Norfolk Boreas Offshore Wind Farm

Appendix 10.1

Benthic Characterisation Report

Environmental Statement

Volume 3

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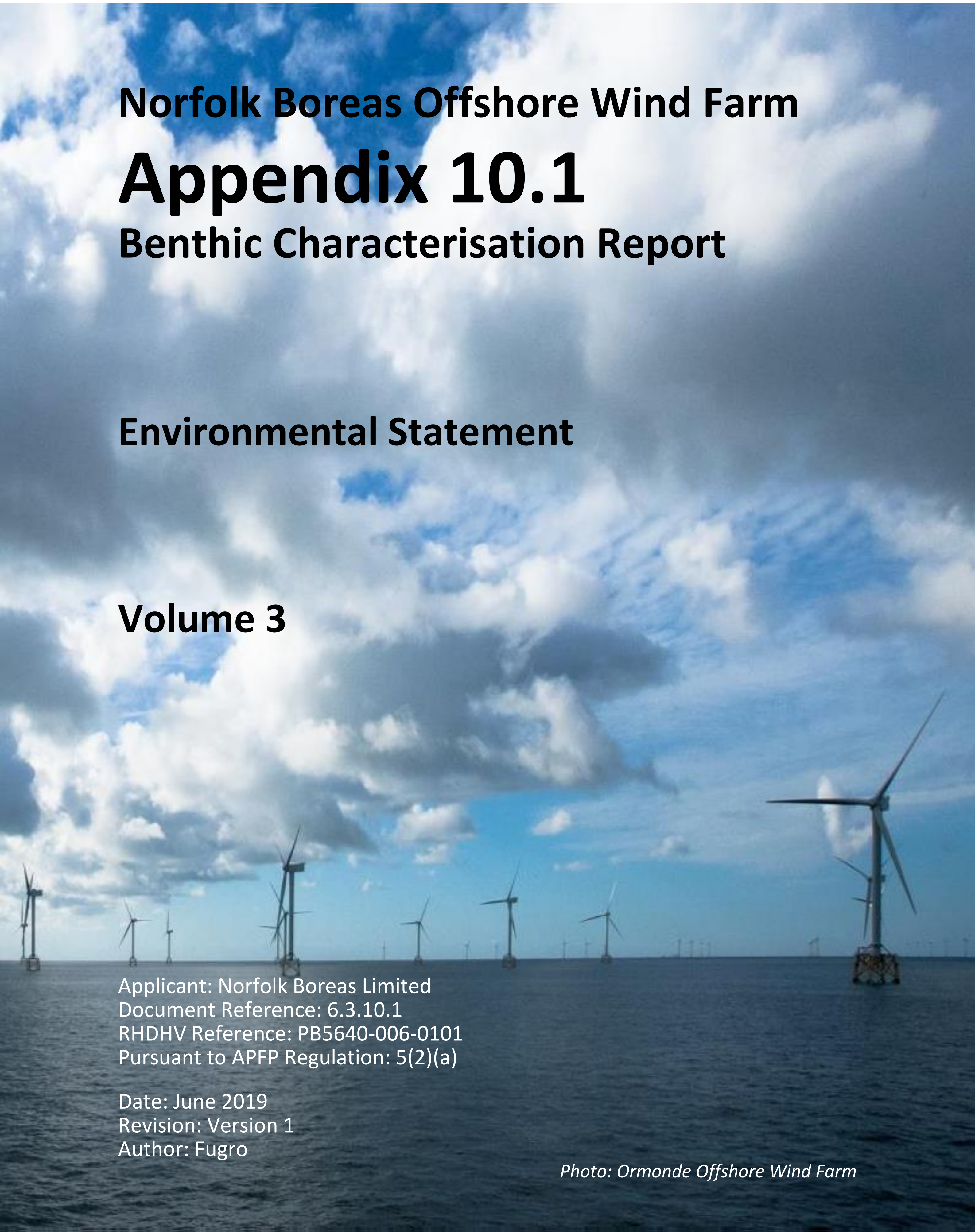

Photo: Ormonde Offshore Wind Farm

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FUGRO

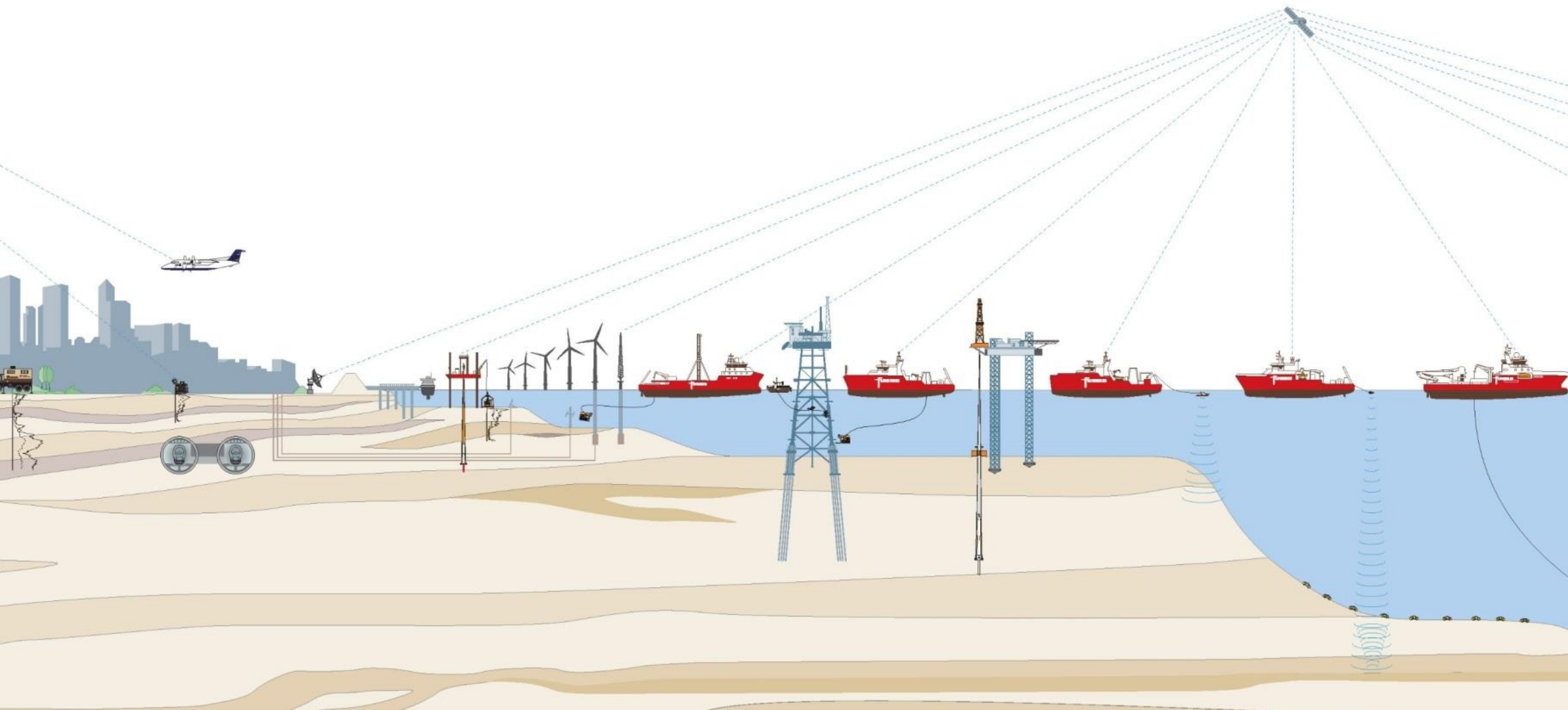
Norfolk Boreas Offshore Wind Farm
UK Continental Shelf, North Sea

Report 3 of 3
Environmental Site Investigation

Benthic Characterisation Report

Fugro Report No.: GE059-R3 (04)
26 January 2018

Vattenfall Wind Power Ltd



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Norfolk Boreas Offshore Wind Farm
UK Continental Shelf, North Sea

Report 3 of 3
Environmental Site Investigation

Benthic Characterisation Report

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Issue Date: 26 January 2018

Prepared for:

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DOCUMENT ARRANGEMENT

REPORT 1: GEOPHYSICAL SITE INVESTIGATION

- VOLUME 1: OPERATIONS AND CALIBRATIONS REPORT
- VOLUME 2: INTERPRETATIVE AND SITE INVESTIGATION REPORT

REPORT 2: GEOTECHNICAL SITE INVESTIGATION

- VOLUME 1: OPERATIONS REPORT
- VOLUME 2: INVESTIGATION DATA REPORT
- VOLUME 3: LABORATORY TEST DATA REPORT

REPORT 3: ENVIRONMENTAL SITE INVESTIGATION

BENTHIC CHARACTERISATION REPORT

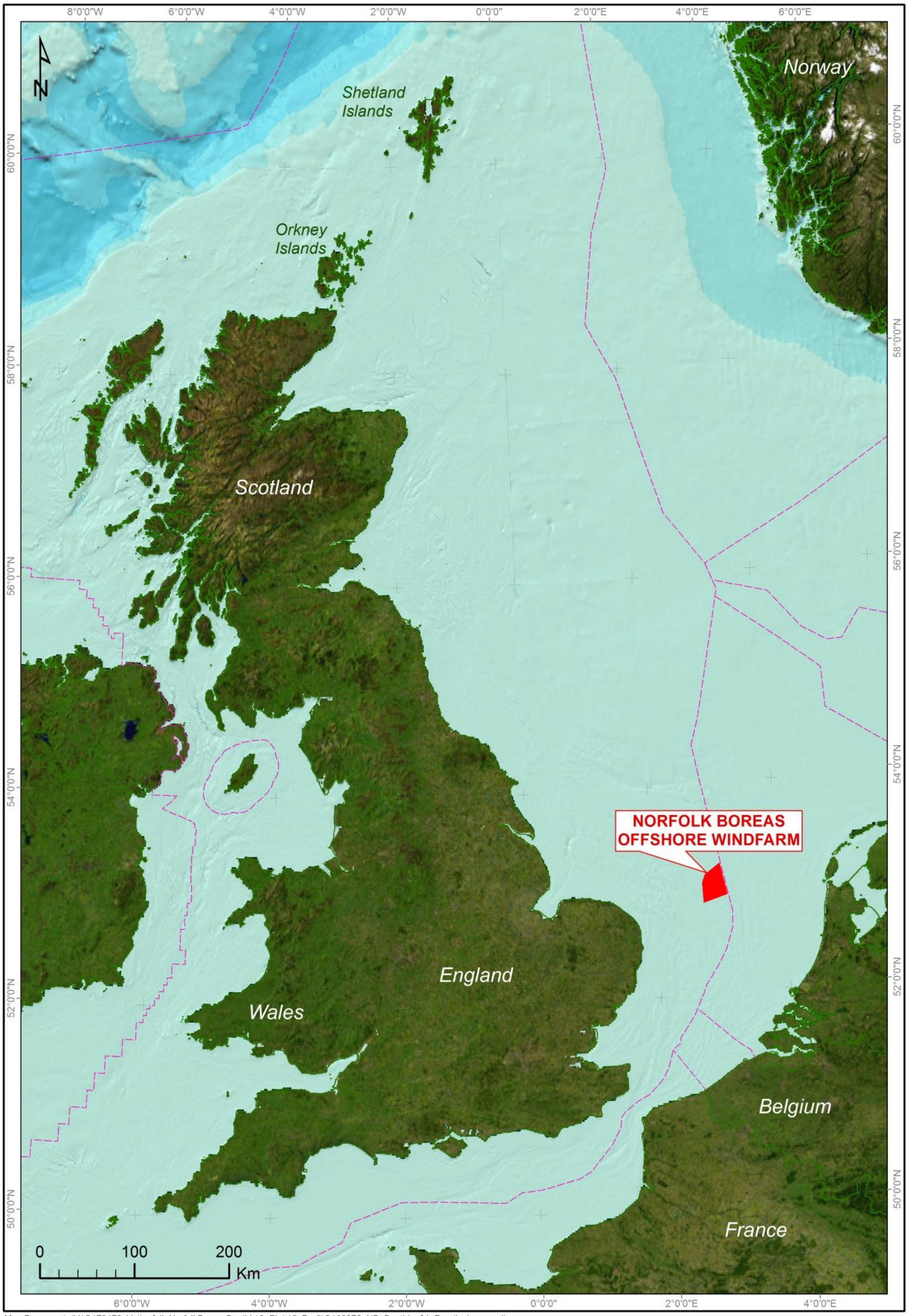
REPORT AMENDMENT SHEET

Issue No.	Report section	Page No.	Table No.	Figure No.	Description
02	EXECUTIVE SUMMARY	iv			Sediment Characterisation section – 'Clean Seas Environment Monitoring Programme (CSEMP)' added earlier, where PAH discussed.
02	ABBREVIATIONS	xii			Addition of 'BAC' Correction ERM 'Effects range medium' to 'Effects range median' Addition of 'NOAA'
02	Section 4.8	22			Paragraphs 2 and 3 edited for better referenced definition of ERL and ERM methodology
02	Section 5.4.1	46	Table 5.9		Formatting and Minor edits
02	Various		Table 5.9		Additional results highlighted where Cefas Action Level 1 exceeded. Report text adjusted to reflect change.
02	Section 5.4.1	46			Paragraph 3 – Reference Long and Morgon (1990) added. Clarification of arsenic and nickel results with respect to CSEMP
02	Section 5.4.3	50	Table 5.12		Formatting; Insertion of OSPAR CSEMP ERLs Column
02	Section 6.2.2	74			Paragraph one reference text deleted as not relevant to TOM discussion Paragraph 3 correction of 'minimum reporting value' for MRV Paragraph 5 line added 'The PAH levels at the remaining stations were below the minimum reporting value.'
02	Section 6.2.2	75			Paragraph 6, Line 1 "will not be" changed to "not considered"
02	Section 7	81			Paragraph 6 deletion of 'Clean Seas Environment Monitoring Programme (CSEMP)'
02	Section 8	87			Long E.R. and L.G. Morgan. 1990 reference added
03	ABBREVIATIONS	xiii			Addition of 'UHRS'
03	Various			Figure 1.3 Figure 2.1 Figure 5.3 Figure 5.5 Figure 5.7 Figure 5.12 Figure 5.15 Figure 5.16 Figure 5.17 Figure 5.18 Figure 5.19 Figure 5.20 Figure 5.24 Figure 5.28 Figure 5.29	Background chart image amended
03	Section 1.6.1 (Removed in Revision 04)	6			Paragraph 2 edited for clarification

Issue No.	Report section	Page No.	Table No.	Figure No.	Description
03	Section 1.6.2 (Removed in Revision 04)	6			Status of SAC corrected and reference updated
03	Section 5.3	35			"…graphically represented Figure 5.5 in to Figure 5.7." amended to "…graphically represented in Figure 5.5 to Figure 5.7."
03	EXECUTIVE SUMMARY	v			Changed "…which were further assessed in terms of potential biogenic reef." to "…which were further assessed in terms of their potential to be biogenic reef."
03	EXECUTIVE SUMMARY	vi			Added 'typical' to Paragraph 4, Line 1 of Sediment Characterisation section. Paragraph 6 of Sediment Characterisation Section edited for clarification. Deleted 'rich and diverse' from line one of Macrofauna section. Added 'where the survey area is located.' to end Paragraph 2, Macrofauna Section
03	Section 1.5	3	Table 1.1		Amended 2.5 km to 25 km and 3.5 km to 35 km
03	Various				Amended NB to Norfolk Boreas throughout report
03	Section 2.2.3	14			Methodology clarified with regards use of Acetone.
03	Section 4.5	20			Superfluous wording removed from Paragraph 4
03	Section 5.1	24			Sample selection process for sediment physicochemical analyses clarified Extra detail added to end of Paragraph 3.
03	Section 5.2.1	30			2nd paragraph split into 2 paragraphs.
03	Section 5.5.5	67			Paragraph 4, Line 1 corrected
03	Section 5.6	68			Paragraph 3 amended to "No other environmental variable (metals, hydrocarbons), either alone or in combination, returned a higher value than this."
03	Section 6.1	73			Paragraph 3, "…were possible." changed to "…where possible."
03	Section 6.2.2	74			Paragraph 2 re-worded for clarification Paragraph 4 sentence deleted due to ambiguity.
03	Section 6.2.2	75			Paragraph 6 amended to "Polychlorinated biphenyls and organotins were below the MRV in samples from all stations."
03	Section 6.3	75			Paragraph 1 edited for clarification
03	Section 6.4.1 (Removed in Revision 04)	77			Paragraph 6 edited for clarification of biotope mapping and comparison between current and historical data.
04	Section 1.5	3	Table 1.1		Table updated with SNS cSAC, originally in Section 1.6 (removed)
04	Section 1.6	6			Section 1.6 Marine Nature Conservation Designated Areas removed as accommodated by Table 1.1 and current Section 1.6
04	Section 2.2.1	12			Text amended to clarify use of low visibility video system
04	Section 4.6	19			Methodology on biotope mapping clarified. Two paragraphs added.
04	Section 5.1	23			Reference to Section 2.2.2 added at end of paragraph 5

Issue No.	Report section	Page No.	Table No.	Figure No.	Description
04	Section 5.5.5	64			Text added "*Two groups of samples were identified, using the SIMPROF test*"
04	Section 6.1	72			Cross reference removed to deleted section
04	Section 6.3	74			Paragraph 10 text added to clarify similarities between assigned biotopes of Norfolk Vanguard with Norfolk Boreas
04	Section 6.4	76			Section 6.4.1 removed. Section 6.4.2 amended to Section 6.4

KEYPLAN



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EXECUTIVE SUMMARY

Introduction

Vattenfall Wind Power Ltd, plans to develop the Norfolk Boreas Offshore Wind Farm (OWF), located in the United Kingdom Continental Shelf (UK CS) of the North Sea, 75 km north-east of Great Yarmouth. The site covers an area of 725 km^2 in water depths of 20 m to 43 m reduced to Lowest Astronomical Tide (LAT). As part of the development, Fugro was commissioned to undertake geophysical, geotechnical and environmental site investigations within the Norfolk Boreas OWF area, to inform site selection process and preliminary foundation design. This report (GE059-R3) presents the findings of the environmental site investigation.

Survey Strategy

The environmental characterisation survey comprised seabed video footage by means of drop-down video (DDV), and sediment sampling by means of grabs. The sampling stations, selected by Royal HaskoningDHV, were reviewed using the most up-to-date geophysical data, to ensure that all habitats present within the Norfolk Boreas OWF were sampled, and geophysical signatures, associated with habitats of potential conservation interest, were investigated. A total of 35 sampling stations were surveyed, with single replicate samples acquired at each station. Sediment samples for particle size analysis (PSA), total organic matter (TOM) and macrofaunal content were acquired by means of a 0.1 m^2 Hamon grab, while a 0.1 m^2 Day grab was used to acquire samples to be analysed for sediment chemistry, which included: total hydrocarbons (THC), polycyclic aromatic hydrocarbons (PAH), selected metals, polychlorinated biphenyls (PCB) and organotins. PSA and TOM analyses were undertaken on samples from all 35 stations. Chemistry and macrofaunal analysis was undertaken on samples from 10 stations, which were selected for primary analyses based on field records and spatial coverage.

Seabed Video Footage

Results of seabed video footage showed sandy sediment, with a small component of shells and gravel across the entire survey area. Sand ripples were recorded at most stations. Echinoderms were most frequently occurring and included brittlestars (*Ophiura ophiura* and *Ophiura albida*) and starfish (*Asterias rubens*). Arthropoda were also very frequently occurring, and included hermit crabs (Paguridae) and crabs (*Liocarcinus, Cancer pagurus*, *Corystes cassivelaunus*, *Necora puber* and *Atelecyclus rotundatus*). Fish were the most diverse taxon, and included: Pleuronectiformes (*Buglossidium luteum* and *Limanda limanda*), Gadidae, (*Merlangius merlangus*), Triglidae, Ammodytidae, Gobiidae and Rajidae. Cnidaria, Mollusca and Annelida were also recorded. Tubes of the Ross worm *Sabellaria spinulosa* were recorded at high abundances at two stations, which were further assessed in terms of their potential to be biogenic reef. Results indicated low resemblance to *S. spinulosa* reef at both stations. Annex I reef was not recorded.

Sediment Characterisation

Sediment across the survey area comprised mainly sand, with samples peaking in the medium and fine sand regions. Gravel content was low (mean of 2.44 %) and showed little variation across the survey area, while mud (mean of 3.99 %) showed large variations with most stations being totally devoid of mud and 2 stations showing just over 20 % mud. Most stations showed well sorted to moderately sorted sediment.

Four sediment classes were identified, in line with the Folk classification:

i. slightly gravelly sand,
ii. gravelly sand,
iii. slightly gravelly muddy sand,

iv. gravelly muddy sand.

TOM across the survey area was 0.71 % and showed a spatial pattern of distribution closely associated with sediment type.

THC concentrations were within typical values recorded for the North Sea. Quantifiable concentrations of PAH were consistently below the Canadian and the Clean Seas Environment Monitoring Programme (CSEMP) marine sediment quality guidelines.

Results of PCBs and organotins concentrations, were consistently below the minimum reporting value (MRV).

Of the metals analysed, arsenic showed concentrations above the Effect Range Low (ERL) in samples from all stations and between Centre for Environment, Fisheries and Aquaculture Science (Cefas) Action Level (AL) 1 and AL 2 at 2 stations. However, the concentrations of arsenic recorded are within the range reported to be typical of the southern North Sea. The concentrations of all other metals analysed were consistently below the marine sediment quality guidelines.

Macrofauna

Results of the biological analyses showed an infaunal community comprising 85 taxa and 1883 individuals. The annelids were dominant in terms of diversity and abundance, followed by the crustaceans, molluscs, echinoderms and other taxa. *S. spinulosa* was numerically dominant, but restricted in terms of distribution, with most of this species' abundance recorded at two stations. The polychaetes *Spiophanes bombyx* and *Scalibregma inflatum*, were also abundant and most frequently occurring amongst the annelids. Of the arthropods, the long-clawed porcelain crab *Pisidia longicornis* was numerically dominant, whereas the amphipod *Urothoe poseidonis* was the most frequently occurring. Molluscs were dominated by bivalves, such as *Fabulina fabula*, *Abra alba* and *Kurtiella* (formerly *Mysella*) *bidentata*. Of the echinoderms, the sea urchin *Echinocyamus pusillus* was dominant in terms of abundance and frequency of occurrence; other notable species included the brittlestars *Amphipholis squamata* and *Ophiura albida*, and the sea potato *Echinocardium cordatum*. Other taxa comprised: horseshoe worms of the *Phoronis* genus, ribbon worms (Nemertea), the sea anemone *Cerianthus lloydii*, and flatworms (Platyhelminthes). Epifaunal communities were represented mainly by low-lying bryozoans and less often cnidarians, with *Aspidelectra melolontha* being the most frequently recorded species. The benthic communities identified by grab sampling were associated with the sediment type.

Infaunal biomass was 16.7 ash free dry weight (AFDW.g.m^{-2}) which is higher than the average macrofaunal biomass for the whole North Sea (7 AFDWg.m^{-2}) but typical of the shallower southern North Sea, where the survey area is located.

Results of the multivariate analysis identified two groups of samples, both showing low degree of similarity. The groups differed mainly for species abundance rather than species composition. In general, the results are indicative of a dynamic seabed sediment subject to a degree of physical disturbance with subsequent reworking of the sediments which prevents the establishment of stable biotic communities. At the same time, sand grains, put into suspension by strong water movement, are key environmental factors for the establishment and survival of *S. spinulosa* tubes. The presence of small percentage of gravel and mud contributes to a degree of sediment compactness which allows the establishment of species such as *F. fabula* and *A. alba*, which are typical of more compacted sand, with less sediment transport. These habitats often represent transitional areas between dynamic offshore and relatively stable nearshore environments.

Biotopes

Results of the multivariate analysis of the sediment grab samples were assessed in conjunction with the results of the seabed video footage in terms of biotopes, in line with the current Marine Habitat Classification for Britain and Ireland and the corresponding European Nature Information System (EUNIS).

Three biotopes were recorded and included:

i. Sublittoral sands and muddy sands (SS.SSa, A5.2);
ii. *Sabellaria spinulosa* on stable circalittoral mixed sediment (SS.SBR.PoR.SspiMx, A5.611);
iii. *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (SS.SSA.IMuSa.FfabMag, A5.242).

SS.SSa (A5.2) was recorded by the seabed video footage at most stations.

SS.SBR.PoR.SspiMx (A5.611) was recorded at three stations, which grouped together following multivariate analysis. This biotope was also recorded by the seabed video footage at two of these stations which showed low-lying consolidated aggregations of *S. spinulosa* tubes.

SS.SSA.IMuSa.FfabMag (A5.242) was recorded at the remaining seven stations which grouped together following multivariate analysis.

No invertebrate species of conservation importance were recorded.

The seabed video footage recorded species of sandeels (Ammodytidae) and flatfish (Pleuronectiformes). Of the Ammodytidae, *Ammodytes marinus*, is listed as UK BAP priority species. Of the Pleuronectiformes, the solenette *Buglossidium luteum* and the dab *Limanda limanda*, and the pogge *Agonus cataphractus* are on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species as species of least concern.

CONTENTS

APPENDICES

TABLES IN THE MAIN TEXT

FIGURES IN THE MAIN TEXT

ABBREVIATIONS

AODA	Anglian Offshore Dredging Association
AOR	Anglian Offshore Region
AFDW	Ash free dry weight
AL	Action Level
As	Arsenic
BAC	Background Assessment Concentration
BAP	Biodiversity Action Plan
BIOENV	Biological and Environmental
BS	British Standards
BSH	Broad-scale Habitat
BSI	British Standards Institution
CD	Chart Datum
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CS	Continental Shelf
cSAC	Candidate Special Area of Conservation
cSCI	Candidate Site of Community Importance
CCME	Canadian Council of Ministers of the Environment
Cd	Cadmium
CM	Central meridian
CPT	Cone penetration tests
CSEMP	Clean Seas Environment Monitoring Programme
Cr	Chromium
Cu	Copper
d	Margalef’s index of richness
D_{50}	Median
DGPS	Differential geographical positioning system
DDV	Drop-down video
DVD	Digital versatile disc
EC	European Community
EOL	End of the Line
EPGS	European Petroleum Survey Group
ERL	Effects range low
ERM	Effects range median
ETRS89	European Terrestrial Reference System 1989
EUNIS	European Nature Information System
FGBML	Fugro Great Britain Marine Limited
FOCI	Feature of Conservation Importance
GC-MS	Gas chromatography - mass spectrometry
gmS	Gravelly muddy sand
gS	Gravelly sand
(g)S	Slightly gravelly sand
$H'Log_2$	Shannon-Wiener index of diversity
HDD	Hard disc drive
Hg	Mercury
HOCI	Habitat of Conservation Importance
HPI	Habitat of Principal Importance
ICP-OES	Inductively coupled plasma optical emission spectroscopy
IDA	Industrial denatured alcohol
ISO	International Standards Organisation
ISQG	Interim Sediment Quality Guidelines
IUCN	International Union for the Conservation of Nature
J’	Pielou’s index of evenness
JNCC	Joint Nature Conservation Committee
λ	Simpson’s index of dominance
LAT	Lowest Astronomical Tide
Li	Lithium
LOI	Loss on ignition
MAG	Magnetometer
MAREA	Marine Aggregates Regional Environmental Assessment
MBES	Multibeam echo sounder
MCZ	Marine Conservation Zone
MDS	Multi-dimensional scaling
MESH	Mapping European Seabed Habitats
Mn	Manganese
MPA	Marine Protected Area
MRV	Minimum reporting value
N	Number of Individuals
Ni	Nickel
NIST	National Institute of Standards and Technology

NMBAQC	National Marine Biological Association Quality Control
NOAA	National Oceanic and Atmospheric Administration
OSPAR	Oslo - Paris
OWF	Offshore Wind Farm
P	Present
PAH	Polycyclic aromatic hydrocarbons
Pb	Lead
PCB	Polychlorinated biphenyls
PEL	Probable effects levels
PEP	Project Execution Plan
PRIMER	Plymouth Routines in Multivariate Ecological Research
PSA	Particle size analysis
QC	Quality Control
RSD	Relative standard deviation
S	Number of taxa
SAC	Special Area of Conservation
SACFOR	Superabundant, Abundant, Common, Frequent, Occasional, Rare
SBP	sub-bottom profiler
SCI	Site of Community Importance
SCPT	Seismic cone penetration test
SOL	Start of the Line
SSS	Side scan sonar
SD	Standard deviation
SIMPER	Similarity Percentage Analysis
SIMPROF	Similarity profiling
ST	Station
TBT	Tributyltin
THC	Total hydrocarbons
TEL	Threshold effects levels
TM	Test Method
TOM	Total organic matter
TR	Transect
UHRS	Ultra-high Resolution Seismic Survey
UK	United Kingdom
UKAS	United Kingdom Accreditation Service
UKOOA	UK Offshore Operators Association
US EPA	United States Environmental Protection Agency
UTC	Coordinated Universal Time
UTM	Universal Transverse Mercator
V	Vanadium
VC	Vibrocoring
WGS84	World Geodetic System 1984
Zn	Zinc

1. INTRODUCTION

1.1 Purpose of Report

Vattenfall Wind Power Ltd, henceforth referred to as “Client”, is planning the development of the Norfolk Boreas Offshore Wind Farm (OWF). The Norfolk Boreas OWF is located in the United Kingdom Continental Shelf (UK CS) of the North Sea, approximately 75 km north-east of Great Yarmouth. The site covers an area of approximately 725 km^2 in water depths of between 21 m and 41 m reduced to Lowest Astronomical Tide (LAT).

As part of the development, the Client requested Fugro to undertake project-specific geophysical, geotechnical and environmental site investigations within the Norfolk Boreas OWF area. The investigations were required to inform site selection process and to enable preliminary foundation design. The specific objectives were:

- Provide detailed bathymetry data and information on seafloor sediments and seafloor conditions;
- Identify seafloor objects/obstructions and potential man-made hazards;
- Identify geological hazards and other geological complexities;
- Provide subsurface data to inform creation and/or refinement of a suitably detailed ground model to support turbine site selection and preliminary foundation design.

The geophysical investigation included: multibeam echo sounder (MBES), sidescan sonar (SSS), magnetometer (MAG), sub-bottom profiler (SBP) and ultra-high resolution multichannel seismic surveys (UHRS).

The geotechnical investigation included: seabed cone penetration tests (CPTs), seismic cone penetration tests (SCPTs) and vibrocoring (VC).

The environmental investigation included: seabed video footage by means of drop-down video (DDV) and sediment sampling by means of grabs.

This report presents the results of the environmental investigations within Norfolk Boreas OWF area, which were undertaken onboard the MV Victor Henson between 11 and 16 August 2017.

1.2 Scope of Report

Information presented in this report comprises:

- Regional information in relation to benthic environment and marine nature conservation;
- Methodologies in relation to survey operations, and laboratory and data analyses;
- Results of the seabed video footage survey and sediment grab sampling.

1.3 Project Responsibilities and Use of Report

This document presents information according to a project specification determined and monitored by the Client.

Fugro understands that this report will be used for the purpose described in this Main Text section. That purpose was a significant factor in determining the scope and level of the services. Results must not be used if the purpose for which the report was prepared or the Client's proposed development or activity changes. Results may possibly suit alternative use. Suitability must be verified.

Report distribution is restricted to project participants approved by Client. This mobilisation document includes confidential Fugro business information. We would appreciate you restricting distribution to only project participants with direct interest in operational information.

Environmental Site Investigation work package report Limitations of Use Statement are presented in Appendix A.

1.4 Regional Context

Information on the marine environment of the survey area and the surrounding region, was taken from the Benthic Review and Survey Plan Report (EMU Ltd., 2010), which provides a review of benthic environmental data in the Anglian region. The Anglian Offshore Dredging Association Marine Aggregates Regional Environmental Assessment (AODA MAREA) Scoping Report (EMU Ltd., 2008) and the Anglian MAREA Volume 1 (EMU Ltd., 2012) present a regional overview of environmental data.

1.4.1 Physical Environment

The southward narrowing of the North Sea and the change in coastline orientation, result in considerable variation of waves over the Anglian Offshore Region (AOR). On the north-west coastal region, winds directions from between 325º N and 70º N, can generate waves over fetch lengths greater than 200 km. On the south-west coastal region, such fetch lengths are generated by a much narrower range of wind directions, between 20º N and 60º N.

Tidal level variations along the coastline between Lowestoft and Great Yarmouth are small, with mean spring tides' range of 1.9 m. Tidal currents are strong, reaching over 3 knots.

Much of the regional coastline comprises glacial till cliffs, the erosion of which, since the end of the last Ice Age, has resulted in considerable sediment load. This sediment load, transported eastwards and southwards, has formed wide beaches along the coastline, and large sandbanks offshore. Sediments found in the Norfolk section of the AOR derive from the erosion and transport of rock material, whereas off the coast of Suffolk, shells form 30 % or more of the sediment.

1.4.2 Benthic Environment

Acoustic seabed imaging of several aggregate sites within the East Coast MAREA show the presence of mobile bedforms, sandwaves and megaripples which are indicative of physical disturbance, associated with tidal currents and/or wave action. This results in habitats that have low species richness and diversity and, for most part, consist of the more actively swimming amphipods, such as the mysid shrimp *Gastrosaccus spinifer* and robust polychaetes, such as *Ophelia borealis* and *Nephtys cirrosa*. These invertebrates have high reproductive rates and flexible body structures which allows them to burrow rapidly if disturbed. In the southern North Sea, this habitat and associated faunal community are temporally stable, with changes related to species abundances (Rees et al., 2007).

Patches of coarser heterogeneous sediment do, however, occur, and provide several microhabitats, which increase faunal richness. In addition, the presence of the Ross worm *Sabellaria spinulosa* contributes to the overall species diversity of the habitat, as the rigid tube which this polychaete builds from sand and shell fragments, provides structure and stability within the sediment, enabling the influx and establishment of other species. The seabed habitats known to occur within the study area, based on the Mapping European Seabed Habitats (MESH) programme, and classified in line with European Nature Information System (EUNIS) are illustrated in Figure 1.1.

Typical infaunal species associated with coarser sediment areas include: polychaetes, such as *Pholoe baltica*, *Lagis koreni*, *Spiophanes bombyx*, *Scalibregma inflatum*, and *Spirobranchus*; the brittlestar *Ophiura albida*, the bivalve *Kurtiella* (formerly *Mysella*) *bidentata*, the sea urchin *Echinocyamus pusillus*, bryozoans such as *Electra monostachys* and *Flustra foliacea*, and cnidarians such as *Sertularia argentea* and Actiniaria.

1.5 Nature Conservation

The Norfolk Boreas OWF lies in the easternmost boundary of Southern North Sea candidate Special Area of Conservation (cSAC) (Figure 1.2). There are 6 internationally designated sites between the coastline and the Norfolk Boreas OWF, 4 of which are within 100 km from the Norfolk Boreas OWF development and are summarised in Table 1.1.

Table 1.1: Nature Conservation Designations within 100 km of Norfolk Boreas OWF

Site and Status	Qualifying Features	Distance from Norfolk Boreas OWF
Southern North Sea cSAC	Annex II species: Harbour porpoise *Phocoena phocoena*.	Norfolk Boreas OWF within the easternmost boundary
North Norfolk Sandbanks and Saturn Reef MPA/SAC/cSCI	Annex I Habitats: ■ Sandbanks which are slightly covered by sea water all the time ■ Reefs	25 km west, north-west of the Norfolk Boreas OWF
Haisborough Hammond and Winterton MPA/SAC/SCI	Annex I Habitats: ■ Sandbanks which are slightly covered by sea water all the time ■ Reefs	35 km west, south-west of the Norfolk Boreas OWF
Outer Thames Estuary SPA	Annex II species: ■ Red throated diver *Gavia stellata*	40 km south-west of Norfolk Boreas OWF
Cromer Shoal Chalk Beds MPA	■ Moderate energy infralittoral rock ■ High energy infralittoral rock ■ Moderate energy circalittoral rock ■ High energy circalittoral rock ■ Subtidal chalk ■ Subtidal coarse sediment ■ Subtidal mixed sediments ■ Subtidal sand ■ Peat and clay exposures ■ North Norfolk Coast (subtidal geological)	80 km west of Norfolk Boreas OWF

Notes:
cSAC = candidate Special Area of Conservation
OWF = Offshore Windfarm
SAC = Special Area of Conservation
MPA = Marine Protected Area
cSCI = candidate Site of Community Importance
SPA = Special Protection Area

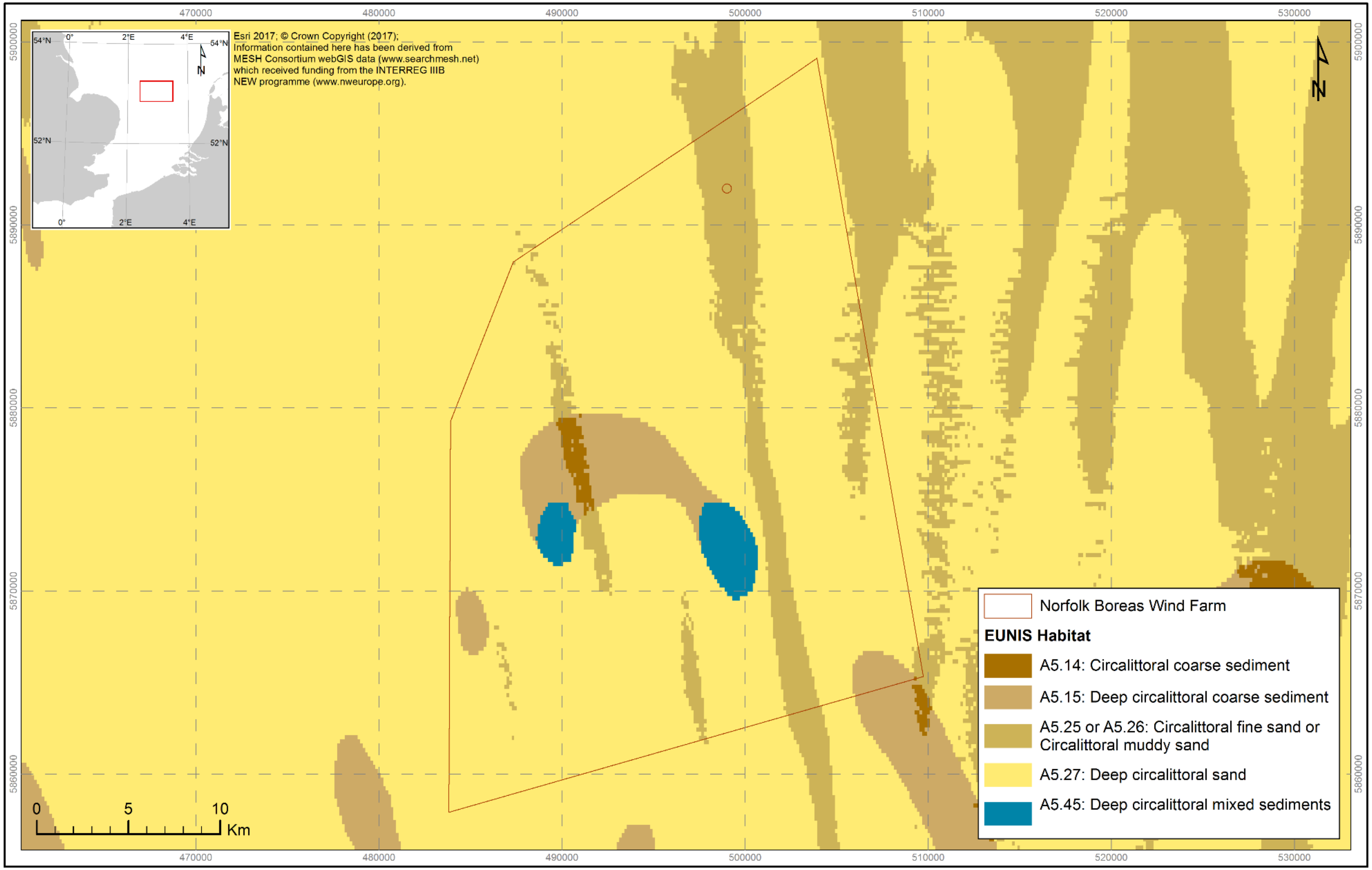

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Figure 1.1: Anticipated EUNIS seabed habitats within and around Norfolk Boreas OWF development

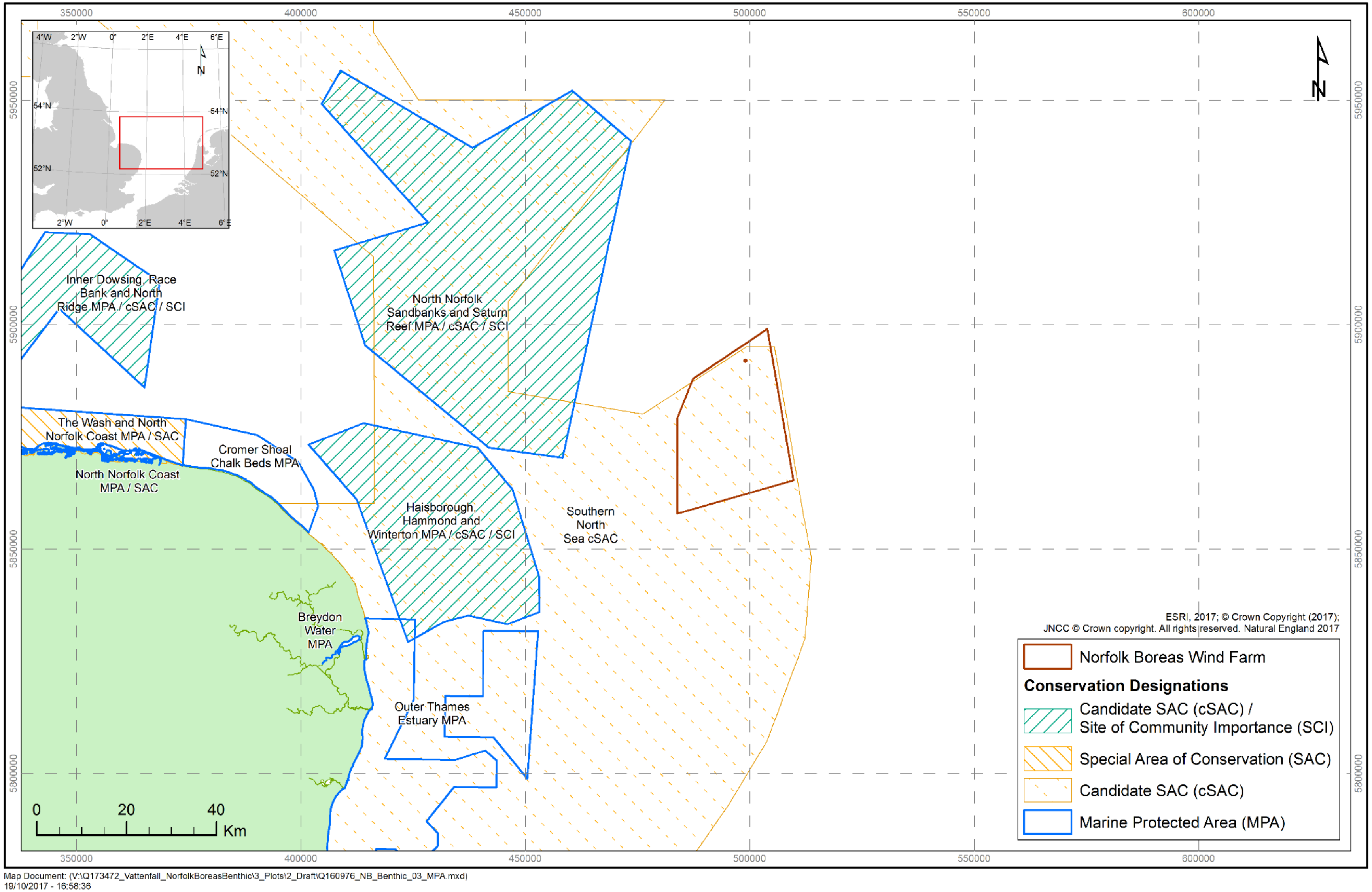

Figure 1.2: Norfolk Boreas OWF Survey area in relation to marine nature conservation designations

1.6 Habitats of Nature Conservation Interest

1.6.1 Ross Worm (*Sabellaria spinulosa*) Reefs

S. spinulosa reef habitats are important for providing suitable substrate for a range of organisms otherwise absent (UK BAP, 2008).

1.6.1.1 Sandbank Habitat

There seems little likelihood of Annex 1 sandbank features in the Norfolk Boreas OWF survey area based on the most recent JNCC data (Figure 1.3)

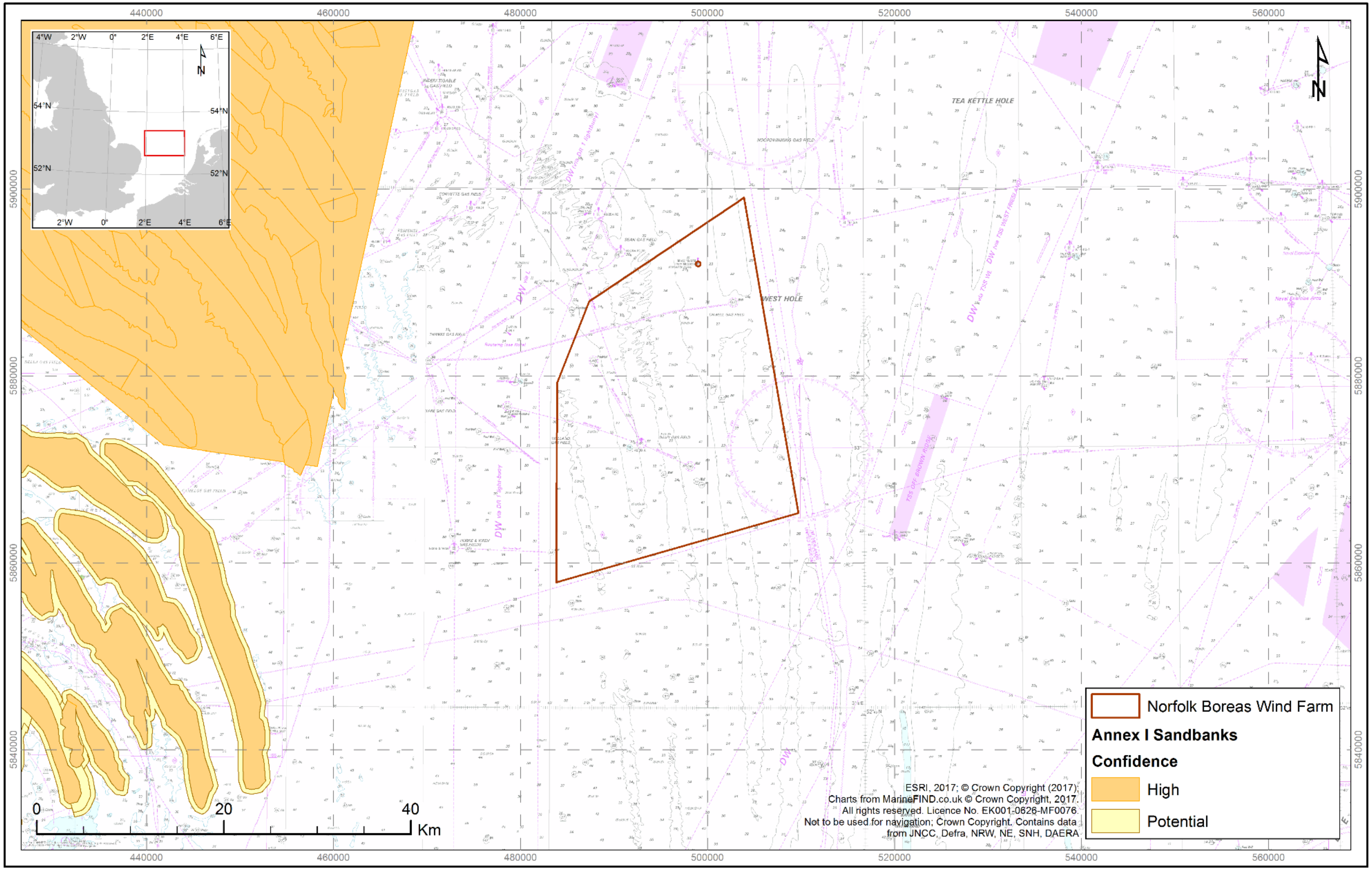

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Figure 1.3: Potential distribution of Annex I sandbanks offshore the Norfolk coast from recent JNCC GIS data

1.7 Geodetic Parameters

Geographical and projection coordinates were based on the European Terrestrial Reference System 1989 (ETRS89). Projection coordinates were in Universal Transverse Mercator (UTM) projection, Zone 31 North, Central Meridian (CM) 3º East.

Differential geographical positioning system (DGPS) coordinates were based on World Geodetic System 1984 (WGS84). The UK Offshore Operators Association (UKOOA) datum shift, rotation and scale parameters were used for the transformation from WGS84 to ETRS89. Details in Table 1.2 and Table 1.3.

Table 1.2: Project Geodetic and Project Parameters

Name ETRS89 UTM Zone 31N [FUGRO]		
EPSG Code	EPSG = 25831	
Global Navigation Satellite System (GNSS) Geodetic Parameters*		
Datum	World Geodetic System (WGS) 1984	EPSG: 6326
Ellipsoid	WGS 84	
Semi major axis	a = 6 378 137 000 m	
Inverse flattening	1/f = 298.257 223 563	
Local Geodetic Datum Parameters		
Datum	European Terrestrial Reference System (ETRS) 1989	EPGS: 6258
Ellipsoid	GR 1980	
Semi major axis	A = 6 378 137 000 m	
Inverse flattening	1/f = 298.257 222 101	
Datum Transformation Parameters from WGS 84 to ETRS89		
X-axis translation 0.05545 m	X-axis rotation −0.0023082″	Scale difference 0.00294455 ppm
Y-axis translation 0.05295 m	Y-axis rotation −0.0139630″	Coordinate Frame rotation
Z-axis translation −0.08834 m	Z-axis rotation 0.0225688″	FUGRO: 5156466566820057483
Local Projection Parameters		
Map Projection	Transverse Mercator	
Grid System	UTM zone 31N	EPGS: 16031
Latitude origin	00º 00′ 00.000″ North	
Central Meridian	003º 00′ 00.000″ East	
Scale Factor on Central Meridian	0.9996	
False Easting	500 000 m	
False Northing	0 m	
Notes: EPGS = European Petroleum Survey Group		

Table 1.3: Validation Calculation

WGS84	Test Point [Position]	Computed Point
Latitude	59º 42′ 18.00000″N	59º 42′ 00000″N
Longitude	003º00′18.00000″E	003º 00′ 00000″E
ETRS89		
Latitude	59º 42′ 17.98316″N	59º42′17.98316″N
Longitude	003º 00′ 17.97546″E	003º00′17.97546″E
UTM zone 31N		
Easting	500 280.984 m	500 280.984 m
Northing	6 618 557.942 m	6 618 557.942 m

2. ENVIRONMENTAL SURVEY METHODS

2.1 Survey Design

The environmental characterisation survey comprised seabed video footage by means of DDV, and sediment sampling by means of grabs. Sediment samples were subsequently analysed with respect to physico-chemical and biological characteristics.

The grab sampling stations were selected by Royal HaskoningDHV on behalf of the Client. The sampling stations were reviewed using the most up-to-date geophysical data, to ensure that all habitats present within the Norfolk Boreas OWF were sampled, and geophysical signatures, associated with habitats of potential conservation interest, were investigated.

A total of 35 sampling stations were proposed to provide coverage of the Norfolk Boreas OWF area, with the following strategy:

- 35 sediment samples, collected by means of a 0.1 m^2 Hamon grab, to be analysed for particle size analysis (PSA) and macrofaunal content;
- 35 sediment samples, collected by means of a 0.1 m^2 Day grab, to be analysed for chemistry.

Each proposed sampling location had a tolerance of 20 m radius.

For this study, single replicate samples per sampling station, provided the information necessary to characterise the seabed from an environmental and biological perspective.

Table 2.1 provides a summary of the sampling locations. The proposed survey array is presented in Figure 2.1.

Table 2.1: Proposed Environmental Locations: Grab Sampling

Geodetic Datum: ETRS89 UTM Zone 31N						
Station Number	**Sample Type**	**Point**	**Easting [m]**	**Northing [m]**	**Transect**	**Tolerance [m]**
ST01	Grab/Video	Point	493 813	5 862 906	DDV	20 m
ST02	Grab/Video	Point	484 554	5 867 866	DDV	20 m
ST03	Grab/Video	Point	488 813	5 867 906	DDV	20 m
ST04	Grab/Video	Point	493 813	5 867 906	DDV	20 m
ST05	Grab/Video	Point	499 993	5 870 010	DDV	20 m
ST06	Grab/Video	Point	503 813	5 867 906	DDV	20 m
ST07	Grab/Video	Point	508 813	5 867 906	DDV	20 m
ST08	Grab/Video	Point	484 554	5 872 893	DDV	20 m
ST09	Grab/Video	Point	488 813	5 872 906	DDV	20 m
ST10	Grab/Video	Point	493 813	5 872 906	DDV	20 m
ST11	Grab/Video	Point	498 709	5 872 858	DDV	20 m
ST12	Grab/Video	Point	503 813	5 872 906	DDV	20 m
ST13	Grab/Video	Point	484 580	5 877 932	DDV	20 m
ST14	Grab/Video	Point	488 813	5 877 906	DDV	20 m
ST15	Grab/Video	Point	493 813	5 877 906	DDV	20 m
ST16	Grab/Video	Point	498 813	5 877 906	DDV	20 m

Geodetic Datum: ETRS89 UTM Zone 31N						
Station Number	**Sample Type**	**Point**	**Easting [m]**	**Northing [m]**	**Transect**	**Tolerance [m]**
ST17	Grab/Video	Point	503 813	5 877 906	DDV	20 m
ST18	Grab/Video	Point	488 813	5 882 906	DDV	20 m
ST19	Grab/Video	Point	493 813	5 882 906	DDV	20 m
ST20	Grab/Video	Point	498 813	5 882 906	DDV	20 m
ST21	Grab/Video	Point	503 813	5 882 906	DDV	20 m
ST22	Grab/Video	Point	488 737	5 887 827	DDV	20 m
ST23	Grab/Video	Point	493 813	5 887 906	DDV	20 m
ST24	Grab/Video	Point	503 813	5 887 906	DDV	20 m
ST25	Grab/Video	Point	498 813	5 892 906	DDV	20 m
ST26	Grab/Video	Point	503 813	5 897 906	DDV	20 m
ST27	Grab/Video	Point	493 958	5 891 539	DDV	20 m
ST28	Grab/Video	Point	488 911	5 860 248	DDV	20 m
ST29	Grab/Video	Point	499 177	5 887 823	DDV	20 m
ST30	Grab/Video	Point	504 048	5 892 889	DDV	20 m
ST31	Grab/Video	Point	484 782	5 859 644	DDV	20 m
ST32	Grab/Video	Point	484 933	5 863 602	DDV	20 m
ST33	Grab/Video	Point	487 543	5 863 700	DDV	20 m
ST34	Grab/Video	Point	498 866	5 863 965	DDV	20 m
ST35	Grab/Video	Point	504 750	5 864 872	DDV	20 m

Notes:
DDV = Drop-down video
ETRS = European Terrestrial Reference System
ST = Station
UTM = Universal Transverse Mercator

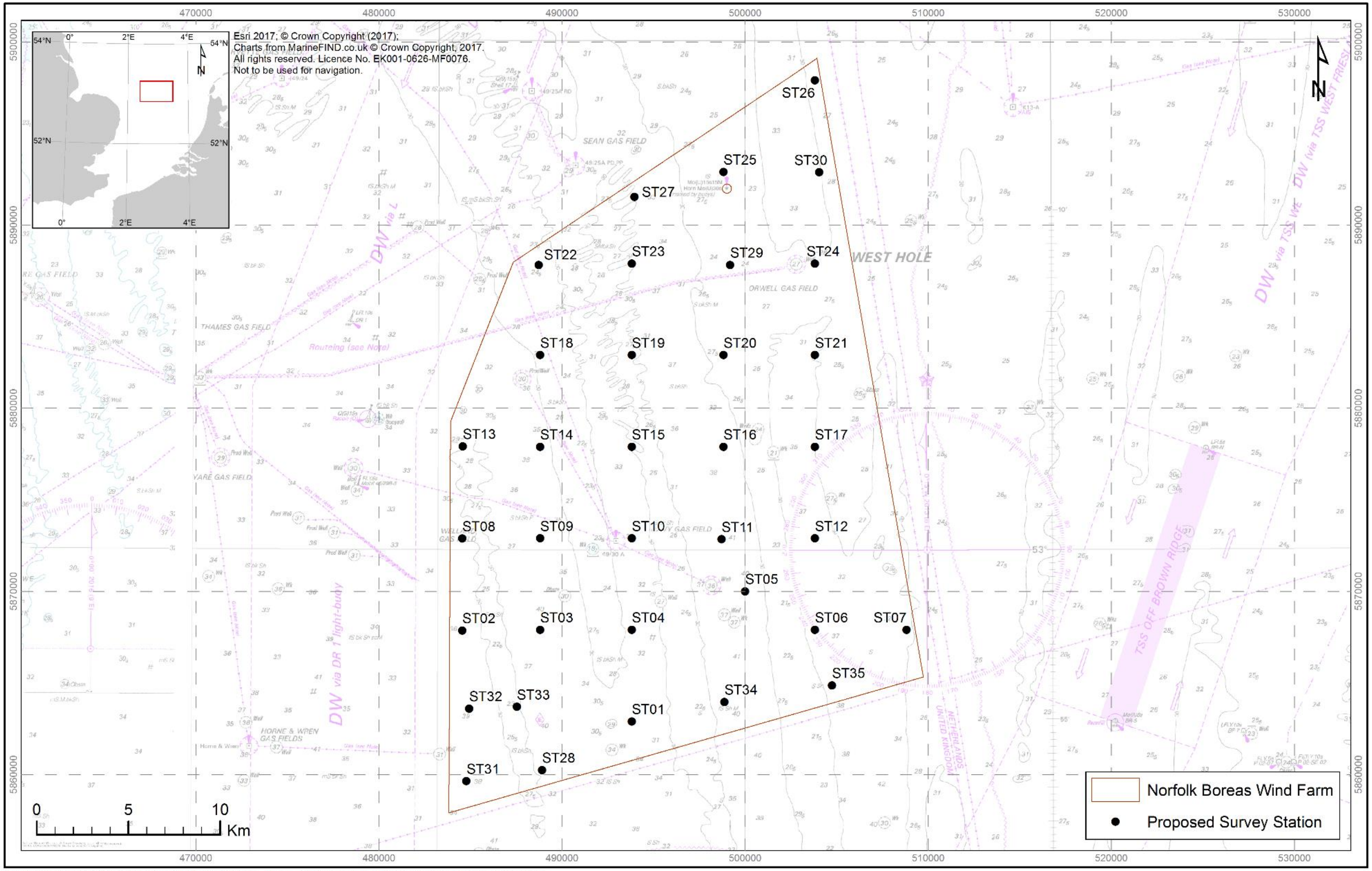

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Figure 2.1: Proposed environmental survey locations

2.2 Survey Methods

2.2.1 Seabed Video/Photography

All grab sampling stations were investigated using DDV prior to sampling.

Seabed video footage was acquired by means of a Kongsberg OE14-208 camera system mounted on a DDV frame. A low visibility system with a freshwater lens casing was present, to acquire video data in high levels of underwater turbidity. At the time of the survey, there was good underwater visibility and no need to use the low visibility system. The DDV frame was equipped with an adjustable weight system and was connected to the surface by a subsea telemetry cable system. The bespoke topside control unit, comprised a hard disc drive (HDD), and incorporated a digital versatile disc (DVD) recorder for use as the primary video recording system, with DGPS overlay. A mini-DV player was used for simultaneous backup.

A laser scaling device was fitted to the frame to enable the size of objects and features to be measured, with scale lasers set at 21 cm distance. The camera was towed approximately 0.5 m above the seabed at approximately 0.7 knots.

At each environmental station, a short (up to 200 m or 10 minutes) seabed video footage and still images were acquired, each image acquired approximately every 30 seconds. Where the seabed video footage provided a strong indication of Annex I *S. spinulosa* reef, the video transect/line was extended to identify the extent of the potential reef, if possible, with no additional transects lines. Positions for the video survey were logged throughout each deployment at each proposed station, and overlaid on the video footage to ensure accurate geo-referencing. Survey logs were completed during video operations, and are presented in Appendix B.1.1.

2.2.2 Sediment Grab Sampling

Seabed samples were acquired using a 0.1 m^2 mini Hamon grab, for physical and biological analysis and a 0.1 m^2 Day grab for chemistry analysis. Sample positioning was achieved using a DGPS with a nominal accuracy of 2 m. Navigation and position recording was achieved using Trimble's HYDROpro software version 2.30.844. The actual position of each sample was recorded each time the grab landed on the seabed, as indicated by the winch wire slackening. This was done by taking a manual fix within HYDROpro.

Upon retrieval, samples were checked for integrity (e.g. evidence of sediment washout, or disruption during retrieval, sediment taken at an angle, presence of hagfish) and adequate sample volume, those with a minimum of 5 litres considered to be acceptable. Samples with a lower volume than this were generally rejected and sampling re-attempted up to a maximum of 3 times. Where samples of less than 5 litres volume were continuously achieved, the maximum viable grab sample was retained. However, if evidence of potential *S. spinulosa* reef was observed in the grab sample, the sample would be accepted regardless of volume and no further sampling undertaken at the station. If the grab sample failed to acquire a sample, no further attempts were made at that station, other than one for contaminant grab sample, if possible. All samples were acquired within the 20 m radius tolerance of the proposed sampling station.

Once the sample was accepted, it was emptied into a deck tray. Supernatant water was poured over a 1 mm sieve, and the retained sample qualitatively assessed in terms of sediment type, and notes of conspicuous fauna, including presence of *S. spinulosa* tubes, documented in the survey log (Appendix B.3). All samples were photographed (Appendix B.4). Samples for macrofaunal analysis were transferred to a sediment sieving chute and sieved over a 1 mm sieve; once sieved, samples were transferred to plastic containers appropriately labelled and fixed in 10 % buffered formal saline solution (4 % formaldehyde). The sample containers were then sealed, hazard labelled and stored securely on deck. Samples for PSA were transferred into labelled plastic bags and stored into a freezer, prior analysis.

