Hydroid/Bryozoan  turf species  <i>Asterias rubens</i>  <i>Ophiura ophiura</i>  <i>Urticina</i>  Paguridae  <i>Nephrops norvegicus</i>  <i>Abetinaria abietina</i>  <i>Ophiothrix fragilis</i>  <i>Nemertesia</i>  <i>Chaetopterus variopedatus</i> tubes  DECAPODA  OSTEICHTHYES  Tubes</p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>



Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 15	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction</p> <p><i>Pennatula phosphorea</i> was seen throughout. Very little mobile fauna except for one <i>Pagurus</i> sp.. Soft worm tubes seen throughout.</p>	<p><i>Pennatula phosphorea</i> <i>Pagurus</i> Hydroid/Bryozoan turf species Burrows/holes Tubes</p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 16	<p><b>Muddy sand</b></p> <p>Shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> regularly seen throughout the transect with occasional <i>Virgularia mirabilis</i>. On the soft substrate soft worms tube were also seen.</p>	<p><i>Pennatula phosphorea</i> <i>Virgularia mirabilis</i> <i>Liocarcinus</i> <i>Nephrops norvegicus</i> <i>Pagurus bernhardus</i> <i>Soleidae</i> Hydroid/Bryozoan turf species Burrows/holes Tubes</p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 17	<p><b>Muddy sand</b></p> <p>Shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> was regularly seen. Very little fauna was seen, with the exception of the area surrounding a group of three small boulders half way through the transect. These were hosting a variety of sessile/encrusting fauna. <i>Alcyonium digitatum</i> colonies were rarely seen in the first part of the transect, becoming more common toward the end.</p>	<p><i>Pennatula phosphorea</i> <i>Virgularia mirabilis</i> Hydroid/Bryozoan turf species Hydroid/Bryozoan meadow species <i>Agonus cataphractus</i> <i>Nephrops norvegicus</i> <i>Alcyonium digitatum</i> <i>Cancer pagurus</i> <i>Urticina/Stomphia</i> <i>Hydrallmania falcata</i> Paguridae DECAPODA HEXACORALLIA Burrows/holes Tubes</p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>




Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Near na Gaoithe 2009</p> <p>Site 18</p>	<p><b>Muddy sand lying over mixed coarse sediment with pebbles</b></p> <p>Slightly shelly muddy sand mixed with mixed pebbles and gravel. A small boulder was also seen. Substrate with a very fine easily disturbed surface silt fraction</p> <p>The substrate appears generally coarser with patches of pebbles. <i>Alcyonium digitatum</i> seen along the entire transect.</p>	<p><i>Alcyonium digitatum</i> Hydroid/Bryozoan turf species <i>Urticina/Stomphia</i> <i>Bolocera tueidae</i> <i>Metridium senile</i> PORIFERA <i>Echinus esculentus</i> <i>Cancer pagurus</i> <i>Asterias rubens</i> <i>Abetinarina abietina</i> DECAPODA HEXACORALLIA <i>Callionymidae</i> <i>Gobiidae</i> Tubes</p>	 <p>SS.SMX.CMx Circalittoral mixed sediment</p>
<p>Near na Gaoithe 2009</p> <p>Site 29</p>	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction. This was occasionally impeding the visibility.</p> <p><i>Virgularia mirabilis</i> was commonly seen along the whole transect. <i>Pennatula phosphorea</i> was also seen, but was less common. <i>Nephrops norvegicus</i> was also seen as well as rare hydroid/bryozoan turf species.</p>	<p><i>Pennatula phosphorea</i> <i>Virgularia mirabilis</i> Hydroid/Bryozoan turf species Paguridae <i>Nephrops norvegicus</i> Burrows/holes Tubes</p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p>
<p>Near na Gaoithe 2009</p> <p>Site 30</p>	<p><b>Muddy sand</b></p> <p>Shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> regularly seen as well as occasional <i>Pagurus</i> and <i>Alcyonium digitatum</i>. Soft worms tubes commonly seen on the substrate.</p>	<p><i>Pennatula phosphorea</i> Hydroid/Bryozoan turf species Paguridae <i>Pagurus bernhardus</i> <i>Urticina/Stomphia</i> <i>Alcyonium digitatum</i> Burrows/holes Tubes</p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p>



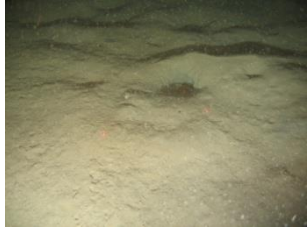





Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 41	<p><b>Muddy Sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction. This was occasionally impeding the visibility.</p> <p>Both seapens <i>Pennatula phosphorea</i> and <i>Virgularia mirabilis</i> seen throughout. Although none seen, <i>Nephrops norvegicus</i> is believed to inhabit the burrows. <i>Chetopterus variopedatus</i> tubes and soft worm tubes occurred regularly.</p>	<p><i>Pennatula phosphorea</i> <i>Virgularia mirabilis</i> <i>Liocarcinus</i> <i>Alcyonium digitatum</i> <i>Chetopterus variopedatus</i> tubes Burrows/holes Tubes</p>	 <p>SS.SMu.CFiMu.SpnMeg</p> <p>Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 60	<p><b>Shelly Sand</b></p> <p>Shelly sandy mud with sparse fauna. Tubes seen along the whole transect. The proportion of shell fragments appear higher than seen across most of the sites with this type of substrate. Tubes are visible.</p> <p>Mobile fauna most commonly seen across the site include <i>Asterias rubens</i>. Sandeels have been seen at this site.</p>	<p><i>Liocarcinus</i> Ammodytidae <i>Asterias rubens</i> <i>Astropecten irregularis</i> Hydroid/Bryozoan turf species Tubes</p>	 <p>SS.SSa.CFiSa</p> <p>Circalittoral Fine Sand</p>
Neart na Gaoithe 2009 Site 61	<p><b>Shelly sand</b></p> <p>Shelly sand with sparse fauna. Tubes seen along the whole transect.</p> <p>Mobile fauna most frequently seen across the site include <i>Asterias rubens</i>. Occasional Soleidae have also been seen at this site.</p>	<p><i>Asterias rubens</i> Soleidae <i>Agonus cataphractus</i> Holes/Burrows Tubes</p>	 <p>SS.SSa.CMuSa</p> <p>Circalittoral Muddy Sand</p>




Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 62	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> was regularly seen throughout. Other fauna included few <i>Asterias rubens</i> and rare sights of <i>Alcyonium digitatum</i>. Soft worm tubes were also seen.</p>	<p><i>Pennatula phosphorea</i> <i>Alcyonium digitatum</i> <i>Asterias rubens</i> Hydroid/Bryozoan turf species Tubes Holes/Burrows <i>Urticina.Stomphia</i></p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in cirralittoral fine mud</p>
Neart na Gaoithe 2009 Site 63	<p><b>Muddy sand lying over mixed coarse sediment</b></p> <p>Slightly shelly muddy sand mixed with small to medium cobbles and mixed pebbles and gravel. Substrate with a very fine easily disturbed surface silt fraction</p> <p>The substrate appears generally coarser with patches of pebbles and small cobbles with abundant sessile fauna such as hydroid/bryozoan turf species. Mobile fauna was also frequent.</p> <p><i>Chaetopterus variopedatus</i> tubes were seen.</p>	<p>DECAPODA Hydroid/Bryozoan turf species Hydroid/Bryozoan meadow species <i>Ophiura albida</i> HEXACORALLIA Paguridae <i>Alcyonium digitatum</i> <i>Microchirus variegatus</i> <i>Asciadiella scabra</i> Galatheidae <i>Liocarcinus</i> <i>Urticina/Stomphia</i> <i>Virgularia mirabilis</i> <i>Asterias rubens</i> Echinidae <i>Astropecten irregularis</i> <i>Chaetopterus variopedatus</i> tubes Burrows/holes Tubes</p>	  <p>SS.SMX.CMx Cirralittoral mixed sediment</p>
Neart na Gaoithe 2009 Site 64	<p><b>Shelly muddy sand with pebbles and cobbles</b></p> <p>The substrate is mainly composed of shelly muddy sand. Scattered cobbles and pebbles were seen. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Holes/burrows present. The site is characterised by mobile fauna mainly. The seabed become coarser toward the end of the transect with more pebbles and small cobbles visible. Encrusting species such as <i>Pomatoceros</i> and Bryozoa are present on cobbles.</p>	<p>Galatheidae <i>Asterias rubens</i> <i>Alcyonium digitatum</i> <i>Urticina/Stomphia</i> <i>Nemertesia antennina</i> OSTEICHTHYES <i>Asciadiella scabra</i> Bryozoa crust <i>Pomatoceros</i> <i>Flustra foliacea</i> DECAPODA Burrows/holes Tubes</p>	 <p>SS.SMX.CMx Cirralittoral mixed sediment</p>



Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 65	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> was regularly seen throughout. Other fauna included frequent <i>Asterias rubens</i> and <i>Pagurus bernhardus</i> and rare sights of <i>Alcyonium digitatum</i>. Soft worm tubes were also seen.</p>	<p><i>Pennatula phosphorea</i> Hydroid/Bryozoan turf species <i>Asterias rubens</i> Burrows/holes Tubes <i>Alcyonium digitatum</i> Pagurus <i>Pagurus bernhardus</i> Ophiuridae</p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 66	<p><b>Muddy sand with mixed coarse sediment</b></p> <p>Slightly shelly muddy sand mixed with mixed pebbles and gravel. Burrows and holes are observed along the whole transect.</p> <p>Burrowing fauna was noted at this site with mixed substrate. Hydroid/Bryozoan turf species are frequently seen with occasional <i>A. digitatum</i> as well as mobile species including <i>Asterias rubens</i> and <i>Ophiura ophiura</i>. <i>Ascidella</i> spp. become more abundant toward the end of the transect.</p>	<p><i>Asterias rubens</i> <i>Alcyonium digitatum</i> <i>Urticina/Stomphia</i> OSTEICHTHYES <i>Ascidella</i> <i>Flustra/Securiflustra</i> DECAPODA <i>Nephrops norvegicus</i> <i>Ophiura ophiura</i> <i>Agonus cataphractus</i> Hydroid/Bryozoan turf species <i>Abietinaria abietina</i> Burrows/holes Tubes</p>	 <p>SS.SMX.CMx Circalittoral mixed sediment</p>

Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 67	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction</p> <p>Halfway through the transect a large boulder was observed, covered by hydroid/bryozoan turf species including <i>Abietinaria abietina</i>, and a few large anemones including <i>Urticina/Stomphia</i> and <i>Bolocera tuediae</i>. Juvenile decapods also observed amongst the Hydrozoa/Bryozoa turf species.</p> 	<p><i>Abietinaria abietina</i>  <i>Alcyonium digitatum</i>  <i>Asterias rubens</i>  <i>Bolocera tuediae</i>            Burrows/holes            DECAPODA  <i>Echinus esculentus</i>            Egg cases  <i>Flustra/Securiflustra</i>            Hydroid/Bryozoan turf species  <i>Nephrops norvegicus</i>  <i>Ophiothrix fragilis</i>  <i>Pennatula phosphorea</i>  <i>Scalpellum scalpellum</i>            Tubes  <i>Urticina</i>  <i>Urticina/Stomphia</i>  <i>Chaetopterus tubes</i></p>	 <p>SS.SMu.CFiMu.SpnMeg            Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 72	<p><b>Muddy sand</b></p> <p>Shelly muddy sand with a gravel fraction, appearing quite coarse in places. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Tubes seen along the whole transect including sparse <i>Chaetopterus variopedatus</i> tubes. Occasional small cobble.</p>	<p>Hydroid/Bryozoan turf species            Tubes  <i>Alcyonium digitatum</i>            Asteroidea  <i>Asterias rubens</i>            Ophiuridae</p>	 <p>SS.SSa.CMuSa            Circalittoral Muddy Sand</p>