2.2.3 Contaminants Grab Sampling

Sub-samples for chemistry analysis were taken from the surface of the Day grab sample while still in the grab. Samples for hydrocarbon content analysis were collected using a metal scoop, whereas a plastic scoop was used to subsample for heavy metal content analysis, both to a nominal depth of 2 cm. The samples were then stored in glass jars (for hydrocarbons analysis) and polythene bags (for heavy metals analysis) at -20 ºC. Grab sampler was washed with acetone between sampling. Plastic scoops were pre-washed in saltwater, and metal scoops were cleaned using acetone, prior and between each subsampling.

3. SAMPLE ANALYSES

3.1 Sediment Particle Size Analysis (PSA)

Sediment samples were analysed for particle size distribution at Fugro Great Britain Marine Limited (FGBML) sediment laboratory using wet and dry sieving, and laser diffraction techniques, summarised in Table 3.1. Data were expressed at 0.5 phi intervals.

Table 3.1: Sediment Samples PSA

PSA Method	Description
Wet Split / Dry Sieving	Representative material > 1 mm is split from the bulk sub-sample and oven dried at 105 ± 5 °C to constant weight before sieving through a series of sieves with apertures corresponding to 0.5 phi intervals between 64000 mm and 1 mm, as described by the Wentworth scale. The weight of the sediment fraction retained on each mesh was measured and recorded.
Laser Diffraction	Representative material < 1 mm is removed from the bulk sub-sample for laser analysis. A minimum of 3 triplicate analyses (mixed samples) or 1 triplicate analyses (sands) are analysed using the laser sizer at 0.5 phi intervals between <1 mm and <0.4 µm. Laser diffraction is carried out using a Malvern Mastersizer 2000 with a Hydro 2000G dispersion unit.
Quality Control (QC)	In house quality control (QC): In house test method (TM)08_001 and TM08_002, based on the National Marine Biological Association Quality Control (NMBAQC) best practice guidance document – PSA for Supporting Biological Analysis, British Standards (BS) 1377: Parts 1: 2016 and 2: 1990; In house procedure TM08_006 based on BS International Standards Organisation (ISO) 13320: 2009. External QC: United Kingdom Accreditation Service (UKAS) for dry sieve analysis.

3.1.1 Sediment Chemistry

The total organic matter (TOM) analysis was carried out at FGBML's sediment laboratory. Chemical analyses to include determination of hydrocarbons, heavy metals, organotins and polychlorinated biphenyls (PCB), were sub contracted to a UKAS accredited chemistry laboratory. Summaries of the methodologies are detailed in Table 3.2 to Table 3.7.

Table 3.2: Sediment Chemistry Analysis – Total Organic Matter

Total Organic Matter	
Method Description	Loss on ignition (LOI) at 440 ºC for 4 hours
QC	In house procedure TM08_008 based on BS 1377: Parts 1: 2016 and 3: 1990

Table 3.3: Sediment Chemistry Analysis – Total Hydrocarbons (THC)

Determination of Hydrocarbons in marine sediment samples by fluorescence spectroscopy	
Method Description	LE I Total Hydrocarbons by fluorescence mg/kg (dry weight as Ekofisk)
QC	In house QC – Method description 402: UKAS Method accredited to ISO/IEC 17025

Table 3.4: Sediment Chemistry Analysis – Polycyclic Aromatic Hydrocarbons (PAHs)

Determination of Poly-nuclear Aromatic Hydrocarbons in Marine Sediment by GC-MS/MS	
Method Description	LE O OCP_PAH_PCB in Marine Biota and Sediment NMMP - solvent extracted, determined by GCMS QQQ. Dry weight µg/kg
QC	In house QC: Method description 1051 UKAS Method accredited to ISO/IEC 17025 except for analytes Benzo(j)fluoranthene, Chrysene + Triphenylene, Dibenzothiophene, Perylene and Triphenylene

Table 3.5: Sediment Chemistry Analysis – Trace Metals

Determination of Metals by ICP-MS in Marine Sediment.	
Method Description	LE M Metals ICP-MS Sediment - microwave aqua regia digested, determined by ICPMS, samples are sieved to <2000um mg/kg (Note. Mercury CSEMP - microwave aqua regia digest, acidic $SnCl_2$ reduced, determined by CV-AFS)
Analytes	Mercury (Hg), Copper (Cu), Cadmium (Cd), Lead (Pb), Chromium (Cr), Nickel (Ni), Manganese (Mn), Zinc (Zn), Arsenic (As), Lithium (Li) and Vanadium (V).
QC	In house QC: Method description 1042 for Hg; all other analytes Method description 1041 UKAS Method accredited to ISO/IEC 17025, except for Li

Table 3.6: Sediment Chemistry Analysis – Organotins

Method Summary for the Determination of Organotin Compounds by GCMS	
Method Description	LE O Organotins (GCMS) 01 - acetic acid/methanol extracted; derivatised; determined GCMS (SIM); from "as received" sample Dry Wt as Cation µg/kg
QC	In house QC: Method description 897 UKAS Method accredited to ISO/IEC 17025

Table 3.7: Sediment Chemistry Analysis – Poly-chlorinated Biphenyls (PCB)

Determination of Poly-chlorinated Biphenyls in Marine Sediment by GC-MS/MS	
Method Description	L E O OCP_PAH_PCB in Marine Biota and Sediment NMMP - solvent extracted, determined by GCMS QQQ. Dry Wt µg/kg
QC	In house QC: Method description 685 UKAS Method accredited to ISO/IEC 17025

3.2 Biological Analyses

Benthic macrofaunal analysis, including taxonomic identification and enumeration, and biomass, was undertaken at FGBML's benthic laboratory. Method description are summarised in Table 3.8.

Table 3.8: Benthic Macrofaunal Analysis

Macrofaunal Analysis	
Taxonomic identification and enumeration	Macrofaunal grab samples were sieved over a 1 mm mesh to remove all fine sediment and fixative. Fauna were sorted from the sieved sample under a dissecting microscope and subsequently identified to the lowest possible taxonomic level and enumerated. Colonial, encrusting epifaunal species were identified to species level, where possible, and allocated a P (present) value. Taxonomic nomenclature was in line with WoRMS Editorial Board (2017). Uncertainties in taxonomic identification are indicated by a question mark before the second epithet for a species (e.g. *Capitella capitata*) and before the generic name at genus level (e.g.? *Capitella*). All biological faunal material retained were stored in 70 % industrial denatured alcohol (IDA). A reference collection was prepared with a minimum of one individual of all species identified retained. FGBML undertook QC checks on a representative number of whole samples, and the entire reference collection in compliance with internal analytical QC criteria.
Biomass	Biomass analysis was undertaken on the infauna from grab samples, following identification and enumeration. The infauna from each sample were sorted into groups, including: Polychaeta, Arthropoda, Mollusca, Echinodermata, Phoronida Cnidaria (burrowing species only), Platyhelminthes, Nemertea, Echinodermata and Pisces, and biomass undertaken using the wet blot method.
QC	In house QC: In house procedures for benthic macro-invertebrate analyses in line with procedures recommended by the NMBAQC scheme (Worsfold et al., 2010) and British Standards Institution (BSI) 16665:2013. External QC: NMBAQC

4. DATA ANALYSES

Summary statistics (mean, standard deviation, median) were derived in Excel; the statistical package Plymouth Routines in Multivariate Ecological Research version 6 (Primer v6) was used for statistical analysis.

4.1 Sediment Particle Size Analysis (PSA)

Sediment particle size distribution statistics for each sample were calculated from the raw data using GRADISTAT V8 (Blott, 2010) and included:

- Phi scale: A logarithmic scale that allows grain size data to be expressed in units of equal value;
- Median (D_{50}): a measure of central tendency;
- Mode: peak of the frequency distribution;
- Sorting: a measure of the grain size range and magnitude of their spread around the mean;
- Skewness: a measure of the degree of symmetry;
- Kurtosis: a measure of the degree of sharpness in a grain size frequency distribution curve.

4.2 Correlations

Correlation analysis between environmental variables was undertaken using the Spearman's correlation coefficient, using Primer v6 to generate the matrix. This correlation analysis, based on ranks, allows characterising of the strength of relationships among a set of variables, without making assumption of linearity between variables (Hauke and Kossowski, 2011). Significance levels were taken from tabulated values for a two-tail test (Fowler et al., 2000).

4.3 Macrofauna Analysis

Primer v6 was used to analyse datasets using univariate and multivariate analyses, which included:

- Univariate analyses:
  - number of taxa (S): count of taxa (very dependent on the sample size);
  - abundance (N): count of individuals (very dependent on the sample size);
  - Margalef's index of richness (d): a measure of the number of species present for a given number of individuals (less dependent on sampling size than S and N);
  - Pielou's index of evenness (J): a measure of how evenly distributed the individuals are among the different species;
  - Shannon-Wiener index of diversity (H' $\log_2$): a measure of the number of species within a sample and the distribution of abundance across these species;
  - Simpson's index of dominance (λ): a measure of dominance whereby its largest value corresponds to assemblages, the total abundance of which is dominated by one or very few of the species present.

- Multivariate analysis:
  - Data Transformation: reduce skewness of data, for optimal performance of multivariate analysis;
  - Hierarchical clustering analysis: samples grouped based on the nearest neighbour sorting of a matrix of sample similarities using Bray Curtis similarity (for biological data sets) or Euclidean distance measures (for environmental datasets);

- Dendrogram and Multi-Dimensional Scaling (MDS) representations of Bray-Curtis and Euclidean Distance similarity/distance matrices: check adequacy and mutual consistency of both representations to ensure correct interpretation;
- Similarity Profile (SIMPROF) test: identifies statistically significant sample grouping from the cluster analysis;
- Similarity Percentage Analysis (SIMPER): gauge the distinctiveness of each of the multivariate groups of samples;
- Biological and Environmental (BIOENV) test: relationships between macrofauna and environmental variables.

Assessment of benthic faunal diversity, (Shannon-Wiener Index, H'$\log_2$) followed the threshold values outlined in Dauvin et al. (2012), whereby values of Shannon-Wiener Index > 4 indicate high diversity; values between 3 and 4 indicate good diversity; values between 3 and 2 indicate moderate diversity; values between 1 and 2 indicate poor diversity; and valued < 1, indicate bad diversity (Dauvin et al., 2012).

4.4 Macrofaunal Data Rationalisation

Prior to analysis being undertaken, the infaunal dataset was subjected to a degree of rationalisation, where some species and/or higher taxa of indeterminate identity, and therefore already possibly identified, were removed from the dataset or merged with higher taxa to avoid spurious enhancement of the species list. Juvenile species were removed, as they represent an ephemeral stage of the macrofaunal community and are, therefore, not representative of prevailing benthic conditions. Fish were excluded as they are vertebrates (results in Section 5.5).

4.4.1 Grab Macrofaunal Biomass Conversion to Ash Free Dry Weight (AFDW)

The macrofaunal biomass dataset was converted to ash free dry weight (AFDW) by applying the appropriate standard corrections which provide the equivalent dry weight biomass, as outlined in Eleftheriou and Basford (1989). The corrections applied are listed below:

- Annelida 15.5 %
- Arthropoda 22.5 %
- Mollusca 8.5 %
- Echinodermata 8.0 %
- Other Taxa 15.5 %

Other taxa included: Cnidaria, Platyhelminthes, Nemertea and Phoronida. Fish (Pisces) were excluded from the dataset (see also Section 4.4).

4.5 Seabed Video Footage and Photographic Stills Analysis

Video footage and still images collected at each station were analysed to assess the seabed habitat and epibenthic communities. The analysis was carried out by reviewing the video footage from each transect at each station, describing the sediment type and conspicuous species recorded along transect.

The digital still images were used to assist identification of species and improve habitat descriptions. The video footage provided a more complete and detailed description of the communities observed, including the less frequently occurring species which may be under represented from static image analysis alone.

The Wentworth Scale (Table 4.1) was used for qualitative assessment of substrate composition. An overlay grid was used for estimating percentage cover of encrusting and/or turf forming species. The grid was also used for calculating percentage cover of cobbles and boulders, where appropriate.

Species abundance was estimated using the industry standard SACFOR abundance scale (JNCC, 2015a) shown in Table 4.2.

Table 4.1: Wentworth Scale

Sediment Particle Size	Wentworth (1922) Sediment Classes
>256 mm	Boulder
>64 to 256 mm	Cobble
>2 to 64 mm	Gravel/Pebble
>62.5 µm to 2 mm	Sand
>4 to 62.5 µm	Silt
>1 to 4 µm	Clay

Table 4.2: Marine Nature Conservation Review (MNCR) SACFOR* Abundance Scale

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^2
40 – 79 %	A	S	A	S			1 - 9/0.001 m^2
20 – 39 %	C	A	C	A	S		1 - 9/0.01 m^2
10 – 19 %	F	C	F	C	A	S	1 - 9/0.1 m^2
5 – 9 %	O	F	O	F	C	A	1 - 9/1 m^2
1 – 5 % or density	R	O	R	O	F	C	1 - 9/10 m^2
< 1 % or density		R		R	O	F	1 - 9/100 m^2
					R	O	1 - 9/1000 m^2
						R	< 1/1000 m^2

Notes:
* S = Superabundant A = Abundant C = Common F = Frequent
O = Occasional R = Rare P = Present

4.6 Biotope Classification

Biotope classification followed that outlined by EUNIS (2012) and Joint Nature Conservation Committee (JNCC) (Connor et al., 2004). The latter has actively contributed to the development of the marine sections of the EUNIS classification (JNCC, 2015b), and was adhered to with respect to the biotopes description. Biotope classification was carried out following revision of data from the video footage, the sediment particle size analysis and the macrofauna identification and biomass. The geophysical data were used in combination with the results of the grab sampling and seabed video footage to classify the biotopes.

Results were integrated within a Geophysical Information System (GIS) and the habitat maps developed by combining the interpretation of each of the data sets (video, sediment particle size, macrofauna, geophysics). Throughout this process, the assumption was made such that where a habitat or biotope identified from ground-truthing occurred upon similar topographic regions (e.g. depth, slope, rugosity) and upon a similar substrate (as shown by the geophysical images), an area surrounding the ground truthing station with similar properties can be the same habitat or biotope.

Extrapolation of such interpretation to areas far from any ground truthing was based on the geophysical data output, with the assumption that lack of distinctiveness, acoustic signature and demarcation was indicative of the same habitat/biotope. The limitation of such an assumption, in a dynamic environment, such as that of the Norfolk Boreas OWF, is the continuous reworking of the seabed sediment and associated biological communities, which result in changing habitats/biotopes even in a short time (e.g. following a storm). Therefore, although areas distant from ground-truthed locations may show a similar geophysical signature, it cannot be certain that the same habitat/biotope as that of the ground truthed location is present, or a variation of a similar habitat/biotope.

4.7 Habitats and Species of Nature Conservation Interest

4.7.1 *Sabellaria spinulosa* Reef Assessment

Video footages and still images from each site were reviewed, noting the type of *S. spinulosa* aggregation present, following the categories outlined below:

- Absent;
- Moribund loose tubes;
- Crusts;
- Clumps (nodules of reef < 10 cm in diameter);
- Potential reef.

Assessment of potential reef structure followed the standard methodology for classification of reef structure and population density (Gubbay, 2007). The guidelines for the assessment of *S. spinulosa* reef, as outlined in Hendrick and Foster-Smith (2006) and Limpenny et al. (2010), were also followed. A summary of the assessment criteria is presented in Table 4.3. The simplest definition of *S. spinulosa* reef in the context of the Habitats Directive is currently considered to be an area of *S. spinulosa* which is elevated from the seabed and has a large spatial extent (two of the characteristics presented by Hendrick and Foster-Smith, 2006). Colonies may be patchy within an area defined as reef and show a range of elevations.

Table 4.3: Criteria for the assessment of *Sabellaria spinulosa* reefs (from Gubbay, 2007)

Measure of 'reefiness'	NOT a REEF	LOW	MEDIUM	HIGH
Elevation (cm) (average tube height)	< 2	2 - 5	5 – 10	> 10
Patchiness (% cover)	< 10	10 - 20	20 - 30	> 30

Measure of 'reefiness'	NOT a REEF	LOW	MEDIUM	HIGH
Consolidation♦	< 5	5*. Stones joined by tubes that overlap	Upright *S. spinulosa* including concretion of substrata	Intertwined matrix of upright *S. spinulosa* tubes
Density (maximum/m^2)	< 500	500 - 1700	1700 - 3500	> 3500

Notes:
* = *S. spinulosa* reef scale (Limpenny et al., 2010) where:
1. Discreet tubes only; none connected (<1 cm thick);
2. Some connection between tubes but not overlapping (accretions < 1 cm thick);
3. Some tubes on top of each other in three dimensions (accretions 1-2 cm thick);
4. Many tubes overlapping but no incorporation or joining of stones (accretions 1-2 cm thick);
5. Stones joined by tubes; most tubes overlapping or connected (accretions >2 cm thick) (thickness to be specified).

4.8 Marine Sediments Quality Standards

Standards and/or guidelines which are used to define marine sediment quality standards at national and international level were used to evaluate the results of chemistry analysis. Quality standards are interpretative tools used to determine if contaminants are present at concentrations which could potentially impair the designated uses of the marine environment.

Results of chemistry concentrations from seabed sediment samples were compared to Effects Range Low (ERL) and Effects Range Median (ERM). The ERL and ERM measures are expressed as specific chemical concentrations of a toxic substance in sediment, the ERL indicating the concentration below which toxic effects in marine organisms are rarely observed; the ERM indicating the concentration above which toxic effects are often or always observed in some marine organisms (OSPAR, 2009a). The numerical values of ERL and ERM are derived from biological toxicity assays and synoptic sampling, and are incorporated in sediment quality guidelines that were developed by Long and Morgan (1990) for the National Oceanic and Atmospheric Administration (NOAA) National Status and trends program as informal tools to evaluate whether a concentration of a contaminant in sediment might have toxicological effects. The ERL and ERM are not threshold values to determine whether toxicity will occur - they are relationships between bulk chemical concentrations and toxicity effects that are expressed along a continuum, meaning that there is no concentration above which toxicity will occur and below which toxicity will not occur (O'Connor, 2004). As such, these guidelines are used for screening sediments but are not regulatory criteria.

ERLs are used by the Clean Seas Environment Monitoring Programme (CSEMP) for most PAH and metals (CSEMP, 2012a and 2012b). CSEMP allows the UK to deliver its monitoring commitments as signatories to the Oslo and Paris Convention (OSPAR). Some ERLs, however, have not been used in OSPAR assessment, because their values are less than the OSPAR Background Assessment Concentration (BAC). This is the case of the metals: arsenic and nickel. BACs are normalised to 5% aluminium, while no normalisation is made when deriving ER values (OSPAR, 2009a).

Results of chemistry concentrations from seabed sediment samples were also compared to Canadian Sediment Guidelines for the Protection of Aquatic Life (CCME, 2017) and Centre for Environment, Fisheries and Aquaculture Science (Cefas) Guideline Action Levels (AL) for the Disposal of Dredged Material (PLA, 2017).

The Canadian marine sediment guidelines were developed by the Canadian Council of Ministers of the Environment (CCME) as broadly protective tools to support the functioning of healthy aquatic ecosystems. They are based on field research programmes that have demonstrated associations between chemicals and biological effects by establishing cause and affect relationships in some organisms. The guidelines consist of threshold effects levels (TELs) and probable effects levels (PELs). Together, they are used to identify 3 ranges of chemical concentrations for biological effects:

i. values below TEL indicate the minimal effect range within which adverse effects rarely occur;
ii. values between TEL and PEL indicate the possible effect range where adverse effects occasionally occur;
iii. values above the PEL indicate the probable effect range within which adverse effects frequently occur.

The TELs have been adopted as the Interim Sediment Quality Guidelines (ISQGs).

Cefas Guidelines are not statutory contaminant concentrations for dredged material, but are used as part of a weight of evidence approach for decision making on the disposal of dredged material at sea. The Cefas guidelines are used in conjunction with other assessment methods to make management decisions regarding the fate of dredged material. As such, they are not pass/fail criteria, but triggers for further assessment. In general, dredged material contaminant levels below AL 1 are of no concern; dredged material with contaminant levels above AL 2 is generally considered unsuitable for sea disposal. Dredged material with contaminant levels between AL 1 and AL 2 require further investigation prior to a decision being made.

Amongst the organotins, concentrations of tributyltin (TBT) in the sediments are used by OSPAR to assess adverse effects on biota. The potential effect on benthic fauna is therefore assessed against TBT concentrations reported by the chemistry analysis. As TBT is the most toxic organotin compound to marine fauna, this considers the worst-case scenario against which conservative judgment can be made. The assessment is based on a 6 class (A to F) assessment scheme for TBT-specific biological effects in dogwhelks and other gastropods. The classes are described by a coloured scale (Table 4.4) which indicates if the Ecological Quality Objectives (EcoQOs) are met, providing an indication of the effects that concentration levels of TBT tin may have on the reproductive capability of sensitive key species (OSPAR, 2009b).

Table 4.4: Assessment Classes for TBT (from OSPAR, 2009b).

Assessment class	TBT sediment (µg TBT / kg dw)
A	n.d.
B	< 2
C	2 - <50
D	50-<200
E	200 -500
F	>500

5. RESULTS

5.1 Field Operations

Table 5.1 presents a summary of the grab samples acquired and Table 5.2 presents details of the seabed video footage by DDV.

Grab sampling for sediment and macrofaunal analysis was successful at all proposed stations.

Samples for sediment chemistry analysis were successfully acquired at 34 of the 35 proposed stations. Four attempts were made to obtain a sample for sediment chemistry analysis at ST28 prior to abandoning the station. Failure to obtain a sample at station ST28 was due to the coarse nature of the sediment.

Macrofaunal and sediment contaminants analyses were undertaken on samples from 10 stations, which were selected for primary analyses based on field records (selected for high mud content following visual inspection of the sample in the grab sampler) and spatial coverage and included: ST03, ST05, ST10, ST14, ST16, ST22, ST23, ST30, ST31 and ST35.

Seabed video footage was acquired at all proposed stations (Table 5.2). Video footage was of good quality and allowed still frame capture of representative seabed types and, where possible, features of interest including potentially sensitive habitats and species. A potential Annex I *S. spinulosa* reef feature was identified at station ST05. Two additional seabed video footage transects were used to map the extent of the potential Annex I reef feature. Single successful grab attempts were made at ST05 using the Hamon grab and the Day grab, in accordance with Fugro standard methodology and the Project Execution Plan (PEP) (GE059 WPC PEP-2A OP_Rev02) (see Section 2.2.2).

Table 5.1: Grab Sampling Stations

Geodetic Datum: ETRS89 UTM 31N			
Station	**Easting [m]**	**Northing [m]**	**Depth [m]**
ST01	493 803	5 862 916	31.5
ST02	484 556	5 867 855	34.3
ST03	488 812	5 867 913	36.1
ST04	493 807	5 867 907	30.6
ST05	499 987	5 870 021	37.1
ST06	503 818	5 867 915	30.0
ST07	508 818	5 867 920	28.6
ST08	484 558	5 872 906	29.3
ST09	488 803	5 872 914	35.2
ST10	493 821	5 872 914	31.0
ST11	498 709	5 872 866	37.1
ST12	503 809	5 872 910	29.6
ST13	484 576	5 877 937	28.5
ST14	488 825	5 877 897	34.0
ST15	493 807	5 877 904	29.6
ST16	498 811	5 877 893	33.1
ST17	503 807	5 877 895	27.5
ST18	488 813	5 882 918	25.0

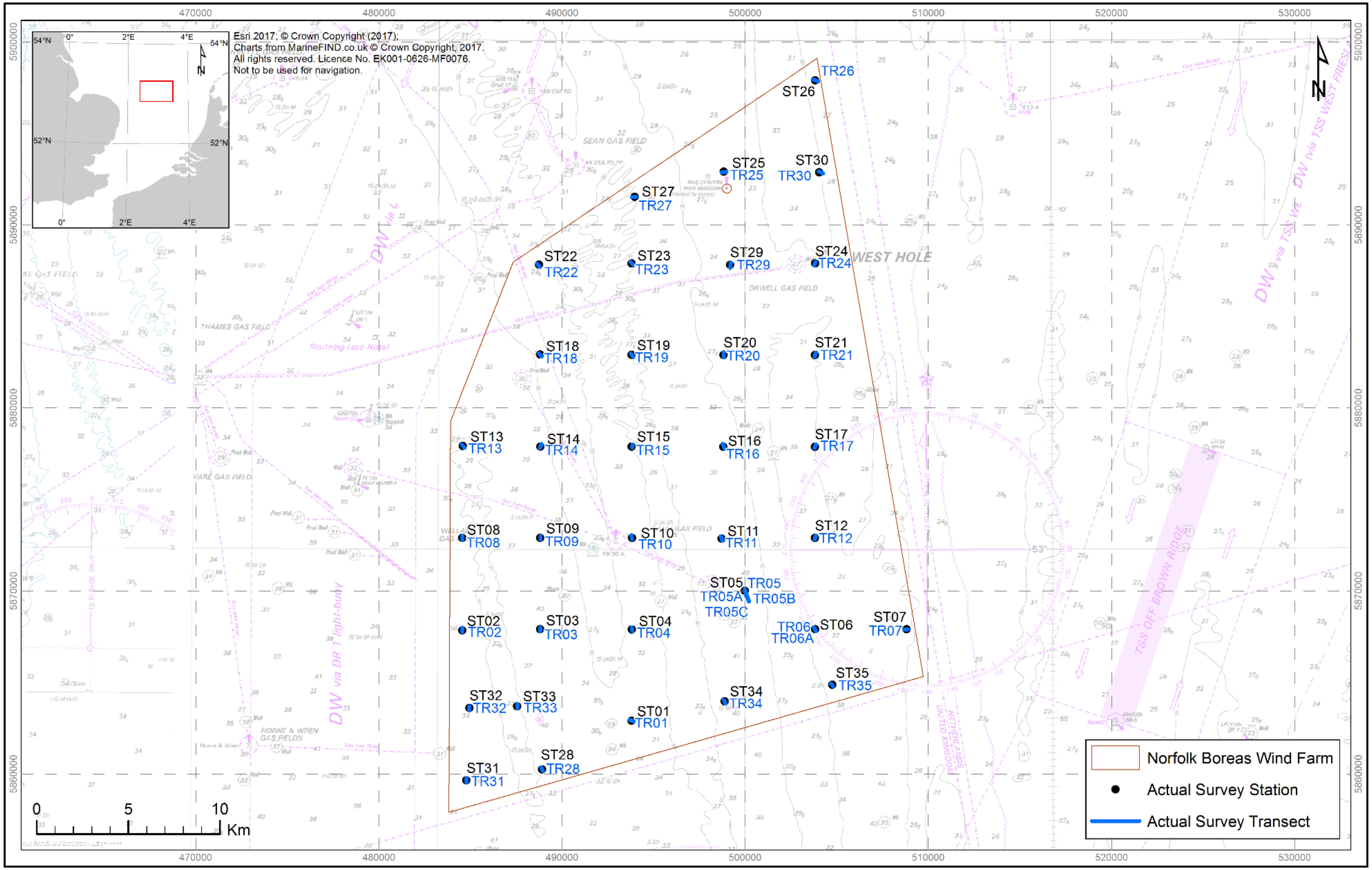
Geodetic Datum: ETRS89 UTM 31N			
Station	**Easting [m]**	**Northing [m]**	**Depth [m]**
ST19	493 804	5 882 911	29.0
ST20	498 812	5 882 899	25.5
ST21	503 816	5 882 901	28.5
ST22	488 737	5 887 833	26.5
ST23	493 800	5 887 905	29.6
ST24	503 819	5 887 904	29.1
ST25	498 826	5 892 919	21.1
ST26	503 820	5 897 913	26.3
ST27	493 965	5 891 538	28.6
ST28	488 911	5 860 256	32.2
ST29	499 186	5 887 828	24.2
ST30	504 046	5 892 882	27.7
ST31	484 782	5 859 655	36.1
ST32	484 937	5 863 618	36.5
ST33	487 548	5 863 701	25.3
ST34	498 880	5 863 975	38.2
ST35	504 763	5 864 883	32.7
Notes: ST = Station ETRS = European Terrestrial Reference System UTM = Universal Transverse Mercator			

Table 5.2: Seabed Video Footage

Geodetic Datum: ETRS 89UTM 31N						
Transect	**SOL**		**EOL**		**Length [m]**	**Number of Photographs**
	Easting [m]	**Northing [m]**	**Easting [m]**	**Northing [m]**		
TR01	493 686	5 862 970	493 903	5 862 856	245	11
TR02	484 552	5 867 998	484 555	5 867 768	230	6
TR03	488 810	5 867 994	488 812	5 867 802	192	14
TR04	493 834	5 867 806	493 806	5 868 009	205	11
TR05	500 026	5 869 950	499 969	5 870 116	176	15
TR05A	500 056	5 869 736	500 011	5 869 924	194	17
TR05B	500 164	5 869 515	500 112	5 869 691	184	15
TR05C	500 052	5 869 845	500 209	5 869 416	456	17
TR06	503 764	5 868 015	503 764	5 868 015	239	17
TR06A	503 844	5 867 871	503 785	5 867 934	86	15
TR07	508 891	5 867 904	508 683	5 867 901	209	14
TR08	484 559	5 873 029	484 554	5 872 795	234	6
TR09	488 821	5 873 003	488 816	5 872 810	193	17
TR10	493 819	5 872 827	493 784	5 873 053	229	26
TR11	498 665	5 872 983	498 755	5 872 739	260	20
TR12	503 857	5 873 024	503 787	5 872 808	227	18
TR13	484 666	5 877 831	484 510	5 878 007	235	20
TR14	488 878	5 878 029	488 776	5 877 809	242	15
TR15	493 821	5 877 830	493 819	5 878 022	192	17
TR16	498 770	5 878 049	498 868	5 877 770	296	18
TR17	503 866	5 878 011	503 781	5 877 808	221	18

Geodetic Datum: ETRS 89UTM 31N						
Transect	SOL		EOL		Length [m]	Number of Photographs
	Easting [m]	Northing [m]	Easting [m]	Northing [m]		
TR18	488 869	5 882 800	488 736	5 882 996	236	18
TR19	493 872	5 882 791	493 751	5 882 989	229	16
TR20	498 820	5 883 045	498 815	5 882 798	247	20
TR21	503 868	5 883 040	503 779	5 882 804	252	16
TR22	488 782	5 887 711	488 631	5 887 886	231	14
TR23	493 904	5 887 791	493 740	5 887 989	257	11
TR24*	503 844	5 887 997	503 790	5 887 865	143	15
TR24	503 887	5 888 123	503 779	5 887 802	338	16
TR25	498 973	5 892 912	498 699	5 892 883	275	13
TR26	504 530	5 897 456	503 716	5 897 949	950	16
TR27	494 040	5 891 538	493 819	5 891 521	222	14
TR28	488 865	5 860 357	488 947	5 860 148	224	18
TR29	499 204	5 887 950	499 182	5 887 658	293	14
TR30*	504 167	5 892 837	504 052	5 892 946	159	17
TR30	504 251	5 892 832	504 006	5 892 936	266	14
TR31	484 780	5 859 773	484 778	5 859 551	222	16
TR32	484 932	5 863 692	484 932	5 863 498	193	12
TR33	487 545	5 863 822	487 546	5 863 600	223	15
TR34	498 917	5 863 846	498 815	5 864 059	237	21
TR35	504 788	5 864 801	504 678	5 864 954	188	24

Notes:
EOL = End of the Line
ETRS = European Terrestrial Reference System
SOL = Start of the Line
TR = Transect
UTM = Universal Transverse Mercator
*Transect line terminated due to equipment maintenance



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12/12/2017 - 14:59:38

Figure 5.1: Completed environmental survey locations

5.2 Seabed Video Footage and Photographic Stills Analysis

Results of seabed video footage showed sandy sediment, with a small component of shell and gravel across the entire survey area. Most stations showed sand ripples. Representative images are presented in Figure 5.2 with full results presented in Appendix E.

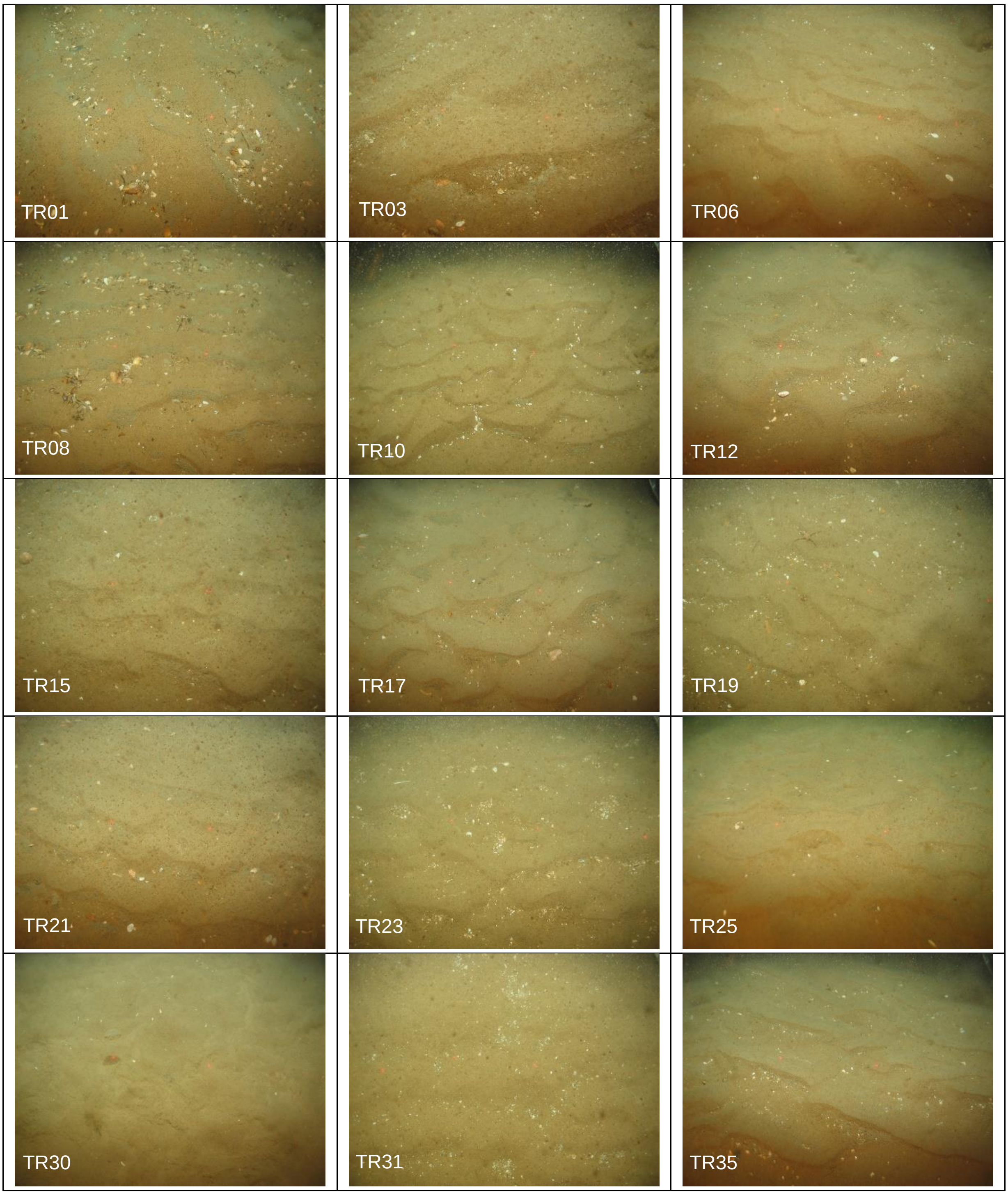


Figure 5.2: Representative images of seabed

A total of 38 taxa were identified, of which 2 Annelida, 7 Arthropoda, 7 Cnidaria, 5 Echinodermata, 2 Mollusca and 15 Fish. In addition, turfs of mixed Hydrozoa and/or Bryozoa were recorded. A summary of the epifauna recorded is presented in Table 5.3.

Echinoderms were the most frequently occurring taxa across the survey area, with the brittlestar *Ophiura ophiura*, being recorded in 65 % of transects, at abundances of between frequent (7.5 % of transects) and super abundant (10 % of transects). At the remaining transects *O. ophiura* was recorded as common (43 % of transects), and abundant (5 % of transects). Of the other echinoderms, *Ophiura albida* was recorded in 53 % of transects with abundances of between frequent (3 % of transects) and abundant (15 %), with the remaining transects (35 %) showing abundances of common. The star fish *Asterias rubens* was recorded as occasional at most transects (53 % of transects) and common (7 % of transects).

Arthropoda were also very frequently occurring, with hermit crabs of the Paguridae family being recorded in 60 % of transects as occasional. Crabs of the *Liocarcinus* genus, were recorded in 45 % of transects at abundances of between occasional (40 % of transects) and frequent (5 % of transects). Crabs, such as *Cancer pagurus*, *Corystes cassivelaunus*, *Necora puber* and *Atelecyclus rotundatus*, showed frequency of occurrence of between 3 % and 18 %, and abundance of occasional to frequent.

Fish were the most diverse taxon, albeit several of the individuals could only be identified at order and/or family level, therefore they may have included individuals already identified at species level (e.g. *Buglossidium luteum* and *Limanda limanda*, amongst the Pleuronectiformes; and *Merlangius merlangus* amongst the Gadidae). Species of the Pleuronectiformes order were the most frequently occurring, being recorded in 55 % of transects at abundances of between occasional (3 % of transects) and common (5 % of transects), with the remaining transects (47 %) showing abundances of frequent. Species of the Gadidae family were recorded in 18 % of transects as present (10 % of transects) and frequent (8 % of transects). The remaining fish included species of the Triglidae, Ammodytidae, Gobiidae and Rajidae families, which showed frequency of occurrence of between 3 % and 10 % of transects and abundance of up to frequent.

The other epibenthic taxa recorded, included Cnidaria, Mollusca and Annelida. Amongst the annelids, *Sabellaria spinulosa* was recorded in 13 % of transects, with abundances of up to superabundant at TR05 and up to frequent at TR14. The results of seabed video footage from these two stations were further assessed in terms of potential *S. spinulosa* reef (see Section 5.2.1).

Table 5.3: Epifauna from Seabed Video Footage

Phylum	No of Taxa	Taxa	Frequency [% of transects]	Abundance (SACFOR)
Echinodermata (starfish, sea urchins)	3	*Ophiura ophiura* *Asterias rubens* *Ophiura albida* Ophiuridae Asteroidea	65 60 53 48 3	F to S O to C F to A F to C O
Arthropoda (shrimps, crabs, lobsters)	7	Paguridae *Liocarcinus* sp. *Cancer pagurus* *Corystes cassivelaunus*	60 45 18 8	O O to F F O

Phylum	No of Taxa	Taxa	Frequency [% of transects]	Abundance (SACFOR)
		Necora puber *Pagurus bernhardus* ? *Atelecyclus rotundatus*	5 3 3	O to F O O
Pisces (Fish)	15	Pleuronectiformes *Buglossidium luteum* *Echiichthys vipera* Gadidae *Callionymus* sp. *Merlangius merlangus* Triglidae *Microstomus kitt* *Scyliorhinus canicula* ?*Limanda limanda* *Agonus cataphractus* Ammodytidae Gobiidae *Raja clavata* Rajidae	55 20 20 18 15 13 10 8 8 5 5 5 5 3 3	O to F P to F O to F P to F F to C P to F F F F F P to O F P to O F F
Mixed Turfs	1	Hydrozoa and/or Bryozoa	38	R
Cnidaria (sea anemones, soft corals)	7	*Hydractinia echinata* *Sagartia* sp. ? *Sagartiogeton laceratus* *Thuiaria thuja* Actiniaria *Urticina* sp. Sertulariidae	15 13 10 5 3 3 3	P O to C C R P O R
Annelida (worms)	2	*Sabellaria spinulosa* *Lanice conchilega*	13 5	O to S P
Mollusca (barnacles, scallops)	2	*Buccinum undatum* Pectinidae	3 3	O O

Notes:
S = Superabundant A = Abundant C = Common F = Frequent
O = Occasional R = Rare P = Present

5.2.1 *Sabellaria spinulosa* Reef Assessment

Of the 35 transects sampled, TR05 and TR14 were further assessed for potential *S. spinulosa* reef presence, following the assessment methodology outlined in Section 4.7.1. Results of the assessment are summarised in Table 5.4, with full assessment details in Appendix F. The extent of the potential *S. spinulosa* reef at TR05 was assessed by means of three additional transects, namely TR05A, TR05B and TR05C.

Results of TR05 showed a seabed sediment of gravelly sand and shells. The occurrence of *S. spinulosa* varied considerably across TR05. In the first section of the transect, *S. spinulosa* was recorded as low-lying aggregations of tubes and small clumps of consolidated tubes over extensive areas, with a patchiness of 33 %. *S. spinulosa* gradually reduced toward the end of the transect, where it occurred rarely, and as small, low-lying consolidated clumps of tubes, with a patchiness of < 1 %. *S. spinulosa* tubes elevated from < 2 cm to 5 cm throughout the transect, with an average height of between 2 cm and 5 cm. Georeferenced details of the occurrence of *S. spinulosa* along TR05 are presented in Table 5.5.

Epibiota comprised echinoderms, such as *O. ophiura*, *O. albida*, and *A. rubens*; crustaceans, such as species of *Liocarcinus* and Paguridae; sea anemones, such as *S. lacerates* and species of *Sagartia*; and the gastropod *B. undatum*. Fish included: *M. kitt*, *M. merlangus*, *S. canicula,* and species of *Callionymus*. The overall assessment of potential *S. spinulosa* reef at TR05 was LOW for the first portion of the transect, and NOT REEF for the end portion of the transect (Table 5.4 and Figure 5.3).

Seabed along TR05A comprised gravelly sand with shells. *S. spinulosa* was recorded as low-lying aggregations of tubes and small clumps of consolidated tubes over extensive areas, with a patchiness of 68 %. The tube elevation varied between < 2 cm and 5 cm, with an average height of between 2 cm and 5 cm. Epibiotic taxa, additional to those recorded along TR05, included *C. pagurus* and *B. luteum*. The overall assessment of potential *S. spinulosa* reef at TR05A was LOW (Table 5.4 and Figure 5.3).

Seabed along TR05B comprised gravelly sand with shells. *S. spinulosa* was recorded as extensive areas of low-lying aggregations, and small clumps of consolidated tubes, with a patchiness of 83 %. Elevation of tubes was < 2 cm through most of the transect, with some areas showing elevation of between 2 cm and 5 cm. Epibiotic taxa, additional to those of TR05 and TR05A, included *Thuiaria thuja* and *Agonus cataphractus*. The overall assessment of potential *S. spinulosa* reef at TR05B was NOT REEF (Table 5.4).

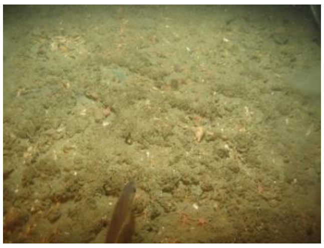
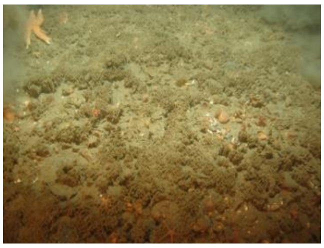
Seabed along TR05C comprised gravelly sand with shells, with areas of *S. spinulosa* tubes overlain with sand. One large cobble was observed. In the first section of TR05C, *S. spinulosa* was recorded as extensive areas of low-lying aggregations, and small clumps of consolidated tubes, with a patchiness of 63 %. Elevation of tubes was < 2 cm through most of the first section of the transect, with some areas showing elevation of between 2 cm and 5 cm. In the second section of the transect, *S. spinulosa* was recorded in small clumps of low-lying tubes, with a mean elevation of < 2 cm and a patchiness < 5 %. Georeferenced details of the occurrence of *S. spinulosa* along TR05C are presented in Table 5.5. The epibiotic range of taxa was the same as that of TR05, TR05A and TR054B. The overall assessment of potential *S. spinulosa* reef at TR05C was NOT REEF (Table 5.4).

Seabed along TR14 comprised gravelly sand with shells. *S. spinulosa* was recorded as small consolidated clumps of tubes, with patchiness of 14 %. Elevation of tubes was between < 2 cm, and > 5 cm, the latter rarely recorded. The mean tube height was between 2 cm and 5 cm. Epibiotic taxa included crustaceans (e.g. *N. puber*, *C. pagurus*, *Liocarcinus*), fish of the Gadidae family, *A. rubens* and cnidarians (e.g. *Urticina* and *Sagartia*). The overall assessment of potential *S. spinulosa* reef at TR14 was LOW (Table 5.4).

The occurrence of potential *S. spinulosa* reef in the survey area is illustrated in Figure 5.3.

Table 5.4: Potential *Sabellaria spinulosa* Reef Assessment

Transect	Assessment Criteria		Representative Image	
TR05 Section 1	Elevation	LOW		
	Patchiness	HIGH		
	Consolidation	LOW-MEDIUM		

Transect	Assessment Criteria		Representative Image	
	Assessment	LOW		
TR05 Section 2	Elevation	LOW		
	Patchiness	NOT REEF		
	Consolidation	LOW		
	Assessment	NOT REEF		
TR05A	Elevation	LOW		
	Patchiness	HIGH		
	Consolidation	LOW-MEDIUM		
	Assessment	LOW		
TR05B	Elevation	NOT REEF		
	Patchiness	HIGH		
	Consolidation	LOW-MEDIUM		
	Assessment	NOT REEF		
TR05C Section 1	Elevation:	NOT REEF		
	Patchiness:	HIGH		
	Consolidation	LOW-MEDIUM		
	Assessment	NOT REEF		
TR05C Section 2	Elevation:	NOT REEF		
	Patchiness:	NOT REEF		
	Consolidation	LOW		
	Assessment	NOT REEF		
TR14	Elevation	LOW		
	Patchiness	LOW		
	Consolidation	LOW-MEDIUM		

Transect	Assessment Criteria		Representative Image	
	Assessment	LOW		

Table 5.5: Details of Potential *S. spinulosa* Reefs along TR05 and TR05C

Geodetic Datum: ETRS 89UTM 31N							
Transect	Section	SOL		EOL		Length [m]	Overall Assessment
		Easting [m]	Northing [m]	Easting [m]	Northing [m]		
TR05	1	500 026	5 869 949	499 961	5 870 078	144	LOW
	2	499 961	5 870 078	499 968	5 870 116	39	NOT REEF
TR05C	1	500 051	5 869 844	500 195	5 869 457	413	NOT REEF
	2	500 195	5 869 457	500 208	5 869 416	43	NOT REEF

Notes:
TR = Transect
SOL = Start of the line
EOL = End of the line
ETRS = European Terrestrial Reference System
UTM = Universal Transverse Mercator

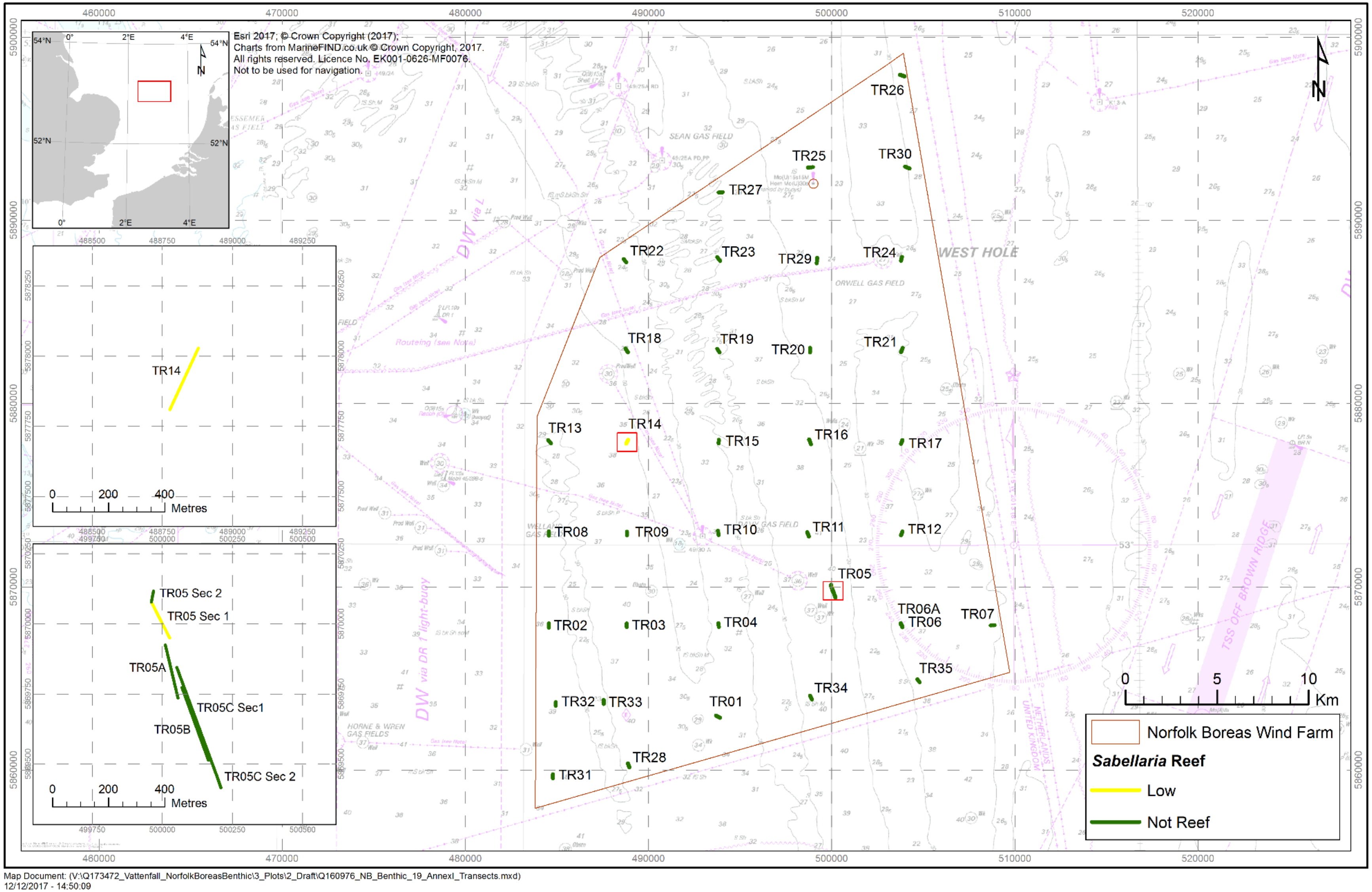


Figure 5.3: Potential *Sabellaria spinulosa* reef occurrence within Norfolk Boreas OWF

5.3 Sediment Particle Size Analysis (PSA)

Results of the PSA and organic content are summarised in Table 5.6 and Table 5.7, and graphically represented in Figure 5.5 in to Figure 5.7. Full results are presented in Appendix C.

Sediment across the survey area comprised predominantly sand, which ranged from 73.21 % (ST32) to 99.98 % (ST04), with a mean of 93.57 % across the survey area.

Gravel content was low, with an average of 2.44 % across the survey area, and a range of between 0.02 % (ST04) and 7.29 % (ST05).

Mud content was low, with an average of 3.99 % and a large variation across the survey area. There was no mud content at 19 stations and the sediment at 2 stations, namely ST11 and ST32, was represented by just over 20 % mud. The remaining stations showed a range of mud of between 0.58 % (ST27) and 17.19 % (ST26) (Table 5.7).

Four Folk (1954) sediment classes were identified; slightly gravelly sand (74 %), gravelly sand (11 %), gravelly muddy sand (9 %) and slightly gravelly muddy sand (6 %) (Figure 5.4).

Sediment was well sorted in samples from 12 stations (34 %); very poorly sorted in samples from 10 stations (29 %); moderately well sorted in samples from 7 stations (20 %); moderately sorted in samples from 4 stations (11 %), and very poorly sorted in samples from 2 stations (6 %) (Table 5.6).

Samples from most stations (57 %) showed symmetrical distribution of sediment particle size, with the remaining samples being very fine skewed (14 %), fine skewed (11 %), coarse skewed (3 %) and very coarse skewed (3 %) (Table 5.6).

Samples from all stations showed unimodal particle sediment distribution. Samples from most stations (83 %) showed a peak at 301.78 µm (medium sand); samples from 5 stations (14 %) peaked at 213.39 µm (fine sand) and sample from ST01 (3 %) peaked at 426.78 µm (medium sand) (Table 5.7).

Information from the field qualitative description of samples (Appendix B.3), showed that patches of anoxia were recorded in samples from 6 stations; ST12, ST22, ST24, ST29, ST31 and ST29. A clear defined anoxic layer of between 1 cm and 3 cm was recorded in sample from ST17. In addition, sample from ST31 showed patches of grey clay at the base. Gravel was observed in samples from 8 stations; ST02, ST08, ST09, ST13, ST14, ST18, ST31 and ST32. Shells were present in samples from all stations, but ST31 and ST32.

Organic content, in the form of total organic matter (TOM), was between 0.30 % (ST33) and 1.54 % (ST11), with an average of 0.71 % across the survey area, and showed a spatial pattern of distribution closely associated with sediment type (Figure 5.7).

Depth had little influence on the sediment distribution across the survey area, with a negative moderate correlation recorded with percentage of sand (rho = −505). TOM showed strong positive correlations with gravel (rho = 0.783) and mud (rho = 0.747; $p<0.01$ when rho = 0.424). At this regard, it is worth noting that the strong correlation between TOM and gravel, may be an artefact of methodology as PSA does not discern between gravel and shells.

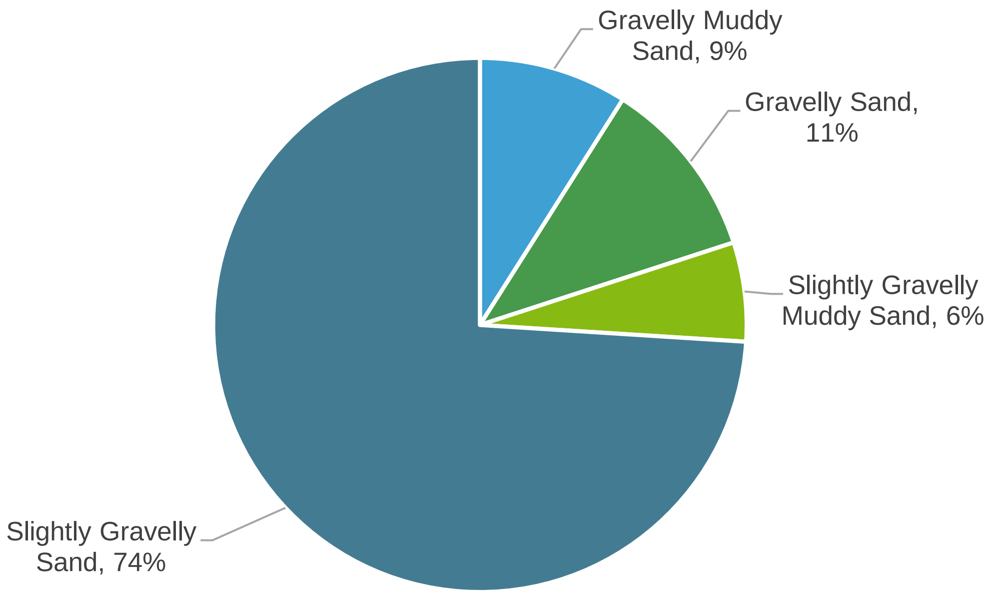
Table 5.6: Seabed Sediment Classification and Description

Station	Sediment Classification Folk (1954)	Sediment Type	Sorting	Skewness
ST01	Slightly Gravelly Sand	Medium Sand	Moderately Sorted	Coarse Skewed
ST02	Slightly Gravelly Sand	Medium Sand	Poorly Sorted	Fine Skewed
ST03	Gravelly Sand	Medium Sand	Poorly Sorted	Fine Skewed
ST04	Slightly Gravelly Sand	Medium Sand	Well Sorted	Symmetrical
ST05	Gravelly Muddy Sand	Fine Sand	Poorly Sorted	Fine Skewed
ST06	Slightly Gravelly Sand	Fine Sand	Well Sorted	Symmetrical
ST07	Slightly Gravelly Sand	Medium Sand	Moderately Well Sorted	Coarse Skewed
ST08	Gravelly Sand	Medium Sand	Moderately Sorted	Very Coarse Skewed
ST09	Slightly Gravelly Sand	Medium Sand	Poorly Sorted	Fine Skewed
ST10	Slightly Gravelly Sand	Medium Sand	Well Sorted	Symmetrical
ST11	Slightly Gravelly Muddy Sand	Fine Sand	Very Poorly Sorted	Very Fine Skewed
ST12	Slightly Gravelly Sand	Medium Sand	Moderately Well Sorted	Symmetrical
ST13	Slightly Gravelly Sand	Medium Sand	Moderately Well Sorted	Symmetrical
ST14	Gravelly Sand	Medium Sand	Poorly Sorted	Coarse Skewed
ST15	Slightly Gravelly Sand	Medium Sand	Well Sorted	Symmetrical
ST16	Gravelly Muddy Sand	Medium Sand	Poorly Sorted	Symmetrical
ST17	Slightly Gravelly Sand	Medium Sand	Moderately Well Sorted	Symmetrical
ST18	Gravelly Sand	Medium Sand	Moderately Sorted	Very Coarse Skewed
ST19	Slightly Gravelly Sand	Medium Sand	Poorly Sorted	Symmetrical
ST20	Slightly Gravelly Sand	Medium Sand	Moderately Well Sorted	Symmetrical
ST21	Slightly Gravelly Sand	Medium Sand	Moderately Well Sorted	Symmetrical
ST22	Slightly Gravelly Sand	Medium Sand	Well Sorted	Symmetrical
ST23	Slightly Gravelly Sand	Medium Sand	Poorly Sorted	Very Fine Skewed
ST24	Slightly Gravelly Sand	Medium Sand	Moderately Well Sorted	Symmetrical
ST25	Slightly Gravelly Sand	Medium Sand	Well Sorted	Symmetrical
ST26	Slightly Gravelly Muddy Sand	Fine Sand	Poorly Sorted	Very Fine Skewed
ST27	Slightly Gravelly Sand	Medium Sand	Well Sorted	Symmetrical
ST28	Slightly Gravelly Sand	Medium Sand	Well Sorted	Symmetrical
ST29	Slightly Gravelly Sand	Medium Sand	Well Sorted	Symmetrical
ST30	Slightly Gravelly Sand	Fine Sand	Well Sorted	Symmetrical
ST31	Slightly Gravelly Sand	Medium Sand	Moderately Sorted	Very Coarse Skewed
ST32	Gravelly Muddy Sand	Fine Sand	Very Poorly Sorted	Very Fine Skewed
ST33	Slightly Gravelly Sand	Medium Sand	Well Sorted	Symmetrical
ST34	Slightly Gravelly Sand	Medium Sand	Well Sorted	Symmetrical
ST35	Slightly Gravelly Sand	Fine Sand	Poorly Sorted	Very Fine Skewed

Table 5.7: Particle Size Analysis and Organic Content

Station	Depth [m]	Median [µm]	Mode [µm]	Fractional Composition			TOM [%]
				Gravel [%]	Sand [%]	Mud [%]	
ST01	31.5	389.76	426.78	4.04	95.96	0.00	0.90
ST02	34.3	306.56	301.78	3.69	90.02	6.29	0.97
ST03	36.1	277.44	301.78	5.67	85.63	8.70	1.40
ST04	30.6	300.33	301.78	0.02	99.98	0.00	0.52
ST05	37.1	249.87	301.78	7.29	79.24	13.47	1.29
ST06	30.0	246.21	213.39	1.62	98.38	0.00	0.52
ST07	28.6	318.14	301.78	3.51	96.49	0.00	0.60
ST08	29.3	320.95	301.78	5.85	94.15	0.00	1.14
ST09	35.2	290.32	301.78	2.67	89.41	7.91	1.17
ST10	31.0	282.12	301.78	0.84	99.16	0.00	0.53
ST11	37.1	218.75	213.39	3.03	76.13	20.84	1.54
ST12	29.6	277.79	301.78	0.53	99.47	0.00	0.46
ST13	28.5	319.68	301.78	0.73	99.27	0.00	0.55
ST14	34.0	303.80	301.78	6.07	88.65	5.28	0.91
ST15	29.6	275.39	301.78	0.91	99.09	0.00	0.53
ST16	33.1	278.88	301.78	6.03	83.81	10.16	0.91
ST17	27.5	266.51	301.78	2.33	96.77	0.90	0.41
ST18	25.0	358.05	301.78	5.69	94.31	0.00	0.59
ST19	29.0	271.23	301.78	4.95	88.22	6.83	0.62
ST20	25.5	322.68	301.78	1.91	98.09	0.00	0.53
ST21	28.5	309.54	301.78	0.10	99.90	0.00	0.40
ST22	26.5	279.80	301.78	0.03	99.97	0.00	0.43
ST23	29.6	260.30	301.78	0.30	90.70	9.00	0.81
ST24	29.1	331.01	301.78	0.44	99.56	0.00	0.40
ST25	21.1	276.81	301.78	0.05	99.95	0.00	0.32
ST26	26.3	211.10	213.39	3.84	78.98	17.19	1.19
ST27	28.6	291.00	301.78	0.08	99.34	0.58	0.44
ST28	32.2	311.66	301.78	0.26	99.74	0.00	0.36
ST29	24.2	293.61	301.78	0.19	99.81	0.00	0.33
ST30	27.7	238.18	213.39	0.22	97.46	2.32	0.56
ST31	36.1	295.70	301.78	4.88	93.53	1.59	0.62
ST32	36.5	272.14	301.78	6.56	73.21	20.23	1.31
ST33	25.3	307.29	301.78	0.22	99.78	0.00	0.30
ST34	38.2	265.90	301.78	0.43	99.57	0.00	0.46
ST35	32.7	235.23	213.39	0.54	91.11	8.36	0.71
Mean	30.4	287.25	292.72	2.44	93.57	3.99	0.71
SD	4.2	36.64	39.04	2.40	7.65	6.13	0.35
Min	21.1	211.10	213.39	0.02	73.21	0.00	0.30
Max	38.2	389.76	426.78	7.29	99.98	20.84	1.54
Median	29.6	282.12	301.78	1.62	96.77	0.00	0.56

Notes:
TOM = Total organic matter
SD = Standard deviation



Gravelly Sand (ST08)

Slightly Gravelly Sand (ST13)

Gravelly Muddy Sand (ST32)

Slightly Gravelly Muddy Sand (ST11)

Figure 5.4: Sediment classes (Folk, 1954) across survey area

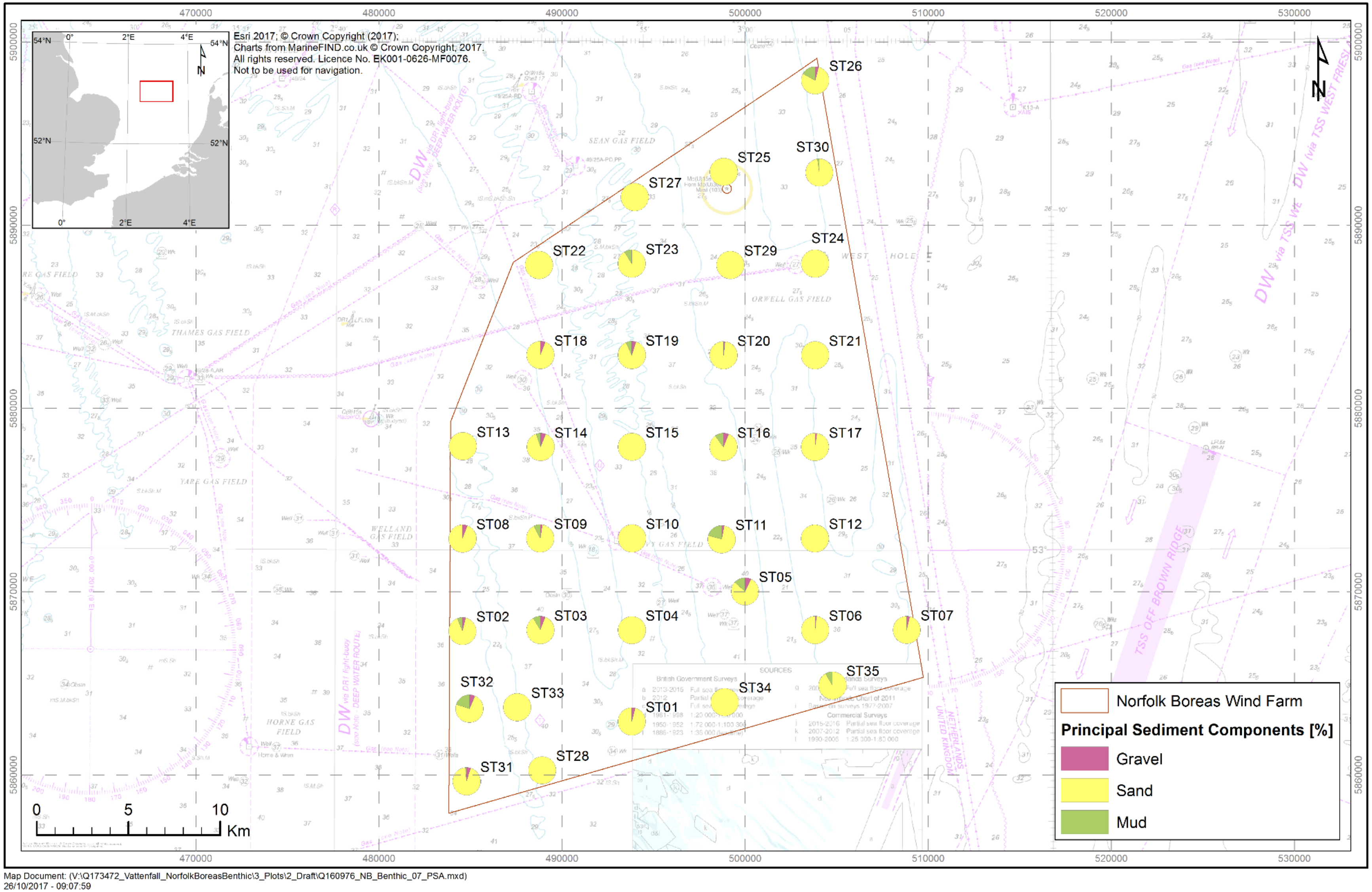


Figure 5.5: Spatial distribution of sediment particle size

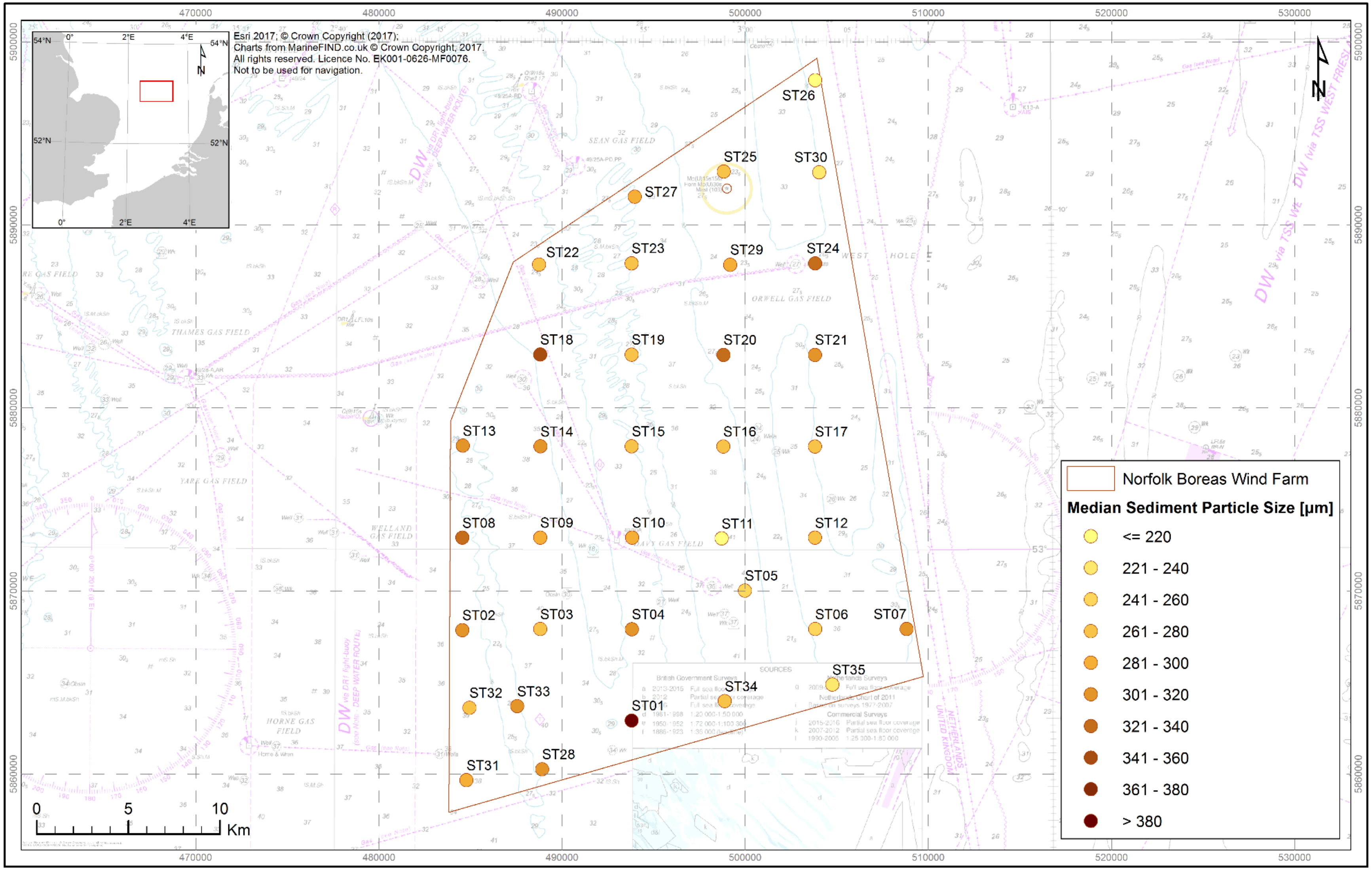


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Figure 5.6: Spatial distribution of median (D_{50}) sediment particle size

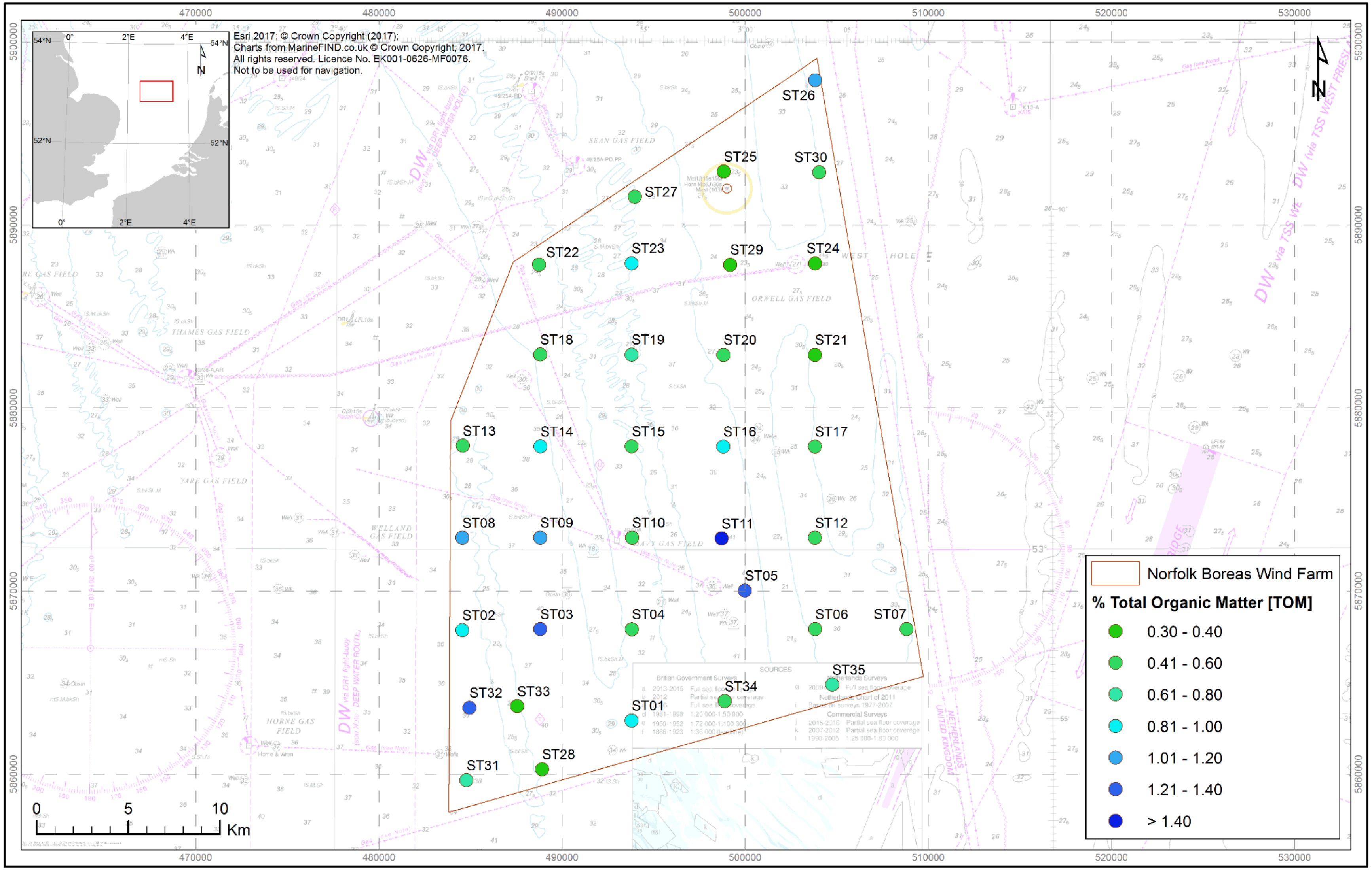

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Figure 5.7: Spatial distribution of total organic matter (TOM)

5.3.1 Multivariate Analysis

Multivariate analysis was undertaken on the sediment particle size dataset to identify spatial patterns of distribution across the survey area. Analysis included hierarchical agglomerative clustering employing the Euclidean distance resemblance matrix. Data were fourth root transformed prior to analysis.

5.3.1.1 Hierarchical agglomerative clustering analysis

Results of the hierarchical agglomerative clustering analysis identified 2 groups of samples (Figure 5.8 and Figure 5.9) the characteristics of which are summarised in Table 5.8. The distribution of the multivariate groups across the survey area is presented in Figure 5.12.

Group A comprised samples from 12 stations. It featured slightly gravelly muddy sand, poorly sorted, in mean water depth of 33 m, and mean median sediment particle of 265 µm (medium sand). Group B comprised samples from 23 stations. It featured slightly gravelly sand, in mean water depth of 29 m and mean median sediment particle of 299 µm (medium sand).

Both groups showed unimodal distribution peaking in the fine sand region (2 phi) (Figure 5.10) and differed for the presence of coarse silt (5.0 phi and 5.5 phi), fine and very fine silt (7.5 phi and 8.0 phi), and clay (9.0 phi and 9.5 phi), in group A (Figure 5.11).

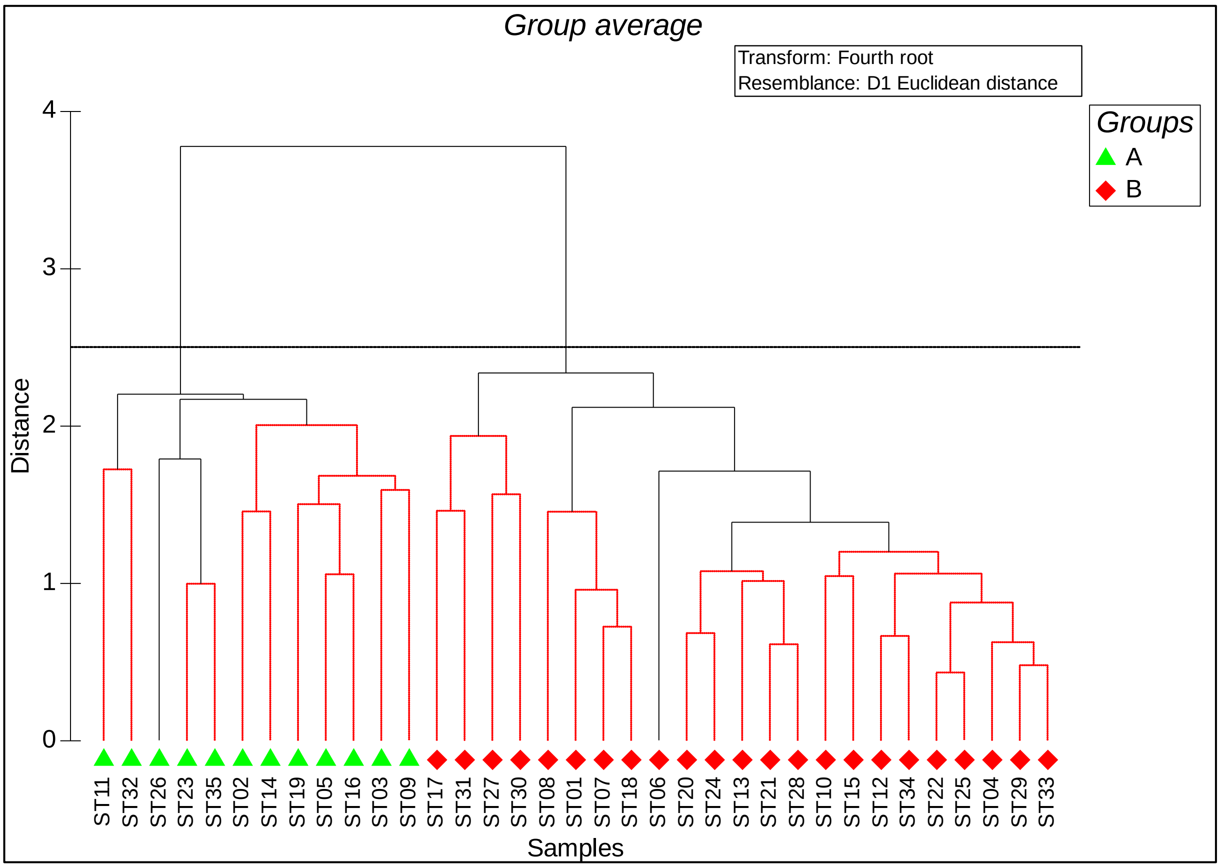


Figure 5.8: Dendrogram of Euclidean distance of sediment particle size

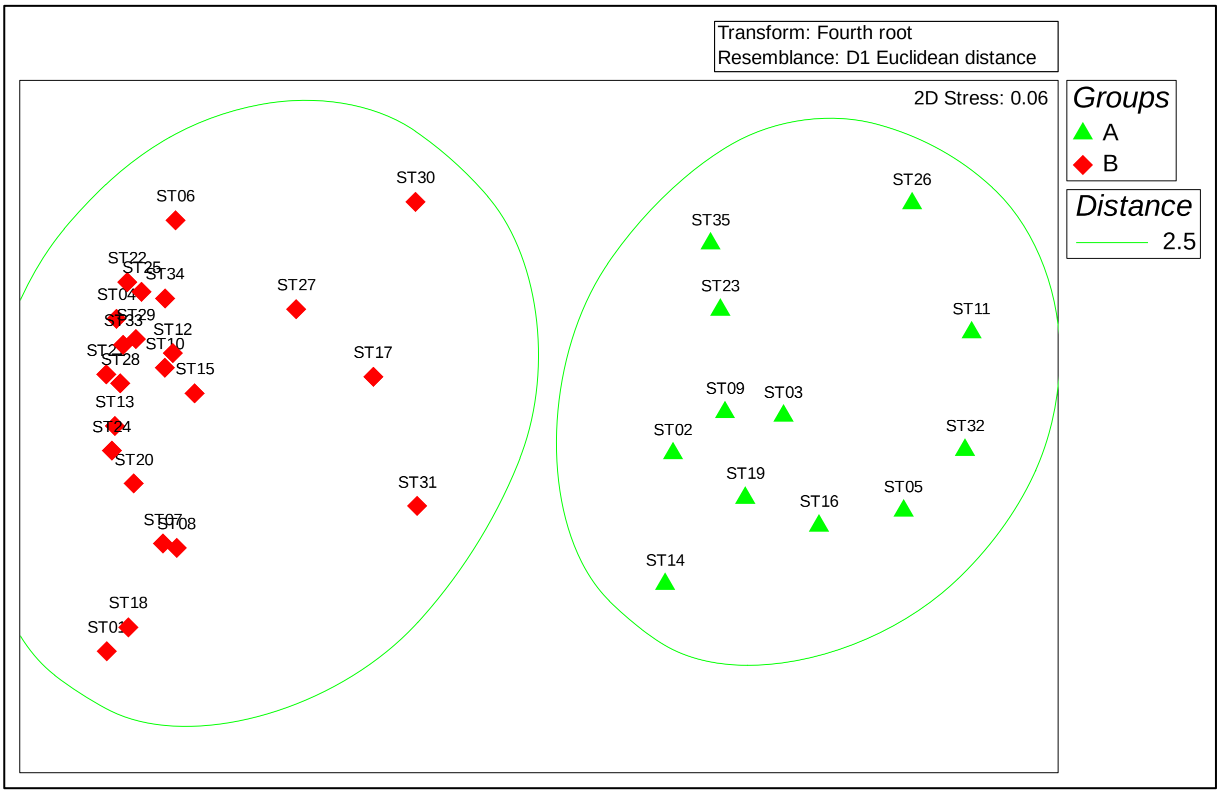
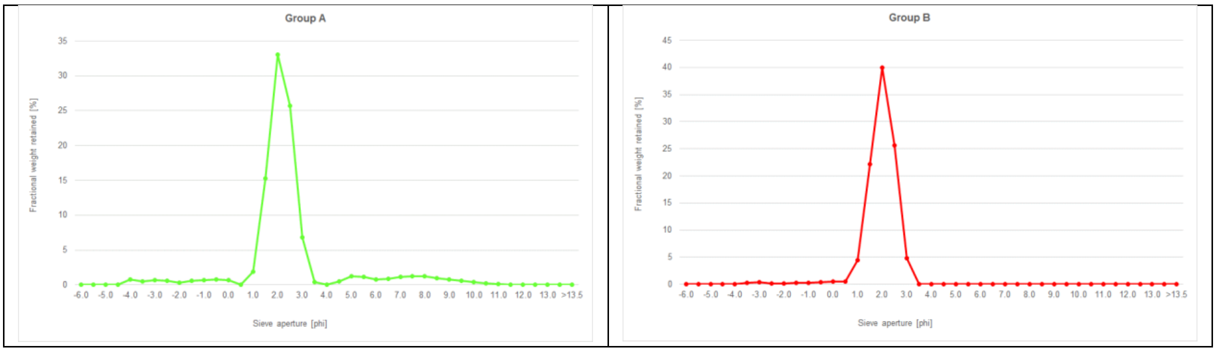


Figure 5.9: MDS of Euclidean distance of sediment particle size

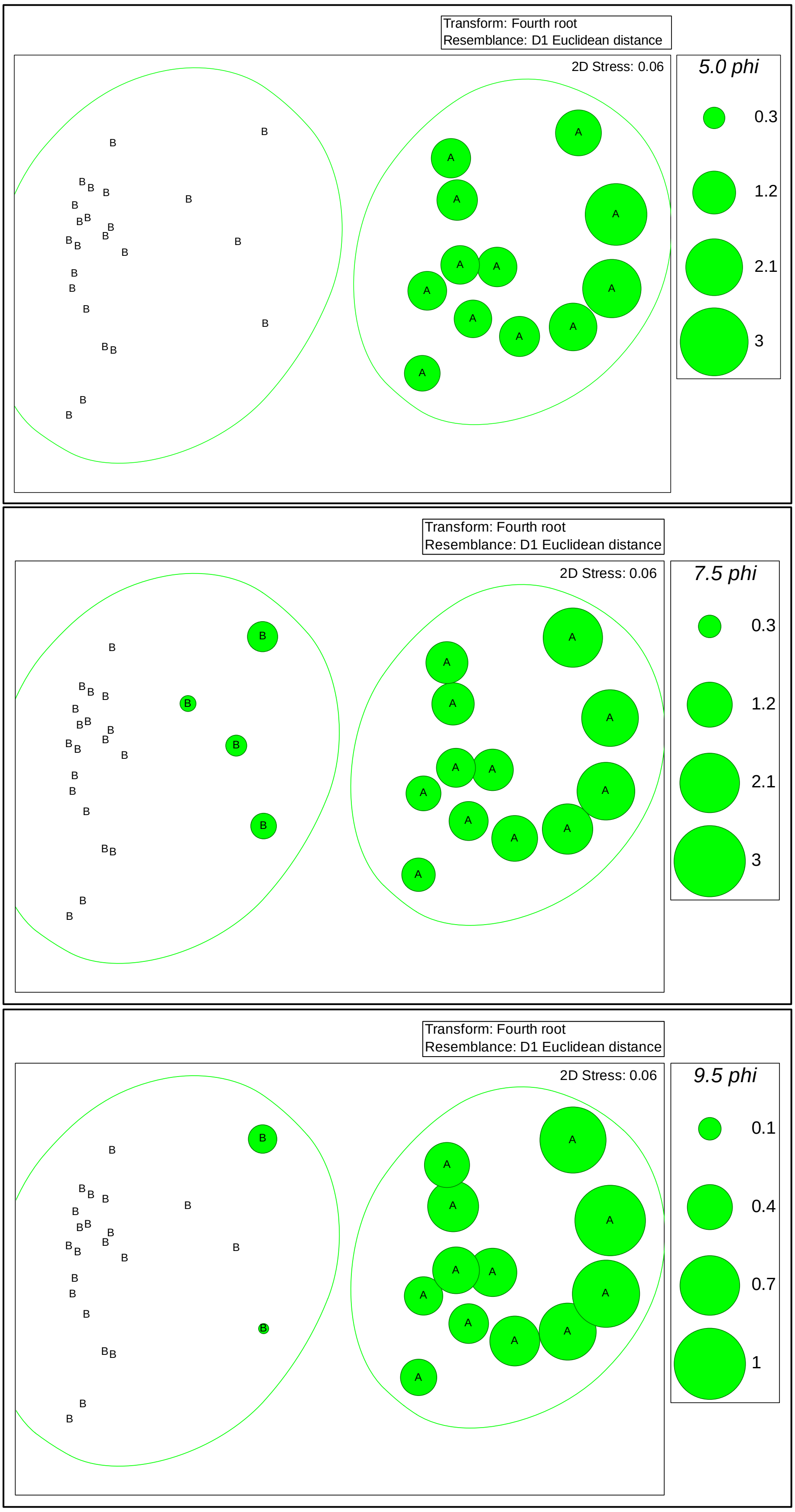
Table 5.8: Groups of Sediment Samples Identified by the Multivariate Analysis

Group	Station	Depth [m]	Median [µm]	Main Sediment Fraction [%]			Description
				Gravel	Sand	Mud	
A ▲	ST (02; 03; 05; 09; 11; 14; 16; 19; 23; 26; 32; 35).	33 ± 3	265 ± 31	4.2 ± 2.3	85 ± 6	11.2 ± 5.4	Slightly gravelly muddy sand, poorly sorted
B ◆	ST (01; 04; 06; 07; 08; 10; 12; 13; 15; 17; 18; 20; 21; 22; 24; 25; 27; 28; 29; 30; 31; 33; 35).	29 ± 4	299 ± 34	1.5 ± 1.9	98 ± 2	0.2 ± 0.2	Slightly gravelly sand, moderately well sorted



2.0 phi = 250 µm

Figure 5.10: Average particle size distribution within multivariate groups of samples



5.0 phi = 31 µm 7.5 phi = <8 µm 9.5 phi = <2 µm

Figure 5.11: MDS of Euclidean distance. Data with superimposed circles proportional in diameter to the percentage of: coarse silt (5.0 phi); very fine silt (7.5 phi) and clay (9.5 phi)

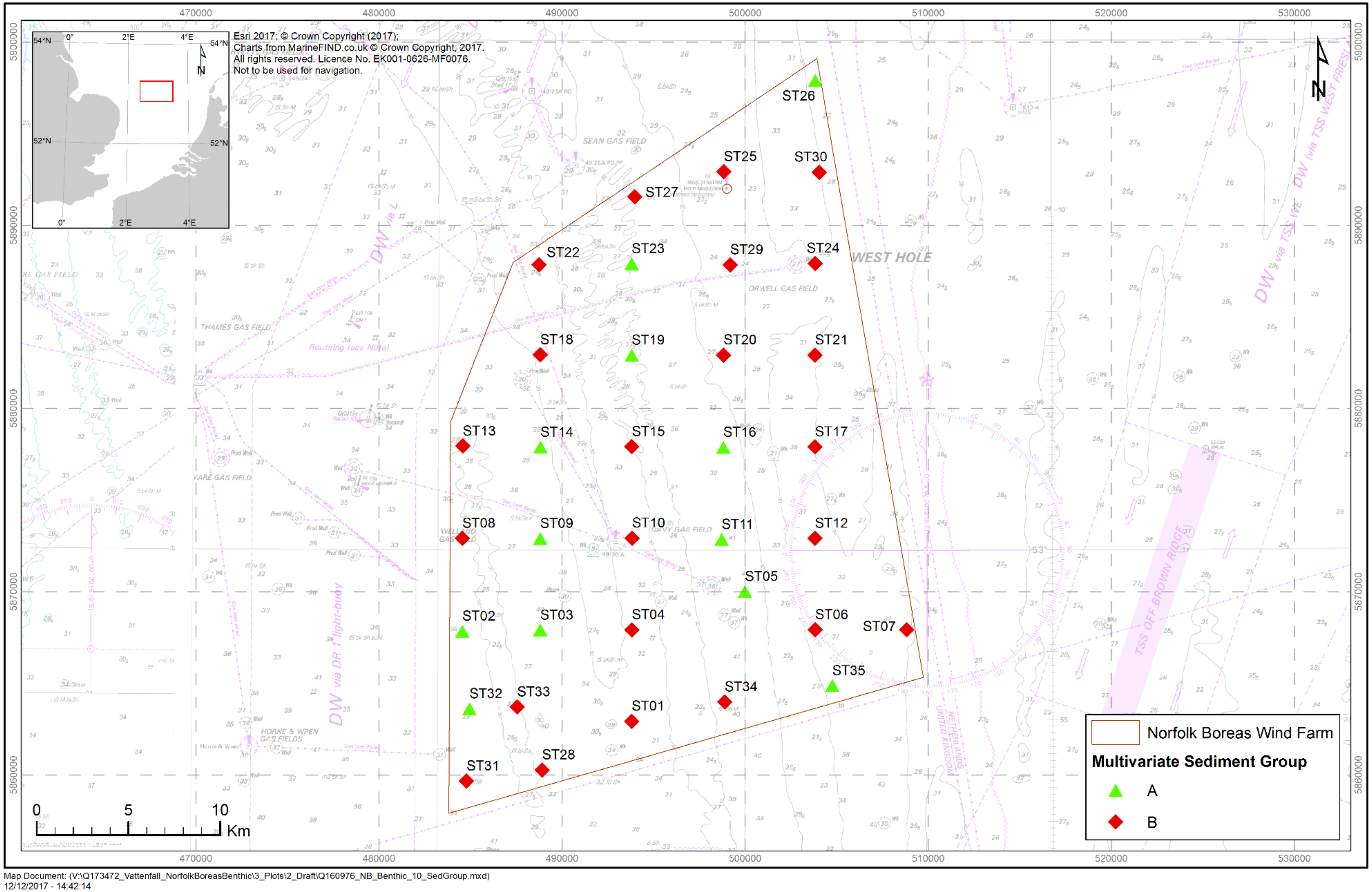


Figure 5.12: Spatial distribution of sediment groups identified by the multivariate analysis

5.4 Sediment Chemistry

5.4.1 Sediment Metals

Table 5.9 presents the results of the metal concentrations in seabed sediment samples from 10 stations, which were selected for primary analyses based on field records and spatial coverage (details in Section 5.1). Table 5.9 also presents marine sediment quality guidelines and standards referred to in this study (details in Section 4.8).

Table 5.9: Seabed Sediment Metal Concentrations

Station	As	Cd	Cr	Cu	Pb	Mn	Ni	V	Zn	Hg	Li
ST03	21.0	<0.04	10.0	1.19	7.17	211	4.41	24.7	22.3	<0.01	3.42
ST05	12.9	<0.04	15.6	3.08	6.74	136	7.85	25.9	22.6	0.0108	7.71
ST10	12.0	<0.04	7.43	1.14	4.67	113	4.57	17.9	17.3	<0.01	3.74
ST14	32.7	<0.04	13.9	1.81	9.91	290	6.41	45.3	27.0	<0.01	5.70
ST16	9.40	<0.04	14.5	3.17	6.62	103	6.95	21.8	23.7	<0.01	7.58
ST22	14.4	<0.04	11.0	1.70	4.87	109	6.10	19.6	14.7	<0.01	3.75
ST23	14.9	<0.04	12.9	1.35	5.09	135	5.22	22.7	18.3	<0.01	4.91
ST30	10.5	<0.04	7.81	1.06	4.63	124	4.20	17	16.1	<0.01	4.00
ST31	13.3	<0.04	12.2	1.75	4.39	136	5.40	18.8	15.2	<0.01	3.44
ST35	8.76	<0.04	14.3	1.38	4.61	98.6	5.49	16.5	14.8	<0.01	5.44
Mean	15.0	-	12.0	1.76	5.87	146	5.66	23.0	19.2	-	4.97
SD	7.1	-	2.8	0.76	1.75	60	1.17	8.5	4.4	-	1.62
Min	8.8	-	7.43	1.06	4.39	98.6	4.20	16.5	14.7	-	3.42
Max	32.7	-	15.6	3.17	9.91	290	7.85	45.3	27.0	-	7.71
RSD [%]	48	-	24	43	30	41	21	37	23	-	33
Clean Seas Environmental Monitoring Programme (CSEMP)											
ERL	-	1.2	81	34	46.7	–	-	-	150	0.15	–
Effects Ranges (Long and Morgan, 1990)											
ERL	8.2	1.2	81	34	46.7	–	20.9	-	150	0.15	–
ERM	70.0	9.6	370	270	218	–	52	-	410	0.71	–
Canadian Sediment Quality Guidelines											
TEL	7.2	0.7	52.3	18.7	30.2	–	–	-	124	0.13	–
PEL	41.6	4.2	160	108	112	–	–	-	271	0.7	–
Cefas Guideline Action Levels											
AL 1	20	0.4	40	40	50	–	20	-	130	0.3	–
AL 2	100	5.0	400	400	500	–	200	-	800	3.0	–

Notes:

Concentrations expressed in mg/kg

As = Arsenic	Cd = Cadmium	Cr = Chromium
Ni = Nickel	V = Vanadium	Zn = Zinc
Cu = Copper	Hg = Mercury	Mn = Manganese
Pb =- Lead	Li = Lithium	SD = Standard deviation
RSD = Relative Standard Deviation	ERL = Effect Range Low	ERM = effect range medium
TEL = Threshold Effect Levels	PEL = Probable Effect Levels	AL = Action Level
Colour Key:	**More than ERL (CSEMP)**	

Cadmium (Cd) concentration was below the minimum reporting value (MRV) (0.04 mg/kg) in samples from all stations. Mercury concentration was below the MRV (0.01 mg/kg) in samples from all stations but ST05, where mercury concentration was 0.0108 mg/kg, and below the marine sediment guidelines (Table 5.9).

Arsenic (As) concentration was between 8.76 mg/kg (ST35) and 32.7 mg/kg (ST14), with an average of 15 mg/kg. Levels of arsenic in all samples were above the effect range low (ERL) (8.2 mg/kg) (Long and Morgan, 1990) and the threshold effect level (TEL) (7.2 mg/kg) values; but below the effect range medium (ERM) (70 mg/kg) and probable effect level (PEL) (41.6 mg/kg) values. Concentrations of arsenic at ST14 (32.7 mg/kg) and ST03 (21.0 mg/kg) were also above the action level (AL) 1 (20 mg/kg). It is worth noting that the OSPAR background concentrations of arsenic and nickel within the North Sea, are higher than the ERL values, and therefore arsenic and nickel are not assessed against ERL within the CSEMP (details in Section 4.8).

Chromium (Cr) concentration was between 7.43 mg/kg (ST10) and 15.6 mg/kg (ST05), average of 12.0 mg/kg, all below the marine sediment guidelines in all samples.

Copper (Cu) concentration was between 1.06 mg/kg (ST30) and 3.17 mg/kg (ST16), average of 1.76 mg/kg, all below the marine sediment guidelines in all samples.

Lead (Pb) concentration was between 4.39 mg/kg (ST31) and 9.91 mg/kg (ST14), with an average of 5.87 mg/kg, all below the marine sediment guidelines in all samples.

Nickel (Ni) concentration was between 4.20 mg/kg (ST30) and 7.85 mg/kg (ST05), average of 5.66 mg/kg, all below the marine sediment guidelines in all samples.

Zinc (Zn) concentration was between 14.7 mg/kg (ST22) and 27.0 mg/kg (ST14), average of 19.2 mg/kg, all below the marine sediment guidelines in all samples.

Vanadium (V) concentration was between 16.5 mg/kg (ST35) and 45.3 mg/kg (ST14), average of 23 mg/kg.

Manganese (Mn) concentration was between 98.6 mg/kg (ST35) and 290 mg/kg (ST14), average of 146 mg/kg.

Lithium (Li) concentration was between 3.42 mg/kg (ST03) and 7.71 mg/kg (ST05), average of 4.97 mg/kg.

Currently there are no threshold for V, Mn and Li, within the marine sediment guidelines referred to in this study.

Of the stations analysed for metal content, sample from ST14 showed the highest levels of arsenic, lead, manganese, vanadium and zinc. Sediment at ST14 comprised sand (88.65 %), and small percentages of gravel (6.07 %) and mud (5.28 %).

Sample from station ST05 showed the highest levels of chromium, nickel and lithium; sediment at ST05 comprised sand (79.24 %) and gravel (7.29 %), with a notable percentage of mud (13.47 %). A strong positive correlation was recorded between lithium and mud (rho = 0.762); lithium also showed strong correlation with chromium (rho = 0.784) and very strong with nickel (rho = 0.840, $p<0.05$ when rho = 0.648).

Sample from ST35 showed the lowest levels of arsenic, manganese, and vanadium; sediment at ST35 comprised sand (91.11 %) with notable percentage of mud (8.36 %) and negligible gravel (0.54 %) (details of PSA in Section 5.3).

5.4.2 Polychlorinated Biphenyls (PCBs) and Organotins

Results of polychlorinated biphenyls (PCBs) (Table 5.10) and organotins (Table 5.11) concentrations, were consistently below the MRV in all samples.

Table 5.10: Polychlorinated Biphenyls (PCBs)

Analyte	Station									
	ST03	ST05	ST10	ST14	ST16	ST22	ST23	ST30	ST31	ST35
PCB - 028	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PCB - 052	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PCB - 101	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PCB - 118	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PCB - 138	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PCB - 153	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PCB - 180	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Notes: Concentrations expressed in µg/kg dry weight										

Table 5.11: Organotins (dry weight as cation)

Analyte	Station									
	ST03	ST05	ST10	ST14	ST16	ST22	ST23	ST30	ST31	ST35
Dibutyl Tin	<3	<4	<4	<4	<4	<4	<4	<4	<4	<4
Tetrabutyl Tin	<2	<3	<2	<2	<2	<2	<3	<3	<3	<2
Tributyl Tin	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Triphenyl Tin	<2	<3	<2	<2	<2	<2	<3	<3	<3	<2
Notes: Concentrations expressed in µg/kg (dry weight as cation)										

5.4.3 Sediment Hydrocarbons

Table 5.12 presents the results of hydrocarbons concentrations and the Canadian marine sediment quality guidelines.

Concentrations of total hydrocarbons (THC) were between 1.96 mg/kg (ST22) and 23.7 mg/kg (ST16), average of 7.65 mg/kg. There was great variability in the hydrocarbon concentration, with a standard deviation of 7.18 and a relative standard deviation of 93.82 %.

Concentration of polycyclic aromatic hydrocarbons (PAH) were below the MRV in samples from seven stations, to include: ST03, ST10, ST14, ST22, ST30, ST31 and ST35. Quantifiable concentrations were consistently below the Canadian marine sediment quality guidelines.

Quantifiable concentrations of benzo(b)fluoranthene, benzo(ghi)perylene, fluoranthene and pyrene were recorded in samples from ST05, ST16 and ST23. Quantifiable concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene + triphenylene, indeno(1,2,3-c,d)pyrene and phenanthrene were recorded in samples from stations ST05 and ST16. Quantifiable concentrations of anthracene, chrysene and perylene were recorded in sample from ST05 (Table 5.12).

Table 5.12: Hydrocarbons concentrations dry weight

Analyte	Unit	Station										Canadian Sediment Quality Guidelines		OSPAR CSEMP ERLs
		ST03	ST05	ST10	ST14	ST16	ST22	ST23	ST30	ST31	ST35	TEL	PEL	
Hydrocarbons	mg/kg	2.35	16.0	6.97	4.63	23.7	1.96	10.8	2.31	4.29	3.53	-	-	-
Acenaphthene	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	6.71	88.9	-
Acenaphthylene	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	5.87	128	-
Anthracene	µg/kg	<1	2.02	<1	<1	<1	<1	<1	<1	<1	<1	46.9	245	85
Benzo(a)anthracene	µg/kg	<1	3.82	<1	<1	2.11	<1	<1	<1	<1	<1	74.8	693	261
Benzo(a)pyrene	µg/kg	<1	3.96	<1	<1	2.54	<1	<1	<1	<1	<1	88.8	763	430
Benzo(b)fluoranthene	µg/kg	<1	5.04	<1	<1	4.07	<1	1.56	<1	<1	<1	-	-	-
Benzo(e) pyrene	µg/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	-
Benzo(ghi)perylene	µg/kg	<1	4.13	<1	<1	3.78	<1	1.29	<1	<1	<1	-	-	85
Benzo(j)fluoranthene	µg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-	-
Benzo(k)fluoranthene	µg/kg	<1	2.49	<1	<1	1.85	<1	<1	<1	<1	<1	-	-	-
Chrysene + Triphenylene	µg/kg	<3	4.52	<3	<3	3.16	<3	<3	<3	<3	<3	-	-	-
Chrysene	µg/kg	<3	3.55	<3	<3	<3	<3	<3	<3	<3	<3	108	846	384
Dibenzo(ah)anthracene	µg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	6.22	135	-
Dibenzothiophene	µg/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	-
Fluoranthene	µg/kg	<1	9.01	<1	<1	4.26	<1	1.55	<1	<1	<1	113	149	600
Fluorene	µg/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	21.2	144	-
Indeno(1,2,3-c,d)pyrene	µg/kg	<1	3.15	<1	<1	2.39	<1	<1	<1	<1	<1	-	-	240
Naphthalene	µg/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	34.6	391	160
Perylene	µg/kg	<5	7.88	<5	<5	<5	<5	<5	<5	<5	<5	-	-	-
Phenanthrene	µg/kg	<5	6.62	<5	<5	6.03	<5	<5	<5	<5	<5	86.7	544	240
Pyrene	µg/kg	<1	7.71	<1	<1	3.84	<1	1.3	<1	<1	<1	153	1398	665
Triphenylene	µg/kg	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-	-	-

Notes:

PEL = Probable Effect Level
TEL = Threshold Effect Level
ERL = Effect Range Low
OSPAR = Oslo and Paris Commission
CSEMP = Clean Sea Environmental Monitoring Programme

Colour Key: **More than ERL**

5.5 Macrofauna Data Analysis

Macrofaunal analysis was undertaken on samples from 10 stations, which were selected for primary analyses based on field records and spatial coverage (details in Section 5.1).

Following the rationalisation process (details in Section 4.4), the macrofaunal dataset from grab samples comprised 85 taxa, represented by 1883 individuals. The removed taxa comprised: juveniles (14 taxa and 417 individuals); damaged taxa (6 worms of the Polynoidae family); fish (1 individual of the Gobiidae family and 1 individual of the Pleuronectiformes order); and 3 species aggregated to their respective higher taxa (i.e. *Heteromysis* to Mysida, *Philocheras trispinosus* to Crangonidae; and *Cerebratulus* to Nemertea).

Of the juveniles, brittlestars of the Ophiuroidea class, with 179 individuals, and bivalves of the *Abra* genus, with155 individuals, represented together just over 80 % of juvenile abundance.

5.5.1 Phyletic Composition

The phyletic composition of the macrofauna from grab samples is summarised in Table 5.13.

Annelida were dominant in terms of taxa composition, comprising 52.9 % of the total infaunal taxa, followed by Arthropoda (22.4 %), Mollusca (11.8 %), Echinodermata (8.2 %) and other taxa (4.7 %).

Annelida were dominant also in terms of abundance (67.4 % of the total abundance), followed by Mollusca (14.2 %), Arthropoda (8.2 %), Echinodermata (6.5 %) and other taxa (3.7 %).

The distribution of macrofaunal taxa and abundance within samples from individual stations is presented in Figure 5.13 and Figure 5.14. Annelida were dominant in terms of taxa diversity at every station, with percentage contribution to the total number of taxa of between 42 % (ST16) and 60 % (ST10 and ST14) (Figure 5.13). The abundance showed greater variability between stations, with molluscs dominating the abundance at stations: ST23 (66 %), ST35 (47 %) and ST30 (42 %) (Figure 5.14).

Table 5.13: Abundance of Taxonomic Groups within the Survey Area

Taxonomic Group	Number of Taxa [S]	Total Taxa [%]	Abundance [N]	Total Abundance [%]
Annelida	45	52.9	1270	67.4
Arthropoda	19	22.4	154	8.2
Mollusca	10	11.8	267	14.2
Echinodermata	7	8.2	123	6.5
Others	4	4.7	69	3.7
Total	85	100	1883	100

Notes:
N = number of individuals
S = number of taxa
Other taxonomic groups include: Cnidaria, Platyhelminthes, Nemertea, Phoronida and Fish
Macrofaunal sample were processed through a 1 mm mesh sieve

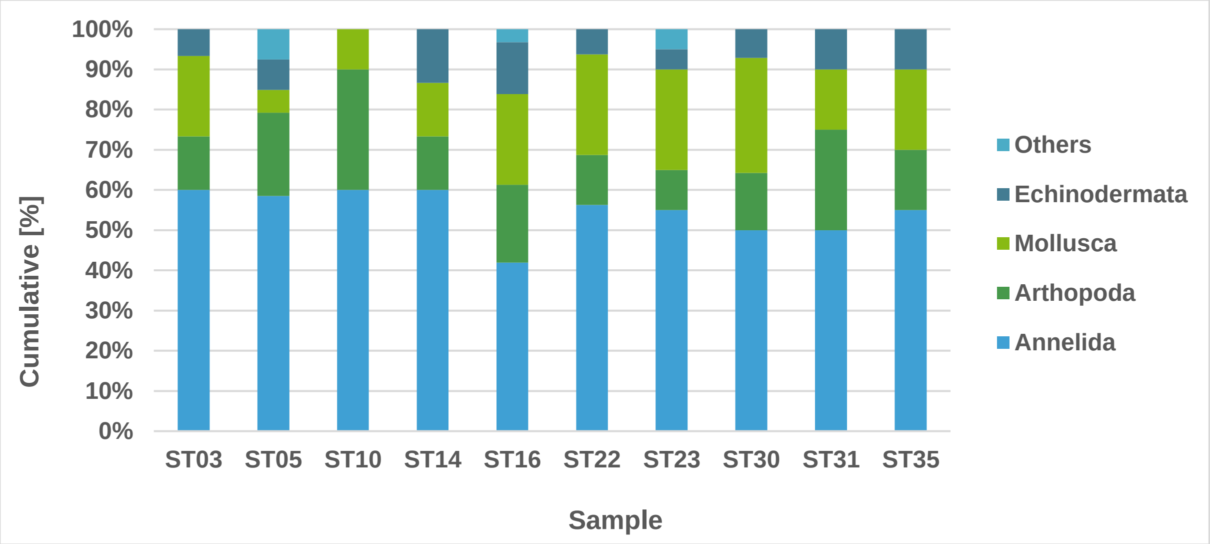


Figure 5.13: Phyletic composition of taxa within the survey area

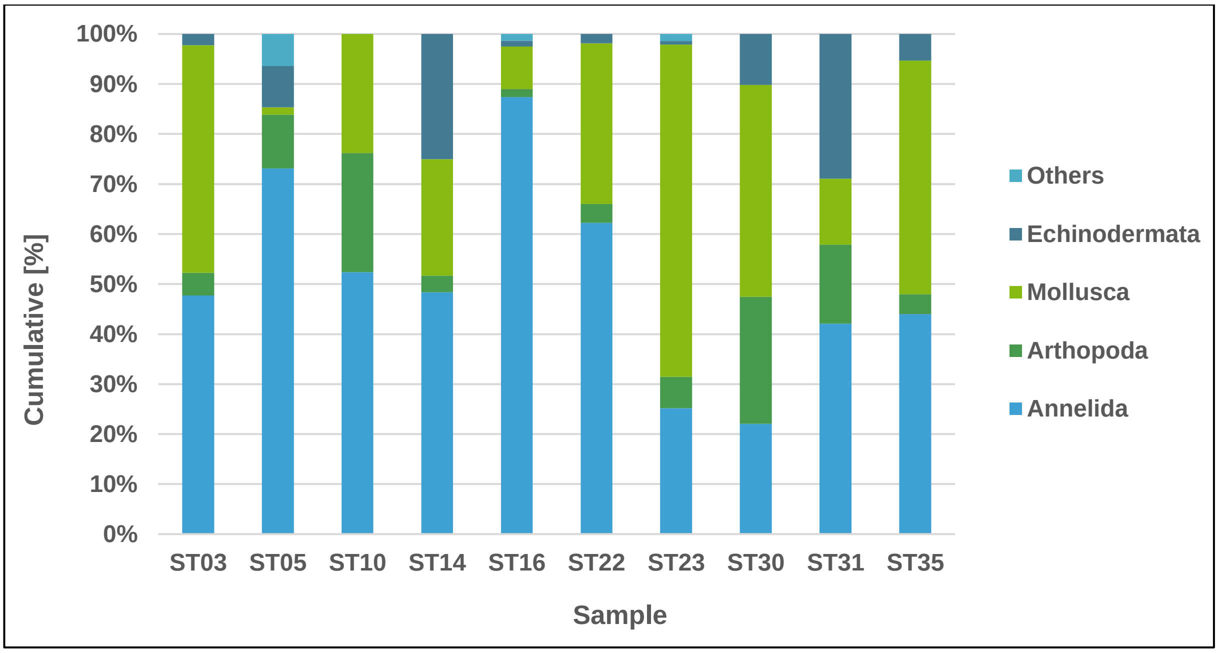


Figure 5.14: Phyletic composition of individuals within the survey area

Amongst the Annelida, *Sabellaria spinulosa* was numerically dominant (858 individuals). *Spiophanes bombyx*, with 83 individuals, *Scalibregma inflatum*, with 78 individuals, *Lumbrineris* nr *cingulata* with 57 individuals, and *Eunereis longissima* with 16 individuals, were amongst the top five numerically dominant species. Of these species, *S. bombyx* was the most frequently occurring, being recorded in 100 % of samples. *S. inflatum* occurred in 80 % of samples, *S. spinulosa* and *L.* nr *cingulata* occurred in 40 % of samples, and *E. longissima* occurred in just 10 % of samples. *Sthenelais limicola*, *Glycera alba* and *Goniada maculata* were amongst the top five most frequently occurring species, with frequency of occurrence of between 70 % and 90 % of samples.

Of the Arthropoda, the long-clawed porcelain crab *Pisidia longicornis* was numerically dominant (62 individuals) and recorded in 40 % of samples. The amphipods *Urothoe poseidonis* (28 individuals), and

Photis longicaudata (21 individuals), and the cumacean *Diastylis laevis* (5 individuals) were amongst the top five most abundant arthropods, with frequency of occurrence of between 10 % (*P. longicaudata*) and 60 % (*U. poseidonis*).

The bivalves *Fabulina fabula* (136 individuals), *Abra alba* (79 individuals) and *Tellimya ferruginosa* (29 individuals) were amongst the top five most abundant molluscs, with frequency of occurrence of 40 % (*T. ferruginosa*), 70 % (*A. alba*) and 80 % (*F. fabula*). The bivalve *Kurtiella* (formerly *Mysella*) *bidentata* comprised 7 individuals across 20 % of samples, and the gastropod *Euspira nitida* comprised 6 individuals across 60 % of samples.

Echinodermata were represented mainly by the sea urchin *Echinocyamus pusillus*, which comprised 48 individuals across 50 % of samples. Other notable echinoderms included the brittlestars *Amphipholis squamata* (34 individuals across 10 % of samples) and *Ophiura albida* (28 individuals across 50 % of samples). The sea potato *Echinocardium cordatum*, comprised 8 individuals across 40 % of samples.

Other taxa comprised: horseshoe worms of the *Phoronis* genus (52 individuals) ribbon worms (Nemertea) (13 individuals), the sea anemone *Cerianthus lloydii* (3 individuals), and flatworms (Platyhelminthes) (1 individual).

A list of the top ten most abundant and most frequently occurring taxa across survey area is presented in Table 5.14.

Table 5.14: Top Ten Most Abundant and Frequently Recorded Taxa in Grab Samples

Most Abundant Taxa		Most Frequently Occurring Taxa	
Taxa	**Total**	**Taxa**	**%**
Sabellaria spinulosa	858	*Spiophanes bombyx*	100
Fabulina fabula	136	*Sthenelais limicola*	90
Spiophanes bombyx	83	*Glycera alba*	80
Abra alba	79	*Scalibregma inflatum*	80
Scalibregma inflatum	78	*Fabulina fabula*	80
Pisidia longicornis	62	*Goniada maculata*	70
Lumbrineris nr cingulata	57	*Abra alba*	70
Phoronis	52	*Urothoe poseidonis*	60
Echinocyamus pusillus	48	*Euspira nitida*	60
Amphipholis squamata	34	*Nephtys hombergii*	50

5.5.2 Univariate Analysis

Univariate analysis was undertaken on the infaunal dataset to assess faunal richness (Margalef's index d), diversity (Shannon-Wiener Index H' $\log_2$), evenness (Pielou's index J') and dominance (Simpson's index λ), which allowed subsequent geographical contextualisation of the results.

There was little variation in the number of species, which ranged from 10 (ST10) to 53 (ST05), averaging 21. A large variation was recorded in the number of individuals which ranged from 21 (ST10) to 955 (ST05), averaging 188.

Faunal richness reflected the number of individual per species recorded, with the highest value of 7.58 at ST05 and the lowest of 2.96 at ST10. The low species richness and abundance at ST10 resulted in the highest evenness value (0.92) at this station, which corresponded well to low values of dominance (0.14). Conversely, ST05 showed high value of dominance (0.34), second only to that of ST16 (0.54). Analysis of the species list showed that the high dominance values at these stations was associated with a numerical dominance of *S. spinulosa*, which represented 54 % of the faunal abundance at ST05 and 76 % of the faunal abundance at ST16. The remaining stations showed values of evenness equal or greater than 0.66.

Values of diversity were on average good (H' $\log_2$ = 3.02), with 7 stations showing good diversity (H' $\log_2$ between 3 and 4), 2 stations showing moderate diversity (H' $\log_2$ between 2 and 3) and 1 station showing poor diversity (H' $\log_2$) between 1 and 2).

The spatial distribution of the univariate indices of diversity is presented in Figure 5.15 to Figure 5.20.