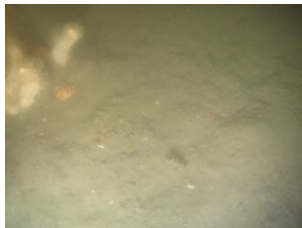


Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 75	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction. This was occasionally impeding visibility.</p> <p><i>Pennatula phosphorea</i> was regularly seen throughout. Other fauna included frequent <i>Asterias rubens</i> and crustaceans. Rare sights of <i>Alcyonium digitatum</i> were also recorded. Soft worm tubes were seen.</p>	<p><i>Pennatula phosphorea</i> Hydroid/Bryozoan turf species <i>Asterias rubens</i> Burrows/holes Tubes <i>Alcyonium digitatum</i> Soleidae</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 76	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> was regularly seen throughout. Other fauna included frequent <i>Asterias rubens</i> and flat fish species. Rare sights of <i>Alcyonium digitatum</i> were also recorded. Soft worm tubes were seen.</p>	<p><i>Pennatula phosphorea</i> <i>Virgularia mirabilis</i> Hydroid/Bryozoan turf species <i>Asterias rubens</i> Burrows/holes Tubes DECAPODA OSTEICHTHYES</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 77	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Virgularia mirabilis</i> was regularly seen throughout with occasional <i>Pennatula phosphorea</i>. Although none seen, <i>Nephrops norvegicus</i> is believed to inhabit the burrows present throughout. Occasional Hydroid/Bryozoan turf species were seen. Soft worm tubes were also seen.</p>	<p><i>Pennatula phosphorea</i> <i>Virgularia mirabilis</i> Hydroid/Bryozoan turf species Burrows/holes Tubes Galatheidae</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>





Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 78	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction</p> <p><i>Virgularia mirabilis</i> was quite common along the whole transect. Burrowing fauna <i>Nephrops norvegicus</i> was frequently seen. Rare sights of <i>A. digitatum</i> and Hydroid/Bryozoan turf species occurred.</p>	<p><i>Virgularia mirabilis</i> Hydroid/Bryozoan turf species Burrows/holes Tubes OSTEICHTHYES</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 103	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> and <i>Virgularia mirabilis</i> were frequently seen throughout as well as burrower <i>Nephrops norvegicus</i>.</p>	<p><i>Pennatula phosphorea</i> <i>Virgularia mirabilis</i> <i>Nephrops norvegicus</i> Tubes Holes/Burrows OSTEICHTHYES</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 104	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Nephrops norvegicus</i> was frequently seen along the transect. No seapen species were seen. The easily disturbed silt fraction occasionally impeded visibility. Occasional and rare sites of <i>Urticina felina</i> and <i>A. digitatum</i> occurred.</p>	<p><i>Nephrops norvegicus</i> <i>Alcyonium digitatum</i> <i>Urticina felina</i> Tubes Holes/Burrows OSTEICHTHYES</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>





Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 105	<p><b>Muddy sand</b></p> <p>Slightly shelly muddy sand with burrows and holes along the whole transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Virgularia mirabilis</i> was occasionally seen and the burrowing species <i>Nephrops norvegicus</i> was frequently seen at this site. The easily disturbed silt fraction occasionally impeded visibility.</p>	<p><i>Nephrops norvegicus</i> <i>Virgularia mirabilis</i> Tubes Holes/Burrows OSTEICHTHYES</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 106	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> commonly seen throughout the transect with occasional <i>Virgularia mirabilis</i>. Very little fauna visible. Holes and burrows visible. Rare views of <i>Chaetopterus variopedatus</i> tubes. On the soft substrate soft worms tube were also seen.</p>	<p><i>Nephrops norvegicus</i> <i>Pennatula phosphorea</i> <i>Virgularia mirabilis</i> <i>Chaetopterus variopedatus</i> tubes Tubes Holes/Burrows <i>Alcyonium digitatum</i> <i>Solea solea</i> DECAPODA</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 107	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> and <i>Virgularia mirabilis</i> regularly seen throughout the transect Very little fauna visible. Holes and burrows visible. Rare views of <i>Chaetopterus variopedatus</i> tubes and of hydroid/bryozoan turf species</p>	<p><i>Nephrops norvegicus</i> <i>Pennatula phosphorea</i> <i>Virgularia mirabilis</i> Tubes Holes/Burrows Paguridae <i>Chaetopterus variopedatus</i> tubes</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>




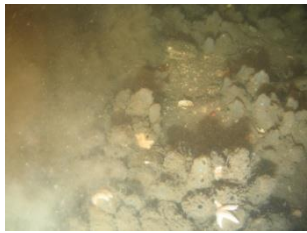
Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Neart na Gaoithe 2009 Site 108</p>	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Virgularia mirabilis</i> was commonly seen along the whole transect. <i>Nephrops norvegicus</i> was also seen as well as rare hydroid/bryozoan turf species. Very little of other fauna visible. Holes and burrows visible. Rare views of <i>Chaetopterus variopedatus</i> tubes and of hydroid/bryozoan turf species</p>	<p><i>Virgularia mirabilis</i> <i>Nephrops norvegicus</i> <i>Asterias rubens</i> <i>Chaetopterus variopedatus</i> tubes Tubes Holes/Burrows Hydroid/Bryozoan turf species</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>
<p>Neart na Gaoithe 2009 Site 109</p>	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction which occasionally impeded visibility.</p> <p><i>Virgularia mirabilis</i> was commonly seen along the whole transect. Very little of other fauna visible. Holes and burrows visible. Rare views of tubes and of hydroid/bryozoan turf species</p>	<p><i>Virgularia mirabilis</i> Hydroid/Bryozoan turf species Holes/Burrows</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>






Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 110	<p><b>Muddy sand with mixed coarse sediment</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction which occasionally impede or reduce visibility.</p> <p>A small boulder was seen at the beginning of the transect hosting sessile species such as <i>Alcyonium digitatum</i>, <i>Stomphia/Urticina</i> and Hydroid/Bryozoan turf species. The first part of the transect is mainly muddy sand/sandy mud with <i>Pennatula phosphorea</i> frequently seen with common <i>Munida rugosa</i>.</p> <p>The substrate changes halfway through the transect becoming coarser mix of gravel and pebbles. Small cobbles also noted. As the sediment changes <i>Cerianthus lloydii</i>, the bryozoan <i>Securiflustra securifrons</i> and mobile fauna including <i>Asterias rubens</i>, <i>Echinus esculentus</i>, <i>Pagurus bernhardus</i>, <i>Cancer pagurus</i> were visible.</p>	<p><i>Alcyonium digitatum</i> <i>Stomphia/Urticina</i> <i>Pennatula phosphorea</i> <i>Liocarcinus</i> DECAPODA <i>Cerianthus lloydii</i> <i>Munida rugosa</i> <i>Asterias rubens</i> <i>Echinus esculentus</i> <i>Pagurus bernhardus</i> <i>Securiflustra securifrons</i> <i>Cancer pagurus</i> Hydroid/Bryozoan turf species Borrows/holes Tubes <i>Chaetopterus variopedatus</i> tubes</p>	<p>Mosaic of:</p>  <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p> <p>and</p>  <p>SS.SMX.CMx Circalittoral mixed sediment</p>
Neart na Gaoithe 2009 Site 111	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction. No visible fauna.</p> <p><i>Virgularia mirabilis</i> was commonly seen along the whole transect. <i>Nephrops norvegicus</i> was also frequently seen. Other faunal species included frequent sight of <i>Asterias rubens</i> and <i>Pagurus</i> sp. <i>Chaetopterus variopedatus</i> tubes were also seen.</p>	<p>OSTEICHTHYES <i>Virgularia mirabilis</i> <i>Asterias rubens</i> <i>Pagurus</i> <i>Nephrops norvegicus</i> <i>Chaetopterus variopedatus</i> tubes</p>	 <p>SS.SMu.CFiMu.SpnMeg Seapens and burrowing megafauna in circalittoral fine mud</p>

Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 112	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction. This was occasionally impeding or reducing visibility.</p> <p><i>Virgularia mirabilis</i> and <i>Nephrops norvegicus</i> were frequently seen along the whole transect. <i>Chaetopterus variopedatus</i> tubes were also seen.</p>	<p><i>Virgularia mirabilis</i> <i>Nephrops norvegicus</i> <i>Liocarcinus</i> <i>Chaetopterus variopedatus</i> tubes</p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 113	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Virgularia mirabilis</i> and <i>Nephrops norvegicus</i> were frequently seen along the whole transect.</p>	<p><i>Virgularia mirabilis</i> <i>Nephrops norvegicus</i> <i>Chaetopterus variopedatus</i> tubes</p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 114	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Site characterised by mobile fauna with frequently seen <i>Asterias rubens</i> and <i>Liocarcinus depurator</i></p>	<p><i>Asterias rubens</i> <i>Liocarcinus depurator</i> <i>Liocarcinus</i> <i>Lanice conchilega</i> Hydroid/Bryozoan turf species Tubes</p>	 <p>SS.SSa.CMuSa Circalittoral muddy sand</p>
Neart na Gaoithe 2009 Site 115	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Virgularia mirabilis</i> and <i>Nephrops norvegicus</i> were commonly seen along the whole transect. Frequent sights of <i>Asterias rubens</i> and <i>Liocarcinus</i> sp. also occurred.</p>	<p><i>Virgularia mirabilis</i> <i>Nephrops norvegicus</i> <i>Asterias rubens</i> <i>Liocarcinus</i> Hydroid/Bryozoan turf species Tubes</p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p>

Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Neart na Gaoithe 2009</p> <p>Site 116</p>	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand lying over coarser mix of gravel/pebbles. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Very common Hydroid/Bryozoan turf species, including <i>Sertularia</i>, and often associated with Ascidiacea (likely belonging to the genus <i>Asciella</i>). <i>Cerianthus lloydii</i> was also quite common. <i>Aequipecten opercularis</i> was also seen at this site.</p>	<p><i>Liocarcinus</i>  <i>Cerianthus lloydii</i>  <i>Alcyonium digitatum</i>  <i>Asciella</i>  <i>Aequipecten opercularis</i>  Ascidiacea  <i>Chaopterus variopedatus</i> tubes  Hydroid/Bryozoan turf species  Tubes  <i>Ophiothrix fragilis</i>  <i>Sertularia</i></p>	 <p>SS.SMX.CMx.FluHyd  <i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tideswept circalittoral mixed sediment  This biotope appeared to be impoverished</p> <p>Alternating with</p>  <p>SS.SSa.CCS  Circalittoral coarse sediment</p>
<p>Neart na Gaoithe 2009</p> <p>Site 117</p>	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand lying over coarser mix of gravel/pebbles. Substrate with a very fine easily disturbed surface silt fraction</p> <p>The whole transects is characterised by a continuous bed of <i>Sabella pavonina</i> amongst dense patches of Hydroid/Bryozoan turf species. Other species frequently recorded included <i>Aequipecten opercularis</i> and <i>Cerianthus lloydii</i>. <i>Lanice conchilega</i> was also recorded at this site.</p>	<p><i>Sabella pavonina</i>  <i>Asterias rubens</i>  <i>Liocarcinus</i>  <i>Asciella</i> spp.  <i>Cerianthus lloydii</i>  <i>Aequipecten opercularis</i>  <i>Pholis gunnellus</i>  <i>Lanice conchilega</i>  <i>Pagurus bernhardus</i>  <i>Alcyonium digitatum</i>  <i>Chaopterus variopedatus</i> tubes  Hydroid/Bryozoan turf species  Tubes</p>	 <p>SS.SMX.CMx.FluHyd  <i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tideswept circalittoral mixed sediment  This biotope appeared to be impoverished</p> <p>Alternating with</p>  <p>SS.SMX.CMx  Circalittoral mixed sediment</p>

Site Number	Sediment Description	Species	Biotope and Representative Image
Neart na Gaoithe 2009 Site 118	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction which impeded or reduced visibility.</p> <p><i>Virgularia mirabilis</i> was frequently seen throughout, whilst <i>Pennatula phosphorea</i>, although present, was less common. Sights of <i>Liocarcinus sp.</i> are frequent with occasional <i>Asterias rubens</i>.</p>	<p><i>Virgularia mirabilis</i>  <i>Pennatula phosphorea</i>  <i>Asterias rubens</i>  <i>Liocarcinus</i>  Soleidae  OSTEICHTHYES  Hydroid/Bryozoan turf species  Tubes</p>	 <p>SS.SMu.CFiMu.SpMmeg  Seapens and burrowing megafauna in circalittoral fine mud</p>
Neart na Gaoithe 2009 Site 119	<p><b>Muddy gravelly sand</b></p> <p>Mixed gravelly sand with shells along the entire transect. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Dense cover of <i>Sabella pavanina</i> and <i>Lanice conchilega</i> seen throughout amongst Rhodophyceae and Hydroid/Bryozoan turf species in shallow water.</p>	<p><i>Sabella pavanina</i>  <i>Liocarcinus</i>  <i>Asterias rubens</i>  <i>Cerianthus lloydii</i>  <i>Pagurus bernhardus</i>  <i>Lanice conchilega</i>  <i>Sabella pavanina</i>  <i>Echinus esculentus</i>  Palmariaceae  Rhodophyceae  OSTEICHTHYES  Hydroid/Bryozoan turf species</p>	 <p>SS.SMX.CMx  Circalittoral mixed sediment</p>
Neart na Gaoithe 2009 Site 121	<p><b>Muddy pebbly gravelly sand</b></p> <p>Mixed gravelly sand with shells along the entire transect. Pebbles are scattered along the area supporting sessile fauna. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Ascidella</i> spp. characterise this site. Clumps of the genus <i>Ascidella</i> are seen throughout, becoming more dense toward the end of the video. Common species seen at the site include <i>Asterias rubens</i>, <i>Liocarcinus</i> and <i>Aequipecten opercularis</i>.</p>	<p><i>Liocarcinus</i>  <i>Asterias rubens</i>  <i>Cerianthus lloydii</i>  <i>Aequipecten opercularis</i>  <i>Echinus esculentus</i>  <i>Abietinaria abietina</i>  <i>Ascidella</i> spp.  OSTEICHTHYES  Hydroid/Bryozoan turf species</p>	  <p>SS.SMX.CMx  Circalittoral mixed sediment</p>

Site Number	Sediment Description	Species	Biotope and Representative Image
<p>Near na Gaoithe 2009 Site 122</p>	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Burrows expected to contain <i>Nephrops norvegicus</i> but none seen. However the presence of easily disturbed silt made continuous observation of the seabed difficult.</p>	<p><i>Virgularia mirabilis</i> <i>Chaetopterus variopedatus</i> Tubes</p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p>
<p>Near na Gaoithe 2009 Site 123</p>	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Burrows and holes present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p><i>Pennatula phosphorea</i> and <i>Nephrops norvegicus</i> were frequently seen at this site. Other sights included occasional <i>Liocarcinus</i> sp. <i>Chaetopterus</i> tubes and soft worm tubes visible.</p>	<p>Burrows/holes <i>Liocarcinus</i> <i>Pennatula phosphorea</i> <i>Nephrops norvegicus</i> <i>Urticina/Stomphia</i> <i>Chaetopterus variopedatus</i> tubes Hydroid/Bryozoan turf species</p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p>
<p>Near na Gaoithe 2009 Site 124</p>	<p><b>Muddy sand</b></p> <p>Slightly shelly sandy mud/muddy sand. Burrows and holes present. Substrate with a very fine easily disturbed surface silt fraction.</p> <p>Very little fauna visible. Holes and burrows seen. <i>Liocarcinus</i> sp. occasionally seen as well as one <i>Nephrops norvegicus</i>. The species is expected to inhabit the holes and burrows. Visibility very poor, <i>Chaetopterus variopedatus</i> tubes expected although not seen. Sparse views of hydroid/bryozoan turf species. Quite a few <i>Ophiura</i> sp. seen.</p>	<p><i>Ophiura</i> <i>Pennatula phosphorea</i> <i>Liocarcinus</i> <i>Nephrops norvegicus</i> DECAPODA OSTEICHTHYES Hydroid/Bryozoan turf species</p>	 <p>SS.SMu.CFiMu.SpMmeg Seapens and burrowing megafauna in circalittoral fine mud</p>

**ANNEX 12C.7 – PHYSICAL CHARACTERISTICS AND FAUNAL ABUNDANCE FROM VIDEO ANALYSIS****Table 12C.7.1: Physical Characteristics Site 1 TO 12**

Physical characteristics	Site No.											
	1	2	3	4	5	6	7	8	9	10	11	12
% Bedrock												
% Boulder V. Large (>1024 mm)												
% Boulder Large (>512 mm)												
% Boulder Small (>256 mm)				0.5								
% Cobbles (>64 mm)		0.5		1								
% Gravel and Pebbles combined (>4 mm to 64 mm)		1		10							1	2
% Shell	1	2	0.5	10	0.5	0.5				0.5	1	2
% Sand												
Biogenic Reef												
Muddy sand/sandy mud	99	96.5	99.5	78.5	99.5	99.5	100	100	100	99.5	98	96
<b>Total</b>	100	100	100	100	100	100	100	100	100	100	100	100
% Total Sand, Gravel & Pebbles	0	1	0	10	0	0	0	0	0	0	1	2
Silt surface deposition	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Silt associated with fauna	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Silt flocculation			Y	Y	Y	Y					Y	Y
<b>Feature on 1-5 scale for sediments</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
Surface relief (even - rugged)	2	2	2	3	2	2	2	2	2	2	2	2
Stability (stable - mobile)	4	3	4	3	4	4	4	4	4	4	4	4

Table 12C.7.2: Physical Characteristics Site 13 to 23

Physical characteristics.	Site No.									
	13	14	15	16	17	18	20	21	22	23
% Bedrock										
% Boulder V. Large (>1024 mm)										
% Boulder Large (>512 mm)										
% Boulder Small (>256 mm)										
% Cobbles (>64 mm)										
% Gravel and Pebbles combined (>4 mm to 64 mm)	0.5						3	5	5	0.5
% Shell	1	1	0.5	0.5	0.5	0.5	5	15	15	0.5
% Sand										
Biogenic Reef										
Muddy sand/sandy mud	98.5	99	99.5	99.5	99.5	99.5	92	80	80	99
<b>Total</b>	100	100	100	100	100	100	100	100	100	100
% Total Sand, Gravel & Pebbles	0.5	0	0	0	0	0	3	5	5	0.5
Silt surface deposition	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Silt associated with fauna	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Silt flocculation	Y	Y	Y	Y	Y	Y			Y	
<b>Feature on 1-5 scale for sediments</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>
Surface relief (even - rugged)	2	2	2	2	2	2	1	1	2	1
Stability (stable - mobile)	4	4	4	4	4	4	4	3	3	4

Table 12C.7.3: Physical Characteristics Site V1 to V11

Physical characteristics.	Site No.										
	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11
% Bedrock	P	P					P				P
% Boulder V. Large (>1024 mm)	10	5					1				1
% Boulder Large (>512 mm)	20	15					5				5
% Boulder Small (>256 mm)	30	20		1			10		1		10
% Cobbles (>64 mm)	20	20		5	2		25		5		25
% Gravel and Pebbles combined (>4 mm to 64 mm)	17	25		25	15		40		27	2	40
% Shell	1	5	0.5	5	5	0.5	1	0.5	2	1	1
% Sand	2	10									
Biogenic Reef											
Muddy sand/sandy mud			99.5	64	78	99.5	18	99.5		97	18
<b>Total</b>	100	100	100	100	100	100	100	100	35	100	100
% Total Sand, Gravel & Pebbles	19	35	0	25	15	0	40	0	27	2	40
Silt surface deposition		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Silt associated with fauna		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Silt flocculation		Y	Y	Y	Y	Y		Y			
<b>Feature on 1-5 scale for sediment</b>	<b>V1</b>	<b>V2</b>	<b>V3</b>	<b>V4</b>	<b>V5</b>	<b>V6</b>	<b>V7</b>	<b>V8</b>	<b>V9</b>	<b>V10</b>	<b>Vs 11</b>
Surface relief (even - rugged)	2	2	2	3	2	2	4	2	2	2	4
Stability (stable - mobile)	2	2	4	3	4	4	3	4	3	4	3



Table 12C.7.4: Physical Characteristics Site N1 to N62

Site No.	N1	N2	N3	N4	N5	N15	N16	N17	N29	N30	N41	N60	N61	N62
<b>Physical characteristics.</b>														
% Bedrock														
% Boulder V. Large (>1024mm)														
% Boulder Large (>512mm)														
% Boulder Small (>256mm)								0.5						
% Cobbles (>64mm)														
% Gravel and Pebbles combined (>4mm to 64mm)														
% Shell												2	2	
% Sand												98	98	
Biogenic Reef														
Muddy sand/sandy mud.	100	100	100	100	100	100	100	99.5	100	100	100			100
<b>Total</b>	100	100	100	100	100	100	100	100	100	100	100	100	100	100
% Total Sand, Gravel & Pebbles	0	0	0	0	0	0	0	0	0	0	0	98	98	0
Silt surface deposition	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y
Silt associated with fauna	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y
Silt flocculation														
<b>Feature on 1-5 scale for sediments</b>	<b>N1</b>	<b>N2</b>	<b>N3</b>	<b>N4</b>	<b>N5</b>	<b>N15</b>	<b>N16</b>	<b>N17</b>	<b>N29</b>	<b>N30</b>	<b>N41</b>	<b>N60</b>	<b>N61</b>	<b>N62</b>
Surface relief (even - rugged)	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Stability (stable - mobile)	4	4	4	4	4	4	4	4	4	4	4	4	4	4

**Table 12C.7.4: Physical Characteristics Site N63 to N106**

Physical characteristics	Site No.													
	N63	N64	N65	N66	N67	N72	N75	N76	N77	N78	N103	N104	N105	N106
% Bedrock														
% Boulder V. Large (>1024 mm)														
% Boulder Large (>512 mm)					1									
% Boulder Small (>256 mm)														
% Cobbles (>64 mm)	6	1												
% Gravel and Pebbles combined (>4 mm to 64 mm)	6	1		24	1	1								
% Shell	1			1		1								
% Sand				75										
Biogenic Reef														
Muddy sand/sandy mud.	87	98	100		98	98	100	100	100	100	100	100	100	100
<b>Total</b>	100	100	100	100	100	100	100	100	100	100	100	100	100	100
% Total Sand, Gravel & Pebbles	6	1	0	99	1	1	0	0	0	0	0	0	0	0
Silt surface deposition	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
Silt associated with fauna	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y			
Silt flocculation														
<b>Feature on 1-5 scale for sediments</b>	<b>N63</b>	<b>N64</b>	<b>N65</b>	<b>N66</b>	<b>N67</b>	<b>N72</b>	<b>N75</b>	<b>N76</b>	<b>N77</b>	<b>N78</b>	<b>N103</b>	<b>N104</b>	<b>N105</b>	<b>N106</b>
Surface relief (even - rugged)	4	4					3	3	3	3				
Stability (stable - mobile)	3	3					4	4	4	4				

**Table 12C.7.5: Physical Characteristics Site N107 to N119**

Physical characteristics	Site No.												
	N107	N108	N109	N110	N111	N112	N113	N114	N115	N116	N117	N118	N119
% Bedrock													
% Boulder V. Large (>1024 mm)													
% Boulder Large (>512 mm)													
% Boulder Small (>256 mm)													
% Cobbles (>64 mm)													
% Gravel and Pebbles combined (>4 mm to 64 mm)				33						35	35		20
% Shell				2						1	1		5
% Sand													
Biogenic Reef													
Muddy sand/sandy mud.	100	100	100	65	100	100	100	100	100	64	64	100	75
<b>Total</b>	100	100	100	100	100	100	100	100	100	100	100	100	100
% Total Sand, Gravel & Pebbles	0	0	0	33	0	0	0	0	0	35	35	0	20
Silt surface deposition	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Silt associated with fauna			Y	Y							Y		
Silt flocculation													
<b>Feature on 1-5 scale for sediments</b>	<b>N107</b>	<b>N108</b>	<b>N109</b>	<b>N110</b>	<b>N111</b>	<b>N112</b>	<b>N113</b>	<b>N114</b>	<b>N115</b>	<b>N116</b>	<b>N117</b>	<b>N118</b>	<b>N119</b>
Surface relief (even - rugged)													
Stability (stable - mobile)													