Table 5.15: Univariate Analysis of Infauna from Grab Samples

Station	Number of Species [S]	Number of Individuals [N]	Margalef's Index [d]	Pielou's Index [J']	Shannon-Wiener Index [H' $\log_2$]	Simpson's Index [λ]
ST03	15	44	3.70	0.81	3.18	0.16
ST05	53	955	7.58	0.53	3.03	0.31
ST10	10	21	2.96	0.92	3.04	0.14
ST14	15	60	3.42	0.84	3.27	0.14
ST16	31	435	4.94	0.36	1.79	0.58
ST22	16	53	3.78	0.81	3.26	0.15
ST23	20	143	3.83	0.66	2.86	0.23
ST30	14	59	3.19	0.72	2.76	0.22
ST31	20	38	5.22	0.90	3.90	0.10
ST35	20	75	4.40	0.72	3.13	0.19
Mean	21	188	4.30	0.73	3.01	0.23
SD	12	269	1.36	0.18	0.53	0.14
Min	10	21	2.96	0.36	1.79	0.10
Max	52	955	7.58	0.92	3.90	0.58

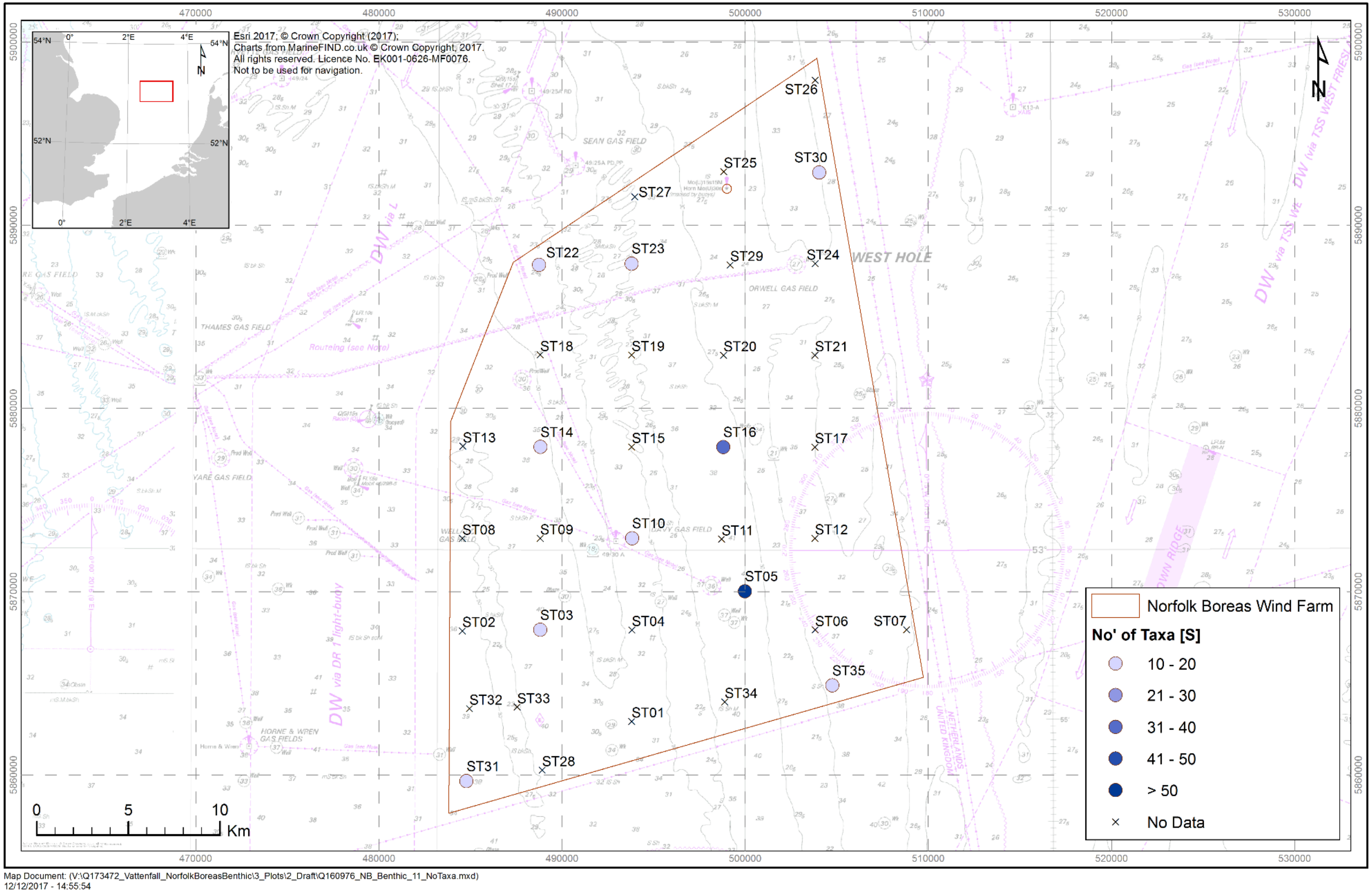


Figure 5.15: Spatial distribution of the number of taxa [S] from grab samples

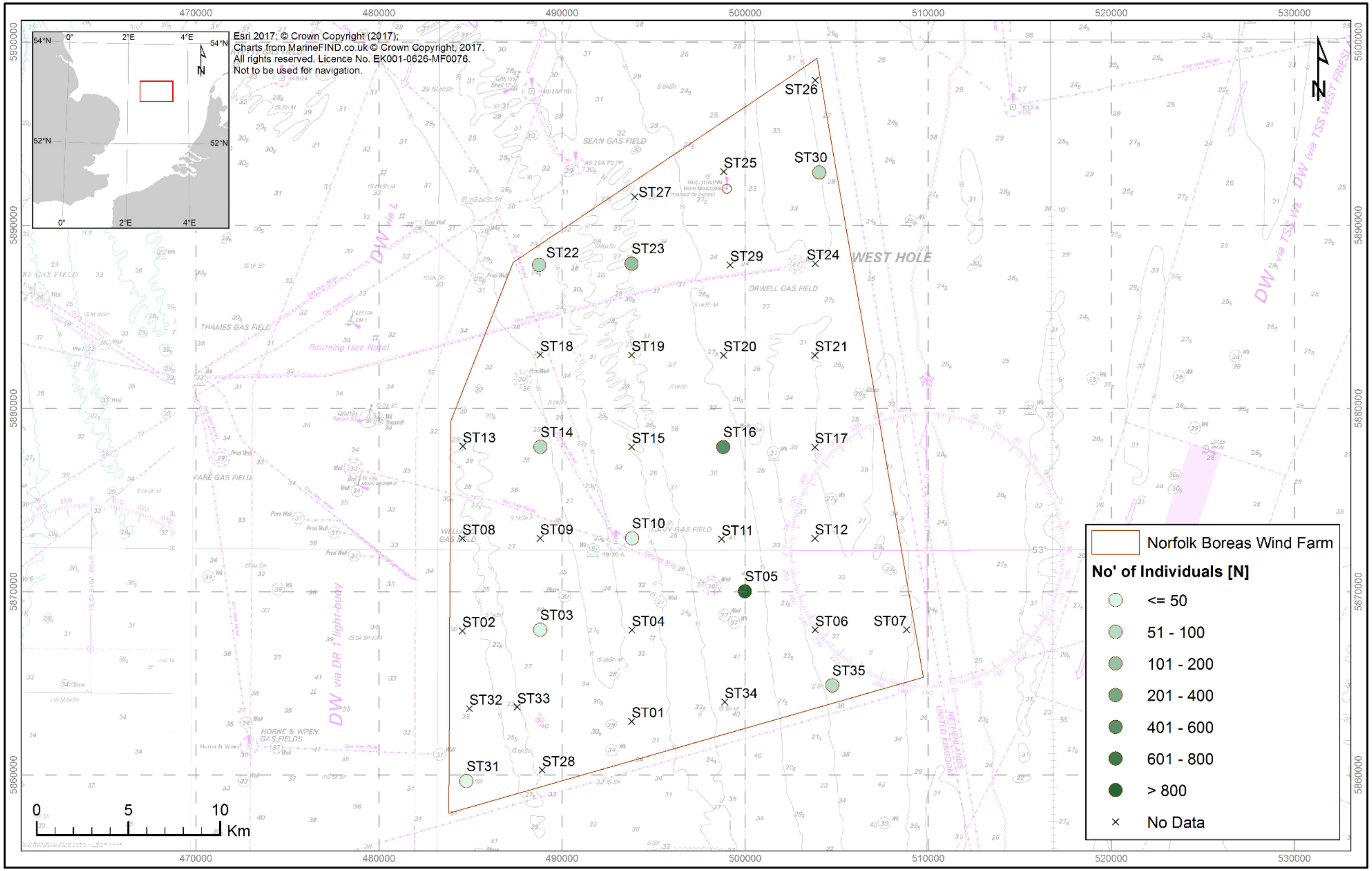


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Figure 5.16: Spatial distribution of the number of individuals [N] from grab samples

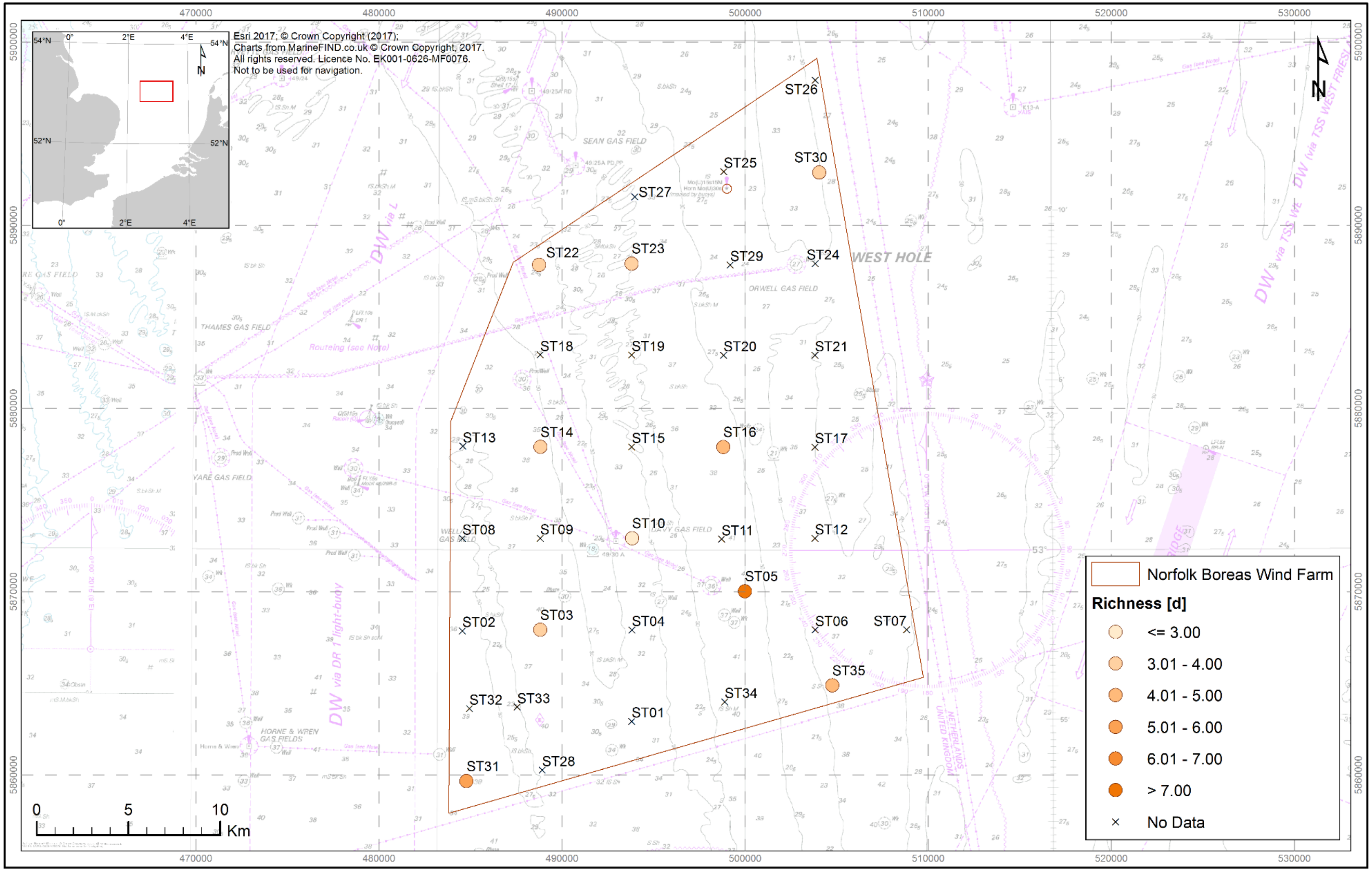

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Figure 5.17: Spatial distribution of the Margalef's richness [d] from grab samples

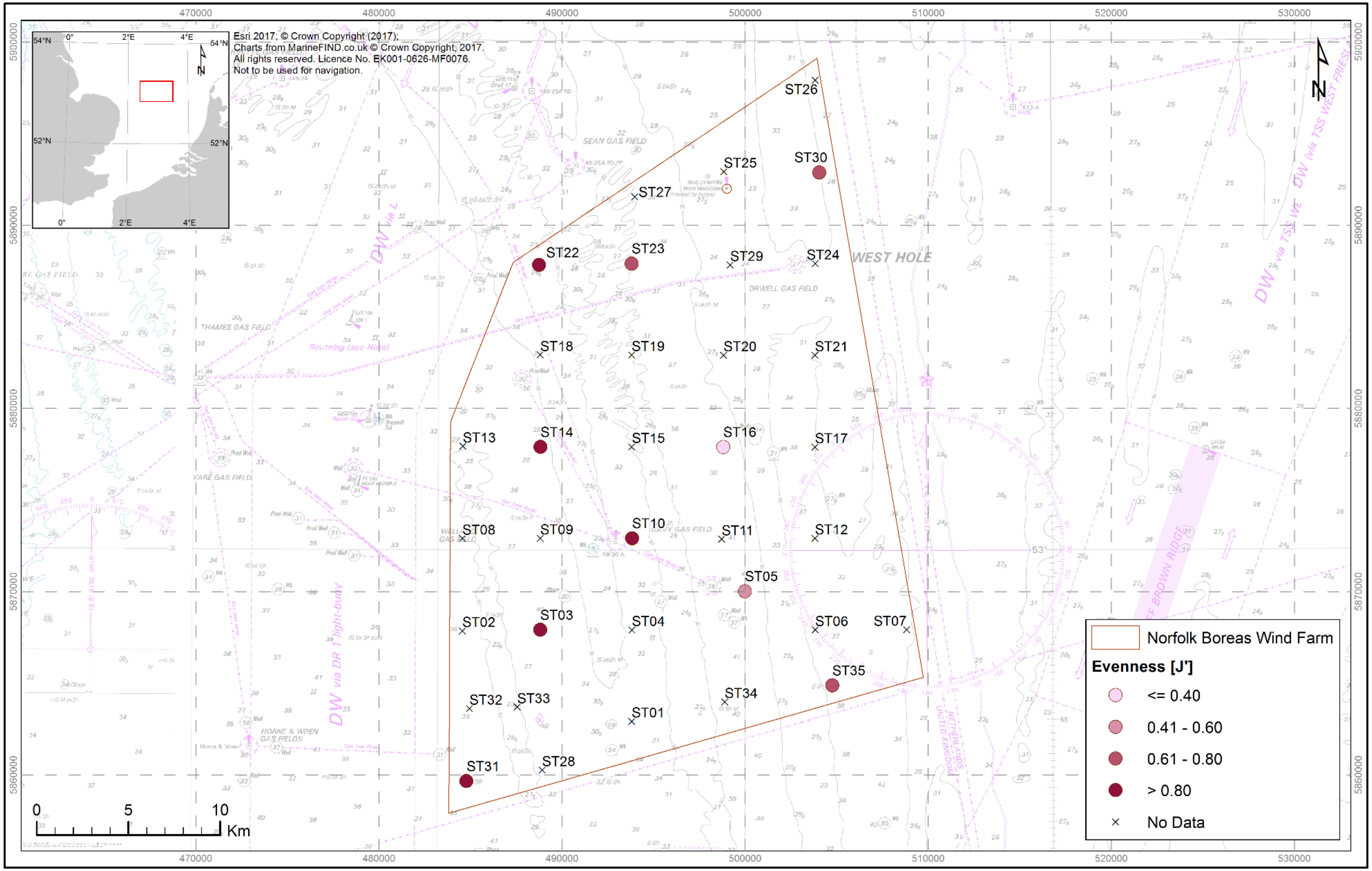

Figure 5.18: Spatial distribution of the Pielou evenness [J'] from grab samples

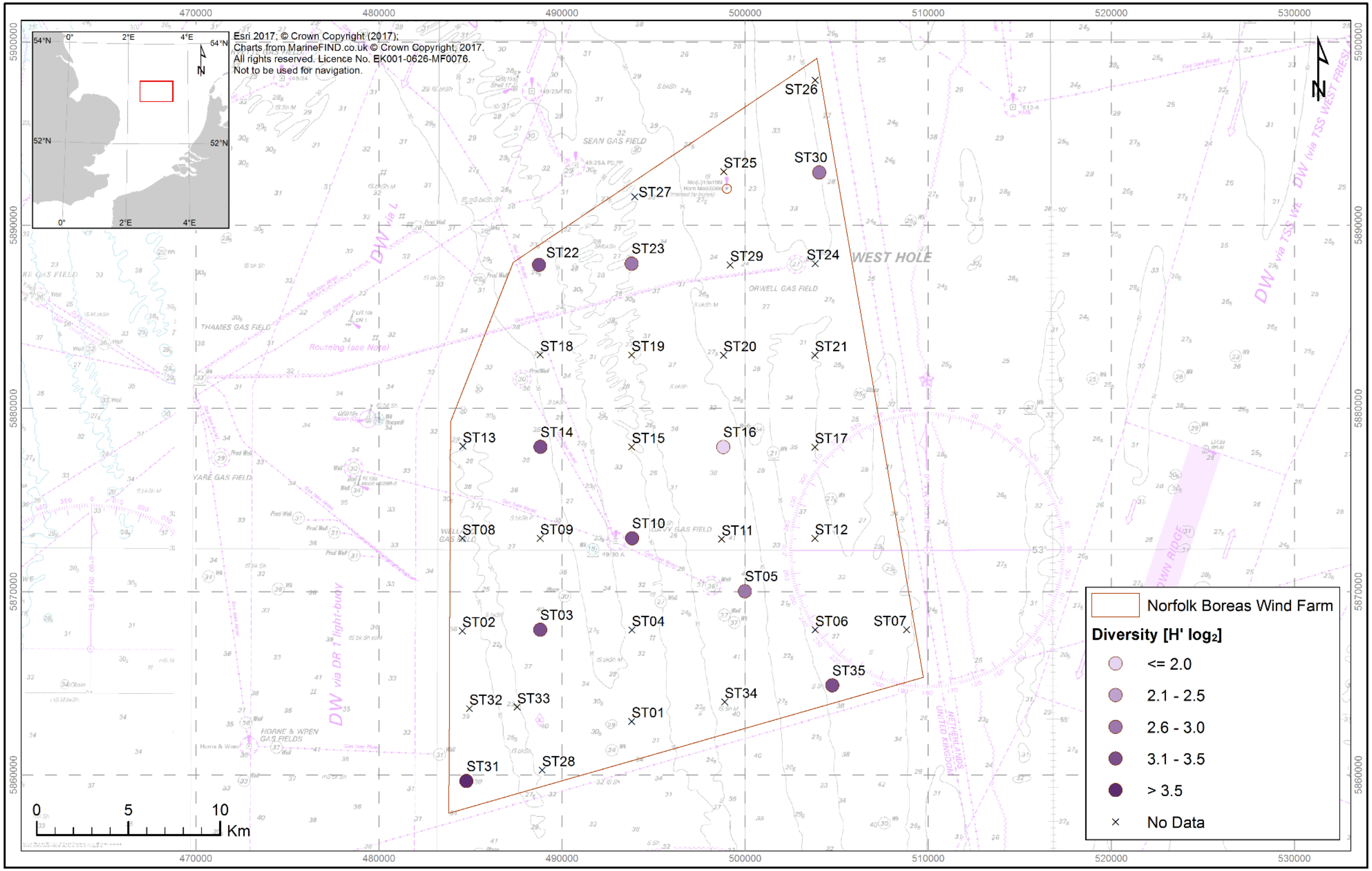

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Figure 5.19: Spatial distribution of Shannon-Weiner diversity [H' log_2] from grab samples

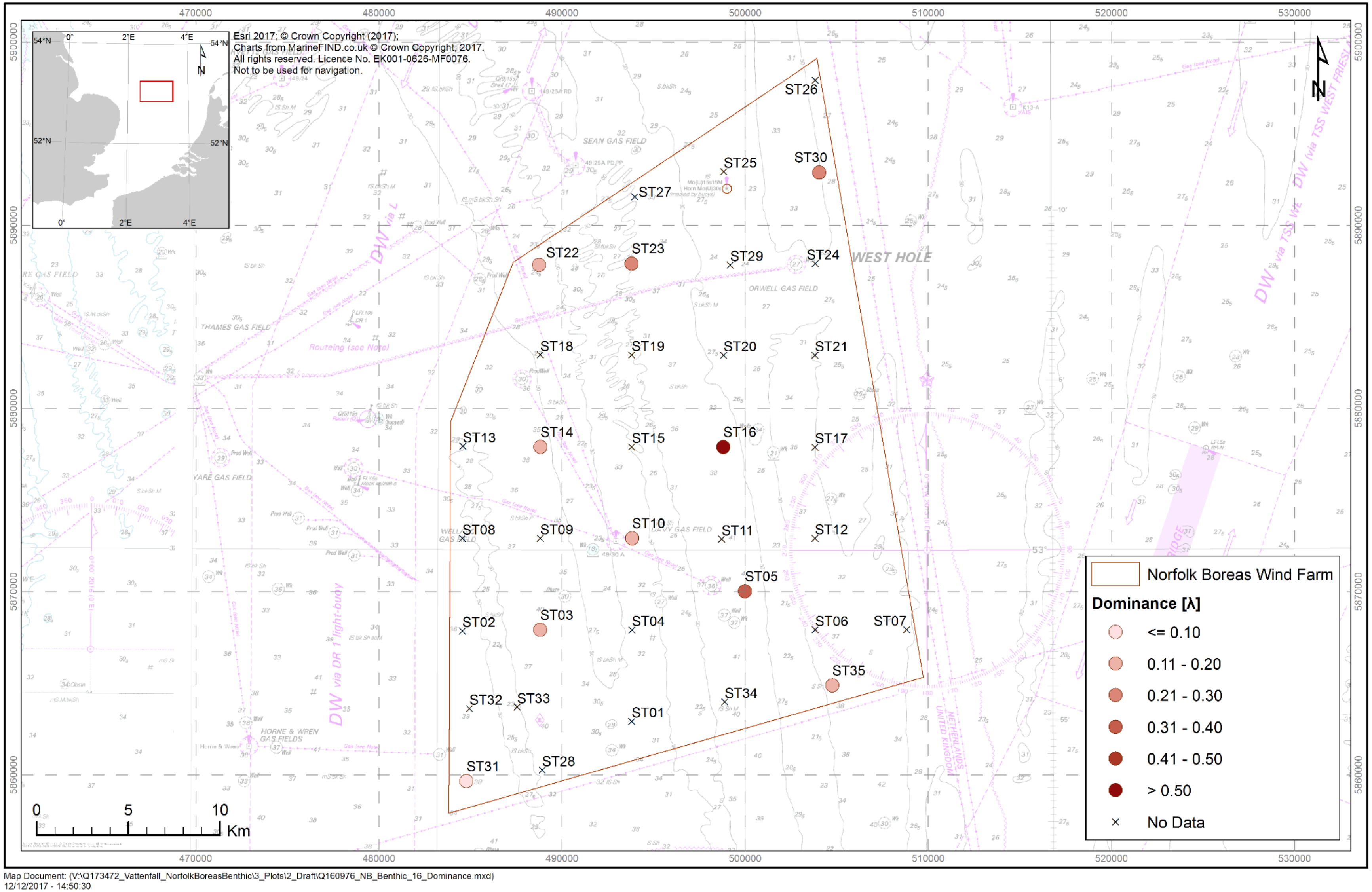


Figure 5.20: Spatial distribution of the Simpson dominance [λ] from grab samples

5.5.3 Epifauna from Grab Samples

Epifauna from grab samples comprised solitary epifauna, such as sea anemones of the Actiniaria order (71 adults and 23 juveniles) and barnacles of the Sessilia order (3 juveniles); and sessile colonial epifauna, such as Bryozoa, Cnidaria, and ciliate of the Folliculinidae family.

Bryozoa comprised 4 species, of which *Aspidelectra melolontha* and *Conopeum reticulum* were the most frequently occurring.

Samples from stations ST30 and ST35 were devoid of epifauna. The highest number of epifauna (7) was recorded at ST14. At the remaining stations, the number of epifaunal taxa was between one (ST16 and ST23) and four (ST31).

The phyletic composition of the epifauna from the grab samples is summarised in Table 5.16 and graphically represented in Figure 5.21.

Table 5.16: Phyletic Composition of Colonial Epifauna from Grab Samples

Phyletic Group	Total no of taxa	Most frequently occurring taxa	Frequency [%]
Cnidaria (sea anemones)	4	Actiniaria Campanulinida Filifera (=?Bounganvillidae) Serularidae	10 10 10 20
Bryozoa (sea mats)	4	*Aspidelectra melolontha* *Conopeum reticulum* *Electra monostachys* *Electra pilosa*	60 30 10 20
Other (ciliates, Bryozoa)	2	Folliculinidae Sessilia	50 10
Total	**10**		

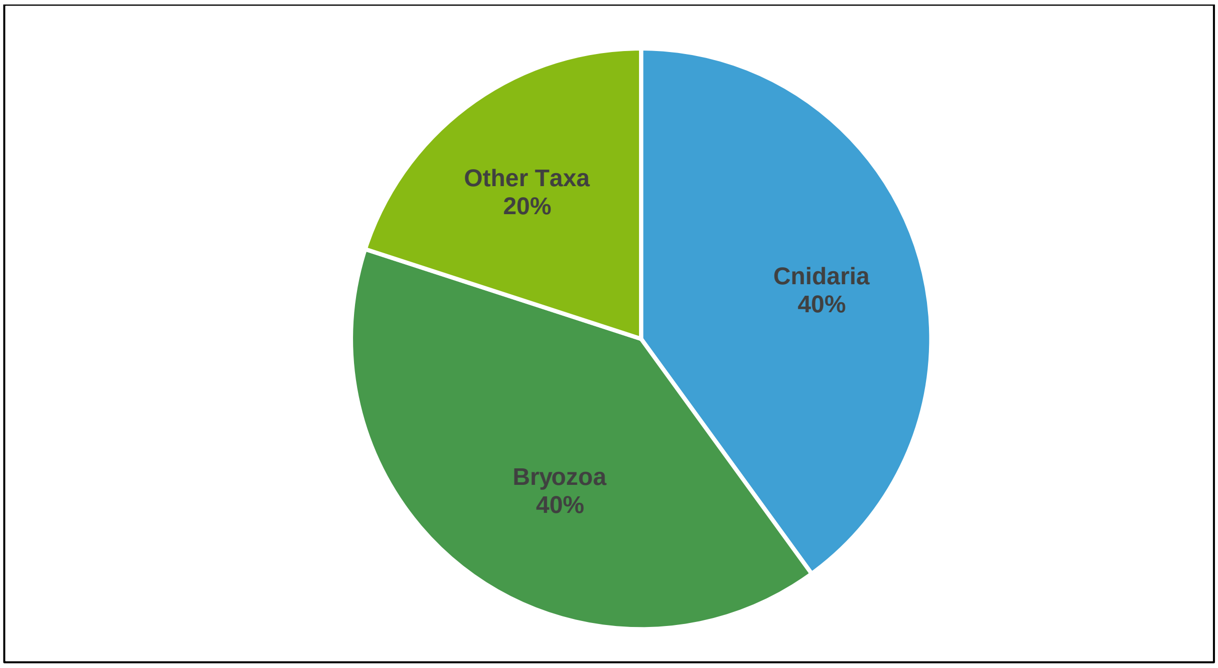


Figure 5.21: Phyletic composition of epifauna from grab samples

5.5.4 Biomass

Biomass was assessed for infaunal invertebrates from grab samples; epifauna was not biomassed. Results are presented in Table 5.17 and Figure 5.24. Results are expressed as ash free dry weight (AFDW g.0.1 m^{-2}).

The infaunal biomass was dominated by the echinoderms (Figure 5.22). Albeit this phylum represented just 6.5 % of the total infaunal abundance (details in Section 5.5.1), it comprised large organisms, such as the sea potato *E. cordatum*, which is 6 cm to 9 cm in length, the pea urchin *E. pusillus*, which is 1 cm in diameter, and the green sea urchin *Psammechinus miliaris*, which is 3.5 cm to 5.7 cm in diameter.

Arthropoda comprised the second highest infaunal biomass, which was associated primarily with the crab *P. longicornis*. This crab has a carapace width of approximately 1 cm and comprised a total of 62 individual across the survey area.

Infaunal biomass ranged from 0.0552 AFDW g.0.1 m^{-2} (ST31) to 3.4777 AFDW g.0.1 m^{-2} (ST35), with an average of 1.6963 AFDW g.0.1 m^{-2}. The high biomass at ST35 was associated with echinoderms, which included 3 individuals of the sea potatoes *E. cordatum* and 1 individual of the brittlestar *Amphiura chiajei*.

High values of infaunal biomass were also recorded at stations ST05 (3.4367 AFDW g.0.1 m^{-2}) and ST16 3.2763 AFDW g.0.1 m^{-2}) and were associated mainly with echinoderms and arthropods (Table 5.17).

The relationship between infaunal biomass and sediment type is illustrated in Figure 5.23. Heterogeneous sediments comprised higher infaunal biomass, particularly with respect to Annelida, Arthopoda and Echinodermata, whereas Mollusca preferred sandier sediments.

Table 5.17: Infaunal Biomass from Grab Samples

Station	Taxa					Total
	Annelida	Arthropoda	Mollusca	Echinodermata	Other Taxa	
ST03	0.0332	0.0017	0.0255	0.0126	0	**0.0730**
ST05	0.7000	1.4366	0.0278	1.1801	0.0921	**3.4367**
ST10	0.0540	0.0026	0.0130	0.0004	0	**0.0699**
ST14	0.0442	0.0032	0.0078	2.9006	0	**2.9558**
ST16	0.3823	0.0660	0.2197	2.6069	0.0015	**3.2763**
ST22	0.1776	0.6494	0.0099	0.0148	0	**0.8517**
ST23	0.0402	0.0027	0.8740	1.3740	0.0005	**2.2915**
ST30	0.0636	0.0061	0.0572	0.3483	0	**0.4753**
ST31	0.0246	0.0028	0.0198	0.0080	0	**0.0552**
ST35	0.1035	0.0012	0.8281	2.5448	0	**3.4777**
Mean	**0.1623**	**0.2172**	**0.2083**	**1.0991**	**0.0094**	**1.6963**

Notes:
Biomass expressed as ash free dry weight [AFDW g.0.1 m^{-2}]

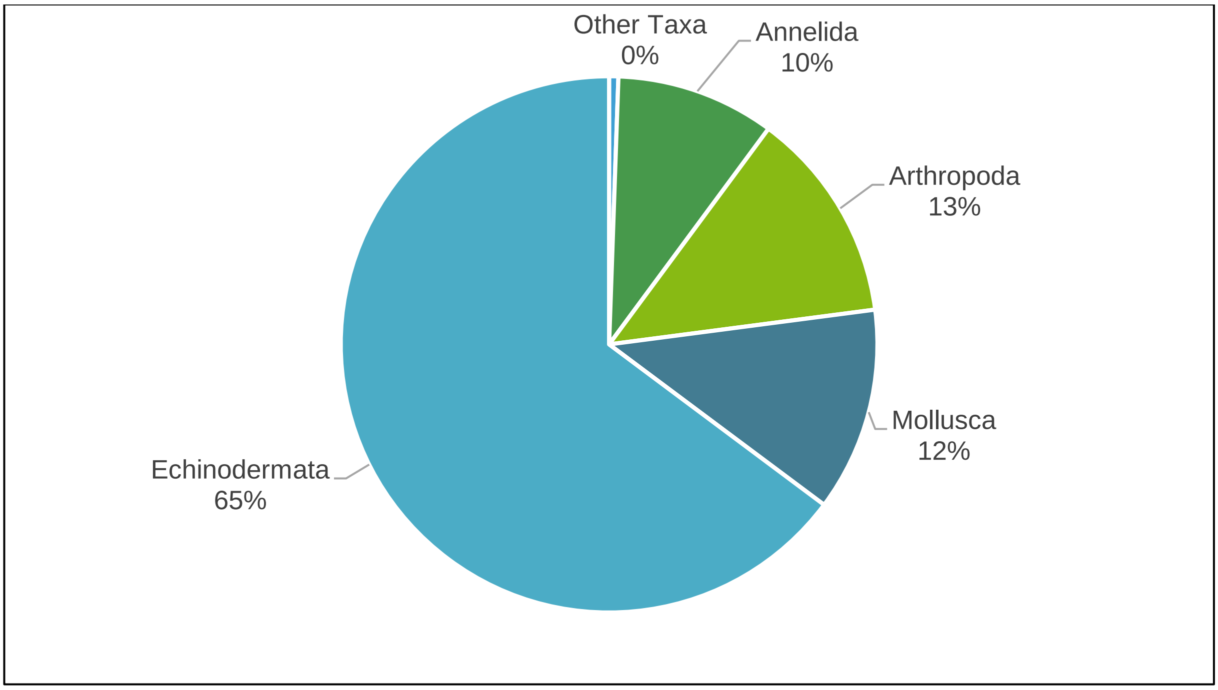
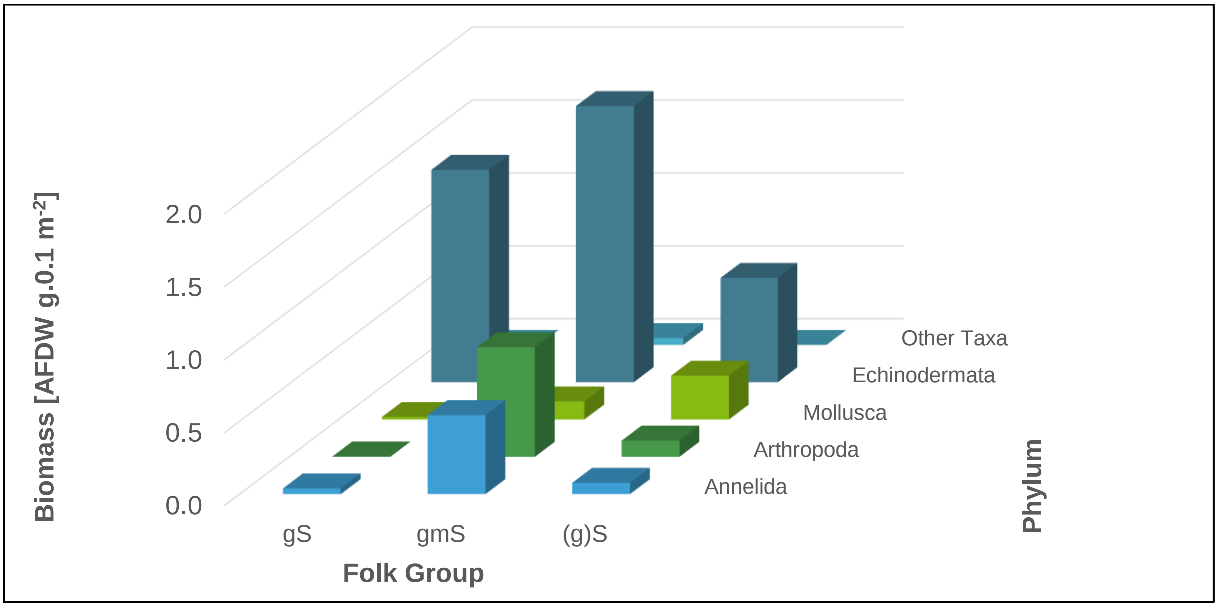


Figure 5.22: Percentage contribution of major phyla to infaunal biomass from grab samples



gS = gravelly Sand gmS = gravelly muddy Sand (g)S = slightly gravelly muddy Sand

Figure 5.23: Relationships between sediment type and infaunal biomass from grab samples

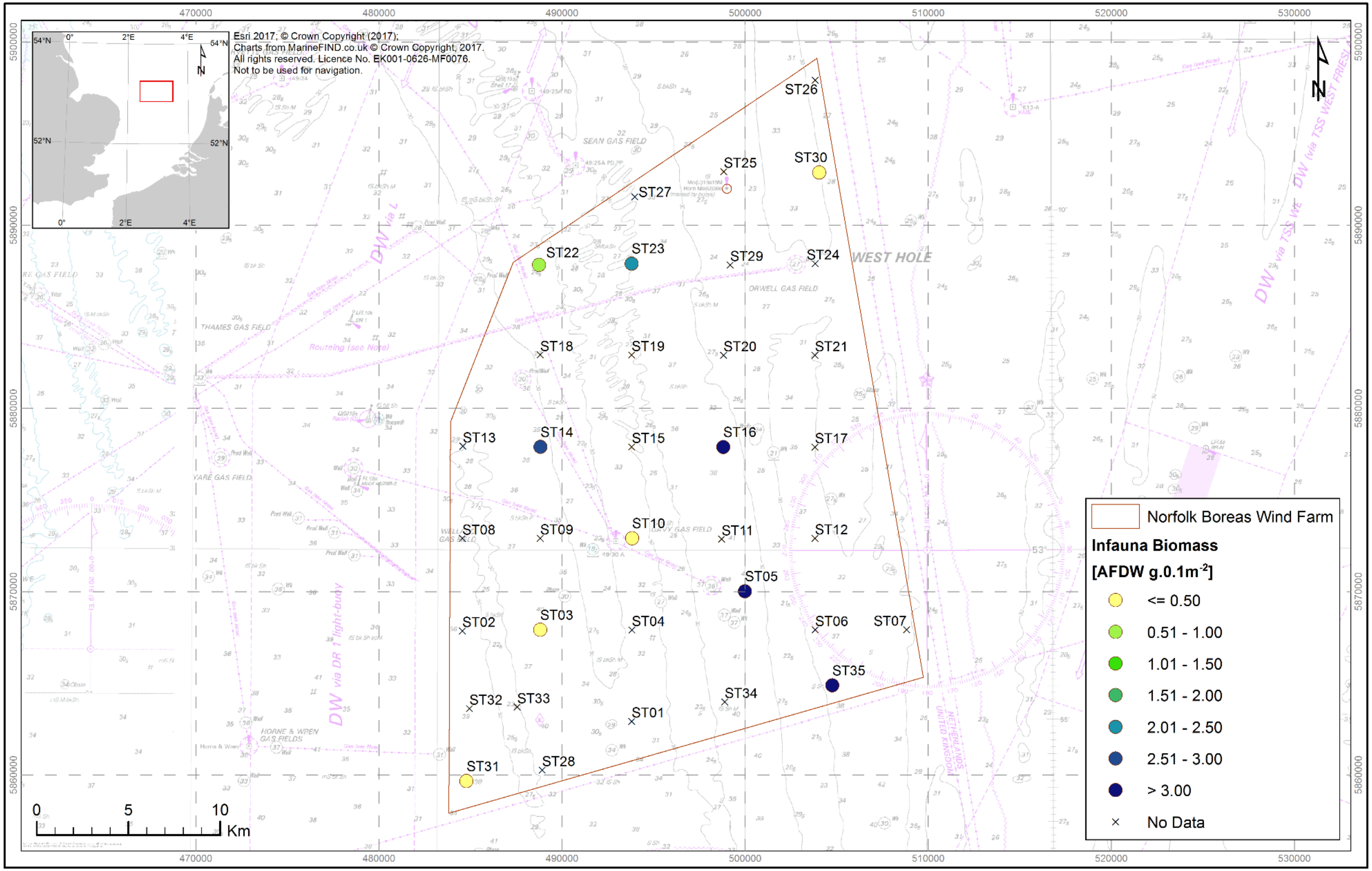


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Figure 5.24: Spatial distribution of infaunal biomass across the survey area

5.5.5 Multivariate Analysis

Multivariate analysis was undertaken on the infaunal dataset. A square root transformation was applied to the dataset to down-weight the numerically dominant species (> 100 individuals) which represented 1 % of the fauna, giving the right weight to the abundant taxa (> 10 individuals) which comprised 25 % of the infauna, and the underlying community (< 10 individuals) which represented 74 % of the infauna.

Multivariate analysis was undertaken to assess the benthic community structure, employing the hierarchical clustering analysis, the results of which are illustrated in Figure 5.25 and Figure 5.26. Two groups of samples were identified, using the SIMPROF test. The characterising species of each group were assessed by means of the SIMPER analysis. The physical and biological characteristics of the multivariate groups of samples, summarised in Table 5.18, were subsequently used for biotope classification (details in Section 5.7).

The distribution of the infaunal multivariate groups across the survey area is illustrated in Figure 5.28.

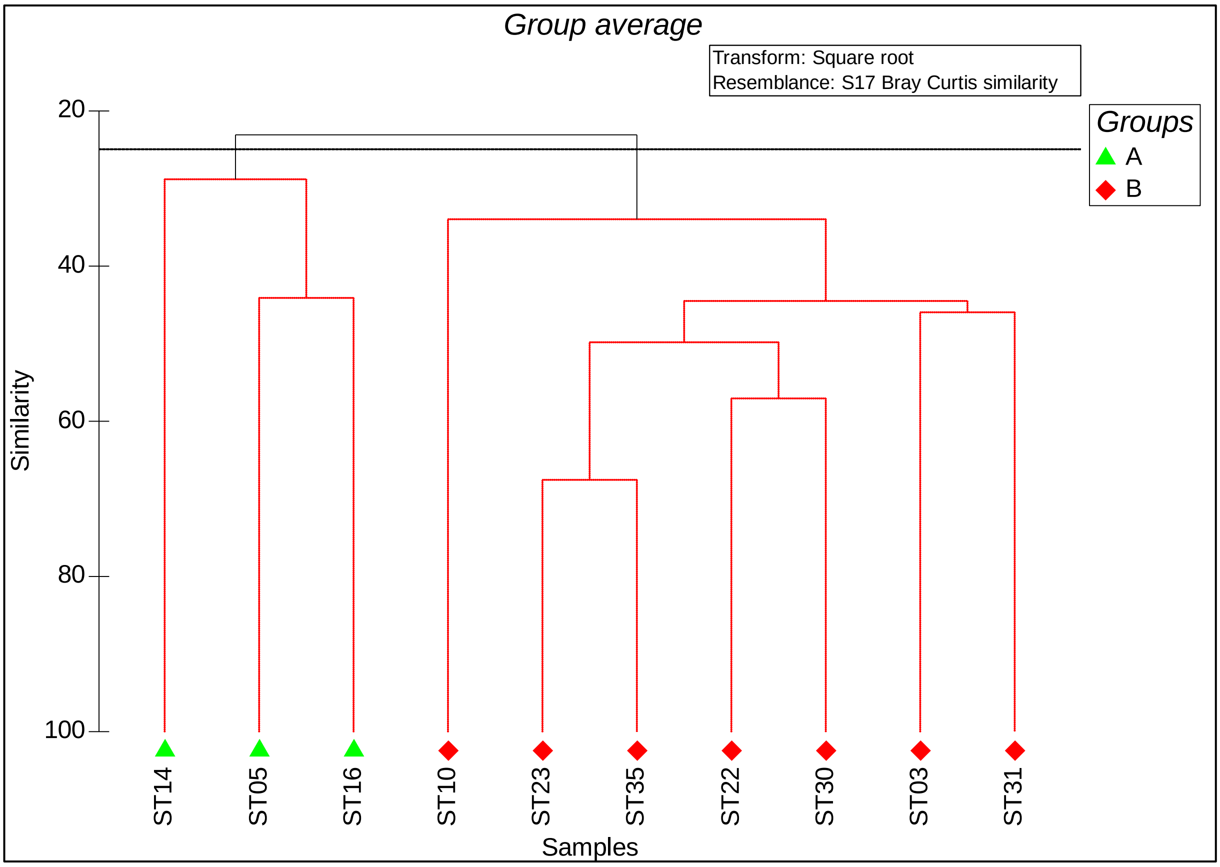

Figure 5.25: Dendrogram of Bray-Curtis similarity index of infauna from grab samples

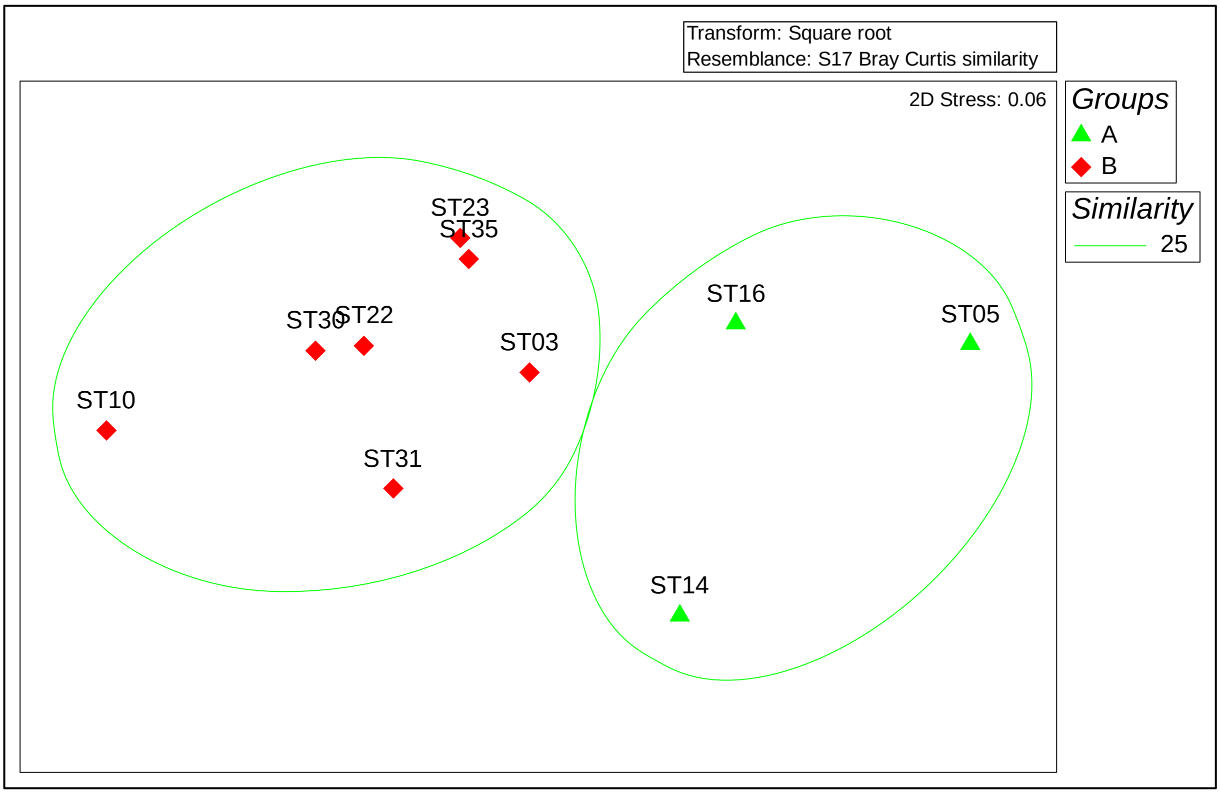

Figure 5.26: MDS plot of Bray-Curtis similarity index of infauna from grab samples

Table 5.18: Physical and Biological Characteristics of the Multivariate Groups of Samples

Group	Samples	Characterising Features	Species	Mean Abundance*	Frequency † [% samples]
A ▲ Average similarity: 33.9 %	ST05 ST14 ST16	S: 33 ± 19 N: 483 ± 449 Depth [m]: 34.7 Gravel: 6 % Sand: 84 % Mud: 10 % D_{50} [µm]: 278	*Sabellaria spinulosa*	286	100
			Lumbrineris nr cingulata	19	100
			Scalibregma inflatum	18	100
			Echinocyamus pusillus	11	100
			Spiophanes bombyx	8	100
			Podarkeopsis capensis	3	100
			Sthenelais limicola	2	100
			Phyllodoce lineata	1	100
			Tellimya ferruginosa	8	67
			Echinocardium cordatum	1	67
B ◆ Average similarity: 44.3 %	ST03 ST10 ST22 ST23 ST30 ST31 ST35	S: 16 ± 4 N: 62 ± 40 Depth [m]: 31.4 Gravel: 2 % Sand: 94 % Mud: 4 % D_{50} [µm]: 267	*Fabulina fabula*	19	100
			Urothoe poseidonis	4	86
			Sthenelais limicola	1	86
			Abra alba	7	71
			Glycera alba	1	86
			Scalibregma inflatum	4	71
			Goniada maculata	1	71
			Euspira nitida	1	71
			Nephtys cirrosa	1	57

Notes:
D_{50} = median sediment particle size
N= number of individuals
S = number of species
*Abundance [N] refers to untransformed data and is expressed as mean value within the multivariate group
†Frequency refers to the percentage of samples within the multivariate group
Cut off for contribution to percentage = 90 %.

Group A comprised samples from ST05, ST14 and ST16. It was characterised by heterogeneous sediment comprising sand and notable percentages of gravel (6 %) and mud (10 %), which resulted in the sediment being poorly sorted (sorting of 1.71). The median sediment particle size was between 250 µm (fine sand) and 304 µm (medium sand), with a mean of 278 µm. Characterising species included the polychaetes *S. spinulosa* and *L. cingulata*, which were mainly responsible for the separation of this group of samples (Figure 5.27).

Group B comprised samples from the remaining seven stations. It featured less heterogeneous sediment, comprising sand and low percentages of gravel (2 %) and mud (4 %), which resulted in the sediment being moderately well sorted (sorting coefficient of 0.84). The median sediment particle size was between 235 µm (fine sand) and 296 µm (medium sand), with a mean of 267 µm. Characterising species included the bivalve *F. fabula* and the amphipod *U. poseidonis*, which were primarily responsible for the separation of this group of samples (Figure 5.27).

Both groups A and B showed low average similarity (<50 %) (Table 5.18), and an average dissimilarity of 77 %. The dissimilarity was mainly associated with the abundance of species common to both groups and to a lesser species composition (Table 5.19).

Mean species richness of group A (5.31) was higher than that of group B (3.87), and reflected the higher number of taxa and individuals in group A (Table 5.18). However, as outlined in Dauvin et al. (2012) (see Section 4.3), the mean diversity of group A was moderate (2.70), compared to that of group B which was good (3.17) and reflected more even distribution of abundance across the species recorded.

Mean infaunal biomass of group A was 3.22 (AFDW g.0.1 m^{-2}) and dominated by the echinoderms (2.23 AFDW g.0.1 m^{-2}), followed by the arthropods (0.50 AFDW g.0.1 m^{-2}) and the annelids (0.38 AFDW g.0.1 m^{-2}). Mean biomass of group B was 1.04 (AFDW g.0.1 m^{-2}), and similarly dominated by the echinoderms (0.61 AFDW g.0.1 m^{-2}), followed by the molluscs (0.26 AFDW g.0.1 m^{-2}) and the arthropods (0.10 AFDW g.0.1 m^{-2}).

Results of the seabed video footage (details in Section 5.2 and Appendix E) showed a mean of 10 epibenthic taxa at stations in group A, with a range of 4 (ST16) to 16 (ST05). Notable taxa included low-lying consolidated aggregations of *S. spinulosa* tubes (details in Section 5.2.1 and Appendix E); echinoderms (e.g. *O. ophiura*, *O. albida*, *A. rubens*), crustaceans (*Liocarcinus*, Paguridae, *C. pagurus*), fish (e.g. Pleuronectiformes, Gobiidae and Gadidae) and cnidarians (e.g. *Urticina*, *Sagartia*).

Epibenthos at stations in group B comprised a mean of 5 taxa, with a range of 3 (ST30) to 13 (ST35). *S. spinulosa* tubes were not recorded in group B. Taxa composition was comparable to that of group A, with brittlestars, starfish and hermit crabs being most frequently recorded, less so fish and cnidarians. All stations within group B featured rippled sand.

Table 5.19: Top Ten Species Responsible for the Separation of Multivariate Groups

Species	Mean Abundance*		Contribution to Dissimilarity* [%]
	Group A	Group B	
Sabellaria spinulosa	286	0.1	16.8
Fabulina fabula	0.3	19	5.5
Lumbrineris nr *cingulata*	19	0.1	4.5

Species	Mean Abundance*		Contribution to Dissimilarity* [%]
	Group A	Group B	
Tellimya ferruginosa	8	1	4.2
Echinocyamus pusillus	11	2	3.9
Abra alba	9	7	3.3
Scalibregma inflatum	18	4	3.0
Pisidia longicornis	20	0.3	2.7
Urothoe poseidonis	0	4	2.5
Podarkeopsis capensis	3	0	2.5

Notes:
Abundance [N] refers to untransformed data and is expressed as mean value within the multivariate group
*Based on the results of the SIMPER analysis

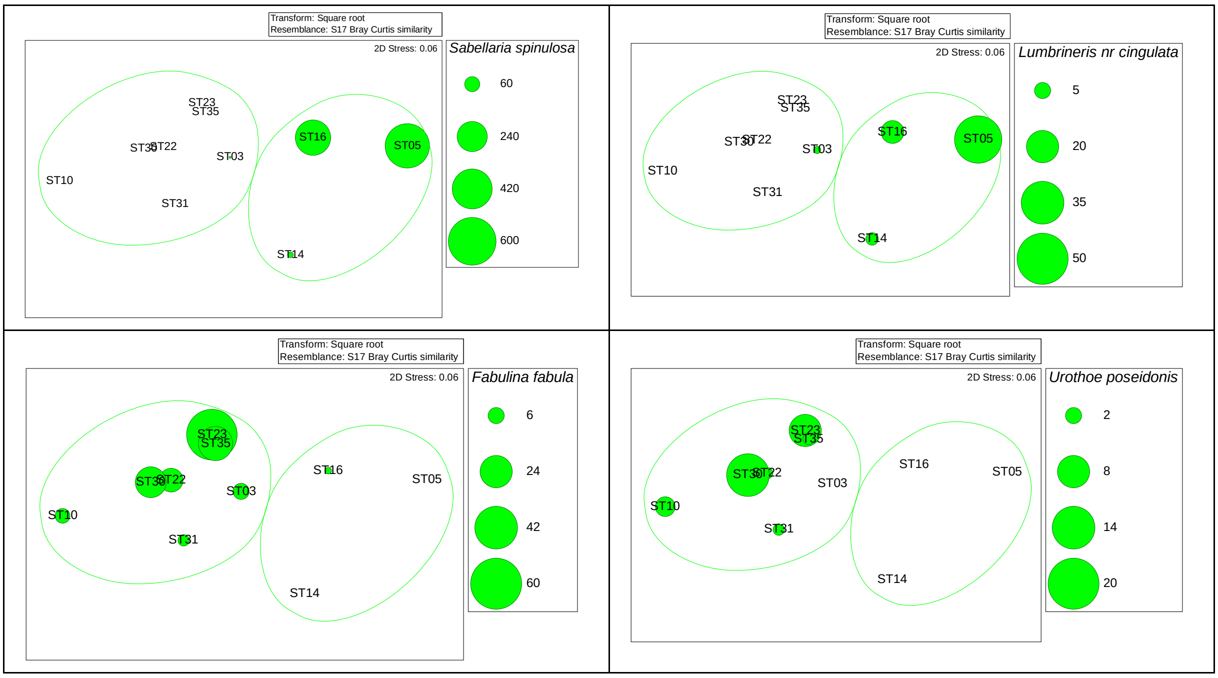

Figure 5.27: MDS of Bray-Curtis similarity matrix of infauna from grab samples: data with superimposed circles proportional in diameter to values of abundance of: *S. spinulosa, L.* nr *cingulata*, *F. fabula* and *U. poseidonis*

5.6 Relationships between Physical and Biological Variables

Relationships between physical and biological variables were assessed by means of the BEST analysis from Primer v6.

Results showed that sediment had the strongest influence on the observed pattern of infaunal distribution with the combination of: fine gravel (−2.5 phi), coarse sand (0.5 phi), fine sand (2 phi), very coarse silt (4.5 phi) and clay (11 phi), returning the highest value of rho: 0.778, significance level 2 %.

No other environmental variable (metals, hydrocarbons), either alone or in combination, returned a higher value than this.

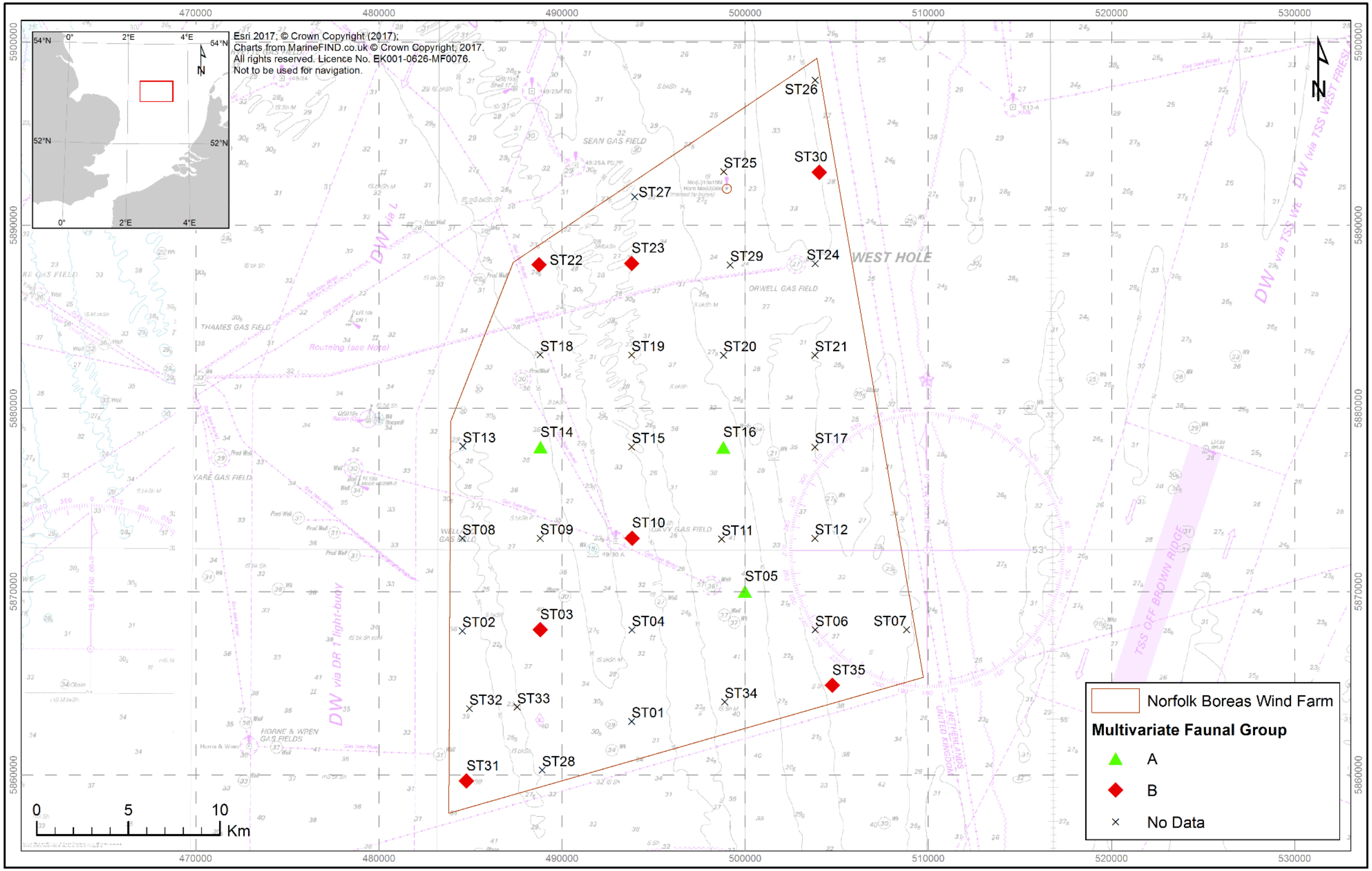

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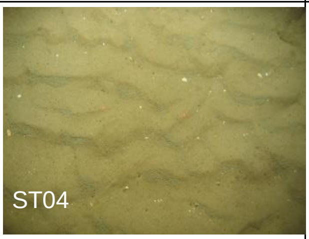
Figure 5.28: Spatial distribution of infaunal groups identified by the multivariate analysis

5.7 Biotope Classification

Biotope classification, in line with the current Marine Habitat Classification of Britain and Ireland, and corresponding EUNIS classification, was undertaken based on the results of the video footage and grab samples analysis, to provide a comprehensive habitat assessment. The video footage provides an overview of the seabed over a wider area, and can identify features such as isolated boulders or cobbles. By comparison, grab sampling provides detailed information of the sediment composition and associated fauna at a single point source. The combination of the video footage and the sediment sampling by remote-operated grab allows making in-situ observations of the habitats sampled and geographical contextualisation of the results.

Two biotopes and one habitat were identified across the survey area, and are summarised in Table 5.20.

Table 5.20: Biotopes

Biotope Code and Name		Representative Image	Stations
JNCC	**EUNIS**		
SS.SSa Sublittoral sands and muddy sands	**A5.2** Sublittoral sands		ST (01, 02, 04, 06, 07, 08, 09, 11, 12, 13, 15, 17, 18, 19, 20, 21, 24, 25, 26, 27, 28, 29, 32, 33, 34).
SS.SBR.PoR.SspiMx *Sabellaria spinulosa* on stable circalittoral mixed sediment	**A5.611** [*Sabellaria spinulosa*] on stable circalittoral mixed sediment		ST (05, 14, 16)
SS.SSA.IMuSa.FfabMag *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand	**A5.242** *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand		ST (03, 10, 22, 23, 30, 31, 35)
Notes: EUNIS = European Union Nature Information System JNCC = Joint Nature Conservation Committee ST = Station			

The habitat SS.SSa (A5.2) was recorded by the seabed video footage at most stations. This habitat features medium to fine sand, clean or non-cohesive slightly muddy sands, on open coasts and offshore, where there is a degree of wave action or tidal currents which restricts the silt and clay content to < 15 %. Taxa characteristic of this habitat include polychaetes, bivalves and amphipods. In the current study, epibiota recorded by the video footage included crabs and hermit crabs, gastropods and bivalves, polychaete tubes including *Lanice conchilega*, brittlestars and starfish.

The biotope SS.SBR.PoR.SspiMx (A5.611) features mixed sediment, characterised by high abundance of the tube-building polychaete *S. spinulosa* which can forms loose agglomerations of tubes forming a low-lying matrix of sand, gravel, mud and tubes on the seabed. The infauna comprises typical sublittoral polychaete, such as species of *Pholoe*, *Harmothoe*, *Scoloplos* and *Mediomastus*, the bivalve *A. alba* and tube building amphipods of the *Ampelisca* genus. Epibiota includes tubeworms, hermit crabs and burrowing anemones. This biotope characterised stations ST05, ST14 and ST16. Of these, ST05 and ST14 showed low-lying consolidated aggregations of *S. spinulosa* tubes (see Section 5.2). In addition, 519 individual of *S. spinulosa* were recorded in grab sample from ST05, and 8 individuals of *S. spinulosa* were recorded in grab sample from ST14. Although no evidence of *S. spinulosa* tubes was recorded at ST16, analysis of the grab sample from this station showed 330 *S. spinulosa* individuals.

The biotope SS.SSA.IMuSa.FfabMag (A5.242) features fine, compacted sand and slightly muddy sand, with communities dominated by venerid bivalves. The biotope may be characterised by a prevalence of *F. fabula* and species of *Magelona*, both of which tend to fluctuate seasonally and temporally. Other taxa, including amphipods, and polychaetes species of *Nephtys*, are also commonly recorded. This biotope characterised stations in multivariate group B (see Section 5.5.5), which was distinct for a prevalence of the bivalves *F. fabula* and *A. alba*, the amphipod *Urothoe* and the polychaetes *G. alba* and *N. cirrosa*.

The occurrence of the habitat and biotopes across Norfolk Boreas OWF survey area is illustrated in Figure 5.29.

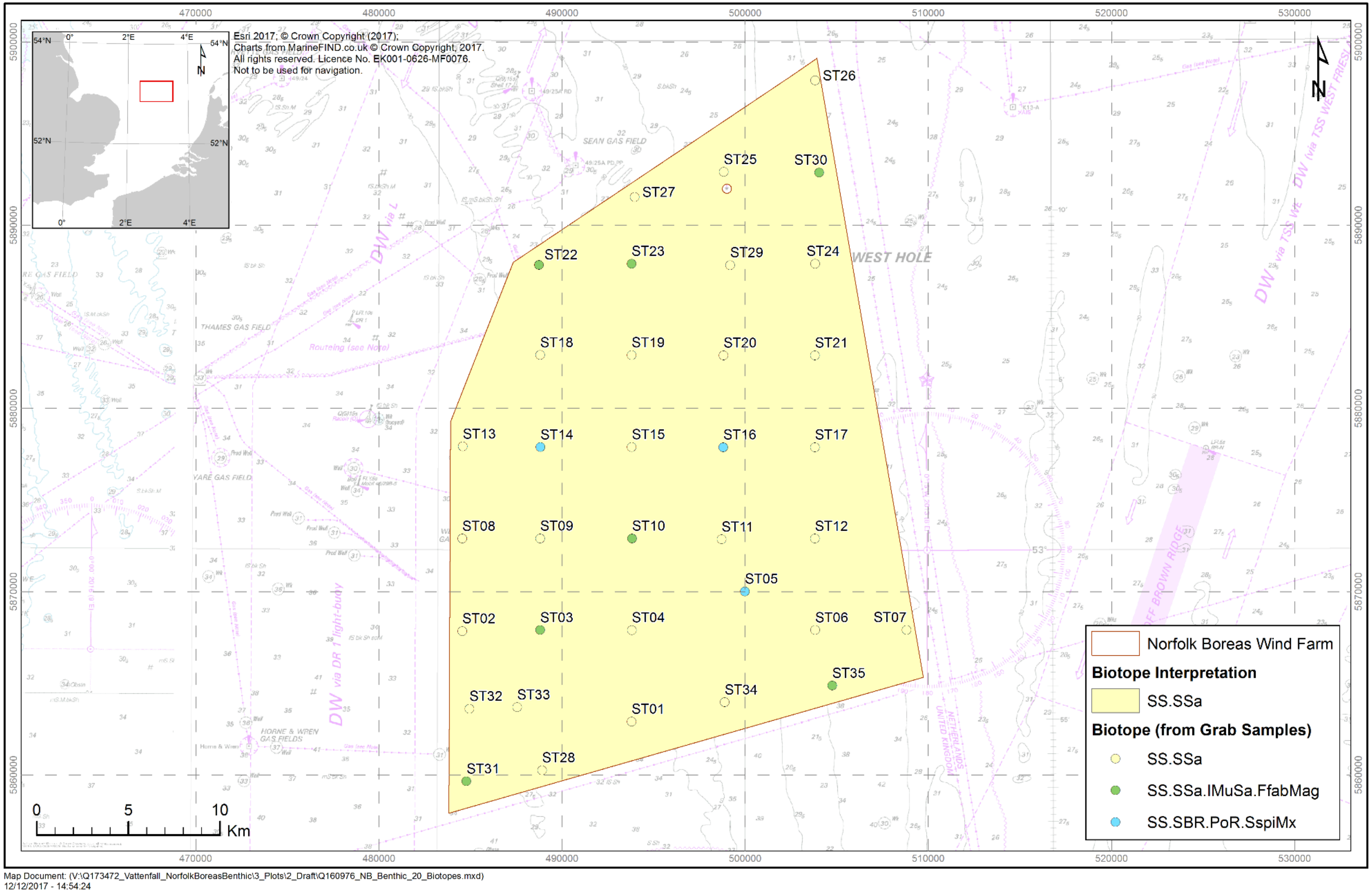


Figure 5.29: Spatial distribution of habitats and biotopes across Norfolk Boreas OWF survey area

6. DISCUSSION

6.1 Seabed Video Footage

Results of the seabed video footage showed a single habitat within the study area, featuring rippled sand with shell fragments and small amount of gravel. The presence of ripples is indicative of sediment disturbance, such as that associated with hydrodynamics. Large areas of rippled sand and other un-cohesive cover comprising superficial sand and silt with various amount of gravel are ubiquitous throughout much of the North Sea (BGS, 2002).

Characteristic epibenthic species included arthropods, such as *Pagurus bernhardus* and *Liocarcinus*, and molluscs, notably *Buccinum undatum* and bivalves of the Pectinidae family. Other notable motile species included echinoderms, such as *Asterias rubens*, *Psammechinus miliaris* and brittlestars of the Ophiuridae family. Sessile colonial epifauna comprised species of Actiniaria, *Sagartia*, *Urticina* and Sertulariidae. Fish species of the Pleuronectiformes order (e.g. *Limanda limanda* and *Buglossidium luteum*) and the Gadidae (e.g. *Merlangius merlangus*) and the Gobiidae families were recorded. The habitat and associated epibiotic communities recorded by the seabed video footage were comparable to those reported for the shallower sediment areas of the southern North Sea (Callaway et al., 2002 and Jennings et al., 1999).

The habitats and associated epibenthic communities recorded by the video footage were classified to habitats and biotopes where possible, which were subsequently assessed in terms of ecological and conservation importance under the current marine nature conservation legislation.

Stations ST05 and ST14, showed high abundances of the Ross worm *Sabellaria spinulosa* tubes, and were therefore assessed for potential biogenic reef, in line with the criteria outlined in Gubbay (2007). The overall assessment for these two stations was of low resemblance to *S. spinulosa* reef, based on patchiness (up to 83 %) and consolidation (low to medium).

In the North Sea, *S. spinulosa* occurs mostly as solitary or in small groups encrusting pebbles, shell and bedrock. Where conditions are favourable, much more extensive thin crusts can be formed, sometimes covering extensive areas of seabed. These crusts may be only seasonal features, being broken up during winter storms and quickly reforming through new settlement the following spring. Due to their ephemeral nature, these crusts, do not provide a stable biogenic habitat that enable associated species to become established in areas where they would otherwise be absent (UK BAP, 2008).

Under a narrow set of environmental conditions, *S. spinulosa* can form reefs consisting of hundreds or thousands of worm tubes that stand proud of the seafloor and extend over large areas of gravel and sandy seafloors usually at the edge of sand banks, drop-offs and channels. These structures are very variable in height, size and patchiness. They can be temporarily variable in their stability and favour areas of high turbidity and sediment load with moderate tidal currents and suspended particulate food matter (Limpenny et al., 2010).

It is reported that the stability of the reef is to some degree a function of the substratum, with the more transient crusts occurring principally on unstable substrata such as mobile sands, while longer lasting reefs could be limited to more stable substrata such as firm mixed sediments (Holt et al., 1998). Mobile sandy areas are therefore unlikely to support large reefs of *S. spinulosa*, and where these occur, they are likely to be very brittle (Limpenny et al., 2010). Indeed, even established Annex I *S. spinulosa* reef features, such that of the Saturn Reef, are potentially highly ephemeral, as demonstrated by changes in location and boundaries, associated with natural variability rather than anthropogenic impact (Jenkins et al., 2015).

6.2 Grab Samples

6.2.1 Sediment Particle Size Analysis (PSA)

Sediment across the survey area comprised mainly sand (≥ 93 %) with small amount of gravel (<3 %) and mud (≤ 4 %). Gravel content showed little variability across the survey area. Mud content did notably vary, with two stations comprising up to 20 % mud. Therefore, sediment at these two stations was very poorly sorted, while most stations showed well sorted, and moderately sorted sediment. Poorly sorted sediment characterised stations with a gravel content of up to 7 % and mud content of up to 13 %. In situ field observations recorded shells in samples from 33 stations, and gravel in samples from 8 stations, which is of relevance as the PSA does not discern between gravel and shell fragments. These sediments are typical of the southern North Sea, where offshore seabed is mainly sand with patches of gravel, sandy mud and sandy gravel, whereas sandy gravel is found closer to the shore (Jones et al., 2005).

6.2.2 Sediment Chemistry

Organic content, in the form of total organic matter (TOM) showed a strong relationship with mud, as would be expected, due to the surface volume ratio of finer sediment particles. The occurrence and distribution of the faunal communities in the current study were not influenced by TOM.

Of the metals analysed, arsenic showed concentration above Effect Range Low (ERL), at all stations, and between Cefas Action Level (AL) 1 and AL2 at 2 stations. All other metals analysed showed concentrations below the marine sediment quality guidelines. Natural sources of arsenic in the marine environment include (but are not limited to) remobilisation and erosion of arsenic-rich rocks (Research Council of Norway, 2012), which vary naturally according to local geology. Anthropogenic sources include mining and smelting (Research Council of Norway, 2012), and burning of fossil fuel (ICES, 2004). Due to the high natural occurrence of this metal, it is often difficult to precisely discern between natural and anthropogenic sources of this metal (OSPAR, 2005). However, high arsenic concentrations in the outer Thames estuary, and the south-west Dogger Bank and Norfolk may be associated with a history of arsenical waste disposal in the Thames estuary (Whalley et al., 1999). The arsenic concentrations in the current study (8.8 mg/kg to 37 mg/kg) were within the range reported for the southern North Sea (< 0.15 mg/kg to 135 mg/kg) (Whalley et al., 1999).

Of the metals with higher toxicity potential to the environment, cadmium was below the minimum reporting value (MRV) at all stations, while quantifiable concentration of mercury was recorded at station ST05 and was below the marine sediment quality standards. Indeed, ST05 showed peak concentrations of chromium, nickel and lithium, and may be associated with the mud content at this station, as finer sediment offers a bigger surface to volume ratio for metals to sorb onto (Davis, 2004).

Total hydrocarbons (THC) concentrations were within the values recorded for this region of the North Sea. Previous studies have reported total hydrocarbon concentration as high as 120 mg/kg in the gas field area off north Norfolk (Cefas, 2001), compared to the highest value of 23.7 mg/kg recorded within

Norfolk Boreas OWF, which is within the range of 17 mg/kg and 33 mg/kg recorded for the central and northern North Sea respectively (Cefas, 2001).

Quantifiable concentrations of polycyclic aromatic hydrocarbons (PAH) were recorded in samples from stations ST05, ST16 and ST23, and were below the marine sediment quality guidelines, and are therefore not considered to be detrimental to the marine environment. The PAH levels at the remaining stations were below the minimum reporting value.

Polychlorinated biphenyls and organotins were below the MRV in samples from all stations.

6.3 Macrobenthic Communities

Results of the biological analyses indicated the presence of infaunal macrobenthic communities dominated by *S. spinulosa*, although this species was restricted within the survey area. Molluscs were mainly represented by the bivalves, *Fabulina fabula*, *Abra alba* and *Tellimya ferruginosa*, while arthropods were dominated by the amphipods *Urothoe poseidonis and Photis longicaudata* and the cumacean *Diastylis laevis.* The crab *Pisidia longicornis*, although numerically dominant within the arthropods showed low frequency of occurrence. Echinoderms comprised the sea urchin *Echinocyamus pusillus*, the brittlestars *Amphipholis squamata and Ophiura albida*, and *Echinocardium cordatum*. Epifaunal communities were represented mainly by low-lying bryozoans and, less often, cnidarians, with *Aspidelectra melolontha* being the most frequently recorded.

The benthic communities identified by grab sampling were found to be associated with the sediment type, in line with the current literature which report bathymetry and granulometry as being the major physical variables affecting macrofaunal occurrence and distribution in the North Sea (Glémarec, 1973; Künitzer et al., 1992; Reiss et al., 2010; Callaway et al., 2002; McGlade, 2002; ICES, 2008). The sediment is reported to be more important than depth for determining the distribution of polychaetes in the North Sea (Künitzer et al., 1992), particularly where the bathymetric range is minimal, this being the case for Norfolk Boreas OWF survey area.

Infauna biomass within the Norfolk Boreas OWF was high, particularly when compared to the average macrofaunal biomass for the whole North Sea, which is reported to be 7 AFDWg.m^{-2} (Heip et al., 1992), compared to 16.7 AFDWg.m^{-2} of the current study. These results are in line with those reported for the North Sea, which indicate an increase of biomass towards the shallower southern North Sea reaching highest values south of the Dogger Bank (North Sea Task Force, 1993).

The results of the multivariate analysis highlighted the presence of two groups of samples, which differed little in terms of sediment and taxa composition, more in terms of infaunal abundance.

The smaller of the two groups, with slightly coarser and more heterogeneous sediment, was characterised by a dominance of *S. spinulosa*, which may have enhanced the structural complexity of the habitat as the rigid tube which this polychaete builds from sand and shell fragments provides structure and stability within the sediment, enabling the influx and establishment of other species (Limpenny et al., 2010). The high abundance of the polychaete *Spiophanes bombyx* was, however, also indicative of a certain degree of surface sediment disturbance (De-Bastos, and Marshall, 2016).

The larger of the two groups was predominantly sandy, and dominated by the bivalves *Fabulina fabula* and *Abra alba*. These species are indicative of relatively stable habitats (Tillin and Rayment, 2016), albeit the presence of amphipods, such as *Urothoe poseidonis* and polychaetes such as *Nephtys cirrosa* are indicative of sediment disturbance associated with tidal movement and/or wave action (Tillin 2016).

Both groups showed low degree of similarity and several invertebrates, such as *Scalibregma inflatum* and *Sthenelais limicola* were characterising species of both groups. Indeed, the difference between the groups was associated primarily with species abundance rather than species composition.

In general, the results are indicative of a dynamic seabed sediment subject to a degree of physical disturbance with subsequent reworking of the sediments which prevents the establishment of stable biotic communities. At the same time, sand grains, put into suspension by strong water movement, are key environmental factors for the establishment and survival of *S. spinulosa* tubes (UK BAP, 2008). The presence of small percentages of gravel and mud contributes to a degree of sediment compactness which allows the establishment of species such as *F. fabula* and *A. alba*. These species occur in more compacted sand, with less sediment transport, which represent transitional areas between dynamic offshore and relatively stable nearshore environments (Tillin and Rayment, 2016). The macrobenthic infauna of sandy habitats include animals which feed largely on particulate matter in/on the sand, and which are themselves preyed upon by populations of juvenile flatfish, and other infaunal predators. Therefore, their number is likely to be closely related to that of their prey, which includes other polychaetes and small crustaceans, creating a degree of variation in community composition (Tillin 2016).

The habitats and biotopes recorded within the Norfolk Boreas OWF were contextualised with those from the Vanguard OWF (Fugro, 2017), and the results presented in Figure 6.1. When interpreting the habitats presented in Figure 6.1, it is worth noting that the Vanguard biotopes were classified using a combination of historical SSS data and single point grab samples. Historical SSS data indicated that the biotope complex SS.SCS.CCS was the most common, within the Vanguard East and West sites, with no obvious demarcation between the two sites. Results of the single point grab samples within Vanguard East also showed stations featuring SS.SCS.CCS, SS.Ssa.MuSa, and a mosaic of SS.SSA.CFiSa/ SS.SSA.MuSa. However, the habitat for the entire survey area was extrapolated based on the SSS data, and the lack of demarcation between the areas in Vanguard East and West suggested the same habitat occurred, albeit single grab sampling point showed the presence of sand. The Vanguard report also states that, the historical study highlighted the presence of megaripples, sand waves, tidal sand ridges and sand ribbons within the survey area. The presence of these features indicates a highly hydrodynamic environment, which suggests that these features are likely to be mobile over time and therefore, their presence, in 2017 cannot be confirmed due to lack of current SSS data. In addition, the biotopes characterised by finer sediments, identified within Norfolk Vanguard East main site, and apparently in contrast with the historical SSS signature, reflect a highly hydrodynamic environment. In the time span between the historical and the current surveys, the seabed characteristics may have changed: new areas of exposed finer sediment may have replaced the previously observed ones and the previously observed seabed features will have moved.

It is worth noting that the biotope SS.SCS.CCS.MedLumVen, recorded within Norfolk Vanguard is part of the Deep Venus community and Boreal offshore gravel association, as is the biotope

SS.SSA.IMuSa.FfabMag, recorded within the Norfolk Boreas OWF. The Deep Venus community and Boreal offshore sand association, are comparable to the fauna characteristic of the subtidal mobile sandbanks (Elliott et. al 1998), typical offshore of the Norfolk coast. In addition, the biotope SS.SCS.CCS.Pkef can be considered as a disturbed or transitional variant of SS.SCS.CCS.MedLumVen due to physical disturbance, such as that associated with storm events. The biotope SS.SSa.CMuSa.AalbNuc is similar to SS.SSA.IMuSa.FfabMag, and separates due to the relative dominance of *Abra alba* and species of *Nucula* in AalbNuc and the increased proportion of amphipods such as *Bathyporeia*. Therefore, the biotopes recorded across Vanguard and Boreas have a high degree of similarity.

Results concur with the European Nature Information System (EUNIS) habitats known to occur offshore the Norfolk coast (see also Section 1.4), and with Jenkins et al (2015) who report that Sublittoral Sand, Sublittoral Mixed Sediments and Sublittoral Coarse Sediments occur as a mosaic within the Saturn reef SCI, with some pockets of Sublittoral Mud, the latter based on single points grab samples. These habitats are typical of this region of the southern North Sea, which comprises sand and gravelly sand offshore and up to 50 km from the coast off Holderness, Lincolnshire and North Norfolk. The regional sediment distribution reflects the level of hydrodynamic forcing (including waves) with finer sediments in the deeper waters, where tidal velocities and wave stirring are reduced, and coarse and medium sands in the highly mobile nearshore zones. Muddy sediments are also found locally in estuaries and embayments, and offshore of some rivers/estuaries (HR Wallingford, 2002). It can therefore be extrapolated with a high degree of confidence that seabed habitats to the west of the Norfolk Boreas OWF are likely to comprise sand (SS.SSa), the seabed sediment grading into coarser habitat (SS.SCS.CCS) nearshore.

6.4 Species of Nature Conservation Interest

Of the Ammodytidae, the lesser sandeel *Ammodytes marinus* is listed as a UK BAP priority species (JNCC, 2016c). Sandeels play a key role in the North Sea food-web as they are major predators of zooplankton and the principal prey of many top predators including marine mammals and birds, including: guillemot, razorbill, puffin and terns. The arctic tern and puffin rely on populations of sandeel as their predominant food source. The sandeel is also an important food source for wintering birds such as scoters, little terns and red-throated divers (Tillin, 2016). Sandeels are also target of a large-scale industrial fishery in the North Sea.

Of the Pleuronectiformes, the solenette *Buglossidium luteum* and the dab *Limanda limanda* are on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species as species of least concern (Munroe and Herdson, 2010; Monroe et al., 2014), and so is the pogge *Agonus cataphractus* (Florin et al., 2014). Pleuronectiformes and Ammodytes are considered characteristics of Sandbanks which are slightly covered by sea water all the time (Interpretation Manual - EUR28, 2013). However, many of the fish observed on the sandbanks are widely distributed in other sandy habitats on the continental shelf. Therefore, the species of sandbank communities may simply be based on a specialized niche of the sand-associated fauna of the region, rather than being obligate sandbank species, and as such, occur on other sandy habitats in other regions. It is the local abundance of selected species which is potentially indicative of such habitats (Ellis, et al., 2011). In the current study, the abundance of Pleuronectiformes was estimated to be occasional to frequent, that of Ammodytidae frequent.

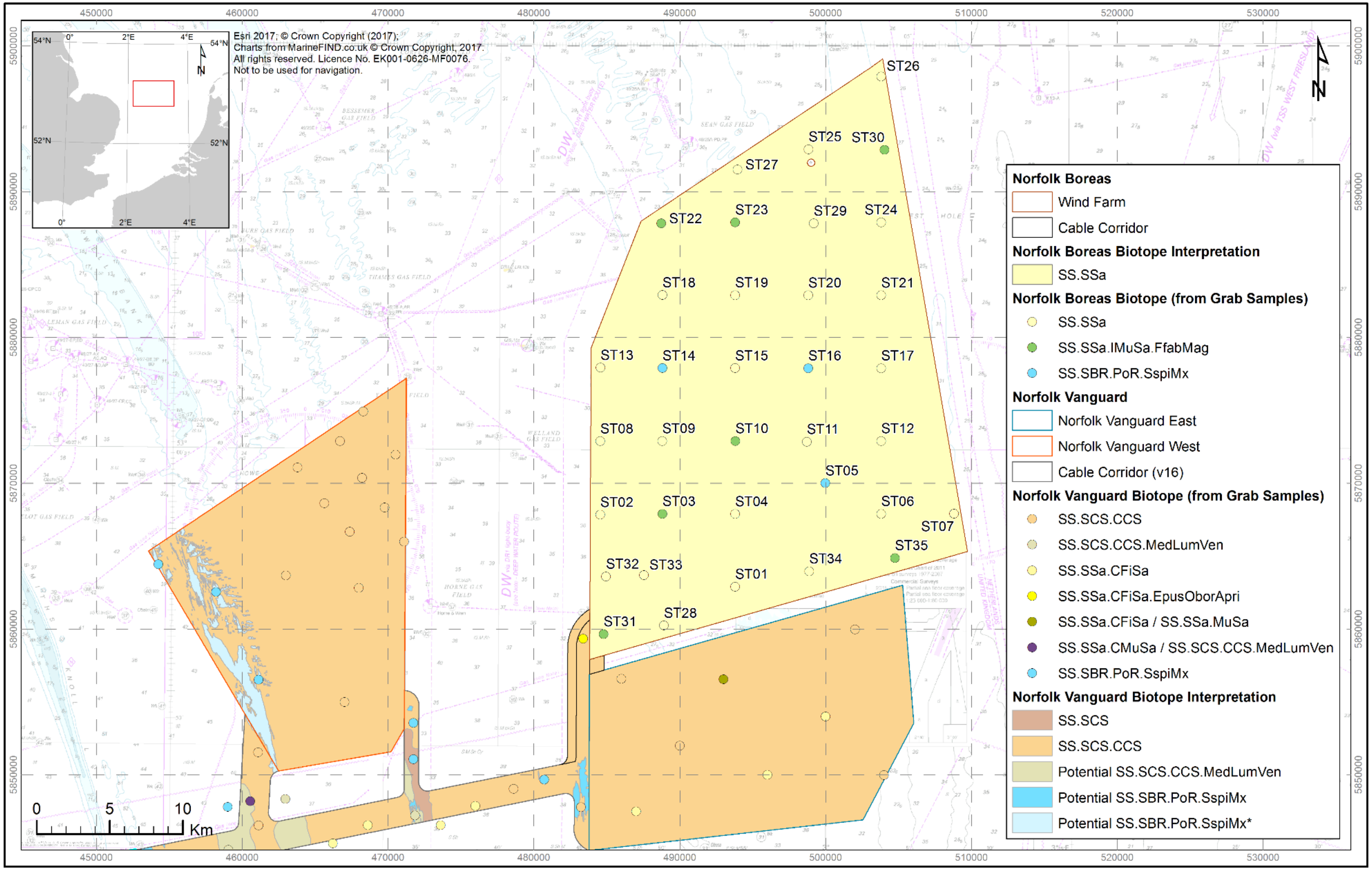


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Figure 6.1: Spatial distribution of habitats and biotopes across Norfolk Boreas and Vanguard OWFs survey areas

7. CONCLUSIONS

Results of environmental investigation of the Norfolk Boreas OWF by seabed video footage showed sandy sediment, with a small component of shells and gravel across the entire survey area. Sand ripples were recorded at most stations. Echinoderms were most frequently occurring and included brittlestars and starfish. Arthropoda were also very frequently occurring, and included hermit crabs and crabs. Fish were the most diverse taxon, and included: Pleuronectiformes, Gadidae, Triglidae, Ammodytidae, Gobiidae and Rajidae. Cnidaria, Mollusca and Annelida were also recorded. Tubes of the Ross worm *Sabellaria spinulosa* were recorded at high abundances at two stations, which were further assessed in terms of potential biogenic reef. Results indicated low resemblance to *S. spinulosa* reef at both stations and Annex I reef was not present.

Results of grab sampling showed that sediment across the survey area comprised mainly sand, with samples peaking in the medium and fine sand regions. Gravel content was low and varied little across the survey area, while mud showed large variations with most stations being totally devoid of mud and selected stations showing just over 20 % mud. Most stations showed well sorted to moderately sorted sediment. Four sediment classes were identified, in line with the Folk classification, and included: slightly gravelly sand, gravelly sand, slightly gravelly muddy sand, and gravelly muddy sand.

TOM across the survey area was comparable as a representative of TOC measurements for the North Sea. TOM showed a spatial pattern of distribution closely associated with sediment type.

Total hydrocarbon (THC) concentrations were within the values recorded for the North Sea. Quantifiable concentrations of polycyclic aromatic hydrocarbons (PAH) were consistently below the Canadian marine sediment quality guidelines.

Results of polychlorinated biphenyls (PCBs) and organotins concentrations, were consistently below the minimum reporting value (MRV).

Of the metals analysed, arsenic showed concentrations above the Effect Range Low (ERL) in samples from all stations and between Centre for Environment, Fisheries and Aquaculture Science (Cefas) Action Level (AL) 1 and AL 2 at 2 stations. However, the concentrations of arsenic recorded are within the range reported to be typical of the southern North Sea. The concentrations of all other metals analysed were consistently below the marine sediment quality guidelines.

Results of the biological analysis of grab samples showed an infaunal community of good diversity, dominated by the annelids, followed by the crustaceans, molluscs, echinoderms and other taxa. *S. spinulosa* was numerically dominant, but restricted in terms of distribution, with most of this species' abundance recorded at two stations. The polychaete *Spiophanes bombyx*, was also abundant and most frequently occurring of the annelids, indicating a degree of surface sediment disturbance. Of the arthropods, the long-clawed porcelain crab *Pisidia longicornis* was numerically dominant, whereas the amphipod *Urothoe poseidonis* was the most frequently occurring. Molluscs were dominated by the bivalves *Fabulina fabula*, *Abra alba* and *Kurtiella* (formerly *Mysella*) *bidentata*. Of the echinoderms, the sea urchin *Echinocyamus pusillus* was dominant in terms of abundance and frequency of occurrence; other notable species included brittlestars, and the sea potato *Echinocardium cordatum*. Other taxa comprised horseshoe worms, ribbon worms, the sea anemone *Cerianthus lloydii*, and flatworms.

Epifaunal communities were represented mainly by low-lying bryozoans and less often cnidarians. The benthic communities identified by grab sampling were associated with the sediment type.

Infaunal biomass was higher than the average macrofaunal biomass for the whole North Sea but typical of the shallower southern North Sea.

Results of the multivariate analysis identified two groups of samples, both showing low degree of similarity. The groups differed mainly for species abundance rather than species composition. In general, the results are indicative of a dynamic seabed sediment subject to a degree of physical disturbance with subsequent reworking of the sediments which prevents the establishment of stable biotic communities. At the same time, sand grains, put into suspension by strong water movement, are key environmental factors for the establishment and survival of *S. spinulosa* tubes. The presence of small percentages of gravel and mud contributes to a degree of sediment compactness which allows the establishment of species such as *F. fabula* and *A. alba*, which are typical of more compacted sand, with less sediment transport. These habitats often represent transitional areas between dynamic offshore and relatively stable nearshore environments.

Results of the multivariate analysis of the sediment grab samples were assessed in conjunction with the results of the seabed video footage in terms of biotopes, in line with the current Marine Habitat Classification for Britain and Ireland and the corresponding European Nature Information System (EUNIS).

Three biotopes were recorded and included:

i. Sublittoral sands and muddy sands (SS.SSa, A5.2);
ii. *Sabellaria spinulosa* on stable circalittoral mixed sediment (SS.SBR.PoR.SspiMx, A5.611);
iii. *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (SS.SSA.IMuSa.FfabMag, A5.242).

The seabed video footage recorded species of sandeels (Ammodytidae) and flatfish (Pleuronectiformes). Of the Ammodytes, *Ammodytes marinus*, is listed as UK BAP priority species. Of the Pleuronectiformes, the solenette *Buglossidium luteum* and the dab *Limanda limanda*, and the pogge *Agonus cataphractus* are on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species as species of least concern.

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APPENDICES

A. GUIDELINES ON USE OF REPORT

This report (the ”Report”) was prepared as part of the services (the “Services”) provided by Fugro GB Marine Limited (‘’Fugro’’) for its client (the “Client”) and in accordance with the terms of the relevant contract between the two parties (the Contract”). The Services were performed by Fugro in accordance with the obligations in the Contract and based on requirements of the Client set out in the Contract or otherwise made known by the Client to Fugro and any other information affecting the Services at the time; save that the extent to which Fugro relied on Client or third party information in carrying out the Services was set out in the Contract.

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B. LOGS

B.1 SURVEY LOGS

B.1.1 Video Survey Log

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location Easting [m]	Actual Location Northing [m]	Notes
12/08/2017	13:44	TR26	Vid	SOL	74	26	503 975.2	5 897 856.6	
12/08/2017	13:48	TR26	Still	161218_TR26_03	75		503 915.5	5 897 894.5	
12/08/2017	13:49	TR26	Still	161218_TR26_04	76		503 891.2	5 897 884.2	
12/08/2017	13:50	TR26	Still	161218_TR26_05	77		503 872.5	5 897 860.5	
12/08/2017	13:52	TR26	Still	161218_TR26_06	78		503 843.5	5 897 888.6	
12/08/2017	13:52	TR26	Still	161218_TR26_07	79		503 840.6	5 897 892.6	
12/08/2017	13:52	TR26	Still	161218_TR26_08	80		503 834.7	5 897 899.1	
12/08/2017	13:53	TR26	Still	161218_TR26_09	81		503 826.4	5 897 906.0	
12/08/2017	13:54	TR26	Still	161218_TR26_10	82		503 820.2	5 897 915.3	
12/08/2017	13:55	TR26	Still	161218_TR26_11	83		503 800.2	5 897 925.2	
12/08/2017	13:56	TR26	Still	161218_TR26_12	84		503 776.1	5 897 918.7	
12/08/2017	13:56	TR26	Still	161218_TR26_13	85		503 763.1	5 897 903.3	
12/08/2017	13:57	TR26	Still	161218_TR26_14	86	26	503 743.3	5 897 889.4	
12/08/2017	13:58	TR26	Vid	EOL	87		503 716.3	5 897 948.6	
12/08/2017	14:54	TR30	Vid	SOL	88	NA	504 166.8	5 892 836.7	
12/08/2017	14:55	TR30	Still	161218_TR30_02	89		504 139.9	5 892 834.1	
12/08/2017	14:55	TR30	Still	161218_TR30_03	90		504 131.3	5 892 845.8	
12/08/2017	14:56	TR30	Still	161218_TR30_04	91		504 125.2	5 892 883.0	
12/08/2017	14:57	TR30	Still	161218_TR30_05	92		504 115.3	5 892 912.6	
12/08/2017	14:57	TR30	Still	161218_TR30_06	93		504 107.1	5 892 921.7	
12/08/2017	14:58	TR30	Still	161218_TR30_07	94		504 081.8	5 892 940.3	
12/08/2017	15:00	TR30	Vid	EOL	95	27	504 051.6	5 892 946.3	Line aborted - outside tolerance
12/08/2017	15:35	TR30	Vid	SOL	96	27	504 251.1	5 892 831.8	
12/08/2017	15:39	TR30	Still	161218_TR30.3_03	97		504 153.1	5 892 854.5	
12/08/2017	15:39	TR30	Still	161218_TR30.3_04	98		504 140.3	5 892 860.0	
12/08/2017	15:40	TR30	Still	161218_TR30.3_05	99		504 121.8	5 892 857.3	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
12/08/2017	15:41	TR30	Still	161218_TR30.3_06	100		504 091.6	5 892 861.0	
12/08/2017	15:42	TR30	Still	161218_TR30.3_07	101		504 068.0	5 892 866.4	
12/08/2017	15:43	TR30	Still	161218_TR30.3_08	102		504 065.8	5 892 900.5	
12/08/2017	15:44	TR30	Still	161218_TR30.3_09	103		504 068.4	5 892 920.3	
12/08/2017	15:44	TR30	Still	161218_TR30.3_10	104		504 071.7	5 892 930.4	
12/08/2017	15:45	TR30	Still	161218_TR30.3_11	105		504 066.3	5 892 949.7	
12/08/2017	15:47	TR30	Still	161218_TR30.3_12	106		504 047.7	5 892 954.9	
12/08/2017	15:48	TR30	Still	161218_TR30.3_13	107		504 045.6	5 892 954.3	
12/08/2017	15:48	TR30	Still	161218_TR30.3_14	108		504 041.2	5 892 953.7	
12/08/2017	15:49	TR30	Still	161218_TR30.3_15	109		504 019.1	5 892 938.8	
12/08/2017	15:50	TR30	Still	161218_TR30.3_16	110		504 005.9	5 892 935.9	
12/08/2017	15:50	TR30	Vid	EOL	110	27	504 005.9	5 892 935.9	
12/08/2017	16:23	TR24	Vid	SOL	111	28	503 844.1	5 887 997.2	
12/08/2017	16:23	TR24	Still	161218_TR24_02	112		503 841.0	5 887 983.2	
12/08/2017	16:24	TR24	Still	161218_TR24_03	113		503 837.5	5 887 972.1	
12/08/2017	16:25	TR24	Still	161218_TR24_04	114		503 825.0	5 887 952.7	
12/08/2017	16:25	TR24	Still	161218_TR24_05	115		503 821.4	5 887 937.0	
12/08/2017	16:26	TR24	Still	161218_TR24_06	116		503 814.6	5 887 916.4	
12/08/2017	16:27	TR24	Still	161218_TR24_07	117		503 810.3	5 887 906.3	
12/08/2017	16:27	TR24	Still	161218_TR24_08	118		503 805.1	5 887 895.5	
12/08/2017	16:28	TR24	Still	161218_TR24_09	119		503 804.8	5 887 888.5	
12/08/2017	16:28	TR24	Still	161218_TR24_10	120		503 799.1	5 887 879.9	
12/08/2017	16:29	TR24	Still	161218_TR24_11	121		503 789.5	5 887 865.2	
12/08/2017	16:29	TR24	Vid	EOL	121	28	503 789.5	5 887 865.2	Line aborted - Equipment fault
12/08/2017	18:33	TR24	Vid	SOL	125	29	503 838.2	5 888 003.2	
12/08/2017	18:33	TR24	Still	161218_TR24.2_02	125		503 838.2	5 888 003.2	
12/08/2017	18:34	TR24	Still	161218_TR24.2_03	126		503 836.5	5 887 993.0	
12/08/2017	18:34	TR24	Still	161218_TR24.2_04	127		503 835.0	5 887 983.0	
12/08/2017	18:35	TR24	Still	161218_TR24.2_05	128		503 830.8	5 887 964.4	
12/08/2017	18:36	TR24	Still	161218_TR24.2_06	129		503 824.1	5 887 952.3	
12/08/2017	18:36	TR24	Still	161218_TR24.2_07	130		503 820.2	5 887 940.9	
12/08/2017	18:37	TR24	Still	161218_TR24.2_08	131		503 813.5	5 887 922.0	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
12/08/2017	18:38	TR24	Still	161218_TR24.2_09	132		503 809.1	5 887 911.5	
12/08/2017	18:38	TR24	Still	161218_TR24.2_10	133		503 807.5	5 887 901.9	
12/08/2017	18:39	TR24	Still	161218_TR24.2_11	134		503 802.4	5 887 886.8	
12/08/2017	18:39	TR24	Still	161218_TR24.2_12	135		503 796.1	5 887 872.0	
12/08/2017	18:40	TR24	Still	161218_TR24.2_13	136		503 788.2	5 887 847.0	
12/08/2017	18:41	TR24	Still	161218_TR24.2_14	137		503 782.8	5 887 819.8	
12/08/2017	18:42	TR24	Still	161218_TR24.2_15	138		503 779.9	5 887 809.2	
12/08/2017	18:42	TR24	Still	161218_TR24.2_16	139		503 778.6	5 887 802.4	
12/08/2017	18:42	TR24	Vid	EOL	139	29	503 778.6	5 887 802.4	High density particulates
12/08/2017	19:14	TR21	Vid	SOL	140	28	503 868.0	5 883 040.3	
12/08/2017	19:16	TR21	Still	161218_TR21_02	141		503 861.0	5 883 011.1	
12/08/2017	19:17	TR21	Still	161218_TR21_03	142		503 854.9	5 882 996.2	
12/08/2017	19:17	TR21	Still	161218_TR21_04	143		503 849.1	5 882 982.9	
12/08/2017	19:18	TR21	Still	161218_TR21_05	144		503 840.6	5 882 968.4	
12/08/2017	19:18	TR21	Still	161218_TR21_06	145		503 838.9	5 882 963.6	
12/08/2017	19:18	TR21	Still	161218_TR21_07	146		503 837.8	5 882 960.3	
12/08/2017	19:20	TR21	Still	161218_TR21_08	147		503 830.7	5 882 931.9	
12/08/2017	19:20	TR21	Still	161218_TR21_09	148		503 826.3	5 882 924.1	
12/08/2017	19:21	TR21	Still	161218_TR21_10	149		503 815.0	5 882 905.6	
12/08/2017	19:21	TR21	Still	161218_TR21_11	150		503 812.0	5 882 895.6	
12/08/2017	19:22	TR21	Still	161218_TR21_12	151		503 805.5	5 882 878.0	
12/08/2017	19:23	TR21	Still	161218_TR21_13	152		503 798.2	5 882 859.1	
12/08/2017	19:23	TR21	Still	161218_TR21_14	153		503 790.1	5 882 838.2	
12/08/2017	19:24	TR21	Still	161218_TR21_15	154		503 786.4	5 882 830.8	
12/08/2017	19:24	TR21	Still	161218_TR21_16	155		503 784.1	5 882 822.2	
12/08/2017	19:25	TR21	Still	161218_TR21_17	156		503 781.7	5 882 811.0	
12/08/2017	19:25	TR21	Still	161218_TR21_18	157		503 778.9	5 882 804.1	
12/08/2017	19:25	TR21	Vid	EOL	157		503 778.9	5 882 804.1	
12/08/2017	20:09	TR17	Vid	SOL	158	27	503 865.5	5 878 011.2	
12/08/2017	20:10	TR17	Still	161218_TR17_02	159		503 849.0	5 877 995.2	
12/08/2017	20:10	TR17	Still	161218_TR17_03	160		503 848.7	5 877 980.6	
12/08/2017	NA	TR17	Still	161218_TR17_04	161		503 846.4	5 877 974.2	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
12/08/2017	NA	TR17	Still	161218_TR17_05	162		503 842.8	5 877 962.8	
12/08/2017	NA	TR17	Still	161218_TR17_06	163		503 835.1	5 877 945.7	
12/08/2017	20:13	TR17	Still	161218_TR17_07	164		503 829.5	5 877 938.1	
12/08/2017	20:14	TR17	Still	161218_TR17_08	165		503 819.5	5 877 917.8	
12/08/2017	20:14	TR17	Still	161218_TR17_09	166		503 815.3	5 877 904.9	
12/08/2017	20:14	TR17	Still	161218_TR17_10	167		503 812.2	5 877 896.7	
12/08/2017	20:15	TR17	Still	161218_TR17_11	168		503 808.7	5 877 884.8	
12/08/2017	20:15	TR17	Still	161218_TR17_12	169		503 807.7	5 877 881.7	
12/08/2017	20:16	TR17	Still	161218_TR17_13	170		503 802.4	5 877 864.1	
12/08/2017	20:17	TR17	Still	161218_TR17_14	171		503 793.5	5 877 845.0	
12/08/2017	20:18	TR17	Still	161218_TR17_15	172		503 783.8	5 877 827.1	
12/08/2017	20:18	TR17	Still	161218_TR17_16	173		503 780.6	5 877 807.6	
12/08/2017	20:18	TR17	Vid	EOL	173	28	503 780.6	5 877 807.6	
12/08/2017	21:04	TR12	Vid	SOL	174	31	503 856.5	5 873 023.7	
12/08/2017	21:04	TR12	Still	161218_TR12_02	175		503 847.0	5 873 003.9	
12/08/2017	21:04	TR12	Still	161218_TR12_03	176		503 845.2	5 873 000.5	
12/08/2017	21:05	TR12	Still	161218_TR12_04	177		503 836.9	5 872 987.5	
12/08/2017	21:05	TR12	Still	161218_TR12_05	178		503 835.0	5 872 982.2	
12/08/2017	21:06	TR12	Still	161218_TR12_06	179		503 832.1	5 872 961.4	
12/08/2017	21:06	TR12	Still	161218_TR12_07	180		503 829.8	5 872 953.4	
12/08/2017	21:07	TR12	Still	161218_TR12_08	181		503 826.4	5 872 937.8	
12/08/2017	21:07	TR12	Still	161218_TR12_09	182		503 824.4	5 872 924.1	
12/08/2017	21:08	TR12	Still	161218_TR12_10	183		503 821.4	5 872 912.1	
12/08/2017	21:08	TR12	Still	161218_TR12_11	184		503 819.6	5 872 903.9	
12/08/2017	21:09	TR12	Still	161218_TR12_12	185		503 814.6	5 872 883.9	
12/08/2017	21:09	TR12	Still	161218_TR12_13	186		503 809.7	5 872 873.2	
12/08/2017	21:10	TR12	Still	161218_TR12_14	187		503 802.4	5 872 857.1	
12/08/2017	21:11	TR12	Still	161218_TR12_15	188		503 796.3	5 872 844.9	
12/08/2017	21:11	TR12	Still	161218_TR12_16	189		503 790.3	5 872 830.4	
12/08/2017	21:12	TR12	Still	161218_TR12_17	190		503 788.7	5 872 814.1	
12/08/2017	21:12	TR12	Still	161218_TR12_18	191		503 787.2	5 872 807.7	
12/08/2017	21:12	TR12	Vid	EOL	191	31	503 787.2	5 872 807.7	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
12/08/2017	22:05	TR07	Vid	SOL	192	29	508 891.4	5 867 903.6	
12/08/2017	22:05	TR07	Still	161218_TR07_02	192		508 891.4	5 867 903.6	
12/08/2017	22:05	TR07	Still	161218_TR07_03	193		508 878.6	5 867 896.8	
12/08/2017	22:06	TR07	Still	161218_TR07_04	194		508 864.9	5 867 897.7	
12/08/2017	22:06	TR07	Still	161218_TR07_05	195		508 859.5	5 867 902.3	
12/08/2017	22:07	TR07	Still	161218_TR07_06	196		508 846.6	5 867 909.2	
12/08/2017	22:08	TR07	Still	161218_TR07_07	197		508 815.3	5 867 900.5	
12/08/2017	22:08	TR07	Still	161218_TR07_08	198		508 808.0	5 867 898.3	
12/08/2017	22:09	TR07	Still	161218_TR07_09	199		508 788.2	5 867 900.6	
12/08/2017	22:09	TR07	Still	161218_TR07_10	200		508 776.5	5 867 899.0	
12/08/2017	22:09	TR07	Still	161218_TR07_11	201		508 771.8	5 867 897.6	
12/08/2017	22:10	TR07	Still	161218_TR07_12	202		508 750.8	5 867 897.6	
12/08/2017	22:11	TR07	Still	161218_TR07_13	203		508 740.1	5 867 898.3	
12/08/2017	22:11	TR07	Still	161218_TR07_14	204		508 724.5	5 867 899.2	
12/08/2017	22:11	TR07	Still	161218_TR07_15	205		508 716.4	5 867 899.2	
12/08/2017	22:12	TR07	Still	161218_TR07_16	206		508 702.3	5 867 899.6	
12/08/2017	22:12	TR07	Still	161218_TR07_17	207		508 687.9	5 867 900.7	
12/08/2017	22:13	TR07	Still	161218_TR07_18	208		508 682.5	5 867 900.9	
12/08/2017	22:13	TR07	Vid	EOL	208	30	508 682.5	5 867 900.9	
12/08/2017	22:47	TR35	Vid	SOL	209	34	504 787.5	5 864 800.7	
12/08/2017	22:47	TR35	Still	161218_TR35_02	209		504 787.5	5 864 800.7	
12/08/2017	22:47	TR35	Still	161218_TR35_03	210		504 783.3	5 864 807.1	
12/08/2017	22:49	TR35	Still	161218_TR35_04	211		504 771.5	5 864 821.4	
12/08/2017	22:49	TR35	Still	161218_TR35_05	212		504 762.8	5 864 832.9	
12/08/2017	22:50	TR35	Still	161218_TR35_06	213		504 760.5	5 864 839.9	
12/08/2017	22:50	TR35	Still	161218_TR35_07	214		504 757.6	5 864 847.7	
12/08/2017	22:51	TR35	Still	161218_TR35_08	215		504 756.2	5 864 856.3	
12/08/2017	22:52	TR35	Still	161218_TR35_09	216		504 741.8	5 864 865.3	
12/08/2017	22:52	TR35	Still	161218_TR35_10	217		504 735.5	5 864 878.8	
12/08/2017	22:53	TR35	Still	161218_TR35_11	218		504 725.6	5 864 893.4	
12/08/2017	22:54	TR35	Still	161218_TR35_12	219		504 717.2	5 864 902.9	
12/08/2017	22:54	TR35	Still	161218_TR35_13	220		504 708.7	5 864 911.0	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location Easting [m]	Actual Location Northing [m]	Notes
12/08/2017	22:55	TR35	Still	161218_TR35_14	221		504 700.8	5 864 923.8	
12/08/2017	22:56	TR35	Still	161218_TR35_15	222		504 688.8	5 864 940.7	
12/08/2017	22:57	TR35	Still	161218_TR35_16	223		504 679.3	5 864 951.5	
12/08/2017	22:57	TR35	Vid	EOL	224	43	504 677.9	5 864 953.8	
12/08/2017	23:39	TR06	Vid	SOL	225	31	503 864.5	5 867 798.1	
12/08/2017	23:40	TR06	Still	161218_TR06_02	226		503 857.8	5 867 821.3	
12/08/2017	23:41	TR06	Still	161218_TR06_03	227		503 842.0	5 867 829.4	
12/08/2017	23:42	TR06	Still	161218_TR06_04	228		503 829.6	5 867 842.4	
12/08/2017	23:42	TR06	Still	161218_TR06_05	229		503 842.0	5 867 856.1	
12/08/2017	23:43	TR06	Still	161218_TR06_06	230		503 839.2	5 867 877.0	
12/08/2017	23:44	TR06	Still	161218_TR06_07	231		503 818.8	5 867 881.0	
12/08/2017	23:46	TR06	Still	161218_TR06_08	232		503 797.4	5 867 910.9	
12/08/2017	23:46	TR06	Still	161218_TR06_09	233		503 806.8	5 867 924.7	
12/08/2017	23:47	TR06	Still	161218_TR06_10	234		503 787.0	5 867 930.7	
12/08/2017	23:48	TR06	Still	161218_TR06_11	235		503 788.9	5 867 937.6	
12/08/2017	23:49	TR06	Still	161218_TR06_12	236		503 785.0	5 867 962.1	
12/08/2017	23:50	TR06	Still	161218_TR06_13	237		503 763.9	5 867 977.4	
12/08/2017	23:50	TR06	Still	161218_TR06_14	238		503 761.1	5 867 982.3	
12/08/2017	23:51	TR06	Still	161218_TR06_15	239		503 762.3	5 868 004.4	
12/08/2017	23:51	TR06	Vid	EOL	240	30	503 763.7	5 868 015.1	
13/08/2017	00:12	TR06A	Vid	SOL	241	29	503 843.6	5 867 870.9	
13/08/2017	00:12	TR06A	Still	161218_TR06A_02	242		503 832.1	5 867 889.4	
13/08/2017	00:13	TR06A	Still	161218_TR06A_03	243		503 825.0	5 867 891.9	
13/08/2017	00:15	TR06A	Still	161218_TR06A_04	244		503 797.7	5 867 907.8	
13/08/2017	00:15	TR06A	Still	161218_TR06A_05	245		503 803.4	5 867 910.0	
13/08/2017	00:16	TR06A	Still	161218_TR06A_06	246		503 807.8	5 867 911.4	
13/08/2017	00:17	TR06A	Still	161218_TR06A_07	247		503 790.2	5 867 931.5	
13/08/2017	00:17	TR06A	Vid	EOL	248	29	503 784.6	5 867 933.6	
13/08/2017	01:01	TR34	Vid	SOL	249	38	498 916.8	5 863 845.7	
13/08/2017	01:03	TR34	Still	161218_TR34_02	250		498 897.4	5 863 863.8	
13/08/2017	01:03	TR34	Still	161218_TR34_03	251		498 929.7	5 863 886.4	
13/08/2017	01:05	TR34	Still	161218_TR34_04	252		498 927.7	5 863 904.2	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
13/08/2017	01:05	TR34	Still	161218_TR34_05	253		498 912.1	5 863 912.5	
13/08/2017	01:06	TR34	Still	161218_TR34_06	254		498 842.6	5 863 892.5	
13/08/2017	01:08	TR34	Still	161218_TR34_07	255		498 897.3	5 863 876.8	
13/08/2017	01:09	TR34	Still	161218_TR34_08	256		498 896.2	5 863 903.2	
13/08/2017	01:10	TR34	Still	161218_TR34_09	257		498 871.8	5 863 909.4	
13/08/2017	01:11	TR34	Still	161218_TR34_10	258		498 874.7	5 863 931.5	
13/08/2017	01:12	TR34	Still	161218_TR34_11	259		498 876.9	5 863 949.8	
13/08/2017	01:12	TR34	Still	161218_TR34_12	260		498 863.8	5 863 973.5	
13/08/2017	01:14	TR34	Still	161218_TR34_13	261		498 845.4	5 863 989.7	
13/08/2017	01:15	TR34	Still	161218_TR34_14	262		498 859.8	5 864 014.3	
13/08/2017	01:16	TR34	Still	161218_TR34_15	263		498 830.1	5 864 035.0	
13/08/2017	01:16	TR34	Still	161218_TR34_16	264		498 818.7	5 864 037.1	
13/08/2017	01:19	TR34	Still	161218_TR34_17	265		498 852.6	5 864 029.0	
13/08/2017	01:20	TR34	Still	161218_TR34_18	266		498 826.1	5 864 056.1	
13/08/2017	01:20	TR34	Vid	EOL	267	37	498 814.6	5 864 059.3	
13/08/2017	02:00	TR05	Vid	SOL	268	37	500 026.0	5 869 949.5	
13/08/2017	02:01	TR05	Still	161218_TR05_02	269		500 019.3	5 869 955.4	
13/08/2017	02:01	TR05	Still	161218_TR05_03	270		500 003.4	5 869 962.6	
13/08/2017	02:02	TR05	Still	161218_TR05_04	271		499 997.9	5 869 966.0	
13/08/2017	02:02	TR05	Still	161218_TR05_05	272		499 997.6	5 869 975.0	
13/08/2017	02:03	TR05	Still	161218_TR05_06	273		500 011.5	5 869 984.1	
13/08/2017	02:03	TR05	Still	161218_TR05_07	274		500 030.7	5 869 997.5	
13/08/2017	02:04	TR05	Still	161218_TR05_08	275		500 030.1	5 870 003.8	
13/08/2017	02:04	TR05	Still	161218_TR05_09	276		500 017.6	5 870 016.2	
13/08/2017	02:05	TR05	Still	161218_TR05_10	277		499 997.4	5 870 004.2	
13/08/2017	02:05	TR05	Still	161218_TR05_11	278		499 986.8	5 869 994.7	
13/08/2017	02:07	TR05	Still	161218_TR05_12	279		499 931.5	5 869 968.9	
13/08/2017	02:09	TR05	Still	161218_TR05_13	280		499 990.8	5 869 970.9	
13/08/2017	02:10	TR05	Still	161218_TR05_14	281		499 997.6	5 869 983.2	
13/08/2017	02:10	TR05	Still	161218_TR05_15	282		499 999.4	5 869 990.5	
13/08/2017	02:10	TR05	Still	161218_TR05_16	283		499 999.5	5 869 996.0	
13/08/2017	02:11	TR05	Still	161218_TR05_17	284		499 991.0	5 870 007.1	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location Easting [m]	Actual Location Northing [m]	Notes
13/08/2017	02:12	TR05	Still	161218_TR05_18	285		499 985.8	5 870 023.3	
13/08/2017	02:12	TR05	Still	161218_TR05_19	286		499 990.5	5 870 046.4	
13/08/2017	02:13	TR05	Still	161218_TR05_20	287		499 983.7	5 870 059.0	
13/08/2017	02:13	TR05	Still	161218_TR05_21	288		499 966.3	5 870 072.9	
13/08/2017	02:14	TR05	Still	161218_TR05_22	289		499 953.2	5 870 084.7	
13/08/2017	02:14	TR05	Still	161218_TR05_23	290		499 950.1	5 870 089.6	
13/08/2017	02:15	TR05	Still	161218_TR05_24	291		499 955.7	5 870 096.7	
13/08/2017	02:15	TR05	Still	161218_TR05_25	292		499 963.8	5 870 099.8	
13/08/2017	02:16	TR05	Still	161218_TR05_26	293		499 970.4	5 870 105.2	
13/08/2017	02:16	TR05	Still	161218_TR05_27	294		499 970.7	5 870 112.6	
13/08/2017	02:16	TR05	Vid	EOL	295	37	499 968.8	5 870 116.2	
13/08/2017	02:33	TR05A	Vid	SOL	296	37	500 055.7	5 869 735.8	
13/08/2017	02:33	TR05A	Still	161218_TR05A_02	297		500 059.0	5 869 747.8	
13/08/2017	02:34	TR05A	Still	161218_TR05A_03	298		500 061.4	5 869 765.4	
13/08/2017	02:35	TR05A	Still	161218_TR05A_04	299		500 068.5	5 869 788.0	
13/08/2017	02:35	TR05A	Still	161218_TR05A_05	300		500 064.3	5 869 803.1	
13/08/2017	02:36	TR05A	Still	161218_TR05A_06	301		500 058.2	5 869 808.8	
13/08/2017	02:36	TR05A	Still	161218_TR05A_07	302		500 054.6	5 869 812.2	
13/08/2017	02:37	TR05A	Still	161218_TR05A_08	303		500 051.5	5 869 832.5	
13/08/2017	02:38	TR05A	Still	161218_TR05A_09	304		500 081.5	5 869 839.9	
13/08/2017	02:39	TR05A	Still	161218_TR05A_10	305		500 092.9	5 869 864.8	
13/08/2017	02:40	TR05A	Still	161218_TR05A_11	306		500 085.3	5 869 877.5	
13/08/2017	02:41	TR05A	Still	161218_TR05A_12	307		500 053.9	5 869 882.8	
13/08/2017	02:41	TR05A	Still	161218_TR05A_13	308		500 023.4	5 869 876.8	
13/08/2017	02:43	TR05A	Still	161218_TR05A_14	309		499 975.2	5 869 866.0	
13/08/2017	02:44	TR05A	Still	161218_TR05A_15	310		499 971.5	5 869 870.5	
13/08/2017	02:45	TR05A	Still	161218_TR05A_16	311		500 018.2	5 869 888.9	
13/08/2017	02:46	TR05A	Still	161218_TR05A_17	312		500 044.5	5 869 904.6	
13/08/2017	02:47	TR05A	Still	161218_TR05A_18	313		500 050.9	5 869 909.8	
13/08/2017	02:48	TR05A	Still	161218_TR05A_19	314		500 056.4	5 869 929.5	
13/08/2017	02:48	TR05A	Still	161218_TR05A_20	315		500 036.7	5 869 946.7	
13/08/2017	02:49	TR05A	Still	161218_TR05A_21	316		500 018.4	5 869 935.5	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
13/08/2017	02:49	TR05A	Vid	EOL	317	37	500 011.2	5 869 924.2	
13/08/2017	03:34	TR05B	Vid	SOL	318	36	500 164.1	5 869 514.5	
13/08/2017	03:34	TR05B	Still	161218_TR05B_02	319		500 159.5	5 869 533.4	
13/08/2017	03:34	TR05B	Still	161218_TR05B_03	320		500 156.3	5 869 544.7	
13/08/2017	03:35	TR05B	Still	161218_TR05B_04	321		500 148.1	5 869 566.9	
13/08/2017	03:36	TR05B	Still	161218_TR05B_05	322		500 139.6	5 869 583.4	
13/08/2017	03:36	TR05B	Still	161218_TR05B_06	323		500 132.0	5 869 604.2	
13/08/2017	03:39	TR05B	Still	161218_TR05B_07	324		500 112.4	5 869 691.1	
13/08/2017	03:41	TR05B	Still	161218_TR05B_08	325		500 071.9	5 869 757.0	
13/08/2017	03:42	TR05B	Vid	EOL	326	37	500 070.1	5 869 772.8	
13/08/2017	04:10	TR05C	Vid	SOL	327	37	500 051.5	5 869 844.7	
13/08/2017	04:10	TR05C	Still	161218_TR05C_02	328		500 057.7	5 869 824.6	
13/08/2017	04:11	TR05C	Still	161218_TR05C_03	329		500 062.5	5 869 809.8	
13/08/2017	04:11	TR05C	Still	161218_TR05C_04	330		500 065.3	5 869 800.0	
13/08/2017	04:11	TR05C	Still	161218_TR05C_05	331		500 070.8	5 869 787.1	
13/08/2017	04:12	TR05C	Still	161218_TR05C_06	332		500 079.8	5 869 767.8	
13/08/2017	04:13	TR05C	Still	161218_TR05C_07	333		500 085.5	5 869 753.3	
13/08/2017	04:13	TR05C	Still	161218_TR05C_08	334		500 094.9	5 869 731.7	
13/08/2017	04:14	TR05C	Still	161218_TR05C_09	335		500 104.0	5 869 709.3	
13/08/2017	04:14	TR05C	Still	161218_TR05C_10	336		500 107.0	5 869 699.1	
13/08/2017	04:15	TR05C	Still	161218_TR05C_11	337		500 114.0	5 869 677.9	
13/08/2017	04:16	TR05C	Still	161218_TR05C_12	338		500 127.0	5 869 635.4	
13/08/2017	04:17	TR05C	Still	161218_TR05C_13	339		500 136.1	5 869 610.2	
13/08/2017	04:18	TR05C	Still	161218_TR05C_14	340		500 145.5	5 869 585.3	
13/08/2017	04:19	TR05C	Still	161218_TR05C_15	341		500 153.8	5 869 562.9	
13/08/2017	04:20	TR05C	Still	161218_TR05C_16	342		500 166.2	5 869 533.4	
13/08/2017	04:21	TR05C	Still	161218_TR05C_17	343		500 175.7	5 869 508.0	
13/08/2017	04:22	TR05C	Still	161218_TR05C_18	344		500 187.4	5 869 477.3	
13/08/2017	04:22	TR05C	Still	161218_TR05C_19	345		500 195.1	5 869 457.3	
13/08/2017	04:23	TR05C	Still	161218_TR05C_20	346		500 202.1	5 869 435.2	
13/08/2017	04:24	TR05C	Still	161218_TR05C_21	347		500 207.5	5 869 419.2	
13/08/2017	04:24	TR05C	Vid	EOL	348	37	500 208.6	5 869 416.2	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location Easting [m]	Actual Location Northing [m]	Notes
13/08/2017	04:57	TR11	Vid	SOL	349	37	498 665.0	5 872 983.4	
13/08/2017	04:57	TR11	Still	161218_TR11_03	350		498 671.0	5 872 967.9	
13/08/2017	04:58	TR11	Still	161218_TR11_04	351		498 675.9	5 872 956.5	
13/08/2017	04:58	TR11	Still	161218_TR11_05	352		498 681.1	5 872 943.4	
13/08/2017	04:59	TR11	Still	161218_TR11_06	353		498 687.5	5 872 924.4	
13/08/2017	05:00	TR11	Still	161218_TR11_07	354		498 692.6	5 872 908.2	
13/08/2017	05:00	TR11	Still	161218_TR11_08	355		498 700.2	5 872 893.0	
13/08/2017	05:01	TR11	Still	161218_TR11_09	356		498 711.2	5 872 857.4	
13/08/2017	05:02	TR11	Still	161218_TR11_10	357		498 715.4	5 872 846.9	
13/08/2017	05:02	TR11	Still	161218_TR11_11	358		498 718.4	5 872 837.5	
13/08/2017	05:03	TR11	Still	161218_TR11_12	359		498 724.4	5 872 820.9	
13/08/2017	05:03	TR11	Still	161218_TR11_13	360		498 726.3	5 872 813.2	
13/08/2017	05:04	TR11	Still	161218_TR11_14	361		498 733.7	5 872 788.3	
13/08/2017	05:04	TR11	Still	161218_TR11_15	362		498 735.7	5 872 784.4	
13/08/2017	05:05	TR11	Still	161218_TR11_16	363		498 742.8	5 872 768.5	
13/08/2017	05:05	TR11	Still	161218_TR11_17	364		498 748.2	5 872 756.0	
13/08/2017	05:06	TR11	Vid	EOL	365	38	498 755.3	5 872 739.4	
13/08/2017	05:40	TR16	Vid	SOL	366	33	498 769.5	5 878 049.0	
13/08/2017	05:41	TR16	Still	161218_TR16_02	367		498 775.9	5 878 017.7	
13/08/2017	05:42	TR16	Still	161218_TR16_03	368		498 782.1	5 878 001.9	
13/08/2017	05:43	TR16	Still	161218_TR16_04	369		498 787.8	5 877 984.5	
13/08/2017	05:43	TR16	Still	161218_TR16_05	370		498 794.3	5 877 969.1	
13/08/2017	05:44	TR16	Still	161218_TR16_06	371		498 800.5	5 877 946.4	
13/08/2017	05:44	TR16	Still	161218_TR16_07	372		498 803.7	5 877 938.7	
13/08/2017	05:45	TR16	Still	161218_TR16_08	373		498 809.0	5 877 924.9	
13/08/2017	05:45	TR16	Still	161218_TR16_09	374		498 812.0	5 877 916.4	
13/08/2017	05:46	TR16	Still	161218_TR16_10	375		498 819.4	5 877 895.3	
13/08/2017	05:46	TR16	Still	161218_TR16_11	376		498 823.3	5 877 883.5	
13/08/2017	05:46	TR16	Still	161218_TR16_12	377		498 829.8	5 877 869.0	
13/08/2017	05:47	TR16	Still	161218_TR16_13	378		498 837.5	5 877 849.2	
13/08/2017	05:48	TR16	Still	161218_TR16_14	379		498 845.3	5 877 832.4	
13/08/2017	05:48	TR16	Still	161218_TR16_15	380		498 850.7	5 877 820.4	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location Easting [m]	Actual Location Northing [m]	Notes
13/08/2017	05:49	TR16	Still	161218_TR16_16	381		498 858.9	5 877 797.4	
13/08/2017	05:50	TR16	Still	161218_TR16_17	382		498 865.0	5 877 780.6	
13/08/2017	05:50	TR16	Still	161218_TR16_18	383		498 867.3	5 877 774.6	
13/08/2017	05:50	TR16	Vid	EOL	384	33	498 868.3	5 877 769.5	
13/08/2017	07:52	TR20	Vid	SOL	385	36	498 819.6	5 883 044.7	
13/08/2017	07:53	TR20	Still	161218_TR20_02	386		498 819.7	5 883 034.2	
13/08/2017	07:53	TR20	Still	161218_TR20_03	387		498 819.8	5 883 017.8	
13/08/2017	07:54	TR20	Still	161218_TR20_04	388		498 820.1	5 882 988.0	
13/08/2017	07:55	TR20	Still	161218_TR20_05	389		498 818.8	5 882 974.5	
13/08/2017	07:55	TR20	Still	161218_TR20_06	390		498 818.2	5 882 968.1	
13/08/2017	07:56	TR20	Still	161218_TR20_07	391		498 816.6	5 882 950.7	
13/08/2017	07:56	TR20	Still	161218_TR20_08	392		498 817.3	5 882 944.7	
13/08/2017	07:56	TR20	Still	161218_TR20_09	393		498 817.3	5 882 938.8	
13/08/2017	07:57	TR20	Still	161218_TR20_10	394		498 817.0	5 882 922.7	
13/08/2017	07:57	TR20	Still	161218_TR20_11	395		498 817.4	5 882 916.3	
13/08/2017	07:58	TR20	Still	161218_TR20_12	396		498 817.0	5 882 906.9	
13/08/2017	07:58	TR20	Still	161218_TR20_13	398		498 815.3	5 882 889.5	
13/08/2017	07:59	TR20	Still	161218_TR20_14	399		498 813.7	5 882 867.4	
13/08/2017	07:59	TR20	Still	161218_TR20_15	400		498 814.4	5 882 861.2	
13/08/2017	08:00	TR20	Still	161218_TR20_16	401		498 814.1	5 882 844.2	
13/08/2017	08:01	TR20	Still	161218_TR20_17	402		498 814.6	5 882 827.9	
13/08/2017	08:01	TR20	Still	161218_TR20_18	403		498 814.3	5 882 812.7	
13/08/2017	08:02	TR20	Still	161218_TR20_19	404		498 814.8	5 882 804.7	
13/08/2017	08:02	TR20	Vid	EOL	405	26	498 814.7	5 882 798.1	
13/08/2017	08:44	TR29	Vid	SOL	406	24	499 204.2	5 887 950.4	
13/08/2017	08:45	TR29	Still	161218_TR29_02	407		499 199.4	5 887 921.0	
13/08/2017	08:45	TR29	Still	161218_TR29_03	408		499 195.4	5 887 906.7	
13/08/2017	08:46	TR29	Still	161218_TR29_04	409		499 187.3	5 887 888.4	
13/08/2017	08:46	TR29	Still	161218_TR29_05	410		499 183.4	5 887 868.2	
13/08/2017	08:46	TR29	Still	161218_TR29_06	411		499 182.4	5 887 857.8	
13/08/2017	08:47	TR29	Still	161218_TR29_07	412		499 182.3	5 887 843.6	
13/08/2017	08:47	TR29	Still	161218_TR29_08	413		499 182.1	5 887 834.4	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location Easting [m]	Actual Location Northing [m]	Notes
13/08/2017	08:47	TR29	Still	161218_TR29_09	414		499 182.7	5 887 826.1	
13/08/2017	08:48	TR29	Still	161218_TR29_10	415		499 186.7	5 887 810.7	
13/08/2017	08:48	TR29	Still	161218_TR29_11	416		499 188.4	5 887 792.3	
13/08/2017	08:49	TR29	Still	161218_TR29_12	417		499 185.8	5 887 783.7	
13/08/2017	08:49	TR29	Still	161218_TR29_13	418		499 181.5	5 887 771.7	
13/08/2017	08:50	TR29	Still	161218_TR29_14	419		499 183.1	5 887 758.0	
13/08/2017	08:50	TR29	Still	161218_TR29_15	420		499 183.0	5 887 750.9	
13/08/2017	08:50	TR29	Still	161218_TR29_16	421		499 182.8	5 887 732.9	
13/08/2017	08:51	TR29	Still	161218_TR29_17	422		499 182.7	5 887 715.3	
13/08/2017	08:52	TR29	Still	161218_TR29_18	423		499 182.4	5 887 688.2	
13/08/2017	08:53	TR29	Still	161218_TR29_19	424		499 181.8	5 887 665.8	
13/08/2017	08:53	TR29	Vid	EOL	425	22	499 182.4	5 887 658.1	
13/08/2017	09:28	TR25	Vid	SOL	426	23	498 973.1	5 892 912.0	
13/08/2017	09:29	TR25	Still	161218_TR25_02	427		498 952.8	5 892 914.1	
13/08/2017	09:30	TR25	Still	161218_TR25_03	428		498 918.5	5 892 916.5	
13/08/2017	09:31	TR25	Still	161218_TR25_04	429		498 912.3	5 892 917.2	
13/08/2017	09:31	TR25	Still	161218_TR25_05	430		498 897.7	5 892 907.5	
13/08/2017	09:32	TR25	Still	161218_TR25_06	431		498 886.8	5 892 909.0	
13/08/2017	09:33	TR25	Still	161218_TR25_07	432		498 864.0	5 892 912.8	
13/08/2017	09:33	TR25	Still	161218_TR25_08	433		498 857.4	5 892 911.8	
13/08/2017	09:34	TR25	Still	161218_TR25_09	434		498 835.7	5 892 907.6	
13/08/2017	09:35	TR25	Still	161218_TR25_10	435		498 822.9	5 892 906.3	
13/08/2017	09:36	TR25	Still	161218_TR25_11	436		498 805.0	5 892 904.2	
13/08/2017	09:37	TR25	Still	161218_TR25_12	437		498 792.7	5 892 898.2	
13/08/2017	09:37	TR25	Still	161218_TR25_13	438		498 783.3	5 892 898.1	
13/08/2017	09:38	TR25	Still	161218_TR25_14	439		498 773.9	5 892 892.5	
13/08/2017	09:39	TR25	Still	161218_TR25_15	440		498 749.8	5 892 891.4	
13/08/2017	09:40	TR25	Still	161218_TR25_16	441		498 734.2	5 892 891.1	
13/08/2017	09:40	TR25	Still	161218_TR25_17	442		498 725.8	5 892 889.3	
13/08/2017	09:41	TR25	Still	161218_TR25_18	443		498 713.3	5 892 887.8	
13/08/2017	09:41	TR25	Still	161218_TR25_19	444		498 703.2	5 892 885.4	
13/08/2017	09:41	TR25	Vid	EOL	445	23	498 699.3	5 892 883.3	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location Easting [m]	Actual Location Northing [m]	Notes
13/08/2017	10:14	TR27	Vid	SOL	446	30	494 040.2	5 891 538.7	
13/08/2017	10:14	TR27	Still	161218_TR27_02	447		494 025.2	5 891 542.1	
13/08/2017	10:14	TR27	Still	161218_TR27_03	448		494 018.8	5 891 541.0	
13/08/2017	10:15	TR27	Still	161218_TR27_04	449		494 003.7	5 891 533.3	
13/08/2017	10:15	TR27	Still	161218_TR27_05	450		493 994.7	5 891 535.3	
13/08/2017	10:16	TR27	Still	161218_TR27_06	451		493 990.5	5 891 536.2	
13/08/2017	10:16	TR27	Still	161218_TR27_07	452		493 978.1	5 891 531.9	
13/08/2017	10:17	TR27	Still	161218_TR27_08	453		493 963.2	5 891 528.4	
13/08/2017	10:17	TR27	Still	161218_TR27_09	454		493 949.7	5 891 534.4	
13/08/2017	10:18	TR27	Still	161218_TR27_10	455		493 931.8	5 891 535.9	
13/08/2017	10:19	TR27	Still	161218_TR27_11	456		493 907.9	5 891 537.1	
13/08/2017	10:19	TR27	Still	161218_TR27_12	457		493 896.4	5 891 535.3	
13/08/2017	10:20	TR27	Still	161218_TR27_13	458		493 876.4	5 891 531.5	
13/08/2017	10:20	TR27	Still	161218_TR27_14	459		493 853.8	5 891 526.7	
13/08/2017	10:21	TR27	Still	161218_TR27_15	460		493 844.4	5 891 524.9	
13/08/2017	10:21	TR27	Still	161218_TR27_16	461		493 832.1	5 891 523.1	
13/08/2017	10:21	TR27	Still	161218_TR27_17	462		493 825.4	5 891 521.4	
13/08/2017	10:22	TR27	Vid	EOL	463	32	493 819.4	5 891 520.5	
13/08/2017	10:48	TR23	Vid	SOL	464	30	493 903.5	5 887 791.0	
13/08/2017	10:49	TR23	Still	161218_TR23_02	465		493 892.4	5 887 801.1	
13/08/2017	10:50	TR23	Still	161218_TR23_03	466		493 881.8	5 887 811.4	
13/08/2017	10:51	TR23	Still	161218_TR23_04	467		493 864.0	5 887 835.6	
13/08/2017	10:51	TR23	Still	161218_TR23_05	468		493 859.6	5 887 840.6	
13/08/2017	10:52	TR23	Still	161218_TR23_06	469		493 846.8	5 887 855.7	
13/08/2017	10:53	TR23	Still	161218_TR23_07	470		493 840.3	5 887 867.6	
13/08/2017	10:53	TR23	Still	161218_TR23_08	471		493 833.1	5 887 874.5	
13/08/2017	10:54	TR23	Still	161218_TR23_09	472		493 820.9	5 887 889.8	
13/08/2017	10:54	TR23	Still	161218_TR23_10	473		493 813.5	5 887 896.0	
13/08/2017	10:54	TR23	Still	161218_TR23_11	474		493 809.9	5 887 900.5	
13/08/2017	10:55	TR23	Still	161218_TR23_12	475		493 804.0	5 887 909.5	
13/08/2017	10:55	TR23	Still	161218_TR23_13	476		493 798.4	5 887 916.8	
13/08/2017	10:56	TR23	Still	161218_TR23_14	477		493 790.5	5 887 926.5	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location Easting [m]	Actual Location Northing [m]	Notes
13/08/2017	10:56	TR23	Still	161218_TR23_15	478		493 786.7	5 887 931.1	
13/08/2017	10:56	TR23	Still	161218_TR23_16	479		493 780.2	5 887 937.3	
13/08/2017	10:57	TR23	Still	161218_TR23_17	480		493 777.2	5 887 940.2	
13/08/2017	10:57	TR23	Still	161218_TR23_18	481		493 771.3	5 887 948.6	
13/08/2017	10:58	TR23	Still	161218_TR23_19	482		493 764.5	5 887 959.6	
13/08/2017	10:58	TR23	Still	161218_TR23_20	483		493 757.1	5 887 969.6	
13/08/2017	10:59	TR23	Still	161218_TR23_21	484		493 744.0	5 887 985.2	
13/08/2017	10:59	TR23	Vid	EOL	485	31	493 740.4	5 887 989.4	
13/08/2017	12:10	TR19	Vid	SOL	486	30	493 872.1	5 882 791.1	
13/08/2017	12:11	TR19	Still	161218_TR19_04	487		493 877.6	5 882 826.7	
13/08/2017	12:11	TR19	Still	161218_TR19_05	488		493 868.9	5 882 831.6	
13/08/2017	12:13	TR19	Still	161218_TR19_06	489		493 860.2	5 882 845.6	
13/08/2017	12:13	TR19	Still	161218_TR19_07	490		493 856.1	5 882 862.6	
13/08/2017	12:14	TR19	Still	161218_TR19_08	491		493 846.8	5 882 876.5	
13/08/2017	12:14	TR19	Still	161218_TR19_09	492		493 834.0	5 882 883.8	
13/08/2017	12:15	TR19	Still	161218_TR19_10	493		493 824.9	5 882 898.0	
13/08/2017	12:16	TR19	Still	161218_TR19_11	494		493 826.8	5 882 919.4	
13/08/2017	12:17	TR19	Still	161218_TR19_12	495		493 817.8	5 882 931.6	
13/08/2017	12:18	TR19	Still	161218_TR19_13	496		493 784.8	5 882 923.4	
13/08/2017	12:19	TR19	Still	161218_TR19_14	497		493 760.8	5 882 921.1	
13/08/2017	12:19	TR19	Still	161218_TR19_15	498		493 778.4	5 882 939.8	
13/08/2017	12:20	TR19	Still	161218_TR19_16	499		493 803.0	5 882 948.5	
13/08/2017	12:21	TR19	Still	161218_TR19_17	500		493 792.7	5 882 947.6	
13/08/2017	12:23	TR19	Still	161218_TR19_18	501		493 757.3	5 882 974.5	
13/08/2017	12:24	TR19	Still	161218_TR19_19	502		493 750.9	5 882 985.7	
13/08/2017	12:24	TR19	Vid	EOL	502	30	493 750.9	5 882 985.7	
13/08/2017	12:58	TR15	Vid	SOL	503	27	493 820.9	5 877 830.0	
13/08/2017	12:58	TR15	Still	161218_TR15_02	503		493 820.9	5 877 830.0	
13/08/2017	12:58	TR15	Still	161218_TR15_03	504		493 822.3	5 877 837.5	
13/08/2017	12:59	TR15	Still	161218_TR15_04	505		493 820.1	5 877 845.2	
13/08/2017	12:59	TR15	Still	161218_TR15_05	506		493 809.6	5 877 858.9	
13/08/2017	13:00	TR15	Still	161218_TR15_06	507		493 813.0	5 877 873.9	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
13/08/2017	13:01	TR15	Still	161218_TR15_07	508		493 823.8	5 877 891.0	
13/08/2017	13:01	TR15	Still	161218_TR15_08	509		493 819.4	5 877 900.0	
13/08/2017	13:02	TR15	Still	161218_TR15_09	510		493 808.1	5 877 919.8	
13/08/2017	13:03	TR15	Still	161218_TR15_10	511		493 815.5	5 877 939.5	
13/08/2017	13:04	TR15	Still	161218_TR15_11	512		493 797.7	5 877 964.2	
13/08/2017	13:04	TR15	Still	161218_TR15_12	513		493 788.8	5 877 977.0	
13/08/2017	13:06	TR15	Still	161218_TR15_13	514		493 834.1	5 878 003.1	
13/08/2017	13:07	TR15	Still	161218_TR15_14	515		493 838.3	5 878 017.7	
13/08/2017	13:07	TR15	Still	161218_TR15_15	516		493 819.4	5 878 021.7	
13/08/2017	13:07	TR15	Vid	EOL	516	30	493 819.4	5 878 021.7	
13/08/2017	13:39	TR10	Vid	SOL	-	31	493 819.3	5 872 826.9	
13/08/2017	13:43	TR10	Vid	161218_TR10_02	517		493 822.3	5 872 812.3	
13/08/2017	13:44	TR10	Still	161218_TR10_03	518		493 816.6	5 872 886.9	
13/08/2017	13:45	TR10	Still	161218_TR10_04	519		493 813.5	5 872 898.6	
13/08/2017	13:46	TR10	Still	161218_TR10_05	520		493 811.7	5 872 916.2	
13/08/2017	13:46	TR10	Still	161218_TR10_06	521		493 809.4	5 872 937.1	
13/08/2017	13:47	TR10	Still	161218_TR10_07	522		493 812.6	5 872 949.9	
13/08/2017	13:48	TR10	Still	161218_TR10_08	523		493 806.9	5 872 990.8	
13/08/2017	13:50	TR10	Still	161218_TR10_09	524		493 781.3	5 873 020.8	
13/08/2017	13:50	TR10	Still	161218_TR10_10	525		493 775.1	5 873 039.5	
13/08/2017	13:51	TR10	Still	161218_TR10_11	526		493 779.5	5 873 047.4	
13/08/2017	13:51	TR10	Still	161218_TR10_12	527	31	493 783.8	5 873 053.4	
13/08/2017	13:51	TR10	Vid	EOL	527	31	493 783.8	5 873 053.4	
13/08/2017	14:28	TR04	Vid	SOL	528	30	493 834.2	5 867 805.6	
13/08/2017	14:28	TR04	Still	161218_TR04_02	529		493 838.7	5 867 819.3	
13/08/2017	14:29	TR04	Still	161218_TR04_03	530		493 841.2	5 867 843.3	
13/08/2017	14:29	TR04	Still	161218_TR04_04	531		493 840.4	5 867 863.3	
13/08/2017	14:29	TR04	Still	161218_TR04_05	532		493 839.0	5 867 869.8	
13/08/2017	14:30	TR04	Still	161218_TR04_06	533		493 825.0	5 867 894.7	
13/08/2017	14:30	TR04	Still	161218_TR04_07	534		493 810.3	5 867 908.4	
13/08/2017	14:31	TR04	Still	161218_TR04_08	535		493 802.6	5 867 915.4	
13/08/2017	14:32	TR04	Still	161218_TR04_09	536		493 801.2	5 867 934.0	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
13/08/2017	14:32	TR04	Still	161218_TR04_10	537		493 820.0	5 867 940.7	
13/08/2017	14:32	TR04	Still	161218_TR04_11	538		493 827.4	5 867 946.8	
13/08/2017	14:33	TR04	Still	161218_TR04_12	539		493 835.0	5 867 960.2	
13/08/2017	14:34	TR04	Still	161218_TR04_13	540		493 830.1	5 868 000.1	
13/08/2017	14:34	TR04	Still	161218_TR04_14	541		493 824.7	5 868 005.0	
13/08/2017	14:35	TR04	Still	161218_TR04_15	542		493 818.0	5 868 007.7	
13/08/2017	14:35	TR04	Still	161218_TR04_16	543		493 806.3	5 868 008.9	
13/08/2017	14:35	TR04	Vid	EOL	543	31	493 806.3	5 868 008.9	
13/08/2017	15:48	TR01	Vid	SOL	544	30	493 686.2	5 862 969.9	
13/08/2017	15:48	TR01	Still	161218_TR01_02	544		493 686.2	5 862 969.9	
13/08/2017	15:49	TR01	Still	161218_TR01_03	545		493 713.8	5 862 958.0	
13/08/2017	15:50	TR01	Still	161218_TR01_04	546		493 731.3	5 862 951.1	
13/08/2017	15:50	TR01	Still	161218_TR01_05	547		493 742.3	5 862 944.1	
13/08/2017	15:51	TR01	Still	161218_TR01_06	548		493 759.2	5 862 935.1	
13/08/2017	15:52	TR01	Still	161218_TR01_07	549		493 783.1	5 862 921.4	
13/08/2017	15:53	TR01	Still	161218_TR01_08	550		493 797.9	5 862 914.0	
13/08/2017	15:53	TR01	Still	161218_TR01_09	551		493 810.2	5 862 908.1	
13/08/2017	15:54	TR01	Still	161218_TR01_10	552		493 817.7	5 862 902.7	
13/08/2017	15:55	TR01	Still	161218_TR01_11	553		493 833.8	5 862 893.0	
13/08/2017	15:55	TR01	Still	161218_TR01_12	554		493 839.5	5 862 888.6	
13/08/2017	15:56	TR01	Still	161218_TR01_13	555		493 855.9	5 862 880.3	
13/08/2017	15:56	TR01	Still	161218_TR01_14	556		493 868.2	5 862 874.4	
13/08/2017	15:56	TR01	Still	161218_TR01_15	557		493 875.4	5 862 870.6	
13/08/2017	15:57	TR01	Still	161218_TR01_16	558		493 890.0	5 862 862.3	
13/08/2017	15:58	TR01	Still	161218_TR01_17	559		493 899.1	5 862 857.5	
13/08/2017	15:58	TR01	Vid	EOL	560	31	493 902.7	5 862 855.7	
13/08/2017	16:31	TR28	Vid	SOL	561	34	488 864.9	5 860 357.1	
13/08/2017	16:31	TR28	Still	161218_TR28_02	561		488 864.9	5 860 357.1	
13/08/2017	16:31	TR28	Still	161218_TR28_03	562		488 870.4	5 860 347.6	
13/08/2017	16:32	TR28	Still	161218_TR28_04	563		488 885.3	5 860 315.4	
13/08/2017	16:32	TR28	Still	161218_TR28_05	564		488 888.9	5 860 304.6	
13/08/2017	16:33	TR28	Still	161218_TR28_06	565		488 895.1	5 860 280.4	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
13/08/2017	16:33	TR28	Still	161218_TR28_07	566		488 899.0	5 860 271.6	
13/08/2017	16:34	TR28	Still	161218_TR28_08	567		488 904.1	5 860 261.2	
13/08/2017	16:34	TR28	Still	161218_TR28_09	568		488 911.9	5 860 244.7	
13/08/2017	16:35	TR28	Still	161218_TR28_10	569		488 915.9	5 860 235.1	
13/08/2017	16:35	TR28	Still	161218_TR28_11	570		488 922.5	5 860 220.6	
13/08/2017	16:35	TR28	Still	161218_TR28_12	571		488 924.4	5 860 215.1	
13/08/2017	16:36	TR28	Still	161218_TR28_13	572		488 929.1	5 860 203.0	
13/08/2017	16:37	TR28	Still	161218_TR28_14	573		488 943.9	5 860 160.5	
13/08/2017	16:37	TR28	Vid	EOL	574	32	488 947.2	5 860 148.4	
13/08/2017	17:32	TR31	Vid	SOL	575	36	484 779.6	5 859 772.7	
13/08/2017	17:33	TR31	Still	161218_TR31_02	576		484 776.7	5 859 746.9	
13/08/2017	17:34	TR31	Still	161218_TR31_03	577		484 778.8	5 859 731.2	
13/08/2017	17:34	TR31	Still	161218_TR31_04	578		484 780.3	5 859 714.8	
13/08/2017	17:35	TR31	Still	161218_TR31_05	579		484 780.0	5 859 697.3	
13/08/2017	17:35	TR31	Still	161218_TR31_06	580		484 779.9	5 859 684.0	
13/08/2017	17:36	TR31	Still	161218_TR31_07	581		484 780.1	5 859 671.6	
13/08/2017	17:36	TR31	Still	161218_TR31_08	582		484 779.8	5 859 663.2	
13/08/2017	17:36	TR31	Still	161218_TR31_09	583		484 779.5	5 859 644.9	
13/08/2017	17:37	TR31	Still	161218_TR31_10	584		484 780.0	5 859 633.9	
13/08/2017	17:37	TR31	Still	161218_TR31_11	585		484 780.0	5 859 621.1	
13/08/2017	17:38	TR31	Still	161218_TR31_12	586		484 780.6	5 859 611.8	
13/08/2017	17:38	TR31	Still	161218_TR31_13	587		484 778.8	5 859 599.1	
13/08/2017	17:38	TR31	Still	161218_TR31_14	588		484 779.1	5 859 586.9	
13/08/2017	17:39	TR31	Still	161218_TR31_15	589		484 778.9	5 859 572.6	
13/08/2017	17:39	TR31	Still	161218_TR31_16	590		484 778.7	5 859 564.1	
13/08/2017	17:40	TR31	Still	161218_TR31_17	591		484 778.0	5 859 550.9	
13/08/2017	17:40	TR31	Vid	EOL	591	36	484 778.0	5 859 550.9	
13/08/2017	18:11	TR32	Vid	SOL	592	35	484 932.4	5 863 691.7	
13/08/2017	18:12	TR32	Still	161218_TR32_02	593		484 931.5	5 863 665.1	
13/08/2017	18:12	TR32	Still	161218_TR32_03	594		484 932.2	5 863 643.5	
13/08/2017	18:13	TR32	Still	161218_TR32_04	595		484 934.0	5 863 609.8	
13/08/2017	18:14	TR32	Still	161218_TR32_05	596		484 933.9	5 863 603.8	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
13/08/2017	18:14	TR32	Still	161218_TR32_06	597		484 932.5	5 863 587.2	
13/08/2017	18:14	TR32	Still	161218_TR32_07	598		484 932.1	5 863 579.0	
13/08/2017	18:15	TR32	Still	161218_TR32_08	599		484 930.7	5 863 563.7	
13/08/2017	18:15	TR32	Still	161218_TR32_09	600		484 929.9	5 863 554.3	
13/08/2017	18:15	TR32	Still	161218_TR32_10	601		484 929.2	5 863 545.5	
13/08/2017	18:16	TR32	Still	161218_TR32_11	602		484 930.2	5 863 525.7	
13/08/2017	18:16	TR32	Still	161218_TR32_12	603		484 930.8	5 863 518.9	
13/08/2017	18:16	TR32	Still	161218_TR32_13	604		484 931.1	5 863 514.7	
13/08/2017	18:17	TR32	Still	161218_TR32_14	605		484 931.9	5 863 503.7	
13/08/2017	18:17	TR32	Still	161218_TR32_15	606		484 931.5	5 863 498.4	
13/08/2017	18:17	TR32	Vid	EOL	606	36	484 931.5	5 863 498.4	
13/08/2017	18:45	TR33	Vid	SOL	607	26	487 545.1	5 863 822.4	
13/08/2017	18:46	TR33	Still	161218_TR33_02	608		487 545.1	5 863 810.3	
13/08/2017	18:46	TR33	Still	161218_TR33_03	609		487 543.8	5 863 804.2	
13/08/2017	18:47	TR33	Still	161218_TR33_04	610		487 544.2	5 863 790.5	
13/08/2017	18:47	TR33	Still	161218_TR33_05	611		487 545.1	5 863 777.0	
13/08/2017	18:48	TR33	Still	161218_TR33_06	612		487 545.3	5 863 763.2	
13/08/2017	18:48	TR33	Still	161218_TR33_07	613		487 545.9	5 863 757.1	
13/08/2017	18:48	TR33	Still	161218_TR33_08	614		487 547.3	5 863 744.9	
13/08/2017	18:49	TR33	Still	161218_TR33_09	615		487 548.6	5 863 731.3	
13/08/2017	18:49	TR33	Still	161218_TR33_10	616		487 548.3	5 863 723.8	
13/08/2017	18:49	TR33	Still	161218_TR33_11	617		487 547.1	5 863 711.3	
13/08/2017	18:50	TR33	Still	161218_TR33_12	618		487 544.6	5 863 698.6	
13/08/2017	18:50	TR33	Still	161218_TR33_13	619		487 547.3	5 863 681.1	
13/08/2017	18:51	TR33	Still	161218_TR33_14	620		487 547.4	5 863 667.3	
13/08/2017	18:51	TR33	Still	161218_TR33_15	621		487 548.0	5 863 653.4	
13/08/2017	18:52	TR33	Still	161218_TR33_16	622		487 548.6	5 863 637.2	
13/08/2017	18:53	TR33	Still	161218_TR33_17	623		487 548.8	5 863 623.2	
13/08/2017	18:53	TR33	Still	161218_TR33_18	624		487 546.6	5 863 606.9	
13/08/2017	18:53	TR33	Still	161218_TR33_19	625		487 545.8	5 863 599.9	
13/08/2017	18:53	TR33	Vid	EOL	625	27	487 545.8	5 863 599.9	
13/08/2017	19:29	TR03	Vid	SOL	626	36	488 809.8	5 867 994.3	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
13/08/2017	19:29	TR03	Still	161218_TR03_02	626		488 809.8	5 867 994.3	
13/08/2017	19:30	TR03	Still	161218_TR03_03	627		488 811.5	5 867 982.7	
13/08/2017	19:30	TR03	Still	161218_TR03_04	628		488 812.2	5 867 976.2	
13/08/2017	19:31	TR03	Still	161218_TR03_05	629		488 812.1	5 867 958.4	
13/08/2017	19:31	TR03	Still	161218_TR03_06	630		488 812.7	5 867 947.1	
13/08/2017	19:32	TR03	Still	161218_TR03_07	631		488 813.6	5 867 929.4	
13/08/2017	19:33	TR03	Still	161218_TR03_08	632		488 812.9	5 867 912.4	
13/08/2017	19:34	TR03	Still	161218_TR03_09	633		488 812.8	5 867 886.9	
13/08/2017	19:34	TR03	Still	161218_TR03_10	634		488 814.4	5 867 873.7	
13/08/2017	19:35	TR03	Still	161218_TR03_11	635		488 814.7	5 867 859.8	
13/08/2017	19:36	TR03	Still	161218_TR03_12	636		488 813.8	5 867 847.0	
13/08/2017	19:36	TR03	Still	161218_TR03_13	637		488 812.6	5 867 831.9	
13/08/2017	19:37	TR03	Still	161218_TR03_14	638		488 811.9	5 867 816.4	
13/08/2017	19:37	TR03	Still	161218_TR03_15	639		488 812.1	5 867 811.1	
13/08/2017	19:38	TR03	Vid	EOL	640	36	488 812.4	5 867 801.9	
13/08/2017	20:06	TR02	Vid	SOL	641	33	484 551.5	5 867 998.1	
13/08/2017	20:07	TR02	Still	161218_TR02_02	642		484 553.0	5 867 976.5	
13/08/2017	20:08	TR02	Still	161218_TR02_03	643		484 549.5	5 867 954.4	
13/08/2017	20:08	TR02	Still	161218_TR02_04	644		484 549.9	5 867 941.0	
13/08/2017	20:09	TR02	Still	161218_TR02_05	645		484 551.6	5 867 924.2	
13/08/2017	20:10	TR02	Still	161218_TR02_06	646		484 551.3	5 867 911.7	
13/08/2017	20:10	TR02	Still	161218_TR02_07	647		484 550.6	5 867 902.9	
13/08/2017	20:11	TR02	Still	161218_TR02_08	648		484 550.8	5 867 883.3	
13/08/2017	20:11	TR02	Still	161218_TR02_09	649		484 553.5	5 867 870.9	
13/08/2017	20:12	TR02	Still	161218_TR02_10	650		484 553.0	5 867 864.5	
13/08/2017	20:12	TR02	Still	161218_TR02_11	651		484 554.0	5 867 852.6	
13/08/2017	20:13	TR02	Still	161218_TR02_12	652		484 553.4	5 867 839.2	
13/08/2017	20:13	TR02	Still	161218_TR02_13	653		484 552.3	5 867 826.9	
13/08/2017	20:13	TR02	Still	161218_TR02_14	654		484 552.3	5 867 826.9	
13/08/2017	20:14	TR02	Still	161218_TR02_15	655		484 554.2	5 867 809.2	
13/08/2017	20:14	TR02	Still	161218_TR02_16	656		484 555.2	5 867 795.3	
13/08/2017	20:15	TR02	Still	161218_TR02_17	657		484 555.9	5 867 786.7	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
13/08/2017	20:15	TR02	Still	161218_TR02_18	658		484 555.5	5 867 778.0	
13/08/2017	20:15	TR02	Vid	EOL	659	33	484 555.0	5 867 767.7	
13/08/2017	20:50	TR08	Vid	SOL	660	30	484 558.6	5 873 029.3	
13/08/2017	20:51	TR08	Still	161218_TR08_02	661		484 556.7	5 873 004.2	
13/08/2017	20:52	TR08	Still	161218_TR08_03	662		484 556.3	5 872 992.8	
13/08/2017	20:53	TR08	Still	161218_TR08_04	663		484 556.9	5 872 971.3	
13/08/2017	20:53	TR08	Still	161218_TR08_05	664		484 555.5	5 872 959.7	
13/08/2017	20:54	TR08	Still	161218_TR08_06	665		484 554.6	5 872 946.5	
13/08/2017	20:54	TR08	Still	161218_TR08_07	666		484 554.4	5 872 941.4	
13/08/2017	20:55	TR08	Still	161218_TR08_08	667		484 554.3	5 872 909.2	
13/08/2017	20:56	TR08	Still	161218_TR08_09	668		484 553.8	5 872 896.9	
13/08/2017	20:57	TR08	Still	161218_TR08_10	669		484 553.7	5 872 876.1	
13/08/2017	20:57	TR08	Still	161218_TR08_11	670		484 553.8	5 872 861.4	
13/08/2017	20:58	TR08	Still	161218_TR08_12	671		484 553.8	5 872 852.8	
13/08/2017	20:58	TR08	Still	161218_TR08_13	672		484 553.6	5 872 838.7	
13/08/2017	20:59	TR08	Still	161218_TR08_14	673		484 554.3	5 872 816.8	
13/08/2017	21:00	TR08	Still	161218_TR08_15	674		484 554.3	5 872 795.4	
13/08/2017	21:00	TR08	Vid	EOL	674	29	484 554.3	5 872 795.4	
13/08/2017	21:34	TR09	Vid	SOL	675	36	488 820.7	5 873 002.8	
13/08/2017	21:34	TR09	Still	161218_TR09_02	675		488 820.7	5 873 002.8	
13/08/2017	21:34	TR09	Still	161218_TR09_03	676		488 821.5	5 872 994.9	
13/08/2017	21:35	TR09	Still	161218_TR09_04	677		488 821.7	5 872 974.0	
13/08/2017	21:36	TR09	Still	161218_TR09_05	678		488 821.4	5 872 963.9	
13/08/2017	21:36	TR09	Still	161218_TR09_06	679		488 820.9	5 872 949.2	
13/08/2017	21:37	TR09	Still	161218_TR09_07	680		488 820.9	5 872 935.2	
13/08/2017	21:38	TR09	Still	161218_TR09_08	681		488 819.3	5 872 921.4	
13/08/2017	21:38	TR09	Still	161218_TR09_09	682		488 818.5	5 872 912.4	
13/08/2017	21:39	TR09	Still	161218_TR09_10	683		488 817.4	5 872 895.9	
13/08/2017	21:39	TR09	Still	161218_TR09_11	684		488 816.9	5 872 885.0	
13/08/2017	21:40	TR09	Still	161218_TR09_12	685		488 816.8	5 872 872.4	
13/08/2017	21:40	TR09	Still	161218_TR09_13	686		488 816.8	5 872 858.8	
13/08/2017	21:41	TR09	Still	161218_TR09_14	687		488 817.1	5 872 844.8	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location Easting [m]	Northing [m]	Notes
13/08/2017	21:41	TR09	Still	161218_TR09_15	688		488 816.1	5 872 831.5	
13/08/2017	21:42	TR09	Still	161218_TR09_16	689		488 816.0	5 872 819.5	
13/08/2017	21:42	TR09	Still	161218_TR09_17	690		488 815.8	5 872 810.1	
13/08/2017	21:42	TR09	Vid	EOL	690	35	488 815.8	5 872 810.1	
13/08/2017	22:31	TR14	Vid	SOL	691	33	488 878.1	5 878 028.6	
13/08/2017	22:31	TR14	Still	161218_TR14_02	692		488 872.9	5 878 020.4	
13/08/2017	22:32	TR14	Still	161218_TR14_03	693		488 850.3	5 877 988.0	
13/08/2017	22:32	TR14	Still	161218_TR14_04	694		488 837.9	5 877 972.2	
13/08/2017	22:34	TR14	Still	161218_TR14_05	695		488 823.6	5 877 927.6	
13/08/2017	22:34	TR14	Still	161218_TR14_06	696		488 820.6	5 877 917.5	
13/08/2017	22:34	TR14	Still	161218_TR14_07	697		488 816.8	5 877 903.6	
13/08/2017	22:35	TR14	Still	161218_TR14_08	698		488 815.6	5 877 881.4	
13/08/2017	22:36	TR14	Still	161218_TR14_09	699		488 814.0	5 877 863.9	
13/08/2017	22:37	TR14	Still	161218_TR14_10	700		488 808.8	5 877 845.9	
13/08/2017	22:37	TR14	Still	161218_TR14_11	701		488 797.2	5 877 835.6	
13/08/2017	22:38	TR14	Still	161218_TR14_12	702		488 779.7	5 877 815.7	
13/08/2017	22:38	TR14	Still	161218_TR14_13	703		488 776.3	5 877 809.0	
13/08/2017	22:38	TR14	Vid	EOL	703	35	488 776.3	5 877 809.0	
13/08/2017	23:57	TR13	Vid	SOL	704	30	484 665.8	5 877 831.3	
13/08/2017	23:58	TR13	Still	161218_TR13_02	705		484 644.4	5 877 841.3	
13/08/2017	23:58	TR13	Still	161218_TR13_03	706		484 642.4	5 877 860.0	
13/08/2017	23:59	TR13	Still	161218_TR13_04	707		484 641.8	5 877 870.4	
13/08/2017	23:59	TR13	Still	161218_TR13_05	708		484 632.9	5 877 883.5	
13/08/2017	00:00	TR13	Still	161218_TR13_06	709		484 608.5	5 877 891.0	
13/08/2017	00:01	TR13	Still	161218_TR13_07	710		484 608.1	5 877 899.3	
13/08/2017	00:02	TR13	Still	161218_TR13_08	711		484 603.4	5 877 933.1	
13/08/2017	00:03	TR13	Still	161218_TR13_09	712		484 593.3	5 877 930.4	
13/08/2017	00:03	TR13	Still	161218_TR13_10	713		484 582.5	5 877 926.9	
13/08/2017	00:04	TR13	Still	161218_TR13_11	714		484 569.5	5 877 934.3	
13/08/2017	00:05	TR13	Still	161218_TR13_12	715		484 575.1	5 877 951.2	
13/08/2017	00:06	TR13	Still	161218_TR13_13	716		484 563.2	5 877 957.9	
13/08/2017	00:06	TR13	Still	161218_TR13_14	717		484 547.4	5 877 965.0	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location Easting [m]	Actual Location Northing [m]	Notes
13/08/2017	00:08	TR13	Still	161218_TR13_15	718		484 535.1	5 878 018.2	
13/08/2017	00:09	TR13	Still	161218_TR13_16	719		484 518.6	5 878 014.6	
14/08/2017	00:09	TR13	Vid	EOL	720	31	484 509.7	5 878 006.7	
14/08/2017	00:47	TR18	Vid	SOL	721	25	488 868.9	5 882 800.0	
14/08/2017	00:48	TR18	Still	161218_TR18_02	722		488 881.5	5 882 809.6	
14/08/2017	00:48	TR18	Still	161218_TR18_03	723		488 878.4	5 882 822.6	
14/08/2017	00:49	TR18	Still	161218_TR18_04	724		488 866.8	5 882 829.8	
14/08/2017	00:50	TR18	Still	161218_TR18_05	725		488 853.6	5 882 837.0	
14/08/2017	00:50	TR18	Still	161218_TR18_06	726		488 850.4	5 882 845.1	
14/08/2017	00:51	TR18	Still	161218_TR18_07	727		488 864.4	5 882 871.7	
14/08/2017	00:52	TR18	Still	161218_TR18_08	728		488 854.1	5 882 883.2	
14/08/2017	00:52	TR18	Still	161218_TR18_09	729		488 824.5	5 882 892.3	
14/08/2017	00:53	TR18	Still	161218_TR18_10	730		488 812.4	5 882 892.4	
14/08/2017	00:53	TR18	Still	161218_TR18_11	731		488 799.5	5 882 893.0	
14/08/2017	00:54	TR18	Still	161218_TR18_12	732		488 781.1	5 882 900.1	
14/08/2017	00:54	TR18	Still	161218_TR18_13	733		488 777.3	5 882 903.2	
14/08/2017	00:55	TR18	Still	161218_TR18_14	734		488 782.1	5 882 906.0	
14/08/2017	00:56	TR18	Still	161218_TR18_15	735		488 809.8	5 882 911.3	
14/08/2017	00:57	TR18	Still	161218_TR18_16	736		488 801.1	5 882 935.4	
14/08/2017	00:58	TR18	Still	161218_TR18_17	737		488 776.8	5 882 938.2	
14/08/2017	00:58	TR18	Still	161218_TR18_18	738		488 774.8	5 882 945.8	
14/08/2017	00:59	TR18	Still	161218_TR18_19	739		488 789.3	5 882 967.9	
14/08/2017	01:00	TR18	Still	161218_TR18_20	740		488 789.7	5 882 975.1	
14/08/2017	01:00	TR18	Still	161218_TR18_21	741		488 772.1	5 882 985.6	
14/08/2017	01:01	TR18	Still	161218_TR18_22	742		488 744.4	5 882 987.6	
14/08/2017	01:02	TR18	Vid	EOL	743	26	488 736.0	5 882 995.5	
14/08/2017	01:30	TR22	Vid	SOL	744	25	488 782.1	5 887 710.7	
14/08/2017	01:31	TR22	Still	161218_TR22_02	745		488 776.7	5 887 725.4	
14/08/2017	01:31	TR22	Still	161218_TR22_03	746		488 784.1	5 887 744.6	
14/08/2017	01:32	TR22	Still	161218_TR22_04	747		488 785.9	5 887 753.8	
14/08/2017	01:32	TR22	Still	161218_TR22_05	748		488 779.3	5 887 770.0	
14/08/2017	01:33	TR22	Still	161218_TR22_06	749		488 757.7	5 887 782.2	