**Table 12C.7.6: Physical Characteristics Site N121 to N124**

Physical characteristics	Site No.			
	N121	N122	N123	N124
% Bedrock				
% Boulder V. Large (>1024 mm)				
% Boulder Large (>512 mm)				
% Boulder Small (>256 mm)				
% Cobbles (>64 mm)				
% Gravel and Pebbles combined (>4 mm to 64 mm)	30			
% Shell	5			
% Sand				
Biogenic Reef				
Muddy sand/sandy mud.	65	100	100	100
<b>Total</b>	100	100	100	100
% Total Sand, Gravel & Pebbles	30	0	0	0
Silt surface deposition	y	y	y	Y
Silt associated with fauna	y			
Silt flocculation				
<b>Feature on 1-5 scale for sediments</b>	<b>N121</b>	<b>N122</b>	<b>N123</b>	<b>N124</b>
Surface relief (even - rugged)	3	3	3	3
Stability (stable - mobile)	3	3	3	3

Table 12C.7.7: SACFOR Abundance Site 1 to 12

Biological characteristics	SACFOR	Code	Site No.											
			1	2	3	4	5	6	7	8	9	10	11	12
<b>PORIFERA</b>														
PORIFERA	Crust %	C0001												
<i>Suberites</i>	3-15 cm	C0414												
<b>CNIDARIA</b>														
<i>Abietinaria abietina</i>	Turf %	D0409												
<i>Hydrallmania falcata</i>	Turf %	D0424	P			P								P
<i>Sertularia</i>	Turf %	D0433					P							P
<i>Thuiaria thuja</i>	Turf %	D0443												
Plumulariidae	Turf %	D0447												
<i>Nemertesia</i>	3-15 cm	D0462												
<i>Nemertesia antennina</i>	3-15 cm	D0463												
Hydroid/Bryozoan turf species	Turf %		O	O	R	O	R	R		R	R	R	R	O
<b>ANTHOZOA</b>														
<i>Alcyonium digitatum</i>	Turf %	D0597	O	O	O	O	O	R					O	O
<i>Virgularia mirabilis</i>	3-15 cm	D0618								F	O		O	
<i>Pennatula phosphorea</i>	3-15 cm	D0623						C						
<i>Cerianthus lloydii</i>	3-15 cm	D0632												F
<i>Bolocera tuediae</i>	3-15 cm	D0681												
<i>Urticina/Stomphia</i>	3-15 cm	D0684	O	O										
<i>Metridium senile</i>	3-15 cm	D0710	R										O	O
Caryophylliidae	1-3 cm	D0780												
<b>POLYCHAETA</b>														
<i>Chaetopterus tubes</i>	3-15 cm	P0811				R								O
<i>Lanice conchilega</i>	1-3 cm	P1195												

Biological characteristics	SACFOR	Code	Site No.											
			1	2	3	4	5	6	7	8	9	10	11	12
<i>Pomatoceros</i>	1-3 cm	P1339												
<b>CRUSTACEA</b>														
CIRRIPIEDIA	Crust %	R0074												
DECAPODA	3-15 cm	S1276									R		O	
CARIDEA	1-3 cm	S1293												
<i>Nephrops norvegicus</i>	>15 cm	S1402								O				
Paguridae	3-15 cm	S1436		R										
<i>Pagurus bernhardus</i>	3-15 cm	S1457		R		R		R					R	R
Galatheidae	3-15 cm	S1469												
<i>Munida rugosa</i>	3-15 cm	S1478	O	O	O	O								
<i>Maja squinado</i>	>15 cm	S1515												
Inachinae	3-15 cm	S1520				R	R							
<i>Atelecyclus rotundatus</i>	3-15 cm	S1555				O								
<i>Cancer pagurus</i>	>15 cm	S1566		O										
<i>Liocarcinus</i>	3-15 cm	S1577									R		P	O
<i>Liocarcinus depurator</i>	3-15 cm	S1580												
<i>Necora puber</i>	3-15 cm	S1589												
<b>MOLLUSCA</b>														
Bivalve Siphons	3-15 cm	W1560								P				
<i>Pecten maximus</i>	3-15 cm	W1771				O								
<b>BRYOZOA</b>														
BRYOZOA crust	Crust %	Y0001												
<i>Alcyonidium diaphanum</i>	3-15 cm	Y0076				R	O							
<i>Flustra foliacea</i>	Turf %	Y0187		R		R								
<i>Securiflustra securifrons</i>	Turf %	Y0194		P										
<b>ECHINODERMATA</b>														

Biological characteristics	SACFOR	Code	Site No.											
			1	2	3	4	5	6	7	8	9	10	11	12
ASTEROIDEA	3-15 cm	ZB0018											O	
<i>Luidia ciliaris</i>	>15 cm	ZB0022												
<i>Astropecten irregularis</i>	3-15 cm	ZB0026	O	P	O		O	O						O
<i>Crossaster papposus</i>	3-15 cm	ZB0075				O								
<i>Asterias rubens</i>	>15 cm	ZB0100	C	F	O	O	O							
<i>Ophiothrix fragilis</i>	3-15 cm	ZB0124												
<i>Ophiocomina nigra</i>	3-15 cm	ZB0128												
<i>Ophiura albida</i>	3-15 cm	ZB0168												C
<i>Ophiura ophiura</i>	3-15 cm	ZB0170						P						
<i>Echinus esculentus</i>	3-15 cm	ZB0198												
<b>ASCIDIACEA</b>														
ASCIDIACEA	3-15 cm	ZD0002												
<b>PISCES</b>														
OSTEICHTHYES	3-15 cm	ZG0001								R		R	R	R
<i>Agonus cataphractus</i>	3-15 cm	ZG0291				O								R
<i>Labrus mixtus</i>	>15 cm	ZG0400												
Ammodytidae	3-15 cm	ZG0441												
Callionymidae	3-15 cm	ZG0450				R						R		
Gobiidae	3-15 cm	ZG0455								R				R
PLEURONECTIFORMES	>15 cm	ZG0545												
<i>Microchirus variegatus</i>	>15 cm	ZG0588												
<b>ALGAE</b>														
RHODOPHYCEAE	Turf %	ZM0002												
Corallinaceae	Crust %	ZM0194												
LAMINARIALES	Turf %	ZR0338												
<b>Miscellanea</b>														

Biological characteristics	SACFOR	Code	Site No.											
			1	2	3	4	5	6	7	8	9	10	11	12
Burrows/holes	Present		P	P	P		P	P	P	P	P	P	P	P



Table 12C.7.8: SACFOR Abundance Site 13 to 23

Biological characteristics	SACFOR	Code	Site No.									
			13	14	15	16	17	18	20	21	22	23
<b>PORIFERA</b>												
PORIFERA	Crust %	C0001										
<i>Suberites</i>	3-15 cm	C0414										
<b>CNIDARIA</b>												
<i>Abietinaria abietina</i>	Turf %	D0409										
<i>Hydrallmania falcata</i>	Turf %	D0424										
<i>Sertularia</i>	Turf %	D0433										
<i>Thuiaria thuja</i>	Turf %	D0443										
Plumulariidae	Turf %	D0447										
<i>Nemertesia</i>	3-15 cm	D0462										
<i>Nemertesia antennina</i>	3-15 cm	D0463										
Hydroid/Bryozoan turf species	Turf %		R	R		R			O			R
<b>ANTHOZOA</b>												
<i>Alcyonium digitatum</i>	Turf %	D0597									O	
<i>Virgularia mirabilis</i>	3-15 cm	D0618		O	O	O	O	O				
<i>Pennatula phosphorea</i>	3-15 cm	D0623						O				
<i>Cerianthus lloydii</i>	3-15 cm	D0632							R			
<i>Bolocera tuediae</i>	3-15 cm	D0681										
<i>Urticina/Stomphia</i>	3-15 cm	D0684										
<i>Metridium senile</i>	3-15 cm	D0710			O	R	R					R
Caryophylliidae	1-3 cm	D0780										
<b>POLYCHAETA</b>												
<i>Chaetopterus tubes</i>	3-15 cm	P0811							O			O

Biological characteristics	SACFOR	Code	Site No.									
			13	14	15	16	17	18	20	21	22	23
<i>Lanice conchilega</i>	1-3 cm	P1195	P							O		
<i>Pomatoceros</i>	1-3 cm	P1339										
<b>CRUSTACEA</b>												
CIRRIPEDIA	Crust %	R0074								P		
DECAPODA	3-15 cm	S1276	O	O						R		R
CARIDEA	1-3 cm	S1293	F									
<i>Nephrops norvegicus</i>	>15 cm	S1402	R									
Paguridae	3-15 cm	S1436										
<i>Pagurus bernhardus</i>	3-15 cm	S1457								R		
Galatheidae	3-15 cm	S1469										
<i>Munida rugosa</i>	3-15 cm	S1478										
<i>Maja squinado</i>	>15 cm	S1515										
Inachinae	3-15 cm	S1520										
<i>Atelecyclus rotundatus</i>	3-15 cm	S1555										
<i>Cancer pagurus</i>	>15 cm	S1566										
<i>Liocarcinus</i>	3-15 cm	S1577	O		O	O	O	O	O	O	O	O
<i>Liocarcinus depurator</i>	3-15 cm	S1580										
<i>Necora puber</i>	3-15 cm	S1589										
<b>MOLLUSCA</b>												
Bivalve Siphons	3-15 cm	W1560										
<i>Pecten maximus</i>	3-15 cm	W1771										
<b>BRYOZOA</b>												
BRYOZOA crust	Crust %	Y0001										
<i>Alcyonidium diaphanum</i>	3-15 cm	Y0076										
<i>Flustra foliacea</i>	Turf %	Y0187										
<i>Securiflustra securifrons</i>	Turf %	Y0194										

Biological characteristics	SACFOR	Code	Site No.										
			13	14	15	16	17	18	20	21	22	23	
<b>ECHINODERMATA</b>													
ASTEROIDEA	3-15 cm	ZB0018								R			
<i>Luidia ciliaris</i>	>15 cm	ZB0022											
<i>Astropecten irregularis</i>	3-15 cm	ZB0026											
<i>Crossaster papposus</i>	3-15 cm	ZB0075											
<i>Asterias rubens</i>	>15 cm	ZB0100				O				O			
<i>Ophiothrix fragilis</i>	3-15 cm	ZB0124											
<i>Ophiocomina nigra</i>	3-15 cm	ZB0128											
<i>Ophiura albida</i>	3-15 cm	ZB0168											
<i>Ophiura ophiura</i>	3-15 cm	ZB0170											
<i>Echinus esculentus</i>	3-15 cm	ZB0198										R	
<b>ASCIDIACEA</b>													
ASCIDIACEA	3-15 cm	ZD0002											
<b>PISCES</b>													
OSTEICHTHYES	3-15 cm	ZG0001		R	R								
<i>Agonus cataphractus</i>	3-15 cm	ZG0291	R										
<i>Labrus mixtus</i>	>15 cm	ZG0400										O	
Ammodytidae	3-15 cm	ZG0441	R										
Callionymidae	3-15 cm	ZG0450											
Gobiidae	3-15 cm	ZG0455			R	R	R					R	
PLEURONECTIFORMES	>15 cm	ZG0545	R		R	R							
<i>Microchirus variegatus</i>	>15 cm	ZG0588											
<b>ALGAE</b>													
RHODOPHYCEAE	Turf %	ZM0002								O	P	R	
Corallinaceae	Crust %	ZM0194											
LAMINARIALES	Turf %	ZR0338									R		

Biological characteristics	SACFOR	Code	Site No.										
			13	14	15	16	17	18	20	21	22	23	
Miscellanea													
Burrows/holes	Present		P	P	P	P	P	P					P

Table 12C.7.9: SACFOR Abundance Video Transectes Site V1 to V11

Biological characteristics	SACFOR	Code	Site No.										
			V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11
<b>PORIFERA</b>													
PORIFERA	Crust %	C0001		R									R
<i>Suberites</i>	3-15 cm	C0414									R		
<b>CNIDARIA</b>													
<i>Abietinaria abietina</i>	Turf %	D0409		R					O				R
<i>Hydrallmania falcata</i>	Turf %	D0424				P	P						P
<i>Sertularia</i>	Turf %	D0433				P	P		P	P	P		P
<i>Thuiaria thuja</i>	Turf %	D0443		R				P	R				R
Plumulariidae	Turf %	D0447						P					R
<i>Nemertesia</i>	3-15 cm	D0462						R					
<i>Nemertesia antennina</i>	3-15 cm	D0463							O				
Hydroid/Bryozoan turf species	Turf %		R	O	R	O	O	R	O	R	R	R	C
<b>ANTHOZOA</b>													
<i>Alcyonium digitatum</i>	Turf %	D0597	F	S		O			O	R	R		F
<i>Virgularia mirabilis</i>	3-15 cm	D0618			O								
<i>Pennatula phosphorea</i>	3-15 cm	D0623				F	O		O	F	R		O
<i>Cerianthus lloydii</i>	3-15 cm	D0632							O				O
<i>Bolocera tuediae</i>	3-15 cm	D0681							R				O
<i>Urticina/Stomphia</i>	3-15 cm	D0684	O	O				R	R	R		O	O
<i>Metridium senile</i>	3-15 cm	D0710				O	R					O	
Caryophylliidae	1-3 cm	D0780		R									
<b>POLYCHAETA</b>													
<i>Chaetopterus tubes</i>	3-15 cm	P0811											
<i>Lanice conchilega</i>	1-3 cm	P1195											

Biological characteristics	SACFOR	Code	Site No.										
			V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11
<i>Pomatoceros</i>	1-3 cm	P1339	F	F									
<b>CRUSTACEA</b>													
CIRRIPIEDIA	Crust %	R0074		P									
DECAPODA	3-15 cm	S1276							R				
CARIDEA	1-3 cm	S1293	P	P	P	P	P	P			P	P	P
<i>Nephrops norvegicus</i>	>15 cm	S1402			F				F	O	F	O	
Paguridae	3-15 cm	S1436								R			
<i>Pagurus bernhardus</i>	3-15 cm	S1457							R				
Galatheidae	3-15 cm	S1469	P										
<i>Munida rugosa</i>	3-15 cm	S1478		F		O	O		O	O	O		C
<i>Maja squinado</i>	>15 cm	S1515							R				
Inachinae	3-15 cm	S1520											
<i>Atelecyclus rotundatus</i>	3-15 cm	S1555											
<i>Cancer pagurus</i>	>15 cm	S1566	F			R			R	O			
<i>Liocarcinus</i>	3-15 cm	S1577			O	O	O	R	R	O	O	O	R
<i>Liocarcinus depurator</i>	3-15 cm	S1580	O	R									
<i>Necora puber</i>	3-15 cm	S1589	O										
<b>MOLLUSCA</b>													
Bivalve Siphons	3-15 cm	W1560											
<i>Pecten maximus</i>	3-15 cm	W1771		R		R	R		R				R
<b>BRYOZOA</b>													
BRYOZOA crust	Crust %	Y0001		O									
<i>Alcyonidium diaphanum</i>	3-15 cm	Y0076											
<i>Flustra foliacea</i>	Turf %	Y0187											R
<i>Securiflustra securifrons</i>	Turf %	Y0194							O				O
<b>ECHINODERMATA</b>													

Biological characteristics	SACFOR	Code	Site No.											
			V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	
ASTEROIDEA	3-15 cm	ZB0018												
<i>Luidia ciliaris</i>	>15 cm	ZB0022	F	O										
<i>Astropecten irregularis</i>	3-15 cm	ZB0026												
<i>Crossaster papposus</i>	3-15 cm	ZB0075		R						R				O
<i>Asterias rubens</i>	>15 cm	ZB0100	C	F		F	F	O	F	F	F	R		F
<i>Ophiothrix fragilis</i>	3-15 cm	ZB0124	S	O										R
<i>Ophiocomina nigra</i>	3-15 cm	ZB0128	O	R										
<i>Ophiura albida</i>	3-15 cm	ZB0168												
<i>Ophiura ophiura</i>	3-15 cm	ZB0170												
<i>Echinus esculentus</i>	3-15 cm	ZB0198	F	F						O				O
<b>ASCIDIACEA</b>														
ASCIDIACEA	3-15 cm	ZD0002								R				O
<b>PISCES</b>														
OSTEICHTHYES	3-15 cm	ZG0001				R	R			R	R			
<i>Agonus cataphractus</i>	3-15 cm	ZG0291											R	
<i>Labrus mixtus</i>	>15 cm	ZG0400												
Ammodytidae	3-15 cm	ZG0441											R	
Callionymidae	3-15 cm	ZG0450				R	R			R	R			
Gobiidae	3-15 cm	ZG0455				R	R				R			
PLEURONECTIFORMES	>15 cm	ZG0545			R	R	R			R				R
<i>Microchirus variegatus</i>	>15 cm	ZG0588								R				
<b>ALGAE</b>														
RHODOPHYCEAE	Turf %	ZM0002												
Corallinaceae	Crust %	ZM0194	C	O										
LAMINARIALES	Turf %	ZR0338												
<b>Miscellanea</b>														

Biological characteristics	SACFOR	Code	Site No.										
			V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11
Burrows/holes	Present					P	P	P		P	P	P	P



Table 12C.7.10: SACFOR Abundance Historical Video Site N1 to N62

Biological characteristics	SACFOR	Code	Site No.													
			N1	N2	N3	N4	N5	N15	N16	N17	N29	N30	N41	N60	N61	N62
<b>PORIFERA</b>																
PORIFERA	Crust %	C0001														
<i>Suberites</i>	3-15 cm	C0414														
<b>CNIDARIA</b>																
<i>Abietinaria abietina</i>	Turf %	D0409														
<i>Hydrallmania falcata</i>	Turf %	D0424									p					
<i>Sertularia</i>	Turf %	D0433														
<i>Thuiaria thuja</i>	Turf %	D0443														
Plumulariidae	Turf %	D0447														
<i>Nemertesia</i>	3-15 cm	D0462														
<i>Nemertesia antennina</i>	3-15 cm	D0463												R		R
Hydroid/Bryozoan turf species	Turf %		O	R	R	F	O	O	O	O	R	O				
<b>ANTHOZOA</b>																R
<i>Alcyonium digitatum</i>	Turf %	D0597			R	O	R				R		R	R		
<i>Virgularia mirabilis</i>	3-15 cm	D0618							F		A		F			C
<i>Pennatula phosphorea</i>	3-15 cm	D0623	A	A	A	A	A	A	C	C	C	C	C			
<i>Cerianthus lloydii</i>	3-15 cm	D0632														
<i>Bolocera tuediae</i>	3-15 cm	D0681														F
<i>Urticina/Stomphia</i>	3-15 cm	D0684		F		O					C		O			
<i>Metridium senile</i>	3-15 cm	D0710														
HEXACORALLIA	1-3 cm	D0627									R					
Caryophylliidae	1-3 cm	D0780														
<b>POLYCHAETA</b>																
<i>Chaetopterus tubes</i>	3-15 cm	P0811														
<i>Lanice conchilega</i>	1-3 cm	P1195										O				
<i>Sabella pavanina</i>	3-15 cm	P1320														
<i>Pomatoceros</i>	1-3 cm	P1339														
<b>CRUSTACEA</b>																
CIRRIPEDIA	Crust %	R0074														

Biological characteristics	SACFOR	Code	Site No.														
			N1	N2	N3	N4	N5	N15	N16	N17	N29	N30	N41	N60	N61	N62	
DECAPODA	3-15 cm	S1276	O		O						F						
CARIDEA	1-3 cm	S1293															
<i>Nephrops norvegicus</i>	>15 cm	S1402								F	O	F					
Paguridae	3-15 cm	S1436							R		R	O	R				
<i>Pagurus bernhardus</i>	3-15 cm	S1457								O			F				
Galatheidae	3-15 cm	S1469															
<i>Munida rugosa</i>	3-15 cm	S1478															
<i>Maja squinado</i>	>15 cm	S1515															
Inachinae	3-15 cm	S1520															
<i>Atelecyclus rotundatus</i>	3-15 cm	S1555															
<i>Cancer pagurus</i>	>15 cm	S1566									O				F		
<i>Liocarcinus</i>	3-15 cm	S1577	O	O	O									O			
<i>Liocarcinus depurator</i>	3-15 cm	S1580								O							
<i>Scalpellum scalpellum</i>	1-3 cm	R0022															
<i>Necora puber</i>	3-15 cm	S1589															
<b>MOLLUSCA</b>																	
Bivalve Siphons	3-15 cm	W1560															
<i>Aequipecten opercularis</i>	3-15 cm	W1773															
<i>Pecten maximus</i>	3-15 cm	W1771															
<b>BRYOZOA</b>																	
BRYOZOA crust	Crust %	Y0001															
<i>Alcyonidium diaphanum</i>	3-15 cm	Y0076															
<i>Flustra/Securiflustra</i>	Turf %				R		R										
<i>Flustra foliacea</i>	Turf %	Y0187	R														
<i>Securiflustra securifrons</i>	Turf %	Y0194		R		O											
<b>ECHINODERMATA</b>																	
ASTEROIDEA	3-15 cm	ZB0018															
<i>Luidia ciliaris</i>	>15 cm	ZB0022													F		
<i>Astropecten irregularis</i>	3-15 cm	ZB0026															
<i>Crossaster papposus</i>	3-15 cm	ZB0075															
ECHINIDAE	3-15 cm	ZB0194													C	F	F

Biological characteristics	SACFOR	Code	Site No.													
			N1	N2	N3	N4	N5	N15	N16	N17	N29	N30	N41	N60	N61	N62
<i>Asterias rubens</i>	>15 cm	ZB0100		F	F	C	F									
<i>Ophiothrix fragilis</i>	3-15 cm	ZB0124														
<i>Ophiocomina nigra</i>	3-15 cm	ZB0128														
<i>Ophiura albida</i>	3-15 cm	ZB0168														
<i>Ophiura ophiura</i>	3-15 cm	ZB0170	O													
Ophiuridae	3-15 cm		O	O	O	C										
<i>Echinus esculentus</i>	3-15 cm	ZB0198														
<b>ASCIDIACEA</b>																
<i>Asciella scabra</i>	3-15 cm	ZD0085														
<i>Asciella</i> spp.	3-15 cm	ZD0083														
ASCIDIACEA	3-15 cm	ZD0002														
<b>PISCES</b>																
OSTEICHTHYES	3-15 cm	ZG0001	R			O									O	
<i>Agonus cataphractus</i>	3-15 cm	ZG0291								F						
<i>Labrus mixtus</i>	>15 cm	ZG0400												F		
Ammodytidae	3-15 cm	ZG0441														
Callionymidae	3-15 cm	ZG0450														
Gobiidae	3-15 cm	ZG0455														
PLEURONCTIFORMES	>15 cm	ZG0545													O	
Soleidae		ZG0581				O			F							
<i>Solea solea</i>	3-15 cm	ZG0591														
<i>Pholis gunnellus</i>	3-15 cm	ZG0440														
<i>Microchirus variegatus</i>	>15 cm	ZG0588	O				O									
<b>ALGAE</b>																
RHODOPHYCEAE	Turf %	ZM0002														
Corallinaceae	Crust %	ZM0194														
FLORIDEOPHYCIDAEAE	Turf %	ZM0066														
LAMINARIALES	Turf %	ZR0338														
<b>Miscellanea</b>																
Burrows/holes	Present															