Geodetic Datum: ETRS89 UTM Z31N									
Date	Time [UTC]	Transect	Type	Still No.	Fix No.	Water Depth [m BSL]	Actual Location		Notes
							Easting [m]	Northing [m]	
14/08/2017	01:33	TR22	Still	161218_TR22_07	750		488 743.2	5 887 786.3	
14/08/2017	01:34	TR22	Still	161218_TR22_08	751		488 723.8	5 887 791.8	
14/08/2017	01:35	TR22	Still	161218_TR22_09	752		488 717.2	5 887 802.1	
14/08/2017	01:35	TR22	Still	161218_TR22_10	753		488 736.6	5 887 809.6	
14/08/2017	01:36	TR22	Still	161218_TR22_11	754		488 744.0	5 887 814.9	
14/08/2017	01:36	TR22	Still	161218_TR22_12	755		488 750.7	5 887 825.5	
14/08/2017	01:36	TR22	Still	161218_TR22_13	756		488 750.5	5 887 837.4	
14/08/2017	01:37	TR22	Still	161218_TR22_14	757		488 730.1	5 887 846.4	
14/08/2017	01:38	TR22	Still	161218_TR22_15	758		488 703.4	5 887 850.9	
14/08/2017	01:39	TR22	Still	161218_TR22_16	759		488 690.6	5 887 858.4	
14/08/2017	01:39	TR22	Still	161218_TR22_17	760		488 687.4	5 887 866.7	
14/08/2017	01:40	TR22	Still	161218_TR22_18	761		488 715.2	5 887 873.8	
14/08/2017	01:40	TR22	Still	161218_TR22_19	762		488 724.6	5 887 877.1	
14/08/2017	01:41	TR22	Still	161218_TR22_20	763		488 738.0	5 887 895.7	
14/08/2017	01:42	TR22	Still	161218_TR22_21	764		488 731.2	5 887 910.9	
14/08/2017	01:42	TR22	Still	161218_TR22_22	765		488 717.5	5 887 916.9	
14/08/2017	01:43	TR22	Still	161218_TR22_23	766		488 705.3	5 887 918.4	
14/08/2017	01:44	TR22	Still	161218_TR22_24	767		488 635.0	5 887 889.1	
14/08/2017	01:45	TR22	Vid	EOL	768	27	488 631.3	5 887 885.6	

Notes:
UTC = Coordinated Universal Time
BSL = Below Sea Level
TR = Transect
SOL = Start of line
EOL = End of line

B.1.2 0.1 m-^{2} Hamon Grab Survey Log (Samples for PSA and Macrofauna)

Geodetic Datum: ETRS89 UTM Z31N												
Date	Time [UTC]	Station	Type	Sample Replicate	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
14/08/2017	05:32	ST22	HG	FA	769	26.5	488 736.6	5 887 827.0	488 737.2	5 887 832.6	5.5	
14/08/2017	07:41	ST18	HG	FA	772	25.0	488 813.4	5 882 906.4	488 812.6	5 882 918.2	11.8	
14/08/2017	08:39	ST13	HG	FA	774	28.5	484 580.7	5 877 932.9	484 576.1	5 877 936.8	6.0	
14/08/2017	09:43	ST08	HG	FA	776	29.3	484 554.2	5 872 893.2	484 557.6	5 872 906.3	13.5	
14/08/2017	10:34	ST02	HG	FA	779	34.3	484 554.2	5 867 866.7	484 556.3	5 867 855.3	11.6	
14/08/2017	14:14	ST32	HG	FA	782	36.5	484 932.6	5 863 602.3	484 937.4	5 863 617.8	16.2	
14/08/2017	16:09	ST31	HG	FA	787	36.1	484 781.7	5 859 644.7	484 781.5	5 859 655.2	10.5	
14/08/2017	17:44	ST28	HG	FA	789	32.2	488 910.6	5 860 248.1	488 910.5	5 860 256.4	8.3	
14/08/2017	18:38	ST33	HG	FA	794	25.3	487 543.4	5 863 700.2	487 547.7	5 863 701.0	4.4	
14/08/2017	19:25	ST01	HG	FA	796	31.5	493 813.4	5 862 906.4	493 802.5	5 862 916.1	14.6	
14/08/2017	20:24	ST04	HG	FA	798	30.6	493 813.4	5 867 906.4	493 807.3	5 867 906.8	6.1	
14/08/2017	21:21	ST03	HG	FA	800	36.1	488 813.4	5 867 906.4	488 811.8	5 867 912.6	6.4	
14/08/2017	22:28	ST09	HG	NS	802	35.2	488 813.4	5 872 906.4	488 820.9	5 872 920.8	16.2	No sample, gravel in jaws
14/08/2017	22:35	ST09	HG	FA	803	35.2	488 813.4	5 872 906.4	488 802.5	5 872 913.7	13.0	
15/08/2017	00:08	ST10	HG	FA	805	31.0	493 813.4	5 872 906.4	493 820.7	5 872 914.0	10.6	
15/08/2017	00:59	ST14	HG	NS	807	34.0	488 813.4	5 877 906.4	488 809.2	5 877 896.3	11.0	Sample accidentally spilt on deck, sample rejected
15/08/2017	01:08	ST14	HG	NS	808	34.2	488 813.4	5 877 906.4	488 806.9	5 877 908.3	6.7	Sample volume too small
15/08/2017	01:17	ST14	HG	FA	809	33.8	488 813.4	5 877 906.4	488 824.7	5 877 896.9	14.8	Sample volume too small
15/08/2017	02:07	ST15	HG	NS	811	29.6	493 813.4	5 877 906.4	493 817.0	5 877 896.9	10.2	
15/08/2017	02:14	ST15	HG	FA	812	29.6	493 813.4	5 877 906.4	493 806.7	5 877 904.1	7.1	
15/08/2017	03:28	ST19	HG	NS	814	29.0	493 813.4	5 882 906.4	493 806.0	5 882 888.7	19.2	Sample volume too small
15/08/2017	03:35	ST19	HG	FA	815	29.0	493 813.4	5 882 906.4	493 803.8	5 882 910.9	10.6	
15/08/2017	04:35	ST23	HG	FA	818	29.6	493 813.4	5 887 906.4	493 799.7	5 887 905.2	13.7	
15/08/2017	05:28	ST27	HG	NS	820	28.6	493 957.7	5 891 539.9	493 951.5	5 891 548.3	10.4	
15/08/2017	05:35	ST27	HG	NS	821	29.2	493 957.7	5 891 539.9	493 965.0	5 891 538.4	7.5	Accepted at low volume
15/08/2017	05:45	ST27	HG	FA	822	29.8	493 957.7	5 891 539.9	493 964.8	5 891 538.9	7.1	Sample volume too small
15/08/2017	07:08	ST25	HG	NS	824	21.1	498 813.4	5 892 906.4	498 813.9	5 892 926.3	19.9	Sample volume too small
15/08/2017	07:13	ST25	HG	FA	825	22.1	498 813.4	5 892 906.4	498 825.5	5 892 918.6	17.2	

Geodetic Datum: ETRS89 UTM Z31N												
Date	Time [UTC]	Station	Type	Sample Replicate	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
15/08/2017	08:05	ST26	HG	FA	827	26.3	503 813.4	5 897 906.4	503 820.3	5 897 912.9	9.5	
15/08/2017	08:53	ST30	HG	NS	829	27.7	504 048.1	5 892 889.7	504 050.9	5 892 902.9	13.6	Sample volume too small
15/08/2017	09:01	ST30	HG	FA	830	27.8	504 048.1	5 892 889.7	504 046.2	5 892 881.7	8.1	
15/08/2017	09:53	ST29	HG	FA	832	24.2	499 177.2	5 887 823.7	499 185.9	5 887 828.4	9.9	
15/08/2017	10:33	ST24	HG	NS	834	29.0	503 813.4	5 887 906.4	503 827.5	5 887 903.4	14.5	Sample volume too small
15/08/2017	10:39	ST24	HG	NS	835	29.1	503 813.4	5 887 906.4	503 828.7	5 887 904.4	15.4	Sample volume too small
15/08/2017	10:46	ST24	HG	FA	836	29.1	503 813.4	5 887 906.4	503 818.7	5 887 903.8	5.9	
15/08/2017	12:42	ST20	HG	FA	838	25.5	498 813.4	5 882 906.4	498 812.4	5 882 899.3	7.2	
15/08/2017	13:47	ST21	HG	FA	841	28.5	503 813.4	5 882 906.4	503 816.0	5 882 900.9	6.1	
15/08/2017	14:44	ST16	HG	FA	844	33.1	498 813.4	5 877 906.4	498 811.1	5 877 893.1	13.5	
15/08/2017	15:46	ST17	HG	FA	846	27.5	503 813.4	5 877 906.4	503 807.0	5 877 895.3	12.9	
15/08/2017	17:30	ST12	HG	FA	849	29.6	503 813.4	5 872 906.4	503 809.0	5 872 909.9	5.6	
15/08/2017	18:20	ST11	HG	FA	851	37.1	498 709.1	5 872 858.5	498 709.4	5 872 865.5	6.9	
15/08/2017	19:16	ST05	HG	FA	854	37.1	499 992.6	5 870 010.1	499 987.2	5 870 021.1	12.3	
15/08/2017	20:30	ST06	HG	FA	856	30.0	503 813.4	5 867 906.4	503 817.8	5 867 914.8	9.5	
15/08/2017	21:33	ST07	HG	FA	860	28.6	508 813.4	5 867 906.4	508 817.9	5 867 919.7	14.0	
15/08/2017	22:31	ST35	HG	FA	862	32.7	504 749.5	5 864 872.4	504 763.0	5 864 883.0	17.1	
15/08/2017	23:51	ST34	HG	FA	864	38.2	498 866.3	5 863 964.8	498 879.5	5 863 975.0	16.7	

Notes:
BSL = Below Sea Level
FA = Faunal sample replicate A
HG = Hamon grab
NS = No sample
UTC = Coordinated Universal Time

B.1.3 0.1 m-2 Day Grab Survey Log (Samples for Chemistry Analysis)

Geodetic Datum: ETRS89 UTM Z31N												
Date	Time [UTC]	Station	Type	Samples	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
14/08/2017	05:43	ST22	DG	NS	770	26.1	488 736.6	5 887 827.0	488 731.6	5 887 840.4	14.3	
14/08/2017	05:47	ST22	DG	PC	771	26.1	488 736.6	5 887 827.0	488 738.4	5 887 837.0	10.1	
14/08/2017	07:47	ST18	DG	PC	773	25.3	488 813.4	5 882 906.4	488 806.9	5 882 913.3	9.4	
14/08/2017	08:45	ST13	DG	PC	775	28.3	484 580.7	5 877 932.9	484 570.3	5 877 935.8	10.8	
14/08/2017	09:49	ST08	DG	NS	777	29.3	484 554.2	5 872 893.2	484 559.2	5 872 885.7	9.0	
14/08/2017	09:52	ST08	DG	PC	778	29.2	484 554.2	5 872 893.2	484 556.5	5 872 874.1	19.2	
14/08/2017	10:38	ST02	DG	NS	780	36.7	484 554.2	5 867 866.7	484 555.3	5 867 864.4	2.6	
14/08/2017	10:44	ST02	DG	PC	781	34.2	484 554.2	5 867 866.7	484 569.9	5 867 865.1	15.8	
14/08/2017	14:37	ST32	DG	NS	783	36.7	484 932.6	5 863 602.3	484 927.4	5 863 598.8	6.2	
14/08/2017	14:56	ST32	DG	NS	784	36.4	484 932.6	5 863 602.3	484 922.1	5 863 602.4	10.5	
14/08/2017	14:59	ST32	DG	PC	785	36.0	484 932.6	5 863 602.3	484 934.1	5 863 614.7	12.5	
14/08/2017	16:17	ST31	DG	PC	788	36.3	484 781.7	5 859 644.7	484 786.4	5 859 645.2	4.7	
14/08/2017	17:50	ST28	DG	NS	790	33.3	488 910.6	5 860 248.1	488 911.9	5 860 245.3	3.1	
14/08/2017	17:53	ST28	DG	NS	791	33.3	488 910.6	5 860 248.1	488 917.2	5 860 246.4	6.8	
14/08/2017	17:56	ST28	DG	NS	792	33.3	488 910.6	5 860 248.1	488 913.7	5 860 250.4	3.8	
14/08/2017	17:59	ST28	DG	PC	793	33.3	488 910.6	5 860 248.1	488 913.5	5 860 244.5	4.6	
14/08/2017	18:43	ST33	DG	PC	795	25.0	487 543.4	5 863 700.2	487 547.3	5 863 689.9	11.0	
14/08/2017	19:30	ST01	DG	PC	797	31.5	493 813.4	5 862 906.4	493 810.3	5 862 905.5	3.2	
14/08/2017	20:30	ST04	DG	PC	799	30.6	493 813.4	5 867 906.4	493 816.1	5 867 901.6	5.5	
14/08/2017	21:26	ST03	DG	PC	801	36.1	488 813.4	5 867 906.4	488 798.2	5 867 901.4	16.0	
14/08/2017	22:39	ST09	DG	PC	804	35.0	488 813.4	5 872 906.4	488 809.0	5 872 905.6	4.4	
15/08/2017	00:14	ST10	DG	PC	806	31.0	493 813.4	5 872 906.4	493 828.5	5 872 907.1	15.1	
15/08/2017	01:24	ST14	DG	PC	810	33.8	488 813.4	5 877 906.4	488 823.5	5 877 903.8	10.4	
15/08/2017	02:19	ST15	DG	PC	813	29.6	493 813.4	5 877 906.4	493 813.4	5 877 893.6	12.8	
15/08/2017	03:44	ST19	DG	NS	816	29.1	493 813.4	5 882 906.4	493 805.3	5 882 898.5	11.4	
15/08/2017	03:49	ST19	DG	PC	817	29.3	493 813.4	5 882 906.4	493 812.5	5 882 909.8	3.5	
15/08/2017	04:41	ST23	DG	PC	819	29.6	493 813.4	5 887 906.4	493 800.4	5 887 907.9	13.1	
15/08/2017	05:52	ST27	DG	PC	823	28.7	493 957.7	5 891 539.9	493 961.9	5 891 529.2	11.6	

Geodetic Datum: ETRS89 UTM Z31N

Date	Time [UTC]	Station	Type	Samples	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Location		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
15/08/2017	07:20	ST25	DG	PC	826	21.8	498 813.4	5 892 906.4	498 813.0	5 892 897.6	8.9	
15/08/2017	08:11	ST26	DG	PC	828	26.6	503 813.4	5 897 906.4	503 816.3	5 897 907.2	3.0	
15/08/2017	09:07	ST30	DG	PC	831	28.0	504 048.1	5 892 889.7	504 048.9	5 892 874.1	15.5	
15/08/2017	09:58	ST29	DG	PC	833	24.5	499 177.2	5 887 823.7	499 176.0	5 887 812.5	11.3	
15/08/2017	11:51	ST24	DG	PC	837	29.0	503 813.4	5 887 906.4	503 826.5	5 887 917.1	16.9	
15/08/2017	12:51	ST20	DG	NS	839	25.6	498 813.4	5 882 906.4	498 819.8	5 882 904.5	6.7	
15/08/2017	12:56	ST20	DG	PC	840	25.6	498 813.4	5 882 906.4	498 825.2	5 882 903.7	12.1	
15/08/2017	13:53	ST21	DG	PC	842	28.3	503 813.4	5 882 906.4	503 812.7	5 882 913.4	7.0	
15/08/2017	13:56	ST21	DG	PC	843	28.3	503 813.4	5 882 906.4	503 807.8	5 882 916.2	11.3	
15/08/2017	14:52	ST16	DG	PC	845	33.1	498 813.4	5 877 906.4	498 805.9	5 877 915.9	12.1	
15/08/2017	15:51	ST17	DG	NS	847	27.5	503 813.4	5 877 906.4	503 818.4	5 877 918.1	12.7	
15/08/2017	15:54	ST17	DG	PC	848	27.3	503 813.4	5 877 906.4	503 816.9	5 877 907.2	3.6	
15/08/2017	17:35	ST12	DG	PC	850	29.6	503 813.4	5 872 906.4	503 827.9	5 872 908.9	14.8	
15/08/2017	18:26	ST11	DG	NS	852	37.1	498 709.1	5 872 858.5	498 716.3	5 872 850.8	10.5	
15/08/2017	18:31	ST11	DG	PC	853	37.3	498 709.1	5 872 858.5	498 715.8	5 872 858.0	6.7	
15/08/2017	19:31	ST05	DG	PC	855	37.1	499 992.6	5 870 010.1	499 993.7	5 870 008.5	2.0	
15/08/2017	20:37	ST06	DG	NS	857	30.0	503 813.4	5 867 906.4	503 823.6	5 867 895.9	14.7	
15/08/2017	20:39	ST06	DG	NS	858	30.0	503 813.4	5 867 906.4	503 818.0	5 867 889.0	18.0	
15/08/2017	20:42	ST06	DG	PC	859	30.0	503 813.4	5 867 906.4	503 814.6	5 867 898.8	7.7	
15/08/2017	21:39	ST07	DG	PC	861	28.6	508 813.4	5 867 906.4	508 814.2	5 867 899.2	7.2	
15/08/2017	22:37	ST35	DG	PC	863	33.2	504 749.5	5 864 872.4	504 739.3	5 864 868.6	11.0	
15/08/2017	23:57	ST34	DG	PC	865	38.2	498 866.3	5 863 964.8	498 862.6	5 863 979.7	15.4	

Notes:
BSL = Below Sea Level
DG = Day grab
NS = No sample
PC = Physio-chemical sub samples
ST = Station
UTC = Universal Time Coordinated

B.2 VIDEO AND PHOTOGRAPHIC LOG

Geodetic Datum: ETRS89 UTM Z31N

Date	Transect	Time [UTC]	Video Coordinates		Length [m]	Number of Stills
			Easting [m]	Northing [m]		
12/08/2017	TR01	15:47	493 686.2	5 862 969.9	245	11
		15:57	493 902.7	5 862 855.7		
12/08/2017	TR02	20:05	484 551.5	5 867 998.1	230	6
		20:15	484 555.0	5 867 767.7		
12/08/2017	TR03	19:29	488 809.8	5 867 994.3	192	14
		19:37	488 812.4	5 867 801.9		
12/08/2017	TR04	14:27	493 834.2	5 867 805.6	205	11
		14:35	493 806.3	5 868 008.9		
12/08/2017	TR05	02:00	500 026.0	5 869 949.5	176	15
		02:15	499 968.8	5 870 116.2		
12/08/2017	TR05A	02:32	500 055.7	5 869 735.8	194	17
		02:49	500 011.2	5 869 924.2		
12/08/2017	TR05B	03:33	500 164.1	5 869 514.5	184	15
		03:39	500 112.4	5 869 691.1		
12/08/2017	TR05C	04:09	500 051.5	5 869 844.7	456	17
		04:23	500 208.6	5 869 416.2		
12/08/2017	TR06	23:39	503 864.5	5 867 798.1	239	17
		23:50	503 763.7	5 868 015.1		
12/08/2017	TR06A	00:11	503 843.6	5 867 870.9	86	15
		00:17	503 784.6	5 867 933.6		
12/08/2017	TR07	22:04	508 891.4	5 867 903.6	209	14
		22:12	508 682.5	5 867 900.9		
12/08/2017	TR08	20:49	484 558.6	5 873 029.3	234	6
		21:00	484 554.3	5 872 795.4		
13/08/2017	TR09	21:33	488 820.7	5 873 002.8	193	17
		21:42	488 815.8	5 872 810.1		
13/08/2017	TR10	13:39	493 819.4	5 878 021.7	4969	26
		13:51	493 783.8	5 873 053.4		

Geodetic Datum: ETRS89 UTM Z31N						
Date	Transect	Time [UTC]	Video Coordinates		Length [m]	Number of Stills
			Easting [m]	Northing [m]		
13/08/2017	TR11	04:56	498 665.0	5 872 983.4	260	20
		05:05	498 755.3	5 872 739.4		
13/08/2017	TR12	21:03	503 856.5	5 873 023.7	227	0
		21:12	503 787.2	5 872 807.7		
13/08/2017	TR13	23:56	484 665.8	5 877 831.3	235	20
		00:08	484 509.7	5 878 006.7		
13/08/2017	TR14	22:30	488 878.1	5 878 028.6	242	15
		22:38	488 776.3	5 877 809.0		
13/08/2017	TR15	12:57	493 820.9	5 877 830.0	192	17
		13:09	493 819.4	5 878 021.7		
13/08/2017	TR16	05:39	498 769.5	5 878 049.0	296	18
		05:49	498 868.3	5 877 769.5		
13/08/2017	TR17	20:09	503 865.5	5 878 011.2	221	18
		20:19	503 780.6	5 877 807.6		
13/08/2017	TR18	00:46	488 868.9	5 882 800.0	236	18
		01:01	488 736.0	5 882 995.5		
13/08/2017	TR19	12:10	493 872.1	5 882 791.1	229	16
		12:23	493 750.9	5 882 985.7		
13/08/2017	TR20	07:51	498 819.6	5 883 044.7	247	20
		08:01	498 814.7	5 882 798.1		
13/08/2017	TR21	19:15	503 868.0	5 883 040.3	252	16
		19:26	503 778.9	5 882 804.1		
13/08/2017	TR22	01:29	488 782.1	5 887 710.7	231	14
		01:44	488 631.3	5 887 885.6		
13/08/2017	TR23	10:47	493 903.5	5 887 791.0	257	11
		10:56	493 740.4	5 887 989.4		
13/08/2017	TR24	16:23	503 844.1	5 887 997.2	143	15
		16:29	503 789.5	5 887 865.2		
13/08/2017	TR24	18:27	503 886.8	5 888 123.1	338	16
		18:43	503 778.6	5 887 802.4		

Geodetic Datum: ETRS89 UTM Z31N						
Date	Transect	Time [UTC]	Video Coordinates		Length [m]	Number of Stills
			Easting [m]	Northing [m]		
13/08/2017	TR25	09:27	498 973.1	5 892 912.0	275	13
		09:40	498 699.3	5 892 883.3		
13/08/2017	TR26	13:42	504 529.5	5 897 456.7	950	16
		13:58	503 716.3	5 897 948.6		
13/08/2017	TR27	10:13	494 040.2	5 891 538.7	222	14
		10:21	493 819.4	5 891 520.5		
13/08/2017	TR28	16:31	488 864.9	5 860 357.1	224	18
		16:37	488 947.2	5 860 148.4		
13/08/2017	TR29	08:43	499 204.2	5 887 950.4	293	14
		08:52	499 182.4	5 887 658.1		
13/08/2017	TR30	14:55	504 166.8	5 892 836.7	159	17
		15:01	504 051.6	5 892 946.3		
13/08/2017	TR30	15:34	504 251.1	5 892 831.8	266	14
		15:51	504 005.9	5 892 935.9		
13/08/2017	TR31	17:32	484 779.6	5 859 772.7	222	16
		17:40	484 778.0	5 859 550.9		
13/08/2017	TR32	18:10	484 932.4	5 863 691.7	193	12
		18:17	484 931.5	5 863 498.4		
13/08/2017	TR33	18:44	487 545.1	5 863 822.4	223	15
		18:53	487 545.8	5 863 599.9		
14/08/2017	TR34	01:01	498 916.8	5 863 845.7	237	21
		01:20	498 814.6	5 864 059.3		
14/08/2017	TR35	22:46	504 787.5	5 864 800.7	188	24
		22:57	504 677.9	5 864 953.8		

Notes:
UTC = Coordinated Universal Time
TR = Transect

B.3 0.1 M^2 HAMON GRAB LOG

Date	Time [UTC]	Station	Sample Rep.	Fix No.	Sample Volume [L]	Sediment Description (including stratigraphy)		Comments (fauna, smell, bioturbation, debris)
						Sediment Type	Sediment Description	
14/08/2017	05:32	ST22	1	769	5.0	mS	Slightly shelly muddy sand	Patches of anoxia
14/08/2017	07:41	ST18	1	772	5.5	(g)S	Slightly gravelly slightly shelly sand	Sandeel
14/08/2017	08:39	ST13	1	774	5.0	(g)S	Slightly gravelly slightly shelly sand	Thin streaks of anoxia
14/08/2017	09:43	ST08	1	776	5.0	(g)S	Slightly gravelly slightly shelly sand	*Echinocardium cordatum*
14/08/2017	10:34	ST02	1	779	5.0	(g)mS	Slightly gravelly slightly shelly slightly muddy sand	
14/08/2017	14:14	ST32	1	782	5.0	(g)mS	Slightly gravelly muddy sand	Brittlestars, razorshell
14/08/2017	16:09	ST31	1	787	6.0	(g)mS	Slightly gravelly muddy sand. Patches of grey clay at base.	Patches of anoxia, brittlestar
14/08/2017	17:44	ST28	1	789	5.0	S	Slightly shelly sand	
14/08/2017	18:38	ST33	1	794	5.0	S	Slightly shelly sand	
14/08/2017	19:25	ST01	1	796	5.0	S	Slightly shelly sand	
14/08/2017	20:24	ST04	1	798	5.0	S	Slightly shelly sand	
14/08/2017	21:21	ST03	1	800	5.0	mS	Slightly shelly slightly muddy sand	
14/08/2017	22:28	ST09	1	802	NA	NA	NA	No sample, gravel in jaws
14/08/2017	22:35	ST09	2	803	5.0	(g)S	Slightly shelly slightly gravelly sand	
15/08/2017	00:08	ST10	1	805	5.0	S	Slightly shelly sand	
15/08/2017	00:59	ST14	1	804	5.0	mS	Slightly shelly slightly muddy sand	
15/08/2017	01:08	ST14	2	808	4.0	mS	Slightly shelly slightly muddy sand	
15/08/2017	01:17	ST14	3	809	5.0	(g)S	Slightly gravelly slightly shelly sand	
15/08/2017	02:07	ST15	1	811	3.0	S	Slightly shelly sand	
15/08/2017	02:14	ST15	2	812	5.0	S	Slightly shelly sand	
15/08/2017	03:28	ST19	1	814	3.0	mS	Slightly shelly muddy sand	
15/08/2017	03:35	ST19	2	815	5.0	mS	Slightly shelly muddy sand	
15/08/2017	04:35	ST23	1	818	6.0	mS	Slightly shelly slightly muddy sand	
15/08/2017	05:28	ST27	1	820	4.0	mS	Slightly shelly muddy sand	
15/08/2017	05:35	ST27	2	821	4.0	mS	Slightly shelly muddy sand	Accepted at low volume
15/08/2017	05:45	ST27	3	822	4.0	mS	Slightly shelly muddy sand	

Date	Time [UTC]	Station	Sample Rep.	Fix No.	Sample Volume [L]	Sediment Description (including stratigraphy)		Comments (fauna, smell, bioturbation, debris)
						Sediment Type	Sediment Description	
15/08/2017	07:08	ST25	1	824	3.0	mS	Slightly shelly slightly muddy sand	
15/08/2017	07:13	ST25	2	825	5.0	mS	Slightly shelly slightly muddy sand	
15/08/2017	08:05	ST26	1	827	5.0	mS	Slightly shelly muddy sand	
15/08/2017	08:53	ST30	1	829	4.0	mS	Slightly shelly muddy sand	
15/08/2017	09:01	ST30	2	830	5.0	mS	Slightly shelly muddy sand	Echinoderm
15/08/2017	09:53	ST29	1	832	5.0	mS	Slightly shelly slightly muddy sand	Patches of anoxia / small lumps mud
15/08/2017	10:33	ST24	1	834	2.0	mS	Slightly shelly slightly muddy sand	
15/08/2017	10:39	ST24	2	835	4.5	mS	Slightly shelly slightly muddy sand	Patches of anoxia. Insufficient sample.
15/08/2017	10:46	ST24	3	836	5.0	mS	Slightly shelly slightly muddy sand	
15/08/2017	12:42	ST20	1	838	5.0	mS	Slightly shelly slightly muddy sand	
15/08/2017	13:47	ST21	1	841	5.0	mS	Slightly shelly slightly muddy sand	
15/08/2017	14:44	ST16	1	844	5.0	mS	Shelly muddy sand	Darker underneath but not full anoxic. Brittlestar and *Sabellaria* tubes
15/08/2017	15:46	ST17	1	846	5.0	mS	Shelly muddy sand	Some anoxia in shells
15/08/2017	17:30	ST12	1	849	5.0	mS	Shelly muddy sand	Patches of anoxia
15/08/2017	19:16	ST05	1	854	5.0	mS	Shelly muddy sand	*Sabellaria,* brittlestars
15/08/2017	20:30	ST06	1	856	5.0	mS	Slightly shelly muddy sand	
15/08/2017	21:33	ST07	1	860	5.0	mS	Slightly shelly muddy sand	
15/08/2017	22:31	ST35	1	862	5.0	mS	Slightly shelly muddy sand	Anoxic smell. *Aphrodita aculeata*
15/08/2017	23:51	ST34	1	864	6.0	S	Shelly sand	*Corystes cassivelaunus.* Razor clam.

Notes:
UTC = Coordinated Universal Time
ST = Station
(g)mS = slightly gravelly muddy Sand
(g)S = slightly gravelly Sand
mS = muddy Sand
NA = Not applicable
S = Sand

B.4 0.1 M^2 HAMON GRAB PHOTOGRAPHS

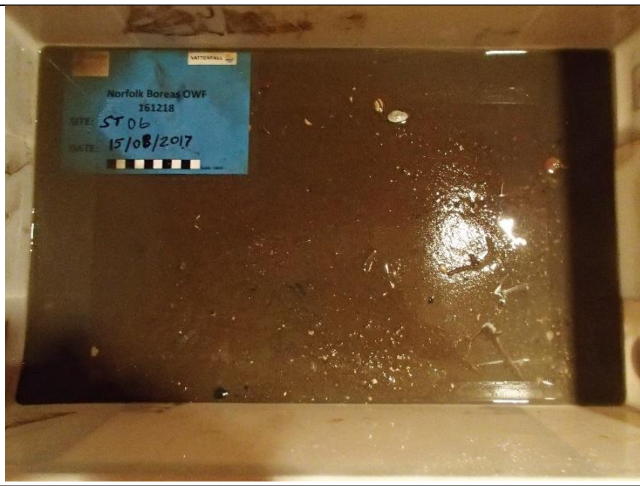
ST01

ST02

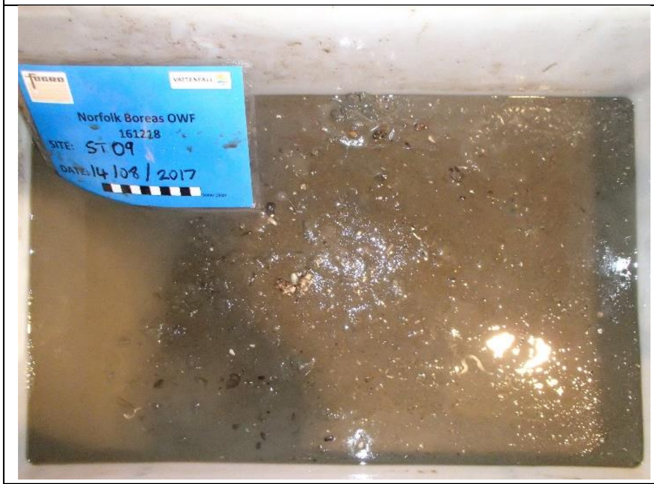
ST03

ST04

ST05



ST06

	
ST07	ST08
	
ST09	ST10
	
ST11	ST12

ST13

ST14

ST015

ST16

ST17

Photograph not available for this grab station

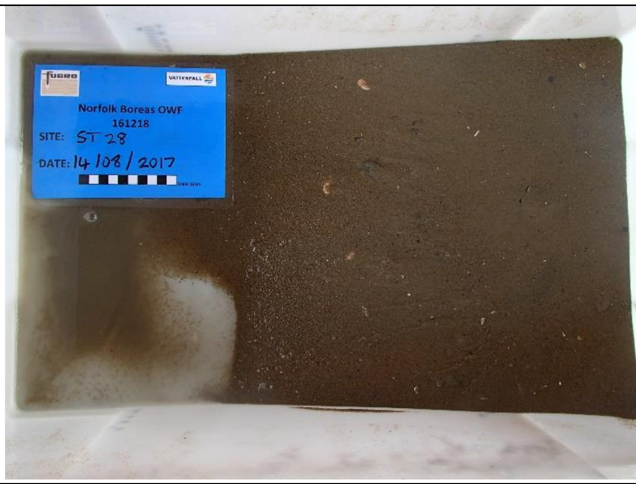
ST18

	
ST19	ST20
	*Photograph not available for this grab station*
ST21	ST22
	
ST23	ST24

ST25

ST26

ST27



ST28

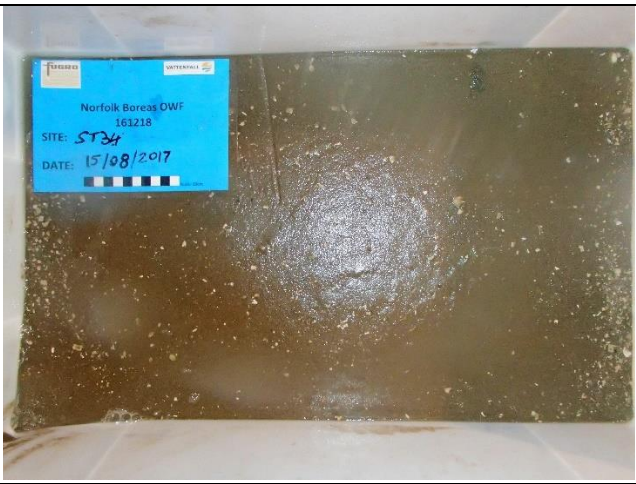
ST29

ST30

ST31

ST32

ST33



ST34

ST35

B.5 0.1 M² DAY GRAB LOG

Date	Time [UTC]	Station	Sample Rep.	Fix No.	Sample Depth [cm]	Sediment Description (including stratigraphy)		Comments (fauna, smell, bioturbation, debris)
						Sediment Type	Sediment Description	
14/08/2017	05:43	ST22	1	770	NA	NA	NA	Unsuccessful sampling
14/08/2017	05:47	ST22	2	771	7.5	mS	Slightly shelly muddy sand	
14/08/2017	07:47	ST18	1	773	7.5	(g)S	Slightly gravelly slightly shelly sand	
14/08/2017	08:45	ST13	1	775	8	(g)S	Slightly gravelly slightly shelly sand	
14/08/2017	09:49	ST08	1	777	NA	NA	NA	Unsuccessful sampling
14/08/2017	09:52	ST08	2	778	7	(g)S	Slightly gravelly slightly shelly sand	
14/08/2017	10:38	ST02	1	780	NA	NA	NA	Washed out
14/08/2017	10:44	ST02	2	781	7	S	Slightly shelly sand	
14/08/2017	14:37	ST32	1	783	NA	NA	NA	Washed out
14/08/2017	14:56	ST32	2	784	NA	NA	NA	Washed out
14/08/2017	14:59	ST32	3	785	12	S	Slightly shelly sand	
14/08/2017	16:17	ST31	1	788	9	S	Slightly shelly sand	
14/08/2017	17:50	ST28	1	790	NA	NA	NA	Shell in jaws - sample washed out
14/08/2017	17:53	ST28	2	791	NA	NA	NA	Misfire
14/08/2017	17:56	ST28	3	792	NA	NA	NA	Shell in jaws
14/08/2017	17:59	ST28	4	793	NA	NA	NA	Shell in jaws
14/08/2017	18:43	ST33	1	795	9	S	Slightly shelly sand	
14/08/2017	19:30	ST01	1	797	9	S	Slightly shelly sand	
14/08/2017	20:30	ST04	1	799	8	S	Slightly shelly sand	
14/08/2017	21:26	ST03	1	801	10	S	Slightly shelly sand	
14/08/2017	22:39	ST09	1	804	9	S	Slightly shelly sand	
15/08/2017	00:14	ST10	1	806	9.5	S	Slightly shelly sand	

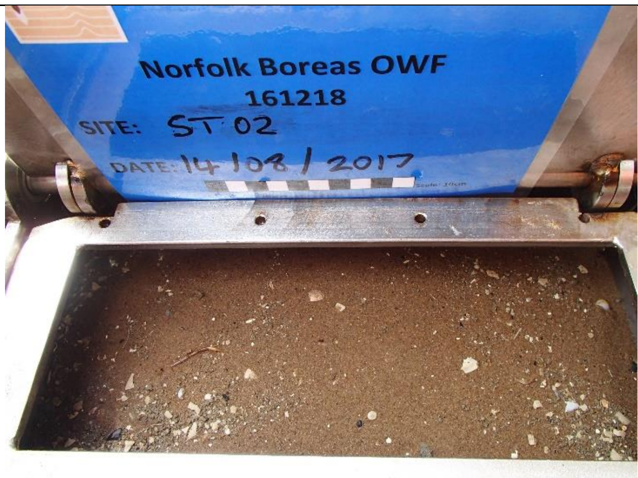
Date	Time [UTC]	Station	Sample Rep.	Fix No.	Sample Depth [cm]	Sediment Description (including stratigraphy)		Comments (fauna, smell, bioturbation, debris)
						Sediment Type	Sediment Description	
15/08/2017	01:24	ST14	1	810	9	(g)S	Slightly gravelly slightly shelly sand	
15/08/2017	02:19	ST15	1	813	7	S	Slightly shelly sand	
15/08/2017	03:44	ST19	1	816	6	NA	NA	Insufficient sample
15/08/2017	03:49	ST19	2	817	8	mS	Slightly shelly slightly muddy sand	
15/08/2017	04:41	ST23	1	819	8	mS	Slightly shelly muddy sand	
15/08/2017	05:52	ST27	1	823	8	mS	Slightly shelly muddy sand	
15/08/2017	07:20	ST25	1	826	10	mS	Slightly shelly muddy sand	
15/08/2017	08:11	ST26	1	828	8	mS	Slightly shelly muddy sand	
15/08/2017	09:07	ST30	1	831	7.5	mS	Slightly shelly muddy sand	
15/08/2017	09:58	ST29	1	833	9	mS	Slightly shelly slightly muddy sand	
15/08/2017	11:51	ST24	1	837	9	mS	Slightly shelly slightly muddy sand	
15/08/2017	12:51	ST20	1	839	NA	NA	NA	Washed out
15/08/2017	12:56	ST20	2	840	9	mS	Slightly shelly slightly muddy sand	
15/08/2017	13:53	ST21	1	842	NA	NA	NA	Washed out
15/08/2017	13:56	ST21	2	843	9	mS	Slightly shelly slightly muddy sand	
15/08/2017	14:52	ST16	1	845	7	mS	Shelly muddy sand	
15/08/2017	15:51	ST17	1	847	NA	NA	NA	Shell in jaws - washed out
15/08/2017	15:54	ST17	2	848	7	mS	Shelly muddy sand	Anoxic layer. 1-3cm very defined black and in empty shells
15/08/2017	17:35	ST12	1	850	9	mS	Shelly muddy sand	
15/08/2017	18:26	ST11	1	852	NA	NA	NA	Shell in jaws - no sample

Date	Time [UTC]	Station	Sample Rep.	Fix No.	Sample Depth [cm]	Sediment Description (including stratigraphy)		Comments (fauna, smell, bioturbation, debris)
						Sediment Type	Sediment Description	
15/08/2017	18:31	ST11	2	853	7	mS	Shelly muddy sand	
15/08/2017	19:31	ST05	1	855	10	mS	Shelly muddy sand	*Sabellaria*
15/08/2017	20:37	ST06	1	857	NA	NA	NA	No sample - washed out
15/08/2017	20:39	ST06	2	858	NA	NA	NA	Shell in jaws - no sample
15/08/2017	20:42	ST06	3	859	8	mS	Slightly shelly muddy sand	
15/08/2017	21:39	ST07	1	861	7	mS	Slightly shelly muddy sand	
15/08/2017	22:37	ST35	1	863	8	mS	Slightly shelly muddy sand	
15/08/2017	23:57	ST34	1	865	7	S	Shelly sand	

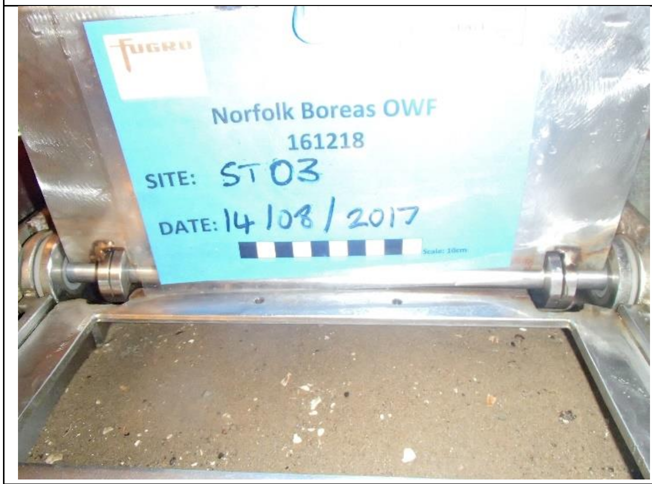
Notes:
UTC = Coordinated Universal Time
ST = Station
(g)mS = Slightly gravelly muddy Sand
(g)S = Slightly gravelly Sand
mS = muddy Sand
NA = Not applicable
S = Sand

B.6 0.1 M^2 DAY GRAB PHOTOGRAPHS

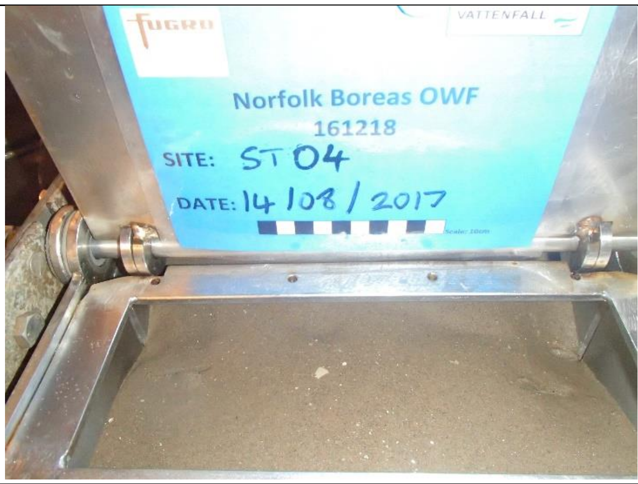
ST01



ST02



ST03



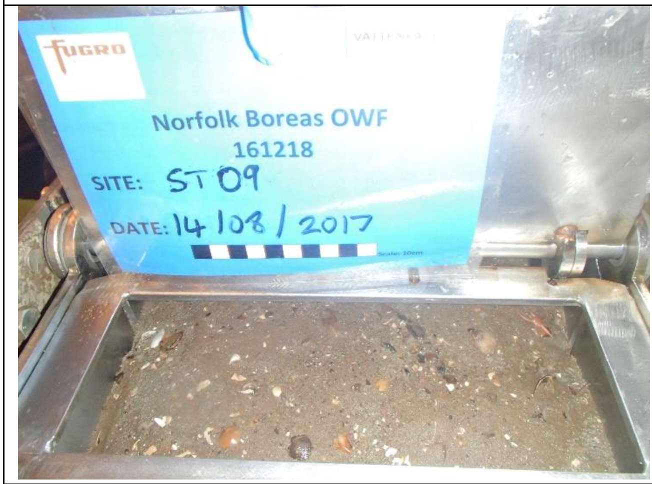
ST04

ST05

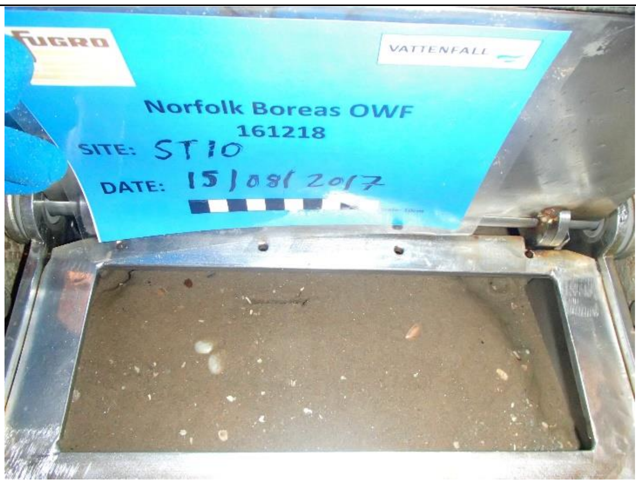
ST06

ST07

ST08



ST09



ST10

ST11

ST12

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<tr><td>ST015</td><td>ST16</td></tr>
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ST19

ST20

ST21

Photograph not available for this contaminant grab station

ST22

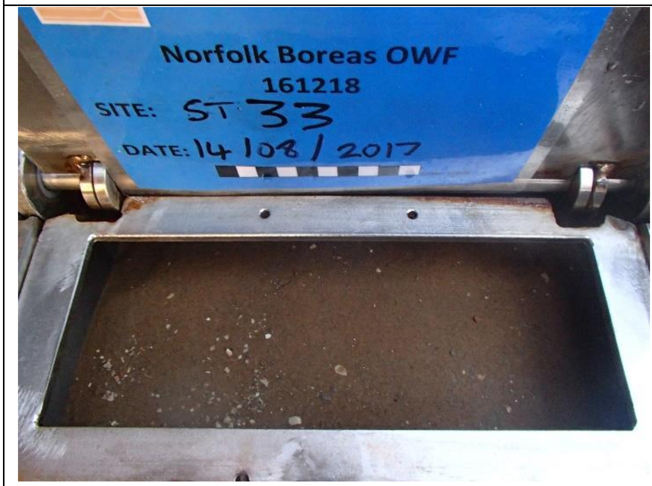
ST23

ST24

	
ST25	ST26
	*Photograph not available for this contaminant grab station*
ST27	ST28
	
ST29	ST30

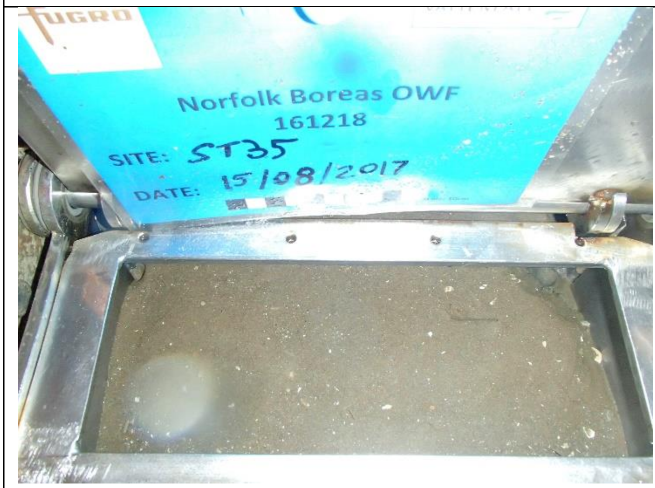
ST31

ST32



ST33

ST34



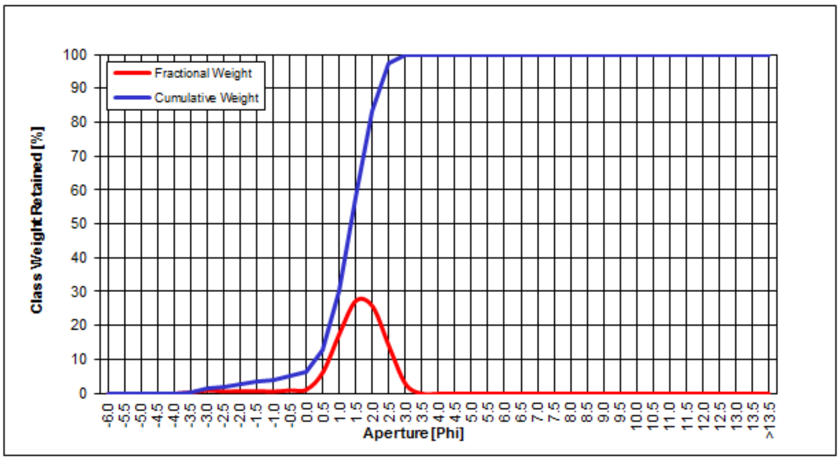
ST35

C. PARTICLE SIZE ANALYSIS (PSA) FRACTIONAL AND CUMULATIVE DATA

ST01

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.4	0.4
8000.0	-3.0	1.0	1.3
5600.0	-2.5	0.7	2.0
4000.0	-2.0	0.7	2.7
2800.0	-1.5	0.7	3.4
2000.0	-1.0	0.6	4.0
1400.0	-0.5	1.0	5.0
1000.0	0.0	1.2	6.2
707.0	0.5	6.4	12.6
500.0	1.0	17.7	30.4
353.6	1.5	27.3	57.7
250.0	2.0	25.6	83.3
176.8	2.5	13.9	97.2
125.0	3.0	2.8	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.80	Moderately Sorted
Skewness	-0.17	Coarse Skewed
Kurtosis	1.21	Leptokurtic
Mean [µm]	398.8	Medium Sand
Mean [phi]	1.33	
Median [µm]	389.8	Medium Sand
Median [phi]	1.36	
Gravel [%]	4.0	Slightly Gravelly Sand
Sand [%]	96.0	
Mud [%]	0.0	

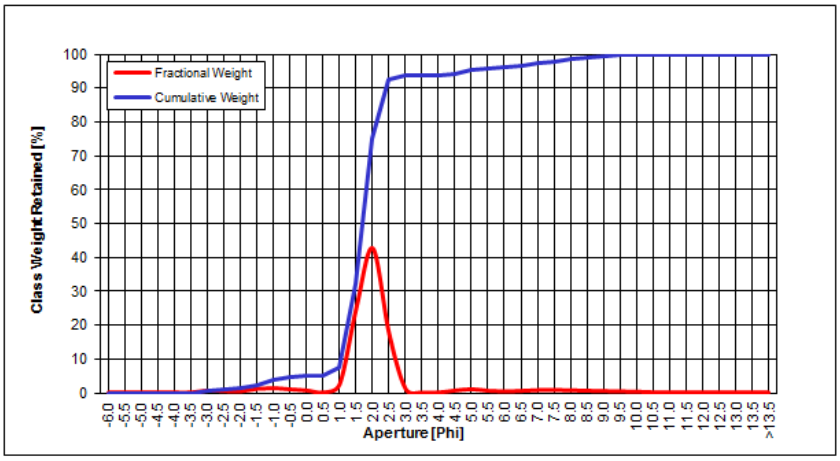


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST02

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.6	0.6
5600.0	-2.5	0.4	1.0
4000.0	-2.0	0.3	1.3
2800.0	-1.5	1.1	2.4
2000.0	-1.0	1.3	3.7
1400.0	-0.5	0.9	4.6
1000.0	0.0	0.6	5.2
707.0	0.5	0.0	5.2
500.0	1.0	2.4	7.7
353.6	1.5	24.7	32.4
250.0	2.0	42.8	75.2
176.8	2.5	17.5	92.7
125.0	3.0	1.0	93.7
88.4	3.5	0.0	93.7
62.5	4.0	0.0	93.7
44.2	4.5	0.6	94.3
31.3	5.0	1.0	95.3
22.1	5.5	0.5	95.8
15.6	6.0	0.3	96.1
11.0	6.5	0.5	96.5
7.8	7.0	0.7	97.2
5.5	7.5	0.7	97.9
3.9	8.0	0.6	98.6
2.8	8.5	0.5	99.1
2.0	9.0	0.4	99.5
1.4	9.5	0.3	99.7
1.0	10.0	0.2	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	1.04	Poorly Sorted
Skewness	0.13	Fine Skewed
Kurtosis	3.21	Extremely Leptokurtic
Mean [µm]	305.9	Medium Sand
Mean [phi]	1.71	
Median [µm]	306.6	Medium Sand
Median [phi]	1.71	
Gravel [%]	3.7	Slightly Gravelly Sand
Sand [%]	90.0	
Mud [%]	6.3	

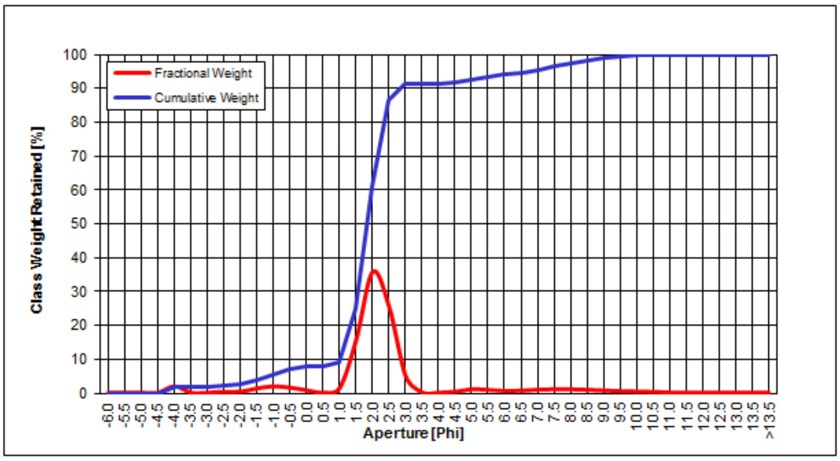


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST03

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	1.9	1.9
11200.0	-3.5	0.0	1.9
8000.0	-3.0	0.0	1.9
5600.0	-2.5	0.3	2.2
4000.0	-2.0	0.3	2.5
2800.0	-1.5	1.3	3.8
2000.0	-1.0	1.9	5.7
1400.0	-0.5	1.5	7.2
1000.0	0.0	0.7	7.9
707.0	0.5	0.0	7.9
500.0	1.0	1.4	9.3
353.6	1.5	15.6	24.9
250.0	2.0	35.9	60.8
176.8	2.5	25.5	86.3
125.0	3.0	4.9	91.2
88.4	3.5	0.1	91.3
62.5	4.0	0.0	91.3
44.2	4.5	0.3	91.6
31.3	5.0	1.0	92.6
22.1	5.5	0.8	93.4
15.6	6.0	0.5	93.9
11.0	6.5	0.6	94.5
7.8	7.0	0.9	95.4
5.5	7.5	1.0	96.4
3.9	8.0	1.0	97.4
2.8	8.5	0.8	98.3
2.0	9.0	0.7	98.9
1.4	9.5	0.5	99.4
1.0	10.0	0.3	99.7
0.69	10.5	0.2	99.9
0.49	11.0	0.1	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	1.51	Poorly Sorted
Skewness	0.11	Fine Skewed
Kurtosis	4.19	Extremely Leptokurtic
Mean [µm]	279.3	Medium Sand
Mean [phi]	1.84	
Median [µm]	277.4	Medium Sand
Median [phi]	1.85	
Gravel [%]	5.7	Gravelly Sand
Sand [%]	85.6	
Mud [%]	8.7	

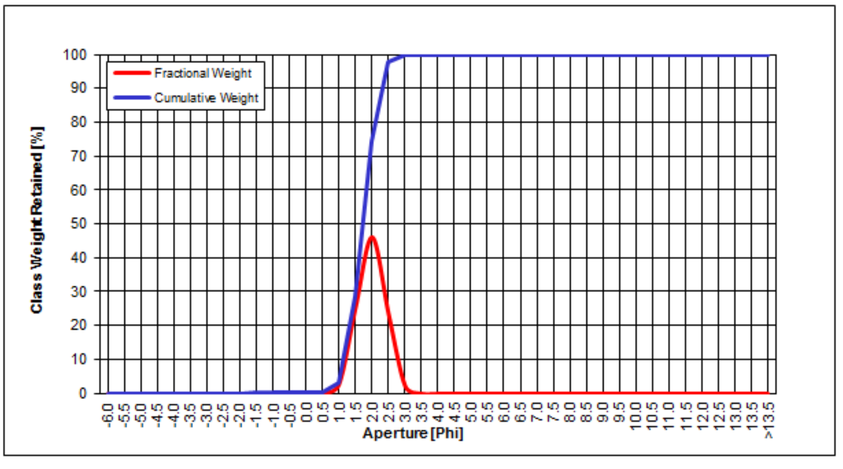


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST04

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.0	0.0
2800.0	-1.5	0.0	0.0
2000.0	-1.0	0.0	0.0
1400.0	-0.5	0.1	0.1
1000.0	0.0	0.1	0.2
707.0	0.5	0.0	0.2
500.0	1.0	2.8	3.0
353.6	1.5	25.3	28.4
250.0	2.0	46.0	74.3
176.8	2.5	23.4	97.7
125.0	3.0	2.3	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.45	Well Sorted
Skewness	0.00	Symmetrical
Kurtosis	0.99	Mesokurtic
Mean [µm]	300.9	Medium Sand
Mean [phi]	1.73	
Median [µm]	300.3	Medium Sand
Median [phi]	1.74	
Gravel [%]	0.0	Slightly Gravelly Sand
Sand [%]	100.0	
Mud [%]	0.0	

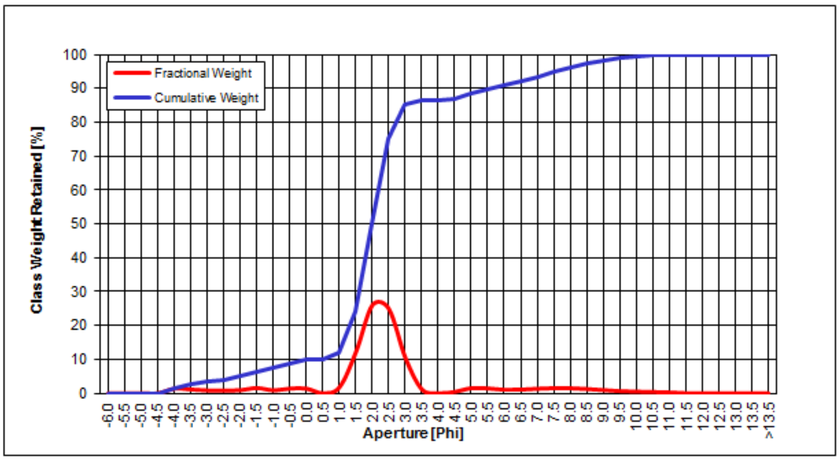


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST05

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	1.3	1.3
11200.0	-3.5	1.1	2.4
8000.0	-3.0	0.8	3.3
5600.0	-2.5	0.7	4.0
4000.0	-2.0	0.9	4.9
2800.0	-1.5	1.5	6.4
2000.0	-1.0	0.9	7.3
1400.0	-0.5	1.4	8.7
1000.0	0.0	1.4	10.0
707.0	0.5	0.0	10.0
500.0	1.0	1.7	11.8
353.6	1.5	12.1	23.9
250.0	2.0	26.1	50.0
176.8	2.5	25.0	74.9
125.0	3.0	10.4	85.4
88.4	3.5	1.1	86.5
62.5	4.0	0.0	86.5
44.2	4.5	0.4	86.9
31.3	5.0	1.5	88.4
22.1	5.5	1.4	89.8
15.6	6.0	1.0	90.9
11.0	6.5	1.1	91.9
7.8	7.0	1.3	93.2
5.5	7.5	1.5	94.7
3.9	8.0	1.5	96.2
2.8	8.5	1.2	97.4
2.0	9.0	0.9	98.4
1.4	9.5	0.6	99.0
1.0	10.0	0.4	99.4
0.69	10.5	0.3	99.8
0.49	11.0	0.2	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	1.89	Poorly Sorted
Skewness	0.12	Fine Skewed
Kurtosis	3.99	Extremely Leptokurtic
Mean [µm]	243.8	Fine Sand
Mean [phi]	2.04	
Median [µm]	249.9	Fine Sand
Median [phi]	2.00	
Gravel [%]	7.3	Gravelly Muddy Sand
Sand [%]	79.2	
Mud [%]	13.5	

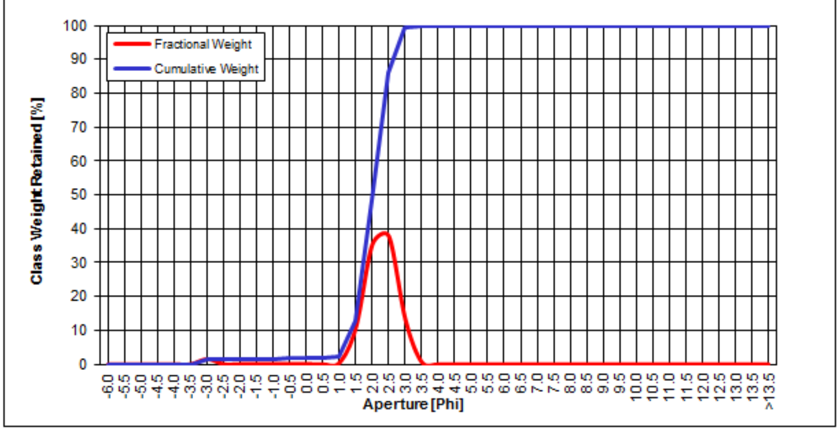


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST06

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	1.5	1.5
5600.0	-2.5	0.0	1.5
4000.0	-2.0	0.0	1.5
2800.0	-1.5	0.0	1.6
2000.0	-1.0	0.0	1.6
1400.0	-0.5	0.1	1.7
1000.0	0.0	0.1	1.7
707.0	0.5	0.0	1.7
500.0	1.0	0.4	2.1
353.6	1.5	10.8	12.9
250.0	2.0	35.5	48.3
176.8	2.5	37.9	86.2
125.0	3.0	13.2	99.4
88.4	3.5	0.6	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.49	Well Sorted
Skewness	-0.04	Symmetrical
Kurtosis	1.02	Mesokurtic
Mean [µm]	247.9	Fine Sand
Mean [phi]	2.01	
Median [µm]	246.2	Fine Sand
Median [phi]	2.02	
Gravel [%]	1.6	Slightly Gravelly Sand
Sand [%]	98.4	
Mud [%]	0.0	

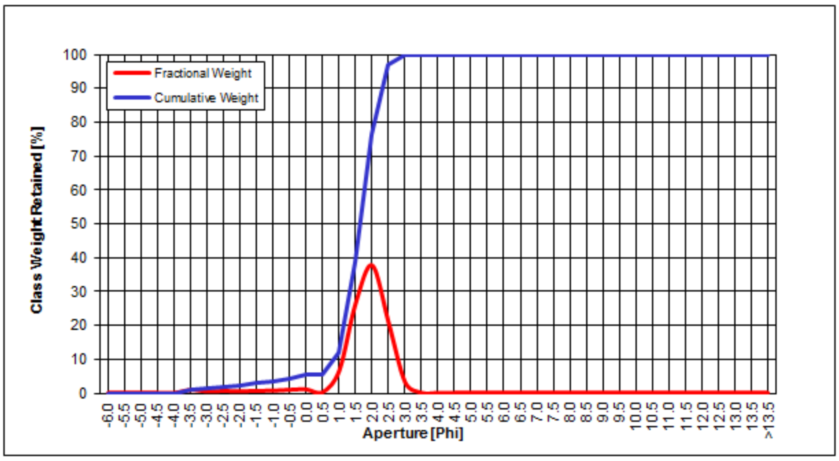


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST07

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.8	0.8
8000.0	-3.0	0.4	1.3
5600.0	-2.5	0.6	1.8
4000.0	-2.0	0.4	2.3
2800.0	-1.5	0.6	2.9
2000.0	-1.0	0.7	3.5
1400.0	-0.5	0.9	4.4
1000.0	0.0	1.0	5.4
707.0	0.5	0.2	5.6
500.0	1.0	6.5	12.1
353.6	1.5	26.4	38.5
250.0	2.0	37.7	76.2
176.8	2.5	20.7	96.9
125.0	3.0	3.1	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.68	Moderately Well Sorted
Skewness	-0.22	Coarse Skewed
Kurtosis	1.47	Leptokurtic
Mean [µm]	321.3	Medium Sand
Mean [phi]	1.64	
Median [µm]	318.1	Medium Sand
Median [phi]	1.65	
Gravel [%]	3.5	Slightly Gravelly Sand
Sand [%]	96.5	
Mud [%]	0.0	

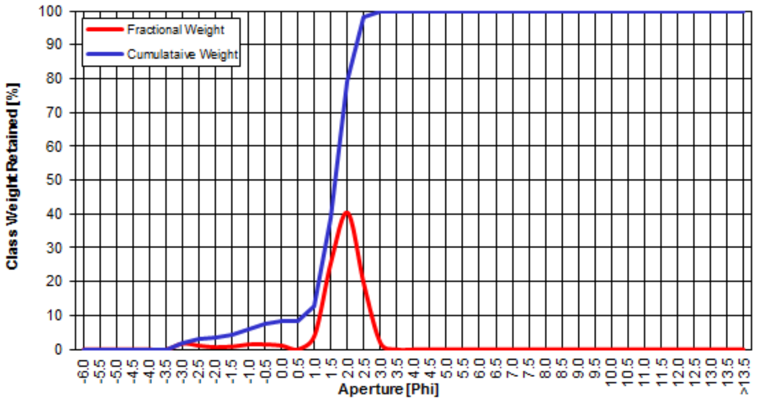


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST08

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	1.7	1.7
5600.0	-2.5	1.1	2.8
4000.0	-2.0	0.7	3.5
2800.0	-1.5	0.8	4.3
2000.0	-1.0	1.5	5.8
1400.0	-0.5	1.5	7.3
1000.0	0.0	1.1	8.5
707.0	0.5	0.0	8.5
500.0	1.0	4.2	12.7
353.6	1.5	26.0	38.7
250.0	2.0	40.5	79.2
176.8	2.5	19.1	98.2
125.0	3.0	1.8	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.82	Moderately Sorted
Skewness	-0.33	Very Coarse Skewed
Kurtosis	2.12	Very Leptokurtic
Mean [µm]	327.6	Medium Sand
Mean [phi]	1.61	
Median [µm]	321.0	Medium Sand
Median [phi]	1.64	
Gravel [%]	5.8	Gravelly Sand
Sand [%]	92.7	
Mud [%]	0.0	

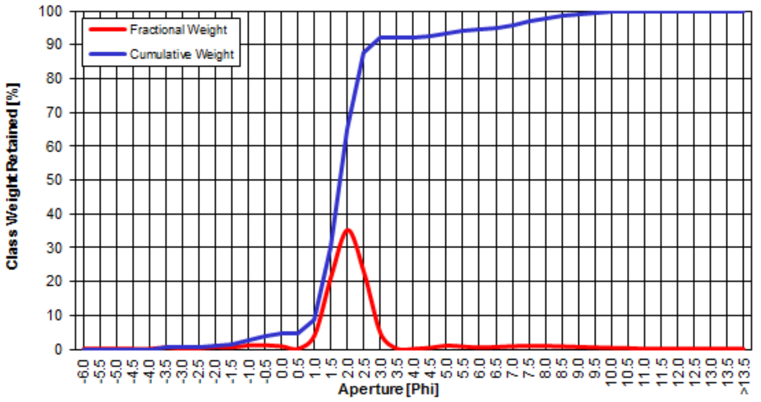


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST09

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.4	0.4
8000.0	-3.0	0.0	0.4
5600.0	-2.5	0.2	0.6
4000.0	-2.0	0.5	1.1
2800.0	-1.5	0.5	1.6
2000.0	-1.0	1.1	2.7
1400.0	-0.5	1.1	3.8
1000.0	0.0	0.8	4.6
707.0	0.5	0.0	4.6
500.0	1.0	4.1	8.7
353.6	1.5	21.3	30.1
250.0	2.0	35.1	65.1
176.8	2.5	22.4	87.6
125.0	3.0	4.5	92.0
88.4	3.5	0.0	92.1
62.5	4.0	0.0	92.1
44.2	4.5	0.3	92.4
31.3	5.0	1.0	93.4
22.1	5.5	0.7	94.1
15.6	6.0	0.4	94.5
11.0	6.5	0.6	95.1
7.8	7.0	0.8	95.9
5.5	7.5	0.9	96.8
3.9	8.0	0.9	97.7
2.8	8.5	0.7	98.4
2.0	9.0	0.6	99.0
1.4	9.5	0.4	99.4
1.0	10.0	0.3	99.7
0.69	10.5	0.2	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	1.20	Poorly Sorted
Skewness	0.30	Fine Skewed
Kurtosis	2.86	Very Leptokurtic
Mean [µm]	288.8	Medium Sand
Mean [phi]	1.79	
Median [µm]	290.3	Medium Sand
Median [phi]	1.78	
Gravel [%]	2.7	Slightly Gravelly Sand
Sand [%]	89.4	
Mud [%]	7.9	

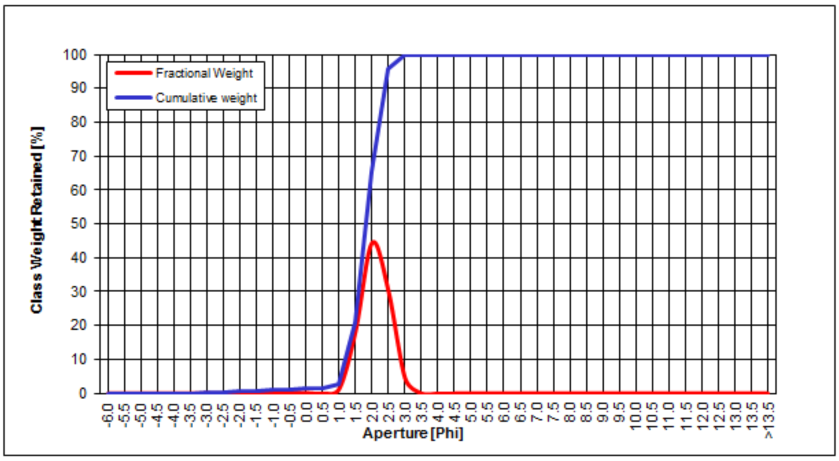


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST10

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.1	0.1
5600.0	-2.5	0.0	0.1
4000.0	-2.0	0.4	0.5
2800.0	-1.5	0.2	0.7
2000.0	-1.0	0.2	0.8
1400.0	-0.5	0.2	1.1
1000.0	0.0	0.2	1.3
707.0	0.5	0.0	1.3
500.0	1.0	1.3	2.6
353.6	1.5	18.4	21.0
250.0	2.0	44.5	65.5
176.8	2.5	30.0	95.6
125.0	3.0	4.4	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.45	Well Sorted
Skewness	-0.02	Symmetrical
Kurtosis	0.95	Mesokurtic
Mean [µm]	280.8	Medium Sand
Mean [phi]	1.83	
Median [µm]	282.1	Medium Sand
Median [phi]	1.83	
Gravel [%]	0.8	Slightly Gravelly Sand
Sand [%]	99.2	
Mud [%]	0.0	

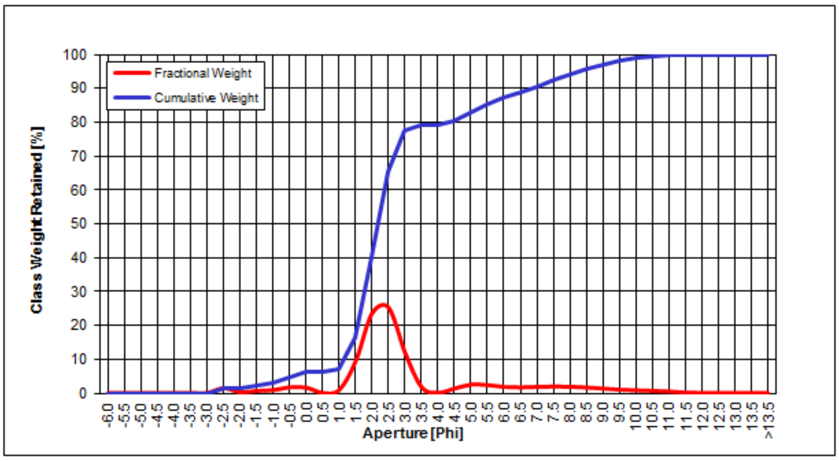


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST11

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	1.4	1.4
4000.0	-2.0	0.2	1.6
2800.0	-1.5	0.6	2.2
2000.0	-1.0	0.8	3.0
1400.0	-0.5	1.7	4.7
1000.0	0.0	1.6	6.3
707.0	0.5	0.0	6.3
500.0	1.0	0.9	7.2
353.6	1.5	9.4	16.6
250.0	2.0	23.7	40.2
176.8	2.5	25.3	65.6
125.0	3.0	11.8	77.4
88.4	3.5	1.7	79.1
62.5	4.0	0.0	79.2
44.2	4.5	1.3	80.5
31.3	5.0	2.5	82.9
22.1	5.5	2.3	85.3
15.6	6.0	1.8	87.0
11.0	6.5	1.6	88.7
7.8	7.0	1.8	90.5
5.5	7.5	1.9	92.4
3.9	8.0	1.8	94.2
2.8	8.5	1.6	95.8
2.0	9.0	1.3	97.1
1.4	9.5	1.0	98.1
1.0	10.0	0.8	98.9
0.69	10.5	0.6	99.5
0.49	11.0	0.4	99.9
0.35	11.5	0.1	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	2.25	Very Poorly Sorted
Skewness	0.51	Very Fine Skewed
Kurtosis	2.90	Very Leptokurtic
Mean [µm]	128.2	Fine Sand
Mean [phi]	2.96	
Median [µm]	218.8	Fine Sand
Median [phi]	2.19	
Gravel [%]	3.0	Slightly Gravelly Muddy Sand
Sand [%]	76.1	
Mud [%]	20.8	

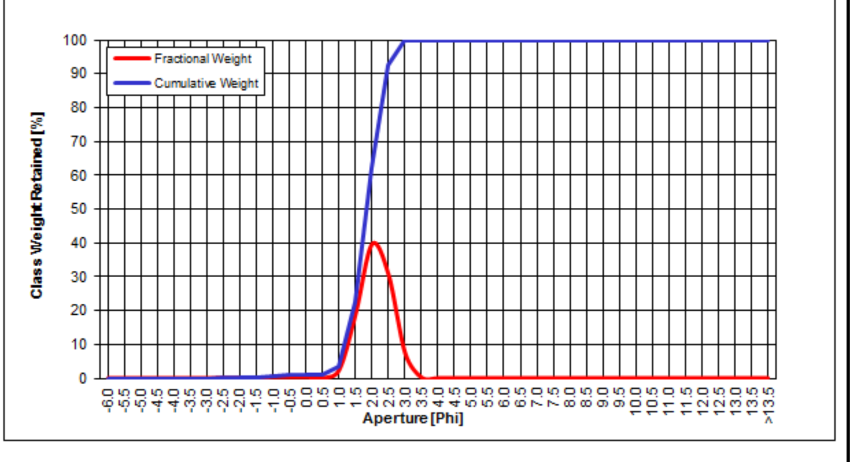


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST12

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.1	0.1
4000.0	-2.0	0.1	0.2
2800.0	-1.5	0.1	0.3
2000.0	-1.0	0.2	0.5
1400.0	-0.5	0.3	0.8
1000.0	0.0	0.3	1.1
707.0	0.5	0.0	1.1
500.0	1.0	2.3	3.5
353.6	1.5	18.9	22.4
250.0	2.0	39.6	62.1
176.8	2.5	30.5	92.5
125.0	3.0	7.3	99.9
88.4	3.5	0.1	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.50	Moderately Well Sorted
Skewness	0.00	Symmetrical
Kurtosis	0.98	Mesokurtic
Mean [µm]	278.1	Medium Sand
Mean [phi]	1.85	
Median [µm]	277.8	Medium Sand
Median [phi]	1.85	
Gravel [%]	0.5	Slightly Gravelly Sand
Sand [%]	99.5	
Mud [%]	0.0	

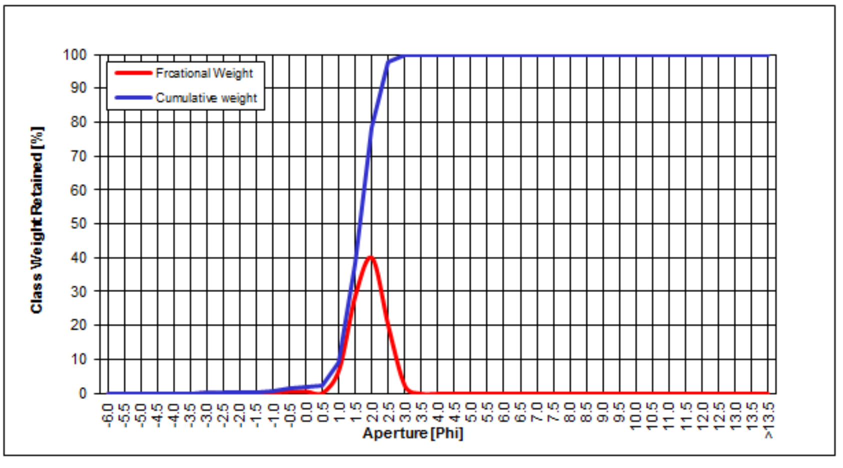


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST13

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.2	0.2
5600.0	-2.5	0.0	0.2
4000.0	-2.0	0.0	0.2
2800.0	-1.5	0.2	0.4
2000.0	-1.0	0.3	0.7
1400.0	-0.5	0.6	1.3
1000.0	0.0	0.6	2.0
707.0	0.5	0.2	2.2
500.0	1.0	7.1	9.3
353.6	1.5	29.1	38.4
250.0	2.0	39.9	78.3
176.8	2.5	19.6	97.9
125.0	3.0	2.1	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.52	Moderately Well Sorted
Skewness	-0.06	Symmetrical
Kurtosis	1.03	Mesokurtic
Mean [µm]	321.9	Medium Sand
Mean [phi]	1.64	
Median [µm]	319.7	Medium Sand
Median [phi]	1.65	
Gravel [%]	0.7	Slightly Gravelly Sand
Sand [%]	99.3	
Mud [%]	0.0	

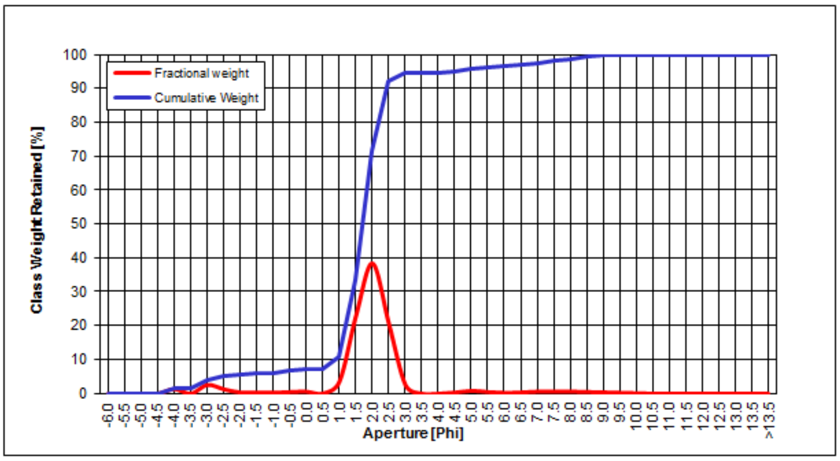


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST14

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	1.3	1.3
11200.0	-3.5	0.0	1.3
8000.0	-3.0	2.6	3.9
5600.0	-2.5	1.3	5.2
4000.0	-2.0	0.4	5.6
2800.0	-1.5	0.2	5.8
2000.0	-1.0	0.3	6.1
1400.0	-0.5	0.4	6.5
1000.0	0.0	0.6	7.1
707.0	0.5	0.0	7.1
500.0	1.0	3.5	10.6
353.6	1.5	22.7	33.2
250.0	2.0	38.3	71.5
176.8	2.5	20.6	92.1
125.0	3.0	2.6	94.7
88.4	3.5	0.0	94.7
62.5	4.0	0.0	94.7
44.2	4.5	0.3	95.0
31.3	5.0	0.8	95.9
22.1	5.5	0.5	96.3
15.6	6.0	0.2	96.6
11.0	6.5	0.4	96.9
7.8	7.0	0.6	97.5
5.5	7.5	0.7	98.2
3.9	8.0	0.6	98.8
2.8	8.5	0.5	99.3
2.0	9.0	0.4	99.6
1.4	9.5	0.3	99.9
1.0	10.0	0.1	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	1.36	Poorly Sorted
Skewness	-0.12	Coarse Skewed
Kurtosis	3.76	Extremely Leptokurtic
Mean [µm]	304.9	Medium Sand
Mean [phi]	1.71	
Median [µm]	303.8	Medium Sand
Median [phi]	1.72	
Gravel [%]	6.1	Gravelly Sand
Sand [%]	88.6	
Mud [%]	5.3	

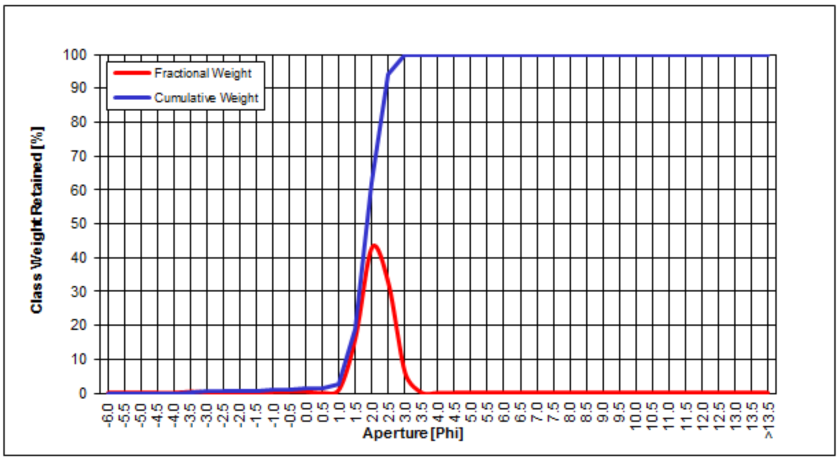


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST15

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.4	0.4
8000.0	-3.0	0.1	0.5
5600.0	-2.5	0.0	0.5
4000.0	-2.0	0.1	0.6
2800.0	-1.5	0.1	0.7
2000.0	-1.0	0.2	0.9
1400.0	-0.5	0.3	1.2
1000.0	0.0	0.3	1.5
707.0	0.5	0.0	1.5
500.0	1.0	1.0	2.5
353.6	1.5	16.5	19.0
250.0	2.0	43.0	62.0
176.8	2.5	32.1	94.1
125.0	3.0	5.8	99.9
88.4	3.5	0.1	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.46	Well Sorted
Skewness	-0.01	Symmetrical
Kurtosis	0.97	Mesokurtic
Mean [µm]	273.4	Medium Sand
Mean [phi]	1.87	
Median [µm]	275.4	Medium Sand
Median [phi]	1.86	
Gravel [%]	0.9	Slightly Gravelly Sand
Sand [%]	99.1	
Mud [%]	0.0	

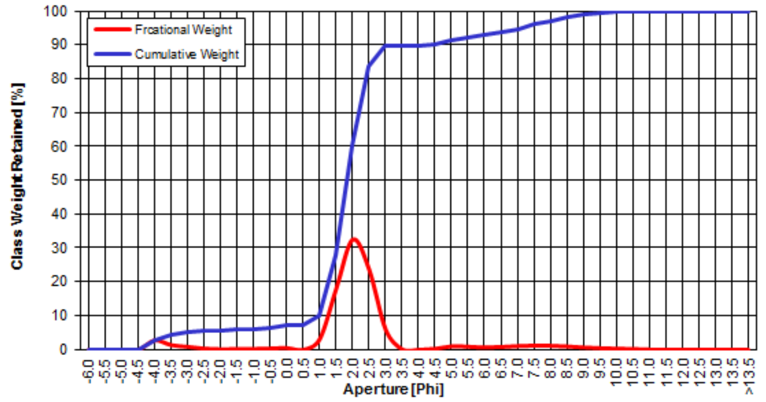


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST16

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	2.8	2.8
11200.0	-3.5	1.4	4.1
8000.0	-3.0	0.9	5.0
5600.0	-2.5	0.4	5.4
4000.0	-2.0	0.1	5.6
2800.0	-1.5	0.2	5.8
2000.0	-1.0	0.3	6.0
1400.0	-0.5	0.4	6.4
1000.0	0.0	0.5	6.9
707.0	0.5	0.0	7.0
500.0	1.0	3.1	10.1
353.6	1.5	17.8	27.9
250.0	2.0	32.3	60.2
176.8	2.5	23.6	83.8
125.0	3.0	5.9	89.7
88.4	3.5	0.2	89.8
62.5	4.0	0.0	89.8
44.2	4.5	0.3	90.1
31.3	5.0	1.0	91.2
22.1	5.5	0.9	92.1
15.6	6.0	0.7	92.8
11.0	6.5	0.8	93.6
7.8	7.0	1.1	94.7
5.5	7.5	1.2	96.0
3.9	8.0	1.2	97.2
2.8	8.5	1.0	98.1
2.0	9.0	0.7	98.9
1.4	9.5	0.5	99.3
1.0	10.0	0.3	99.7
0.69	10.5	0.2	99.9
0.49	11.0	0.1	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	1.87	Poorly Sorted
Skewness	0.02	Symmetrical
Kurtosis	4.64	Extremely Leptokurtic
Mean [µm]	278.7	Medium Sand
Mean [phi]	1.84	
Median [µm]	278.9	Medium Sand
Median [phi]	1.84	
Gravel [%]	6.0	Gravelly Muddy Sand
Sand [%]	83.8	
Mud [%]	10.2	

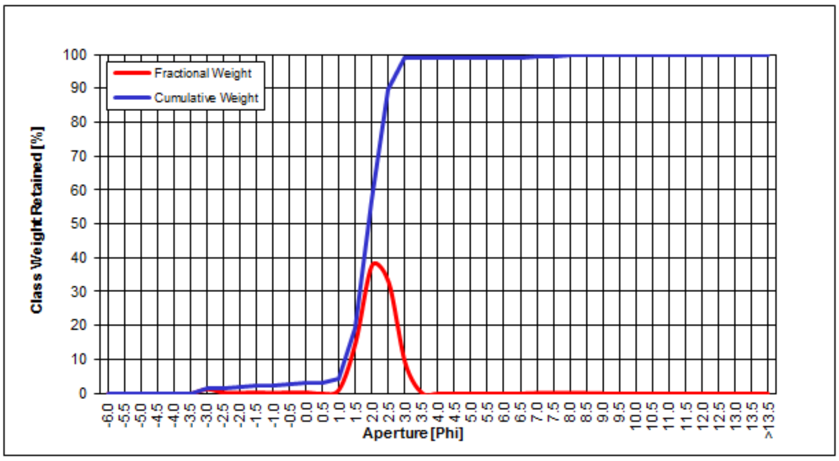


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST17

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	1.3	1.3
5600.0	-2.5	0.3	1.6
4000.0	-2.0	0.2	1.8
2800.0	-1.5	0.3	2.2
2000.0	-1.0	0.2	2.3
1400.0	-0.5	0.3	2.7
1000.0	0.0	0.3	3.0
707.0	0.5	0.0	3.0
500.0	1.0	1.2	4.2
353.6	1.5	15.0	19.2
250.0	2.0	37.8	57.0
176.8	2.5	32.8	89.8
125.0	3.0	9.1	98.8
88.4	3.5	0.3	99.1
62.5	4.0	0.0	99.1
44.2	4.5	0.0	99.1
31.3	5.0	0.0	99.1
22.1	5.5	0.0	99.1
15.6	6.0	0.0	99.1
11.0	6.5	0.0	99.1
7.8	7.0	0.2	99.3
5.5	7.5	0.3	99.6
3.9	8.0	0.2	99.8
2.8	8.5	0.1	99.9
2.0	9.0	0.1	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.52	Moderately Well Sorted
Skewness	-0.01	Symmetrical
Kurtosis	1.03	Mesokurtic
Mean [µm]	267.2	Medium Sand
Mean [phi]	1.90	
Median [µm]	266.5	Medium Sand
Median [phi]	1.91	
Gravel [%]	2.3	Slightly Gravelly Sand
Sand [%]	96.8	
Mud [%]	0.9	

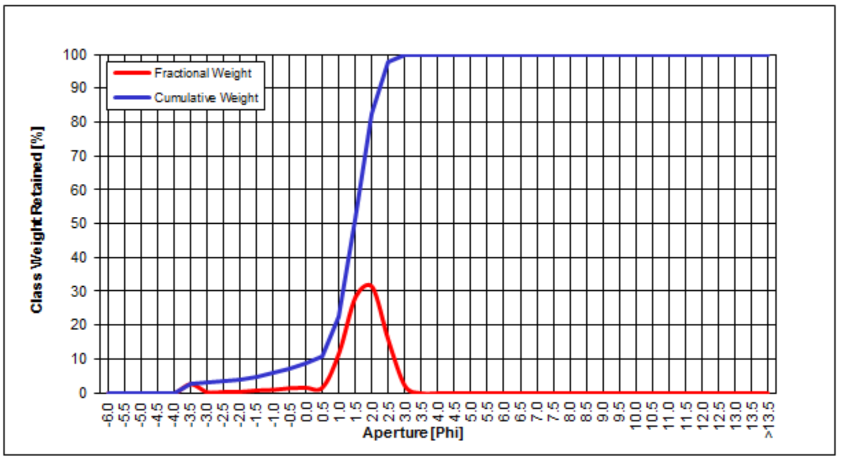


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST18

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	2.7	2.7
8000.0	-3.0	0.3	3.0
5600.0	-2.5	0.4	3.4
4000.0	-2.0	0.4	3.8
2800.0	-1.5	0.8	4.7
2000.0	-1.0	1.0	5.7
1400.0	-0.5	1.5	7.2
1000.0	0.0	1.6	8.8
707.0	0.5	1.8	10.6
500.0	1.0	12.0	22.6
353.6	1.5	28.5	51.0
250.0	2.0	31.4	82.5
176.8	2.5	15.5	97.9
125.0	3.0	2.1	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.90	Moderately Sorted
Skewness	-0.32	Very Coarse Skewed
Kurtosis	1.83	Very Leptokurtic
Mean [µm]	373.9	Medium Sand
Mean [phi]	1.42	
Median [µm]	358.1	Medium Sand
Median [phi]	1.48	
Gravel [%]	5.7	Gravelly Sand
Sand [%]	94.3	
Mud [%]	0.0	