**Table 12C.7.11: SACFOR Abundance Historical Video Site N63 to N106**

Biological characteristics	SACFOR	Code	Site No.													
			N63	N64	N65	N66	N67	N72	N75	N76	N77	N78	N103	N104	N105	N106
<b>PORIFERA</b>																
PORIFERA	Crust %	C0001														
<i>Suberites</i>	3-15 cm	C0414														
<b>CNIDARIA</b>																
<i>Abietinaria abietina</i>	Turf %	D0409				R	R									
<i>Hydrallmania falcata</i>	Turf %	D0424														
<i>Sertularia</i>	Turf %	D0433														
<i>Thuiaria thuja</i>	Turf %	D0443														
Plumulariidae	Turf %	D0447														
<i>Nemertesia</i>	3-15 cm	D0462														
<i>Nemertesia antennina</i>	3-15 cm	D0463														
Hydroid/Bryozoan turf species	Turf %		F	R	R	F	R	O		O	R	R				
<b>ANTHOZOA</b>																
<i>Alcyonium digitatum</i>	Turf %	D0597		R	R	O	R	R				R		R		R
<i>Virgularia mirabilis</i>	3-15 cm	D0618	F							C	A	C	F		O	O
<i>Pennatula phosphorea</i>	3-15 cm	D0623			A		A		A	C	O		F			C
<i>Cerianthus lloydii</i>	3-15 cm	D0632														
<i>Bolocera tuediae</i>	3-15 cm	D0681						R								
<i>Urticina/Stomphia</i>	3-15 cm	D0684	F	F		F	F							O		
<i>Metridium senile</i>	3-15 cm	D0710														
HEXACORALLIA	1-3 cm	D0627	O													
Caryophylliidae	1-3 cm	D0780														
<b>POLYCHAETA</b>																
<i>Chaetopterus tubes</i>	3-15 cm	P0811						P								
<i>Lanice conchilega</i>	1-3 cm	P1195														
<i>Sabella pavonina</i>	3-15 cm	P1320														
<i>Pomatoceros</i>	1-3 cm	P1339														
<b>CRUSTACEA</b>																
CIRRIPEDIA	Crust %	R0074														

Biological characteristics	SACFOR	Code	Site No.													
			N63	N64	N65	N66	N67	N72	N75	N76	N77	N78	N103	N104	N105	N106
DECAPODA	3-15 cm	S1276	F			F				O	F					
CARIDEA	1-3 cm	S1293														
<i>Nephrops norvegicus</i>	>15 cm	S1402				F	F					F	F	F	F	F
Paguridae	3-15 cm	S1436	O		O											
<i>Pagurus bernhardus</i>	3-15 cm	S1457			F											
Galatheidae	3-15 cm	S1469	F								O					
<i>Munida rugosa</i>	3-15 cm	S1478														
<i>Maja squinado</i>	>15 cm	S1515														
Inachinae	3-15 cm	S1520														
<i>Atelecyclus rotundatus</i>	3-15 cm	S1555														
<i>Cancer pagurus</i>	>15 cm	S1566														
<i>Liocarcinus</i>	3-15 cm	S1577	F				F									
<i>Liocarcinus depurator</i>	3-15 cm	S1580														
<i>Scalpellum scalpellum</i>	1-3 cm	R0022														
<i>Necora puber</i>	3-15 cm	S1589					O									
<b>MOLLUSCA</b>																
Bivalve Siphons	3-15 cm	W1560														
<i>Aequipecten opercularis</i>	3-15 cm	W1773														
<i>Pecten maximus</i>	3-15 cm	W1771														
<b>BRYOZOA</b>																
BRYOZOA crust	Crust %	Y0001														
<i>Alcyonidium diaphanum</i>	3-15 cm	Y0076														
<i>Flustra/Securiflustra</i>	Turf %					R	R									
<i>Flustra foliacea</i>	Turf %	Y0187														
<i>Securiflustra securifrons</i>	Turf %	Y0194														
<b>ECHINODERMATA</b>																
ASTEROIDEA	3-15 cm	ZB0018						F								
<i>Luidia ciliaris</i>	>15 cm	ZB0022														
<i>Astropecten irregularis</i>	3-15 cm	ZB0026	O													
<i>Crossaster papposus</i>	3-15 cm	ZB0075														
ECHINIDAE	3-15 cm	ZB0194	F													

Biological characteristics	SACFOR	Code	Site No.													
			N63	N64	N65	N66	N67	N72	N75	N76	N77	N78	N103	N104	N105	N106
<i>Asterias rubens</i>	>15 cm	ZB0100	F	F	F	C	O	F	F							
<i>Ophiothrix fragilis</i>	3-15 cm	ZB0124					O									
<i>Ophiocomina nigra</i>	3-15 cm	ZB0128														
<i>Ophiura albida</i>	3-15 cm	ZB0168	F													
<i>Ophiura ophiura</i>	3-15 cm	ZB0170				F										
Ophiuridae	3-15 cm				F			F								
<i>Echinus esculentus</i>	3-15 cm	ZB0198					O									
<b>ASCIDIACEA</b>																
<i>Asciella scabra</i>	3-15 cm	ZD0085				A										
<i>Asciella</i> spp.	3-15 cm	ZD0083	A													
ASCIDIACEA	3-15 cm	ZD0002														
<b>PISCES</b>																
OSTEICHTHYES	3-15 cm	ZG0001		O		O				O		O	O			
<i>Agonus cataphractus</i>	3-15 cm	ZG0291				O										
<i>Labrus mixtus</i>	>15 cm	ZG0400														
Ammodytidae	3-15 cm	ZG0441														
Callionymidae	3-15 cm	ZG0450														
Gobiidae	3-15 cm	ZG0455														
PLEURONCTIFORMES	>15 cm	ZG0545														
Soleidae		ZG0581					O		F							
<i>Solea solea</i>	3-15 cm	ZG0591													O	
<i>Pholis gunnellus</i>	3-15 cm	ZG0440														
<i>Microchirus variegatus</i>	>15 cm	ZG0588	O													
<b>ALGAE</b>																
RHODOPHYCEAE	Turf %	ZM0002														
Corallinaceae	Crust %	ZM0194														
FLORIDEOPHYCIDAE	Turf %	ZM0066														
LAMINARIALES	Turf %	ZR0338														
<b>Miscellanea</b>																
Burrows/holes	Present															
Eggs	Present						P									

Table 12C.7.12: SACFOR Abundance Historical Video Site N107 to N119

Biological characteristics	SACFOR	Code	Site No.												
			N107	N108	N109	N110	N111	N112	N113	N114	N115	N116	N117	N118	N119
<b>PORIFERA</b>															
PORIFERA	Crust %	C0001													
<i>Suberites</i>	3-15 cm	C0414													
<b>CNIDARIA</b>															
<i>Abietinaria abietina</i>	Turf %	D0409													
<i>Hydrallmania falcata</i>	Turf %	D0424													
<i>Sertularia</i>	Turf %	D0433										P			
<i>Thuiaria thuja</i>	Turf %	D0443													
Plumulariidae	Turf %	D0447													
<i>Nemertesia</i>	3-15 cm	D0462													
<i>Nemertesia antennina</i>	3-15 cm	D0463													
Hydroid/Bryozoan turf species	Turf %		R		R	F				R		C	A	R	R
<b>ANTHOZOA</b>															
<i>Alcyonium digitatum</i>	Turf %	D0597				O						R	R		
<i>Virgularia mirabilis</i>	3-15 cm	D0618	F	C	C		C	F	F		C			F	
<i>Pennatula phosphorea</i>	3-15 cm	D0623	F			F								O	
<i>Cerianthus lloydii</i>	3-15 cm	D0632				O						C			O
<i>Bolocera tuediae</i>	3-15 cm	D0681													
<i>Urticina/Stomphia</i>	3-15 cm	D0684				F								F	
<i>Metridium senile</i>	3-15 cm	D0710													
HEXACORALLIA	1-3 cm	D0627													
Caryophylliidae	1-3 cm	D0780													
<b>POLYCHAETA</b>															
<i>Chaetopterus tubes</i>	3-15 cm	P0811						P				P	P		
<i>Lanice conchilega</i>	1-3 cm	P1195											F		A
<i>Sabella pavonina</i>	3-15 cm	P1320											C		F
<i>Pomatoceros</i>	1-3 cm	P1339													
<b>CRUSTACEA</b>															
CIRRIPEDIA	Crust %	R0074													

Biological characteristics	SACFOR	Code	Site No.													
			N107	N108	N109	N110	N111	N112	N113	N114	N115	N116	N117	N118	N119	
DECAPODA	3-15 cm	S1276				F										
CARIDEA	1-3 cm	S1293														
<i>Nephrops norvegicus</i>	>15 cm	S1402	F	F		C	F	F	F		C					
Paguridae	3-15 cm	S1436	R				F									
<i>Pagurus bernhardus</i>	3-15 cm	S1457				F										O
Galatheididae	3-15 cm	S1469														
<i>Munida rugosa</i>	3-15 cm	S1478														
<i>Maja squinado</i>	>15 cm	S1515														
Inachinae	3-15 cm	S1520														
<i>Atelecyclus rotundatus</i>	3-15 cm	S1555														
<i>Cancer pagurus</i>	>15 cm	S1566				F										
<i>Liocarcinus</i>	3-15 cm	S1577				F		O		F	F	F	F	F	F	O
<i>Liocarcinus depurator</i>	3-15 cm	S1580								F						
<i>Scalpellum scalpellum</i>	1-3 cm	R0022														
<i>Necora puber</i>	3-15 cm	S1589														
<b>MOLLUSCA</b>																
Bivalve Siphons	3-15 cm	W1560														
<i>Aequipecten opercularis</i>	3-15 cm	W1773										O	O			
<i>Pecten maximus</i>	3-15 cm	W1771														
<b>BRYOZOA</b>																
BRYOZOA crust	Crust %	Y0001														
<i>Alcyonidium diaphanum</i>	3-15 cm	Y0076														
<i>Flustra/Securiflustra</i>	Turf %															
<i>Flustra foliacea</i>	Turf %	Y0187														
<i>Securiflustra securifrons</i>	Turf %	Y0194				O										
<b>ECHINODERMATA</b>																
ASTEROIDEA	3-15 cm	ZB0018														
<i>Luidia ciliaris</i>	>15 cm	ZB0022														
<i>Astropecten irregularis</i>	3-15 cm	ZB0026														
<i>Crossaster papposus</i>	3-15 cm	ZB0075														
ECHINIDAE	3-15 cm	ZB0194														



Biological characteristics	SACFOR	Code	Site No.												
			N107	N108	N109	N110	N111	N112	N113	N114	N115	N116	N117	N118	N119
<i>Asterias rubens</i>	>15 cm	ZB0100		F		C	F			F	F		F	O	F
<i>Ophiothrix fragilis</i>	3-15 cm	ZB0124										O			
<i>Ophiocomina nigra</i>	3-15 cm	ZB0128													
<i>Ophiura albida</i>	3-15 cm	ZB0168													
<i>Ophiura ophiura</i>	3-15 cm	ZB0170													
Ophiuridae	3-15 cm														
<i>Echinus esculentus</i>	3-15 cm	ZB0198				F									R
<b>ASCIDIACEA</b>															
<i>Asciella scabra</i>	3-15 cm	ZD0085													
<i>Asciella</i> spp.	3-15 cm	ZD0083										C	F		
ASCIDIACEA	3-15 cm	ZD0002													
<b>PISCES</b>															
OSTEICHTHYES	3-15 cm	ZG0001					F							F	
<i>Agonus cataphractus</i>	3-15 cm	ZG0291													
<i>Labrus mixtus</i>	>15 cm	ZG0400													
Ammodytidae	3-15 cm	ZG0441													
Callionymidae	3-15 cm	ZG0450													
Gobiidae	3-15 cm	ZG0455													
PLEURONCTIFORMES	>15 cm	ZG0545													
Soleidae		ZG0581													
<i>Solea solea</i>	3-15 cm	ZG0591													
<i>Pholis gunnellus</i>	3-15 cm	ZG0440											O		
<i>Microchirus variegatus</i>	>15 cm	ZG0588													
<b>ALGAE</b>															
RHODOPHYCEAE	Turf %	ZM0002													C
Corallinaceae	Crust %	ZM0194													
FLORIDEOPHYCIDAEAE	Turf %	ZM0066													O
LAMINARIALES	Turf %	ZR0338													
<b>Miscellanea</b>															
Burrows/holes	Present														
Eggs	Present														

Table 12C.7.13: SACFOR Abundance Historical Video Site N121 to N124

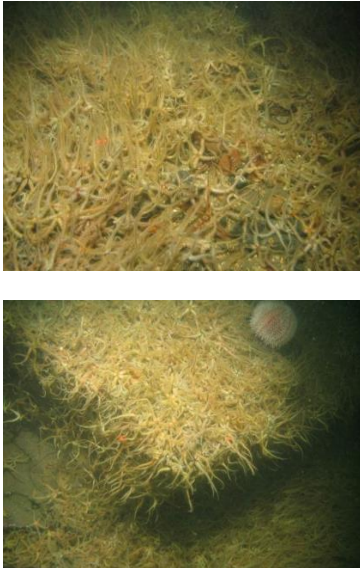
Biological characteristics	SACFOR	Code	Site No.			
			N121	N122	N123	N124
<b>PORIFERA</b>						
PORIFERA	Crust %	C0001				
<i>Suberites</i>	3-15 cm	C0414				
<b>CNIDARIA</b>						
<i>Abietinaria abietina</i>	Turf %	D0409	P			
<i>Hydrallmania falcata</i>	Turf %	D0424				
<i>Sertularia</i>	Turf %	D0433				
<i>Thuiaria thuja</i>	Turf %	D0443				
Plumulariidae	Turf %	D0447				
<i>Nemertesia</i>	3-15 cm	D0462				
<i>Nemertesia antennina</i>	3-15 cm	D0463				
Hydroid/Bryozoan turf species	Turf %		O		R	R
<b>ANTHOZOA</b>						
<i>Alcyonium digitatum</i>	Turf %	D0597				
<i>Virgularia mirabilis</i>	3-15 cm	D0618		F		
<i>Pennatula phosphorea</i>	3-15 cm	D0623			F	F
<i>Cerianthus lloydii</i>	3-15 cm	D0632	O			
<i>Bolocera tuediae</i>	3-15 cm	D0681				
<i>Urticina/Stomphia</i>	3-15 cm	D0684			O	
<i>Metridium senile</i>	3-15 cm	D0710				
HEXACORALLIA	1-3 cm	D0627				
Caryophylliidae	1-3 cm	D0780				
<b>POLYCHAETA</b>						
<i>Chaetopterus tubes</i>	3-15 cm	P0811		F	F	
<i>Lanice conchilega</i>	1-3 cm	P1195				
<i>Sabella pavonina</i>	3-15 cm	P1320				
<i>Pomatoceros</i>	1-3 cm	P1339				
<b>CRUSTACEA</b>						
CIRRIPEDIA	Crust %	R0074				
DECAPODA	3-15 cm	S1276	O			
CARIDEA	1-3 cm	S1293				
<i>Nephrops norvegicus</i>	>15 cm	S1402			F	F
Paguridae	3-15 cm	S1436				
<i>Pagurus bernhardus</i>	3-15 cm	S1457				
Galatheidae	3-15 cm	S1469				
<i>Munida rugosa</i>	3-15 cm	S1478				
<i>Maja squinado</i>	>15 cm	S1515				
Inachinae	3-15 cm	S1520				
<i>Atelecyclus rotundatus</i>	3-15 cm	S1555				
<i>Cancer pagurus</i>	>15 cm	S1566				
<i>Liocarcinus</i>	3-15 cm	S1577	F		O	F
<i>Liocarcinus depurator</i>	3-15 cm	S1580				
<i>Scalpellum scalpellum</i>	1-3 cm	R0022				
<i>Necora puber</i>	3-15 cm	S1589				
<b>MOLLUSCA</b>						
Bivalve Siphons	3-15 cm	W1560				
<i>Aequipecten opercularis</i>	3-15 cm	W1773	F			
<i>Pecten maximus</i>	3-15 cm	W1771				



Appendix 12C: Benthic Ecology Baseline Offshore Export Cable Corridor


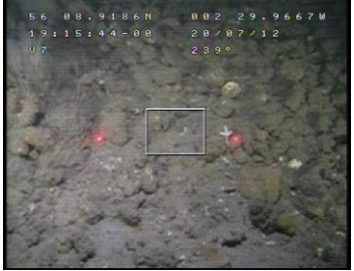
Biological characteristics	SACFOR	Code	Site No.			
			N121	N122	N123	N124
<b>BRYOZOA</b>						
BRYOZOA crust	Crust %	Y0001				
<i>Alcyonidium diaphanum</i>	3-15 cm	Y0076				
<i>Flustra/Securiflustra</i>	Turf %					
<i>Flustra foliacea</i>	Turf %	Y0187				
<i>Securiflustra securifrons</i>	Turf %	Y0194				
<b>ECHINODERMATA</b>						
ASTEROIDEA	3-15 cm	ZB0018				
<i>Luidia ciliaris</i>	>15 cm	ZB0022				
<i>Astropecten irregularis</i>	3-15 cm	ZB0026				
<i>Crossaster papposus</i>	3-15 cm	ZB0075				
ECHINIDAE	3-15 cm	ZB0194				
<i>Asterias rubens</i>	>15 cm	ZB0100	C			
<i>Ophiothrix fragilis</i>	3-15 cm	ZB0124				
<i>Ophiocomina nigra</i>	3-15 cm	ZB0128				
<i>Ophiura albida</i>	3-15 cm	ZB0168				
<i>Ophiura ophiura</i>	3-15 cm	ZB0170				
Ophiuridae	3-15 cm					F
<i>Echinus esculentus</i>	3-15 cm	ZB0198	O			
<b>ASCIDIACEA</b>						
<i>Asciella scabra</i>	3-15 cm	ZD0085				
<i>Asciella</i> spp.	3-15 cm	ZD0083	A			
ASCIDIACEA	3-15 cm	ZD0002				
<b>PISCES</b>						
OSTEICHTHYES	3-15 cm	ZG0001	O			F
<i>Agonus cataphractus</i>	3-15 cm	ZG0291				
<i>Labrus mixtus</i>	>15 cm	ZG0400				
Ammodytidae	3-15 cm	ZG0441				
Callionymidae	3-15 cm	ZG0450				
Gobiidae	3-15 cm	ZG0455				
PLEURONECTIFORMES	>15 cm	ZG0545				
Soleidae		ZG0581			O	
<i>Solea solea</i>	3-15 cm	ZG0591				
<i>Pholis gunnellus</i>	3-15 cm	ZG0440				
<i>Microchirus variegatus</i>	>15 cm	ZG0588				
<b>ALGAE</b>						
RHODOPHYCEAE	Turf %	ZM0002				
Corallinaceae	Crust %	ZM0194				
FLORIDEOPHYCIDEAE	Turf %	ZM0066				
LAMINARIALES	Turf %	ZR0338				
<b>Miscellanea</b>						
Burrows/holes	Present					
Eggs	Present					



**ANNEX 12C.8 – ASSESSMENT OF RESEMBLANCE OF OBSERVED REEF FEATURES TO ANNEX I REEF CRITERIA**

**Table 12C.8.1: Assessment of Resemblance of Observed Reef Features to Annex 1 Reef Criteria**

Site Number	Geogenic Classification			Overall reef classification	Substrate description and associated species	Biotope and representative images
	% cobbles and / or boulders / bedrock	Elevation	% Epibiota cover			
Video Transect 1	40-95% 80% suggested	64 mm-5 m Boulders not more than 1.5 to 2 m high at the most.	>80% of species present composed of epifaunal species	Medium	<p><b>Substrate:</b> Boulder reef, possibly on bedrock. Cobbles and mixed coarse sediment between cobbles and on floor of recesses. Boulder reef rises very steeply towards the shore at Isle of May. Closer to the shore, a more level open plain of slightly sandy gravelly pebbles with the occasional boulder appears, before rising again. Closer to shore again, large shell hash becomes more evident within the coarse mixed sediment and rock ledging begins to appear.</p> <p><b>Typical species:</b>  <i>Alcyonium digitatum</i>  <i>Asterias rubens</i>  <i>Cancer pagurus</i>                      CARIDEA                      Corallinaceae  <i>Echinus esculentus</i>                      Galatheidae                      Hydroid/Bryozoan turf species  <i>Liocarcinus depurator</i>  <i>Luidia ciliaris</i>  <i>Necora puber</i>  <i>Ophiocomina nigra</i>  <i>Ophiothrix fragilis</i>  <i>Pomatoceros</i>  <i>Urticina/Stomphia</i></p>	 <p>CR.MCR.EcCr.FaAlCr.Bri Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock.</p>

Site Number	Geogenic Classification				Substrate description and associated species	Biotope and representative images
	% cobbles and / or boulders / bedrock	Elevation	% Epibiota cover	Overall reef classification		
Video Transect 2	40-95% 60% suggested	64 mm-5 m Boulders not more than 1.5 to 2 m high at the most.	>80% of species present composed of epifaunal species	Medium	<p><b>Substrate:</b> Start of transect, substrate comprised very coarse cobbly pebbly silty, slightly shelly sandy gravel with the occasional small boulder. Coarse mixed sediment plain extended for 2/3 of the transect. Substrate then became substantially coarser, comprising silty slightly sandy slightly shelly gravelly pebble plateau with an increasing amount of cobbles as the transect progresses. A coarse gravelly sand overlay the cobble substrates. Density of boulders increased with decreasing distance to shore and becomes a steeply rising boulder and cobble reef with areas of plateau of bedrock, boulders and cobbles overlaid with gravelly sand towards the end of the transect closest to the Isle of May.</p> <p><b>Typical species:</b>  <i>Abietinaria abietina</i>  <i>Alcyonium digitatum</i>  <i>Asterias rubens</i>                      BRYOZOA crust                      CARIDEA                      Caryophylliidae                      CIRRIPIEDIA                      Corallinaceae  <i>Crossaster papposus</i>  <i>Echinus esculentus</i>                      Hydroid/Bryozoan turf species  <i>Liocarcinus depurator</i>  <i>Luidia ciliaris</i>  <i>Munida rugosa</i>  <i>Ophiocomina nigra</i>  <i>Ophiothrix fragilis</i>  <i>Pecten maximus</i>  <i>Pomatoceros</i>  <i>Thuiaria thuja</i>  <i>Urticina/Stomphia</i></p>	<p>NE end of transect, approaching the Isle of May, the substrate changes to a mixture of bedrock, boulders and coarse sediment. The following two biotopes are suggested to form a mosaic in the area.</p>  <p>CR.MCR.EcCr.FaAlCr.Adig  <i>Alcyonium digitatum</i>, <i>Pomatoceros triqueter</i>, algal and bryozoan crusts on wave-exposed circalittoral rock</p>  <p>CR.MCR.EcCr.FaAlCr.Pom                      Faunal and algal crusts with <i>Pomatoceros triqueter</i> and sparse <i>Alcyonium digitatum</i> on exposed to moderately wave-exposed circalittoral rock</p>

Site Number	Geogenic Classification				Substrate description and associated species	Biotope and representative images
	% cobbles and / or boulders / bedrock	Elevation	% Epibiota cover	Overall reef classification		
Video Transect 7	10-40% 40% suggested	64 mm-5 m Boulders not more than 1 m high at the most.	>80% of species present composed of epifaunal species	Low	<p><b>Substrate:</b> Beginning of transect comprised coarse boulder, cobble and mixed seabed substrates comprising boulders up to 1m across in places. Boulders and cobbles occurred as patches interspersed within a wider matrix of consolidated ground or bedrock. A veneer of silty sand was present throughout the transect.</p> <p><b>Typical species:</b>  <i>Abietinaria abietina</i>  <i>Alcyonium digitatum</i>                      ASCIDIACEA  <i>Asterias rubens</i>  <i>Bolocera tuediae</i>  <i>Cancer pagurus</i>  <i>Cerianthus lloydii</i>  <i>Crossaster papposus</i>  <i>Echinus esculentus</i>                      Hydroid/Bryozoan turf species  <i>Liocarcinus</i>  <i>Maja squinado</i>  <i>Microchirus variegatus</i>  <i>Munida rugosa</i>  <i>Nemertesia antennina</i>  <i>Pagurus bernhardus</i>  <i>Pecten maximus</i>  <i>Pennatula phosphorea</i>  <i>Securiflustra securifrons</i>  <i>Sertularia</i>  <i>Thuaria thuja</i>  <i>Urticina/Stomphia</i></p>	 <p>SS.SMx.CMx.FluHyd  <i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment</p> <p>potentially mixed with occasional patches of:-</p>  <p>SS.SMx.CMx.CIloMx.Nem  <i>Cerianthus lloydii</i> with <i>Nemertesia</i> spp. and other hydroids in circalittoral muddy mixed sediment</p>

Site Number	Geogenic Classification				Substrate description and associated species	Biotope and representative images
	% cobbles and / or boulders / bedrock	Elevation	% Epibiota cover	Overall reef classification		
Video Transect 11	10-40% 40% suggested	64 mm-5 m Boulders not more than 1 m high at the most.	>80% of species present composed of epifaunal species	Low	<p><b>Substrate:</b> Beginning of the transect comprised muddy sand/sandy mud with burrows and holes. Substrate became more consolidated mixed slightly shelly slightly gravelly cobble sediment. A silty sandy veneer was present throughout the transect. As transect continued, larger boulder and cobble deposits occurred, with boulders up to 1m across in places. Boulders and cobbly pebble sediments formed large deposits across the site, interspersed with areas of low lying consolidated ground or bedrock, with a thinner veneer of cobbly gravelly pebbles. Some areas potentially a deeper deposit of sandy muddy coarse mixed sediment.</p> <p><b>Typical species:</b>  <i>Abietinaria abietina</i>  <i>Alcyonium digitatum</i>                      ASCIDIACEA  <i>Asterias rubens</i>  <i>Bolocera tuediae</i>  <i>Cerianthus lloydii</i>  <i>Crossaster papposus</i>  <i>Echinus esculentus</i>  <i>Flustra foliacea</i>  <i>Hydrallmania falcata</i>                      Hydroid/Bryozoan turf species  <i>Liocarcinus</i>  <i>Munida rugosa</i>  <i>Ophiothrix fragilis</i>  <i>Pecten maximus</i>  <i>Securiflustra securifrons</i>  <i>Sertularia</i>  <i>Thuiaria thuja</i>  <i>Urticina/Stomphia</i></p>	<p>SS.SMu.CFiMu.SpnMeg                      Seapens and burrowing megafauna in circalittoral fine mud</p> <p>Becoming</p>  <p>S.SMx.CMx.FluHyd  <i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment</p> <p>potentially mixed with occasional patches of:-</p>  <p>SS.SMx.CMx.CloMx.Nem  <i>Cerianthus lloydii</i> with <i>Nemertesia</i> spp. and other hydroids in circalittoral muddy mixed sediment</p>

Site Number	Geogenic Classification				Substrate description and associated species	Biotope and representative images
	% cobbles and / or boulders / bedrock	Elevation	% Epibiota cover	Overall reef classification		
Video Transect 11 (cont.)					Transect 11 forms a linking transect between Sites 8 and 7, and was undertaken to review the extent of coarse hard ground. Approximate position at which softer sediment in Site 8, running into Site 11, changed to be more consistent with the substrate found in video Site 7 is :56° 09.3767 N, 002° 29.5184 W.	



## ANNEX 12C.9 – CONTAMINANTS

Table 12C.9.1: Contaminants Analysis Results Site 1 to 8

Analyte	Units	Site No.				
		1	3	6	7	8
PAH : Total : Dry Wt :- {Polynuclear Aromatic Hydrocarbons}	mg/kg	<0.103	<0.103	<0.104	<0.296	<0.381
Hydrocarbons : Total : Dry Wt as Ekofisk	mg/kg	2.44	5.66	5.69	26.3	34.5
Mercury : Dry Wt	mg/kg	0.003	0.005	0.055	0.042	0.125
Aluminium, HF Digest : Dry Wt	mg/kg	41800	44800	46000	49100	47000
Barium, HF Digest : Dry Wt	mg/kg	665	496	395	454	469
Arsenic, HF Digest : Dry Wt	mg/kg	10.4	7.89	8.06	6	7.3
Cadmium, HF Digest : Dry Wt	mg/kg	0.106	0.104	0.135	0.078	0.084
Chromium, HF Digest : Dry Wt	mg/kg	166	96.1	142	76.1	92.7
Copper, HF Digest : Dry Wt	mg/kg	70	42.3	31.5	24.2	16.3
Lead, HF Digest : Dry Wt	mg/kg	34.7	33.9	34.8	25.1	31
Nickel, HF Digest : Dry Wt	mg/kg	91.6	37.9	67.1	21.2	26.3
Tin, HF Digest : Dry Wt	mg/kg	3.75	2.48	2.62	2.15	2.93
Zinc : HF Digest : Dry Wt	mg/kg	85	76.1	74.5	60.9	68.9
Acenaphthene : Dry Wt	ug/kg	<2	<2	<2	<2	3.7
Acenaphthylene : Dry Wt	µg/kg	<2	<2	<2	<2	5
Anthracene : Dry Wt	µg/kg	<2	<2	<2	7.6	12.9
Benzo(a)anthracene : Dry Wt	µg/kg	<2	<2	2.3	19.9	27.5
Benzo(a)pyrene : Dry Wt	µg/kg	<2	<2	<2	21.6	29.1
Benzo(b)fluoranthene : Dry Wt	µg/kg	<10	<10	<10	44.8	49.9
Benzo(ghi)perylene : Dry Wt	µg/kg	<10	<10	<10	34.5	36
Benzo(k)fluoranthene : Dry Wt	µg/kg	<10	<10	<10	15.7	19.9
Chrysene : Dry Wt	µg/kg	<3	<3	<3	19.9	26.3
Dibenzo(ah)anthracene : Dry Wt	µg/kg	<5	<5	<5	<5	5.2
Fluoranthene : Dry Wt	µg/kg	<2	<2	<3	29.8	42.4
Fluorene : Dry Wt	µg/kg	<10	<10	<10	<10	<10
Indeno(1,2,3-c,d)pyrene : Dry Wt	µg/kg	<10	<10	<10	34.2	35.9
Naphthalene : Dry Wt	µg/kg	<30	<30	<30	<30	<30
Phenanthrene : Dry Wt	µg/kg	<10	<10	<10	21.6	36
Pyrene : Dry Wt	µg/kg	<3	<3	<3	31.3	46.8
Dibutyl Tin : Dry Wt as Cation	µg/kg	<4	<4	<4	<4	<5
Diocetyl Tin : Dry Wt as Cation	µg/kg	<4	<4	<4	<4	<5
Diphenyl Tin : Dry Wt as Cation	µg/kg	<3	<3	<3	<3	<3
Tetrabutyl Tin : Dry Wt as Cation	µg/kg	<3	<3	<3	<3	<3
Tributyl Tin : Dry Wt as Cation	µg/kg	<4	<4	<4	<4	<5
Triphenyl Tin : Dry Wt as Cation	µg/kg	<3	<3	<3	<3	<3
Dry Solids @ 30°C	%	75.8	75.7	74.4	66.5	67.9
Accreditation Assessment	No.	2	2	2	2	2

Table 12C.9.2: Contaminants Analysis Results Site 10 to 23

Analyte	Units	Site No.					
		10	14	15	17	20	23
PAH : Total : Dry Wt :- {Polynuclear Aromatic Hydrocarbons}	mg/kg	0.859	1.81	2.74	2.82	<0.150	3.66
Hydrocarbons : Total : Dry Wt as Ekofisk	mg/kg	135	105	346	229	27.7	398
Mercury : Dry Wt	mg/kg	0.227	0.27	0.45	0.655	0.037	0.77
Aluminium, HF Digest : Dry Wt	mg/kg	47000	40900	45000	45900	43200	46700
Barium, HF Digest : Dry Wt	mg/kg	539	447	423	437	1670	491
Arsenic, HF Digest : Dry Wt	mg/kg	10.5	10.9	10.5	11.6	13.4	12.1
Cadmium, HF Digest : Dry Wt	mg/kg	0.097	0.082	0.096	0.099	0.148	0.146
Chromium, HF Digest : Dry Wt	mg/kg	107	101	128	137	330	131
Copper, HF Digest : Dry Wt	mg/kg	24.4	21.4	57.5	69.1	38.3	54.1
Lead, HF Digest : Dry Wt	mg/kg	45.9	45.7	57	66.2	51.4	79.3
Nickel, HF Digest : Dry Wt	mg/kg	33.2	33.8	50.8	50.4	108	52.6
Tin, HF Digest : Dry Wt	mg/kg	4.23	3.97	4.91	5.58	3.75	6.8
Zinc : HF Digest : Dry Wt	mg/kg	95.9	91.7	120	135	110	157
Acenaphthene : Dry Wt	ug/kg	5.7	14.5	18.7	22.5	<2	23.7
Acenaphthylene : Dry Wt	µg/kg	7.4	20	37.6	30.5	<2	42.4
Anthracene : Dry Wt	µg/kg	38.2	82.1	110	118	5	155
Benzo(a)anthracene : Dry Wt	µg/kg	67	150	242	226	7.5	330
Benzo(a)pyrene : Dry Wt	µg/kg	73.1	150	252	259	8.2	319
Benzo(b)fluoranthene : Dry Wt	µg/kg	93.4	193	304	310	13.4	367
Benzo(ghi)perylene : Dry Wt	µg/kg	68.2	156	219	199	<10	298
Benzo(k)fluoranthene : Dry Wt	µg/kg	31.5	67.6	123	147	<10	155
Chrysene : Dry Wt	µg/kg	65.4	149	254	219	7.6	297
Dibenzo(ah)anthracene : Dry Wt	µg/kg	12.3	22.2	32.8	32.2	<5	43.4
Fluoranthene : Dry Wt	µg/kg	104	180	331	320	9.8	447
Fluorene : Dry Wt	µg/kg	19.4	38.2	51.7	59.5	<10	67.3
Indeno(1,2,3-c,d)pyrene : Dry Wt	µg/kg	68.1	156	219	199	<10	299
Naphthalene : Dry Wt	µg/kg	56	133	155	204	<30	211
Phenanthrene : Dry Wt	µg/kg	97.7	201	244	269	14.5	376
Pyrene : Dry Wt	µg/kg	120	250	368	406	14.7	529
Dibutyl Tin : Dry Wt as Cation	µg/kg	<5	<4	<5	<7	<4	<6
Diocetyl Tin : Dry Wt as Cation	µg/kg	<5	<4	<5	<7	<4	<6
Diphenyl Tin : Dry Wt as Cation	µg/kg	<3	<3	<4	<4	<3	<4
Tetrabutyl Tin : Dry Wt as Cation	µg/kg	<3	<3	<4	<4	<3	<4
Tributyl Tin : Dry Wt as Cation	µg/kg	<5	7	<5	<7	<4	<6
Triphenyl Tin : Dry Wt as Cation	µg/kg	<3	<3	<4	<4	<3	<4
Dry Solids @ 30°C	%	65.1	71	53.2	48	74	50.9
Accreditation Assessment	No.	2	2	2	2	2	2