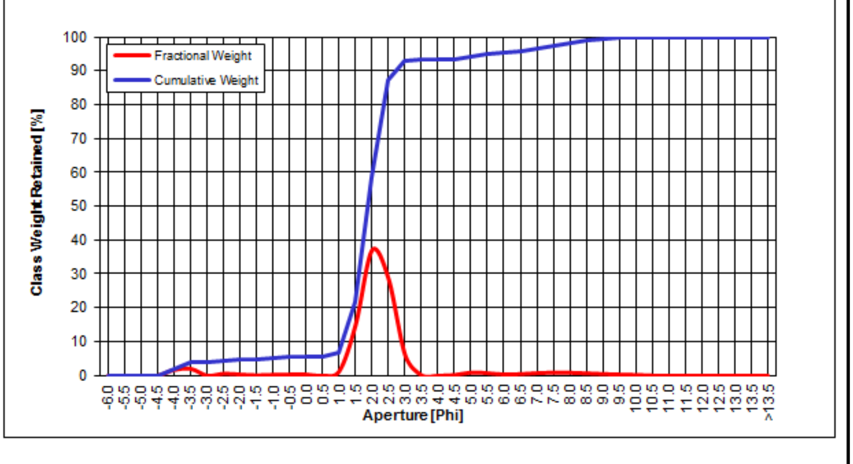


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST19

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	1.7	1.7
11200.0	-3.5	2.0	3.7
8000.0	-3.0	0.0	3.7
5600.0	-2.5	0.6	4.3
4000.0	-2.0	0.3	4.6
2800.0	-1.5	0.1	4.7
2000.0	-1.0	0.2	4.9
1400.0	-0.5	0.3	5.3
1000.0	0.0	0.3	5.6
707.0	0.5	0.0	5.6
500.0	1.0	1.2	6.8
353.6	1.5	14.9	21.8
250.0	2.0	36.9	58.7
176.8	2.5	28.4	87.1
125.0	3.0	6.0	93.1
88.4	3.5	0.1	93.2
62.5	4.0	0.0	93.2
44.2	4.5	0.2	93.4
31.3	5.0	0.9	94.3
22.1	5.5	0.7	95.0
15.6	6.0	0.4	95.4
11.0	6.5	0.5	95.8
7.8	7.0	0.7	96.6
5.5	7.5	0.9	97.5
3.9	8.0	0.9	98.3
2.8	8.5	0.7	99.0
2.0	9.0	0.5	99.5
1.4	9.5	0.3	99.8
1.0	10.0	0.2	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	1.26	Poorly Sorted
Skewness	0.06	Symmetrical
Kurtosis	3.54	Extremely Leptokurtic
Mean [µm]	272.0	Medium Sand
Mean [phi]	1.88	
Median [µm]	271.2	Medium Sand
Median [phi]	1.88	
Gravel [%]	4.9	Slightly Gravelly Sand
Sand [%]	88.2	
Mud [%]	6.8	

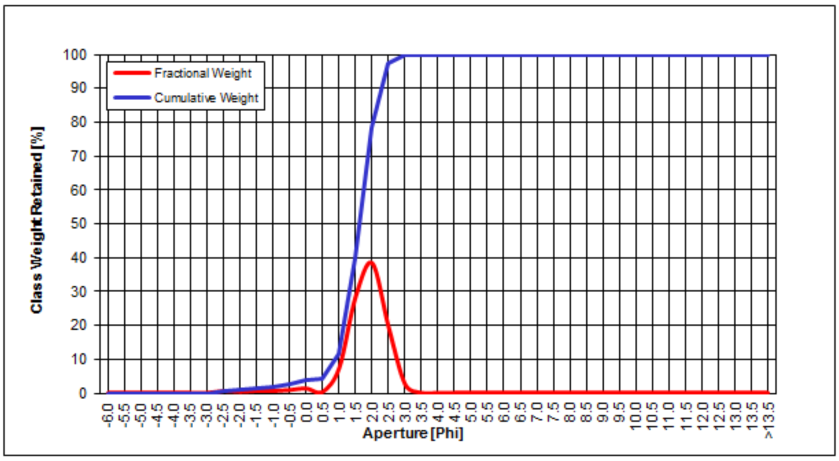


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST20

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.5	0.5
4000.0	-2.0	0.3	0.8
2800.0	-1.5	0.6	1.4
2000.0	-1.0	0.5	1.9
1400.0	-0.5	0.8	2.8
1000.0	0.0	1.3	4.0
707.0	0.5	0.3	4.3
500.0	1.0	7.3	11.6
353.6	1.5	28.3	39.9
250.0	2.0	38.2	78.2
176.8	2.5	19.4	97.5
125.0	3.0	2.5	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.55	Moderately Well Sorted
Skewness	-0.09	Symmetrical
Kurtosis	1.07	Mesokurtic
Mean [µm]	325.3	Medium Sand
Mean [phi]	1.62	
Median [µm]	322.7	Medium Sand
Median [phi]	1.63	
Gravel [%]	1.9	Slightly Gravelly Sand
Sand [%]	98.1	
Mud [%]	0.0	

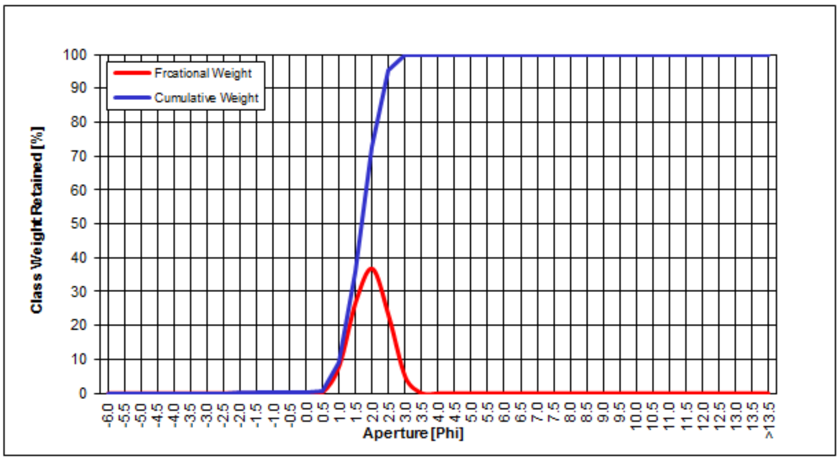


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST21

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.0	0.0
2800.0	-1.5	0.0	0.1
2000.0	-1.0	0.0	0.1
1400.0	-0.5	0.1	0.2
1000.0	0.0	0.2	0.4
707.0	0.5	0.4	0.8
500.0	1.0	8.2	9.0
353.6	1.5	27.0	35.9
250.0	2.0	36.7	72.6
176.8	2.5	22.6	95.2
125.0	3.0	4.7	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.54	Moderately Well Sorted
Skewness	-0.04	Symmetrical
Kurtosis	0.94	Mesokurtic
Mean [µm]	309.6	Medium Sand
Mean [phi]	1.69	
Median [µm]	309.5	Medium Sand
Median [phi]	1.69	
Gravel [%]	0.1	Slightly Gravelly Sand
Sand [%]	99.9	
Mud [%]	0.0	

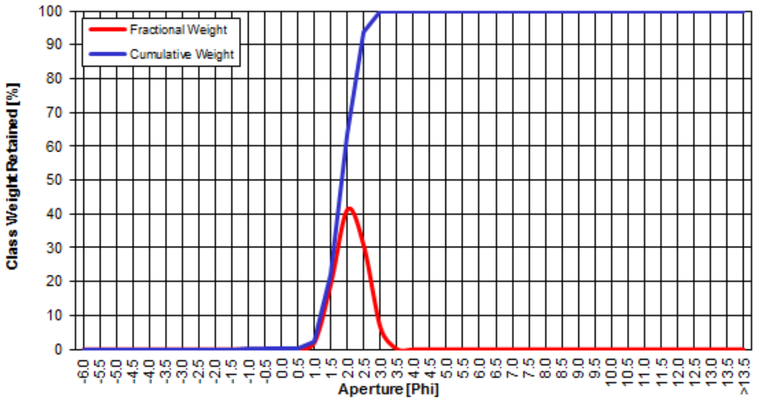


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST22

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.0	0.0
2800.0	-1.5	0.0	0.0
2000.0	-1.0	0.0	0.0
1400.0	-0.5	0.0	0.1
1000.0	0.0	0.1	0.1
707.0	0.5	0.0	0.1
500.0	1.0	2.1	2.2
353.6	1.5	19.8	22.0
250.0	2.0	41.5	63.5
176.8	2.5	30.2	93.7
125.0	3.0	6.2	99.9
88.4	3.5	0.1	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.48	Well Sorted
Skewness	0.01	Symmetrical
Kurtosis	0.96	Mesokurtic
Mean [µm]	279.0	Medium Sand
Mean [phi]	1.84	
Median [µm]	279.8	Medium Sand
Median [phi]	1.84	
Gravel [%]	0.0	Slightly Gravelly Sand
Sand [%]	100.0	
Mud [%]	0.0	

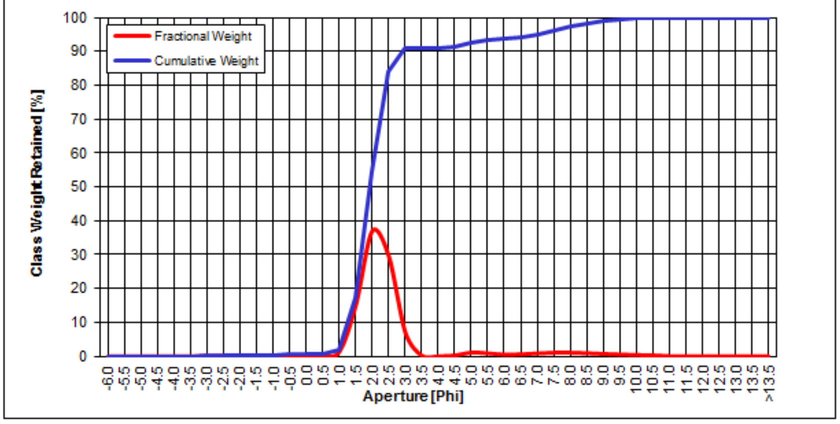


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST23

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.1	0.1
5600.0	-2.5	0.1	0.1
4000.0	-2.0	0.0	0.1
2800.0	-1.5	0.1	0.2
2000.0	-1.0	0.1	0.3
1400.0	-0.5	0.1	0.4
1000.0	0.0	0.1	0.6
707.0	0.5	0.0	0.6
500.0	1.0	1.3	1.9
353.6	1.5	15.2	17.1
250.0	2.0	37.2	54.3
176.8	2.5	29.5	83.9
125.0	3.0	7.0	90.8
88.4	3.5	0.2	91.0
62.5	4.0	0.0	91.0
44.2	4.5	0.3	91.3
31.3	5.0	1.1	92.3
22.1	5.5	0.9	93.2
15.6	6.0	0.5	93.7
11.0	6.5	0.6	94.2
7.8	7.0	0.9	95.1
5.5	7.5	1.1	96.2
3.9	8.0	1.1	97.2
2.8	8.5	0.9	98.1
2.0	9.0	0.7	98.8
1.4	9.5	0.5	99.4
1.0	10.0	0.4	99.7
0.69	10.5	0.3	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	1.15	Poorly Sorted
Skewness	0.40	Very Fine Skewed
Kurtosis	3.21	Extremely Leptokurtic
Mean [µm]	255.0	Medium Sand
Mean [phi]	1.97	
Median [µm]	260.3	Medium Sand
Median [phi]	1.94	
Gravel [%]	0.3	Slightly Gravelly Sand
Sand [%]	90.6	
Mud [%]	8.7	

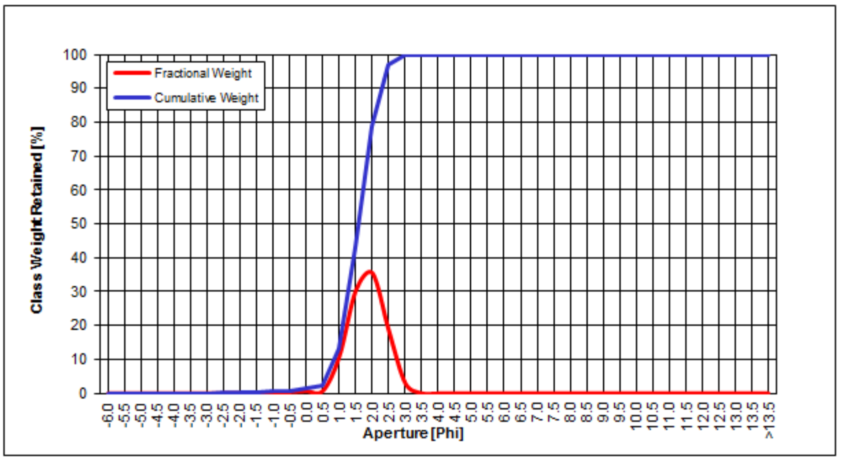


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST24

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.1	0.2
2800.0	-1.5	0.2	0.3
2000.0	-1.0	0.1	0.4
1400.0	-0.5	0.3	0.8
1000.0	0.0	0.6	1.3
707.0	0.5	0.7	2.1
500.0	1.0	10.9	13.0
353.6	1.5	30.3	43.3
250.0	2.0	35.4	78.7
176.8	2.5	18.4	97.1
125.0	3.0	2.9	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.55	Moderately Well Sorted
Skewness	-0.03	Symmetrical
Kurtosis	0.99	Mesokurtic
Mean [µm]	330.7	Medium Sand
Mean [phi]	1.60	
Median [µm]	331.0	Medium Sand
Median [phi]	1.60	
Gravel [%]	0.4	Slightly Gravelly Sand
Sand [%]	99.6	
Mud [%]	0.0	

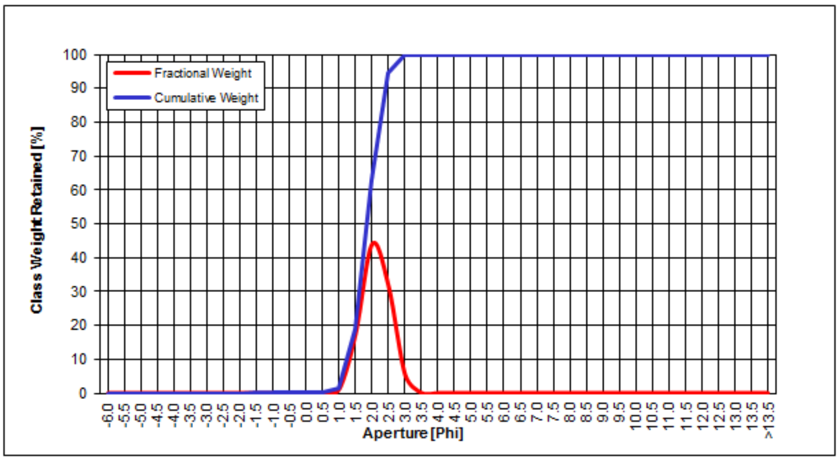


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST25

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.0	0.0
2800.0	-1.5	0.0	0.0
2000.0	-1.0	0.0	0.0
1400.0	-0.5	0.0	0.1
1000.0	0.0	0.1	0.2
707.0	0.5	0.0	0.2
500.0	1.0	1.1	1.3
353.6	1.5	17.5	18.8
250.0	2.0	44.1	63.0
176.8	2.5	31.6	94.6
125.0	3.0	5.4	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.45	Well Sorted
Skewness	0.00	Symmetrical
Kurtosis	0.95	Mesokurtic
Mean [µm]	273.9	Medium Sand
Mean [phi]	1.87	
Median [µm]	276.8	Medium Sand
Median [phi]	1.85	
Gravel [%]	0.0	Slightly Gravelly Sand
Sand [%]	100.0	
Mud [%]	0.0	

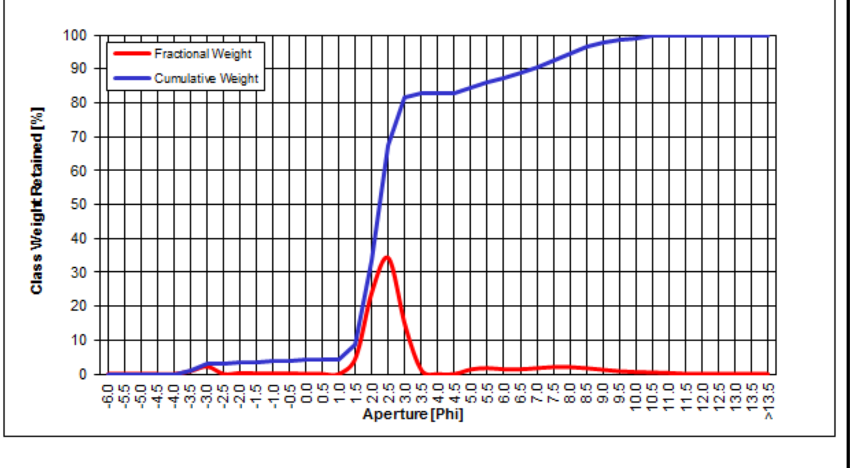


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST26

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.9	0.9
8000.0	-3.0	2.2	3.1
5600.0	-2.5	0.0	3.1
4000.0	-2.0	0.3	3.5
2800.0	-1.5	0.2	3.6
2000.0	-1.0	0.2	3.8
1400.0	-0.5	0.1	4.0
1000.0	0.0	0.1	4.1
707.0	0.5	0.0	4.1
500.0	1.0	0.0	4.1
353.6	1.5	4.8	8.9
250.0	2.0	24.4	33.4
176.8	2.5	34.1	67.5
125.0	3.0	14.3	81.8
88.4	3.5	1.0	82.8
62.5	4.0	0.0	82.8
44.2	4.5	0.0	82.9
31.3	5.0	1.4	84.2
22.1	5.5	1.8	86.0
15.6	6.0	1.4	87.4
11.0	6.5	1.4	88.8
7.8	7.0	1.8	90.6
5.5	7.5	2.1	92.6
3.9	8.0	2.1	94.7
2.8	8.5	1.7	96.4
2.0	9.0	1.3	97.7
1.4	9.5	0.9	98.6
1.0	10.0	0.6	99.2
0.69	10.5	0.5	99.6
0.49	11.0	0.3	99.9
0.35	11.5	0.1	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	1.88	Poorly Sorted
Skewness	0.65	Very Fine Skewed
Kurtosis	3.07	Extremely Leptokurtic
Mean [µm]	130.7	Fine Sand
Mean [phi]	2.94	
Median [µm]	211.1	Fine Sand
Median [phi]	2.24	
Gravel [%]	3.8	Slightly Gravelly Muddy Sand
Sand [%]	79.0	
Mud [%]	17.2	

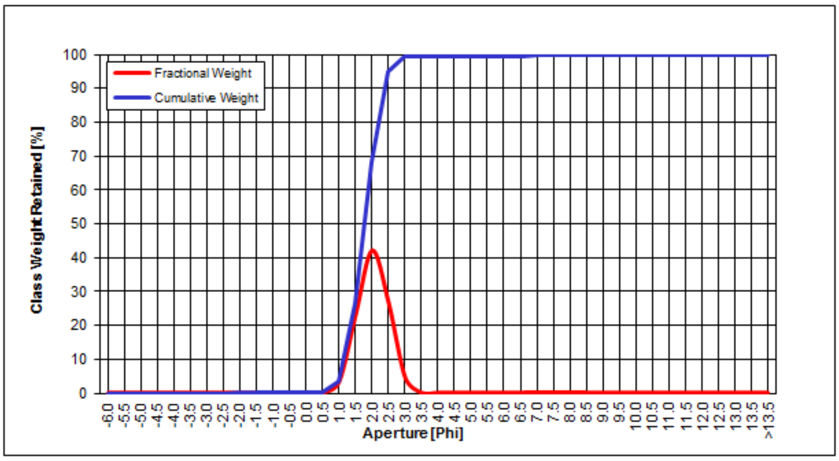


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST27

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.0	0.0
2800.0	-1.5	0.0	0.0
2000.0	-1.0	0.0	0.1
1400.0	-0.5	0.1	0.2
1000.0	0.0	0.1	0.3
707.0	0.5	0.0	0.3
500.0	1.0	3.3	3.5
353.6	1.5	22.9	26.5
250.0	2.0	41.9	68.4
176.8	2.5	26.5	94.9
125.0	3.0	4.5	99.4
88.4	3.5	0.0	99.4
62.5	4.0	0.0	99.4
44.2	4.5	0.0	99.4
31.3	5.0	0.0	99.4
22.1	5.5	0.0	99.4
15.6	6.0	0.0	99.4
11.0	6.5	0.0	99.5
7.8	7.0	0.1	99.6
5.5	7.5	0.2	99.8
3.9	8.0	0.1	99.9
2.8	8.5	0.1	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.48	Well Sorted
Skewness	0.00	Symmetrical
Kurtosis	0.92	Mesokurtic
Mean [µm]	290.7	Medium Sand
Mean [phi]	1.78	
Median [µm]	291.0	Medium Sand
Median [phi]	1.78	
Gravel [%]	0.1	Slightly Gravelly Sand
Sand [%]	99.3	
Mud [%]	0.6	

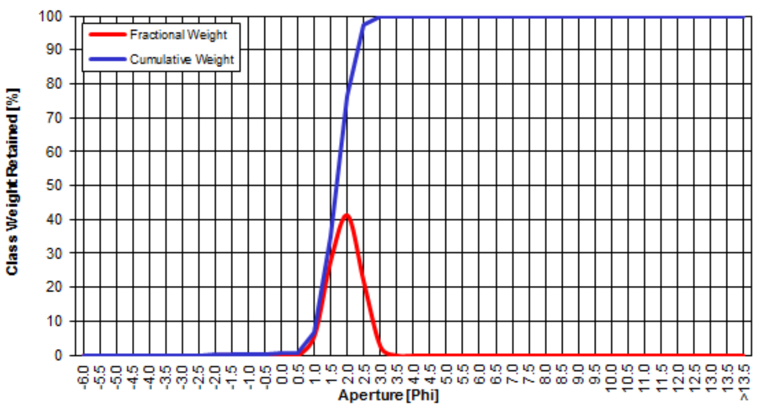


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST28

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.0	0.0
2800.0	-1.5	0.1	0.1
2000.0	-1.0	0.1	0.3
1400.0	-0.5	0.1	0.3
1000.0	0.0	0.2	0.5
707.0	0.5	0.1	0.6
500.0	1.0	6.0	6.6
353.6	1.5	28.4	35.0
250.0	2.0	41.2	76.2
176.8	2.5	21.3	97.5
125.0	3.0	2.5	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.49	Well Sorted
Skewness	-0.03	Symmetrical
Kurtosis	0.98	Mesokurtic
Mean [µm]	312.8	Medium Sand
Mean [phi]	1.68	
Median [µm]	311.7	Medium Sand
Median [phi]	1.68	
Gravel [%]	0.3	Slightly Gravelly Sand
Sand [%]	99.7	
Mud [%]	0.0	

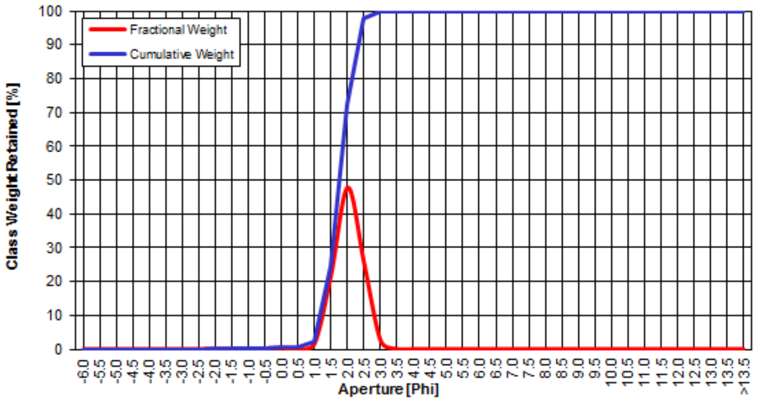


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST29

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.1	0.1
2800.0	-1.5	0.0	0.1
2000.0	-1.0	0.1	0.2
1400.0	-0.5	0.2	0.4
1000.0	0.0	0.3	0.7
707.0	0.5	0.0	0.7
500.0	1.0	1.7	2.3
353.6	1.5	22.0	24.4
250.0	2.0	47.8	72.2
176.8	2.5	25.4	97.6
125.0	3.0	2.4	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.44	Well Sorted
Skewness	-0.01	Symmetrical
Kurtosis	1.04	Mesokurtic
Mean [µm]	293.2	Medium Sand
Mean [phi]	1.77	
Median [µm]	293.6	Medium Sand
Median [phi]	1.77	
Gravel [%]	0.2	Slightly Gravelly Sand
Sand [%]	99.8	
Mud [%]	0.0	

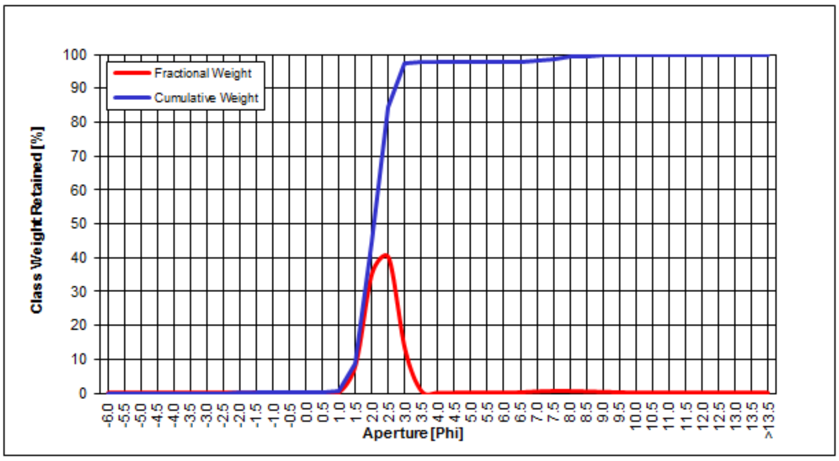


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST30

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.0	0.0
2800.0	-1.5	0.1	0.1
2000.0	-1.0	0.1	0.2
1400.0	-0.5	0.1	0.3
1000.0	0.0	0.1	0.4
707.0	0.5	0.0	0.4
500.0	1.0	0.1	0.5
353.6	1.5	8.3	8.8
250.0	2.0	35.6	44.4
176.8	2.5	40.1	84.5
125.0	3.0	12.8	97.3
88.4	3.5	0.4	97.7
62.5	4.0	0.0	97.7
44.2	4.5	0.0	97.7
31.3	5.0	0.0	97.7
22.1	5.5	0.0	97.7
15.6	6.0	0.0	97.7
11.0	6.5	0.1	97.8
7.8	7.0	0.4	98.2
5.5	7.5	0.5	98.7
3.9	8.0	0.5	99.2
2.8	8.5	0.4	99.6
2.0	9.0	0.3	99.8
1.4	9.5	0.2	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.47	Well Sorted
Skewness	-0.01	Symmetrical
Kurtosis	1.03	Mesokurtic
Mean [µm]	240.7	Fine Sand
Mean [phi]	2.05	
Median [µm]	238.2	Fine Sand
Median [phi]	2.07	
Gravel [%]	0.2	Slightly Gravelly Sand
Sand [%]	97.5	
Mud [%]	2.3	

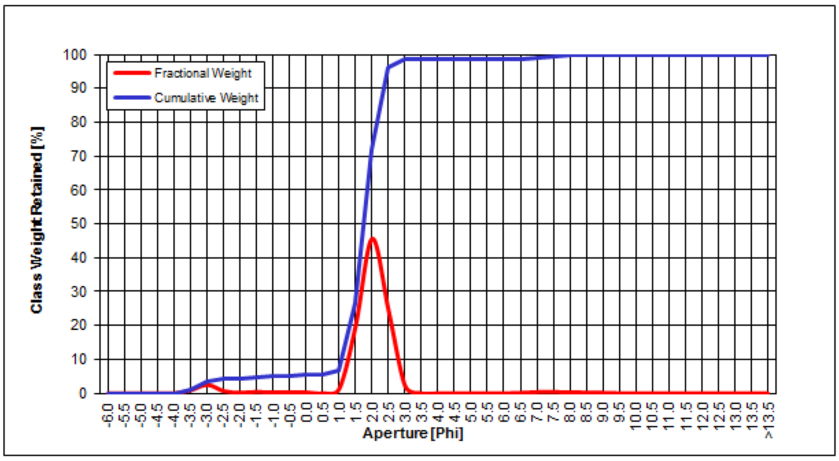


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST31

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.9	0.9
8000.0	-3.0	2.5	3.4
5600.0	-2.5	0.7	4.1
4000.0	-2.0	0.2	4.2
2800.0	-1.5	0.4	4.6
2000.0	-1.0	0.2	4.9
1400.0	-0.5	0.3	5.2
1000.0	0.0	0.3	5.5
707.0	0.5	0.0	5.5
500.0	1.0	1.3	6.8
353.6	1.5	19.8	26.6
250.0	2.0	45.4	72.0
176.8	2.5	24.3	96.3
125.0	3.0	2.1	98.4
88.4	3.5	0.0	98.4
62.5	4.0	0.0	98.4
44.2	4.5	0.0	98.4
31.3	5.0	0.0	98.4
22.1	5.5	0.0	98.4
15.6	6.0	0.0	98.4
11.0	6.5	0.1	98.5
7.8	7.0	0.4	98.9
5.5	7.5	0.4	99.3
3.9	8.0	0.3	99.6
2.8	8.5	0.2	99.8
2.0	9.0	0.2	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.75	Moderately Sorted
Skewness	-0.30	Very Coarse Skewed
Kurtosis	2.25	Very Leptokurtic
Mean [µm]	298.2	Medium Sand
Mean [phi]	1.75	
Median [µm]	295.7	Medium Sand
Median [phi]	1.76	
Gravel [%]	4.9	Slightly Gravelly Sand
Sand [%]	93.5	
Mud [%]	1.6	

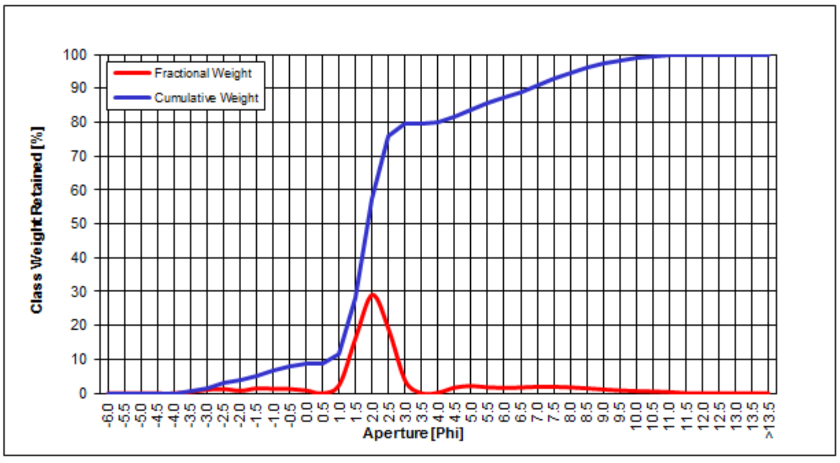


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST32

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.5	0.5
8000.0	-3.0	1.1	1.6
5600.0	-2.5	1.3	2.9
4000.0	-2.0	0.8	3.7
2800.0	-1.5	1.5	5.2
2000.0	-1.0	1.3	6.6
1400.0	-0.5	1.3	7.9
1000.0	0.0	0.9	8.8
707.0	0.5	0.0	8.8
500.0	1.0	2.6	11.4
353.6	1.5	16.6	28.0
250.0	2.0	29.1	57.1
176.8	2.5	18.8	75.9
125.0	3.0	3.6	79.5
88.4	3.5	0.0	79.5
62.5	4.0	0.2	79.8
44.2	4.5	1.7	81.5
31.3	5.0	2.2	83.7
22.1	5.5	1.8	85.5
15.6	6.0	1.6	87.1
11.0	6.5	1.8	88.9
7.8	7.0	2.0	90.9
5.5	7.5	2.0	92.9
3.9	8.0	1.8	94.6
2.8	8.5	1.5	96.2
2.0	9.0	1.2	97.3
1.4	9.5	0.9	98.2
1.0	10.0	0.7	98.9
0.69	10.5	0.6	99.5
0.49	11.0	0.4	99.9
0.35	11.5	0.1	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	2.45	Very Poorly Sorted
Skewness	0.46	Very Fine Skewed
Kurtosis	3.72	Extremely Leptokurtic
Mean [µm]	154.3	Fine Sand
Mean [phi]	2.70	
Median [µm]	272.1	Medium Sand
Median [phi]	1.88	
Gravel [%]	6.6	Gravelly Muddy Sand
Sand [%]	73.2	
Mud [%]	20.2	

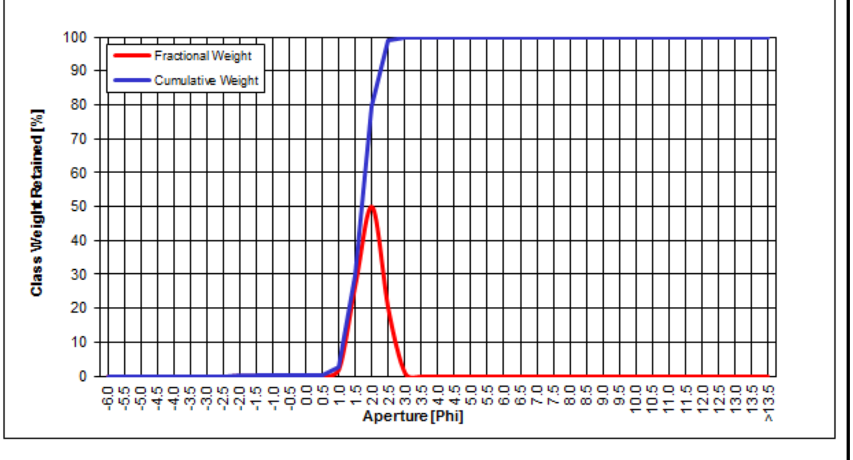


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST33

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.1	0.1
2800.0	-1.5	0.1	0.1
2000.0	-1.0	0.1	0.2
1400.0	-0.5	0.1	0.3
1000.0	0.0	0.1	0.4
707.0	0.5	0.0	0.4
500.0	1.0	2.2	2.6
353.6	1.5	27.2	29.8
250.0	2.0	49.8	79.7
176.8	2.5	19.4	99.1
125.0	3.0	0.9	100.0
88.4	3.5	0.0	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.42	Well Sorted
Skewness	-0.01	Symmetrical
Kurtosis	1.02	Mesokurtic
Mean [µm]	310.7	Medium Sand
Mean [phi]	1.69	
Median [µm]	307.3	Medium Sand
Median [phi]	1.70	
Gravel [%]	0.2	Slightly Gravelly Sand
Sand [%]	99.8	
Mud [%]	0.0	

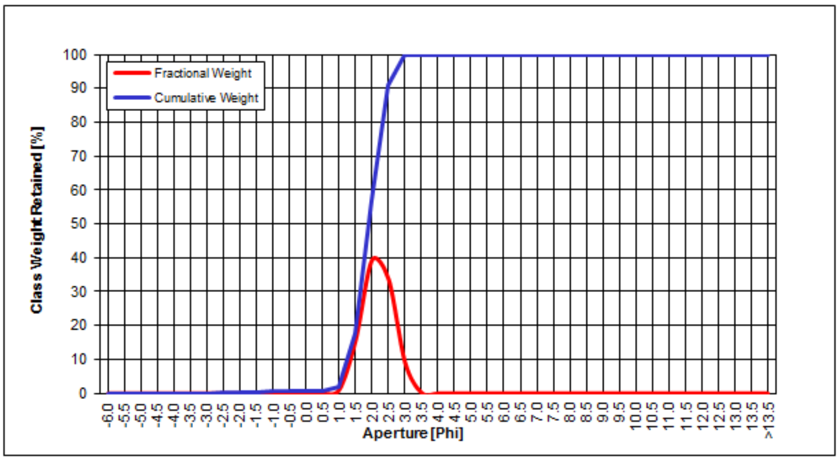


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST34

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.0	0.0
5600.0	-2.5	0.0	0.0
4000.0	-2.0	0.0	0.0
2800.0	-1.5	0.3	0.3
2000.0	-1.0	0.1	0.4
1400.0	-0.5	0.2	0.6
1000.0	0.0	0.1	0.7
707.0	0.5	0.0	0.7
500.0	1.0	1.1	1.8
353.6	1.5	15.7	17.5
250.0	2.0	39.5	57.0
176.8	2.5	33.7	90.7
125.0	3.0	9.1	99.8
88.4	3.5	0.2	100.0
62.5	4.0	0.0	100.0
44.2	4.5	0.0	100.0
31.3	5.0	0.0	100.0
22.1	5.5	0.0	100.0
15.6	6.0	0.0	100.0
11.0	6.5	0.0	100.0
7.8	7.0	0.0	100.0
5.5	7.5	0.0	100.0
3.9	8.0	0.0	100.0
2.8	8.5	0.0	100.0
2.0	9.0	0.0	100.0
1.4	9.5	0.0	100.0
1.0	10.0	0.0	100.0
0.69	10.5	0.0	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	0.48	Well Sorted
Skewness	0.02	Symmetrical
Kurtosis	1.00	Mesokurtic
Mean [µm]	264.1	Medium Sand
Mean [phi]	1.92	
Median [µm]	265.9	Medium Sand
Median [phi]	1.91	
Gravel [%]	0.4	Slightly Gravelly Sand
Sand [%]	99.6	
Mud [%]	0.0	

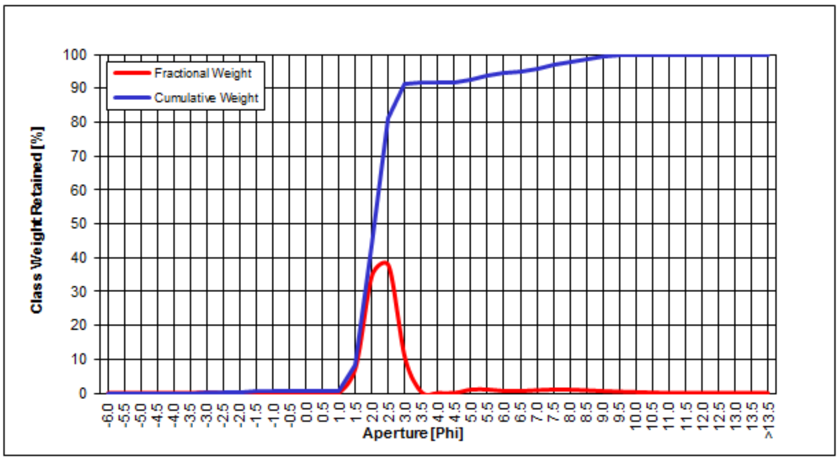


Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

ST35

Aperture [µm]	Aperture [Phi]	Fractional [%]	Cumulative [%]
63000.0	-6.0	0.0	0.0
45000.0	-5.5	0.0	0.0
31500.0	-5.0	0.0	0.0
22400.0	-4.5	0.0	0.0
16000.0	-4.0	0.0	0.0
11200.0	-3.5	0.0	0.0
8000.0	-3.0	0.2	0.2
5600.0	-2.5	0.0	0.2
4000.0	-2.0	0.0	0.2
2800.0	-1.5	0.2	0.4
2000.0	-1.0	0.1	0.5
1400.0	-0.5	0.1	0.6
1000.0	0.0	0.1	0.7
707.0	0.5	0.0	0.7
500.0	1.0	0.1	0.8
353.6	1.5	7.5	8.3
250.0	2.0	35.0	43.4
176.8	2.5	37.8	81.2
125.0	3.0	10.2	91.4
88.4	3.5	0.2	91.6
62.5	4.0	0.0	91.6
44.2	4.5	0.0	91.7
31.3	5.0	1.0	92.7
22.1	5.5	1.0	93.7
15.6	6.0	0.6	94.3
11.0	6.5	0.6	94.9
7.8	7.0	0.9	95.8
5.5	7.5	1.0	96.8
3.9	8.0	1.0	97.8
2.8	8.5	0.8	98.6
2.0	9.0	0.6	99.2
1.4	9.5	0.4	99.6
1.0	10.0	0.3	99.9
0.69	10.5	0.1	100.0
0.49	11.0	0.0	100.0
0.35	11.5	0.0	100.0
0.24	12.0	0.0	100.0
0.17	12.5	0.0	100.0
0.12	13.0	0.0	100.0
0.09	13.5	0.0	100.0
<0.09	>13.5	0.0	100.0
Total		100.0	100.0

Sorting	1.05	Poorly Sorted
Skewness	0.38	Very Fine Skewed
Kurtosis	3.17	Extremely Leptokurtic
Mean [µm]	231.4	Fine Sand
Mean [phi]	2.11	
Median [µm]	235.2	Fine Sand
Median [phi]	2.09	
Gravel [%]	0.5	Slightly Gravelly Sand
Sand [%]	91.1	
Mud [%]	8.4	



Based on Wentworth (1922) Grain Size Classification
Statistics Based on Folk and Ward (1957)

C.1 PARTICLE SIZE ANALYSIS (PSA) CERTIFICATE OF ANALYSIS

D. MACROFAUNAL ANALYSIS

D.1 INFAUNAL DATA

Abundance is expressed as number of individuals per 0.1 m2.

Aphia ID	Taxon	Authority	ST003 FA	ST005 FA	ST010 FA	ST014 FA	ST016 FA	ST022 FA	ST023 FA	ST030 FA	ST031 FA	ST035 FA
	CNIDARIA											
283798	*Cerianthus lloydii*	Grosse 1859	-	3	-	-	-	-	-	-	-	-
	PLATYHELMINTHES											
793	PLATYHELMINTHES	-	-	1	-	-	-	-	-	-	-	-
	NEMERTEA											
152391	NEMERTEA	-	-	5	-	-	6	-	2	-	-	-
	ANNELIDA											
130749	*Gattyana cirrhosa*	(Pallas 1766)	-	1	-	-	-	-	-	-	-	-
236700	*Harmothoe aequespina*?	(Langerhans 1884)		6								
152276	*Malmgrenia arenicolae*	(Saint-Joseph 1888)	-	1	-	-	-	-	-	-	-	-
130599	*Pholoe baltica*	Orsted 1843		5	-	-	1	-	-	-	-	-
131073	*Sigalion squamosus*	Chiaje 1830	-	-	-	-	-	-	-	-	-	1
131077	*Sthenelais limicola*	(Ehlers 1864)	1	3	1	1	1	1	2	-	1	1
130616	*Eteone longa* agg	(Faricius 1780)	-	2	-	-	-	-	-	-	-	-
334506	*Phyllodoce groenlandica*	(Oersted 1842)	-	-	-	-	3	-	-	-	-	-
334514	*Phyllodoce rosea*	(McIntosh 1877)	-	-	-	-	-	-	1	-	-	1
334508	*Phyllodoce lineata*	-	-	1	-	1	1	-	-	-	-	-
130641	*Eumida bahusiensis*	Bergstrom 1914	-	7	-	-	-	-	-	-	-	-
130116	*Glycera alba*	(Muller 1776)	2	3	-	-	1	1	2	1	2	1
130140	*Goniada maculata*	Oersted 1843	2	1	-	-	3	3	3	1	1	-
130195	*Podarkeopsis capensis*	(Day 1963)	-	4	-	3	1	-	-	-	-	-
757970	*Parexogone hebes*	(Webster & Benedict 1884)	-	1	-	-	-	-	-	-	-	-
130375	*Eunereis longissima*	Johnston 1840	-	16	-	-	-	-	-	-	-	-

Aphia ID	Taxon	Authority	ST003 FA	ST005 FA	ST010 FA	ST014 FA	ST016 FA	ST022 FA	ST023 FA	ST030 FA	ST031 FA	ST035 FA
130355	*Nephtys caeca*	(Fabricius 1780)	-	-	-	1	-	-	-	-	-	-
130357	*Nephtys cirrosa*	Ehlers 1868	-	-	4	-	-	1		1	2	-
130359	*Nephtys hombergii*	Savigny 1818	-	-	-	-	3	1	2	2	-	1
130364	*Nephtys longosetosa*	Oersted 1843	-	-	-	-	-	-	-	1	-	-
130072	*Marphysa bellii*	(Audouin & Milne-Edwards 1833)	-	2	-	-	-	-	-	-	-	-
129337	*Lumbrineris* nr *cingulata*	-	1	43	-	3	10	-	-	-	-	-
154127	*Schistomeringos rudolphi*	(Chiaje 1828)	-	3	-	-	-	-	-	-	-	-
130537	*Scoloplos armiger*	(O F Muller 1776)	-	-	1	-	-	-	-	-	-	-
130711	*Poecilochaetus serpens*	Allen 1904	-	-	-	2	-	-	1	-	2	1
131106	*Aonides oxycephala*	(M Sars 1862)		10	-	-	-	-	-	-	-	-
131117	*Dipolydora coeca*	(Oersted 1843)		1	-	-	-	-	-	-	-	-
131171	*Scolelepis bonnieri*	(Mesnil 1896)	-	-	2	-	-	3	1	-	1	-
131183	*Spio filicornis*	(O F Muller 1766)	-	-	-	-	-	-	1	-		2
131187	*Spiophanes bombyx*	(Claparede 1870)	9	2	2	7	14	9	14	6	4	16
130266	*Magelona alleni*	Wilson 1958		1	-	-	-	-	-	-	-	-
130269	*Magelona johnstoni*	Fiege, Licher & Mackie, 2000	-	-	1	-	-	-	5	-	-	1
129943	*Caulleriella alata*	(Southern 1914)	1	3	-	-	-	-	-	-	-	-
152217	*Chaetozone christiei*	Chambers, 2000	-	-	-	-	-	3	-	-	1	-
152269	*Tharyx killariensis*	(Southern 1914)	-	4	-	-	-	-	-	-	-	-
129892	*Mediomastus fragilis*	Rasmussen 1973	-	1	-	-	-	-	-	-	-	1
129220	*Notomastus*	Sars 1850	-	10	-	-	-	-	-	-	-	-
130491	*Ophelia borealis*	Quatrefages 1866	-		-	-	-	-	-	-	1	-
130980	*Scalibregma inflatum*	Rathke 1843	2	42	-	3	8	11	4	1	-	7
129427	*Owenia*	Koh, Bhaud & Jirkov, 2003	-	1	-	-	-	-	-	-	-	-
146950	*Galathowenia oculata*	Zaks 1922	-	1	-	-	-	-	-	-	-	-
152367	*Lagis koreni*	Malmgren 1866	2	1	-	-	4	-	-	-	1	-
130867	*Sabellaria spinulosa*	Leuckart 1849	1	519		5	330	-	-	-	-	-

Aphia ID	Taxon	Authority	ST003 FA	ST005 FA	ST010 FA	ST014 FA	ST016 FA	ST022 FA	ST023 FA	ST030 FA	ST031 FA	ST035 FA
129781	*Ampharete lindstroemi agg*	(Malmgren 1867)		2	-	-	-	-	-	-	-	-
131495	*Lanice conchilega*	(Pallas 1776)	-	1	-	-	-	-	-	-	-	-
	ARTHROPODA											
2824	**Mysida**	Boas, 1883	-	1	-	-	-	-	-	-	1	-
102928	*Synchelidium maculatum*	Stebbing 1906	-	-	-	-	-	-	1	-	-	-
103235	*Urothoe poseidonis*	Reibisch 1905	-		3			1	8	14	1	1
148588	*Nototropis swammerdami*	(H Milne-Edwards 1830)	-	-	-	-	-	-	-	-	2	-
101928	*Ampelisca spinipes*	Boeck 1861	-	2	-	-	1	-	-	-	-	-
103058	*Bathyporeia elegans*	Watkin 1938	-	1	1	-	-	-	-	1	-	-
103060	*Bathyporeia guilliamsoniana*	(Bate 1856)	-	-	1	-	-	-	-	-	-	-
102788	*Abludomelita obtusata*	(Montagu 1813)	-	12	-	-	2	-	-	-	-	-
102377	*Megamphopus cornuta*	(Norman 1869)	-	1	-	-		-	-	-	-	-
102383	*Photis longicaudata*	(Bate & Westwood 1862)	-	21	-	-		-	-	-	-	-
101857	*Pariambus typicus*	(Krøyer 1884)	-		-	-	1	-	-	-	-	-
110481	*Diastylis laevis*	Norman 1869	1	1	-	-	1	-	-	-	1	1
107647	*Pandalina brevirostris*	(Rathke 1837)	-	2	-	-	-	-	-	-	-	-
106782	**Crangonidae**	-	1			1	-	-	-	-	-	-
107729	*Callianassa subterranea*	(Montagu 1808)	-	1	-	-	-	-	-	-	-	-
107739	*Upogebia deltaura*	(Leach 1815)	-	2	-	-	-	-	-	-	-	-
107188	*Pisidia longicornis*	(Linnaeus 1767)	-	59	-	1	-	-	-	-	1	1
107277	*Corystes cassivelaunus*	(Pennant 1777)	-	-	-	-	-	1	-	-	-	-
107388	*Liocarcinus holsatus*	(Fabricius 1798)	-	-	-	-	1	-	-	-	-	-
	MOLLUSCA											
139718	*Epitonium clathratulum*	(Kanmacher 1798)	-	1	-	-	-	-	-	-	-	-
151894	*Euspira nitida*	Risso 1826	-	-	-	-	1	1	1	1	1	1
140129	*Hyala vitrea*	(Montagu 1803)	-	-	-	1	-	-	-	-	-	-
140589	*Nucula nitidosa*	Winckworth 1930	-	-	-	-	1	-	1	-	-	-

Aphia ID	Taxon	Authority	ST003 FA	ST005 FA	ST010 FA	ST014 FA	ST016 FA	ST022 FA	ST023 FA	ST030 FA	ST031 FA	ST035 FA
345281	*Kurtiella bidentata*	(Montagu 1803)	-	5	-	-	2	-	-	-	-	-
146952	*Tellimya ferruginosa*	(Montagu 1808)	-		-	13	11	-	3	-	-	2
140737	*Phaxas pellucidus*	(Pennant 1777)	1	-	-	-	2	-	-	1	-	-
146907	*Fabulina fabula*	(Gmelin 1791)	6	-	5	-	1	13	59	22	3	27
141433	*Abra alba*	(W Wood 1802)	13	8	-	-	19	2	31	-	1	5
141436	*Abra prismatica*	(Montagu 1808)	-		-	-	-	1	-	1	-	-
128545	*Phoronis*	Wright 1856	-	52	-	-	-	-	-	-	-	-
	ECHINODERMATA											
125073	*Amphiura chiajei*	Forbes 1843	-		-	-	-	-	-	-	-	1
125064	*Amphipholis squamata*	(Chiaje 1829)	-	34	-	-	-	-	-	-	-	-
124913	*Ophiura albida*	Forbes 1839	1	23	-	-	1	1	-	-	2	-
124929	*Ophiura ophiura*	(Linnaeus 1758)	-	-	-	-	1	-	-	-	-	-
124319	*Psammechinus miliaris*	(Gmelin 1778)	-	3	-	-	-	-	-	-	-	-
124273	*Echinocyamus pusillus*	(O F Muller 1776)	-	19	-	13	1	-	-	6	9	-
124392	*Echinocardium cordatum*	(Pennant 1777)	-	-	-	2	2	-	1	-	-	3
The following taxa were merged for the statistical analysis												
2824	**Mysida**	Boas, 1883	-	1	-	-	-	-	-	-	1	-
2824	Mysida indet	Boas, 1883	-		-	-	-	-	-	-	1	-
148701	*Heteromysis formosa*	Smith, 1873	-	1	-	-	-	-	-	-	-	-
106782	**Crangonidae**		1	-	-	1	-	-	-	-	-	-
106782	Crangonidae indet	-	1	-	-		-	-	-	-	-	-
107562	*Philocheras trispinosus*	Hailstone 1835	-	-	-	1	-	-	-	-	-	-
152391	**NEMERTEA**	**-**	-	5	-	-	3	-	-	-	-	-
122348	*Cerebratulus*	Renier 1804	-	-	-	-	3	-	2	-	-	-

Aphia ID	**Taxon**	**Authority**	**ST003 FA**	**ST005 FA**	**ST010 FA**	**ST014 FA**	**ST016 FA**	**ST022 FA**	**ST023 FA**	**ST030 FA**	**ST031 FA**	**ST035 FA**
The following taxa were excluded from the statistical analysis												
Juvenile												
939	Polynoidae juv	-	-	1	-	-	2	-	-	-	-	-
129595	*Sthenelais* juv	-	-	5	-	-	-	-	-	1	-	-
106777	Hippolytidae juv	-	-	1	-	-	-	-	-	-	-	-
107079	*Upogebia* juv	Leach 1814	-	9	-	-	-	-	-	-	-	-
106834	*Galathea* juv	-	-	1	-	-	-	-	-	-	-	-
205077	*Macropodia* juv	Leach 1814	-	1	-	-	-	-	-	-	-	-
106763	Portunidae juv	-	-	11	-	-	1	-	-	1	-	-
151320	Pectinoidea juv	-	-	-	-	-	2	-	-	-	-	-
138158	*Mactra* juv	(Linnaeus 1758)	-	-	-	-	1	-	1	1	-	-
140737	*Phaxas pellucidus* juv	(Pennant 1777)	2	-	-	-	-	-	-	-	-	-
138474	*Abra* juv	Lamarck 1818	60	9	1	-	41	1	32	2	-	9
123084	OPHIUROIDEA juv	-	16	130	4	1	22	3	-		2	1
123082	ECHINOIDEA sp juv	-	-	-	-	-	-	13	-	14	-	1
123426	*Echinocardium* juv	J E Gray 1825	4	-	-	-	-	7	-	1	-	2
Damaged												
939	Polynoidae indet	-	-	6	-	-	-	-	-	-	-	-
Fish			-	-	-	-						
125537	GOBIIDAE	-	-	-	-	-	1	-	-	-	-	-
10331	PLEURONECTIFORMES	-	-	-	-	-	1	-	-	-	-	-

Notes:
APHIA ID = World Register of Marine Species (WoRMS) taxon code
Juv. = Juvenile

D.2 EPIFAUNAL DATA

Abundance expressed as number of individuals per 0.1 m^2 for sessile solitary taxa.

Abundance for colonial taxa are recorded as P (present).

				Station and Laboratory Registration									
				ST03 FA	ST05 FA	ST10 FA	ST14 FA	ST16 FA	ST22 FA	ST23 FA	ST30 FA	ST31 FA	ST35 FA
Species Name	MCS Code	Aphia ID	Authority	15222	15224	15229	15233	15235	15241	15242	15249	15250	15254
ACTINIARIA	D0662	1360	–	-	71	-	-	-	-	-	-	-	-
ACTINIARIA (juv.)	D0662	1360	–	-	7	-	11	5	-	-	-	-	-
Aspidelectra melolontha	Y0182	111350	(Landsborough, 1852)	P	-	P	P	P	P	-	-	P	-
CAMPANULINIDA	D0297	13552	–	-	-	-	P	-	-	-	-	-	-
Conopeum reticulum	Y0172	111351	(Linnaeus, 1767)	-	-	-	P	-	-	P	-	P	-
Electra monostachys	Y0177	111354	(Busk, 1854)	-	-	-	-	-	-	-	-	P	-
Electra pilosa	Y0178	111355	(Linnaeus, 1767)	-	P	-	P	-	-	-	-	-	-
Filifera (=Bougainvilliidae?)	D0216	16352	Kühn, 1913	-	-	-	P	-	-	-	-	-	-
Folliculinidae	–	1692	Dons, 1914	P	-	P	P	-	P	-	-	P	-
Sertulariidae	D0407	1614	Lamouroux, 1812	-	P	-	P	-	-	-	-	-	-
Sessilia (juv.)	R0015	106033	Lamarck, 1818	-	-	-	3	-	-	-	-	-	-

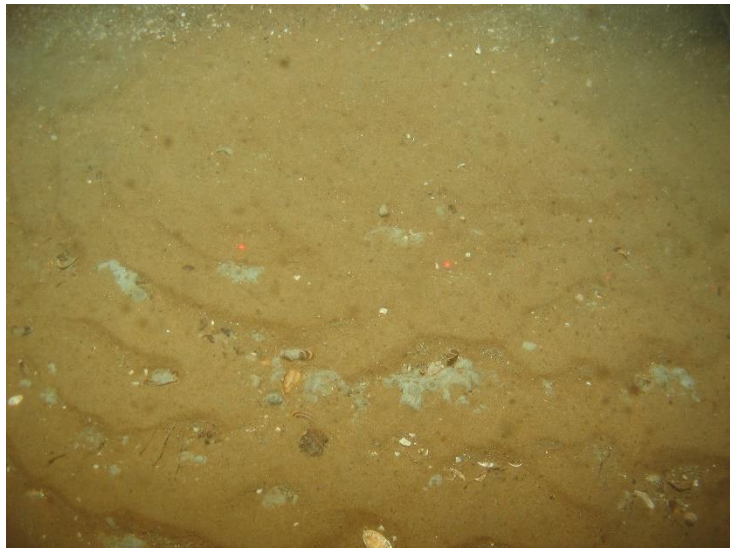
Notes:
SDC = Taxon code from: The species directory of the marine fauna and flora of the British Isles and surrounding seas
APHIA ID = World Register of Marine Species (WoRMS) taxon code
Juv. = Juvenile
P = Present

D.3 FAUNAL BIOMASS DATA

	Wet Blot Biomass [g]									
PHYLA	**ST003 FA**	**ST005 FA**	**ST010 FA**	**ST014 FA**	**ST016 FA**	**ST022 FA**	**ST023 FA**	**ST030 FA**	**ST031 FA**	**ST035 FA**
CNIDARIA	-	0.2506	-	-	-	-	-	-	-	-
PLATYHELMINTHES	-	0.0001	-	-	-	-	-	-	-	-
NEMERTEA	-	0.0022	-	-	0.0094	-	0.0031	-	-	-
POLYCHAETA	0.2144	4.5161	0.3484	0.2853	2.4663	1.1459	0.2596	0.4104	0.1587	0.6679
ARTHROPODA	0.0074	6.3850	0.0114	0.0140	0.2934	2.8864	0.0120	0.0272	0.0124	0.0053
MOLLUSCA	0.3001	0.3271	0.1525	0.0917	2.5842	0.1164	10.2824	0.6734	0.2328	9.7424
PHORONIDA	-	0.3416	-	-	-	-	-	-	-	-
ECHINODERMATA	0.1571	14.7512	0.0052	36.2575	32.5860	0.1849	17.1755	4.3540	0.1003	31.8105
PISCES	-	-	-	-	0.0904	-	-	-	-	-

E. DROP-DOWN VIDEO AND STILL ANALYSIS

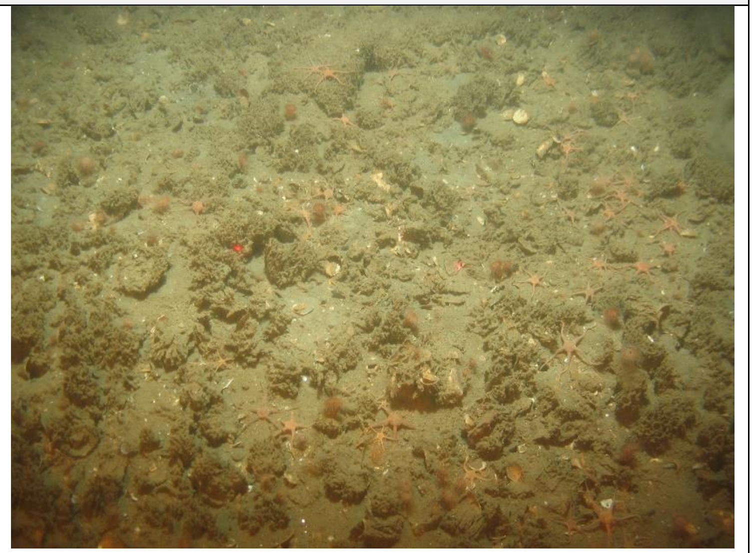
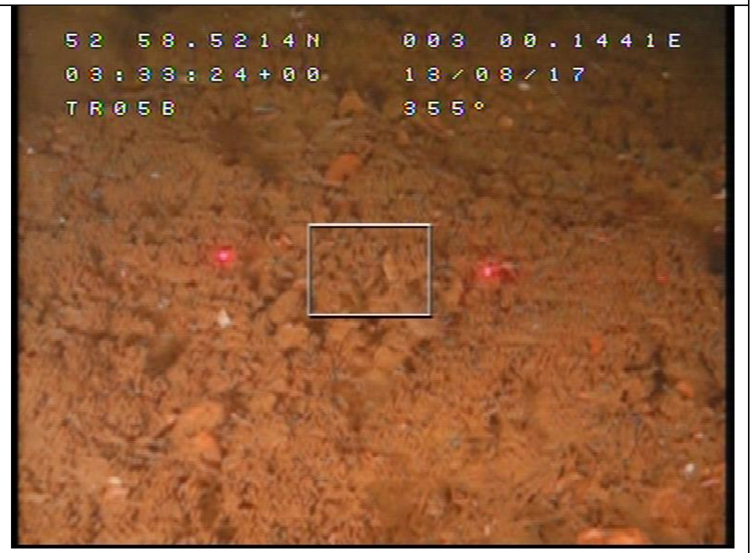
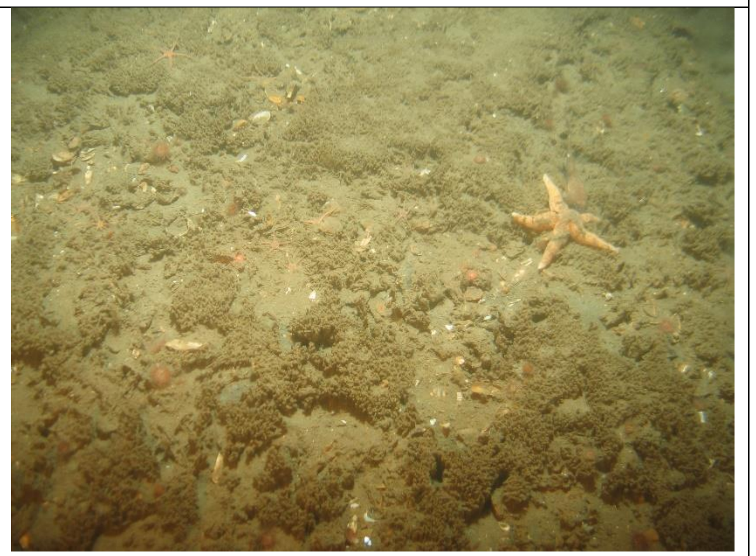
Geodetic datum: ETRS89 UTM Z31N

Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR01	493 686.2	5 862 969.9	493 902.7	5 862 855.7	245	Sand	Rippled shelly sand with a small proportion of gravel	Hydroid/bryozoan turf *Pagurus bernhardus* *Hydractinia echinata* *Asterias rubens* Paguridae *Liocarcinus* sp.	R O P O O O	
TR02	484 551.5	5 867 998.1	484 555.0	5 867 767.7	230	Sand	Rippled shelly sand with a small proportion of gravel Spatangoida tests	Hydroid/bryozoan turf *Liocarcinus* sp. *Echiichthys vipera* Pleuronectiformes Triglidae	R O O F F	

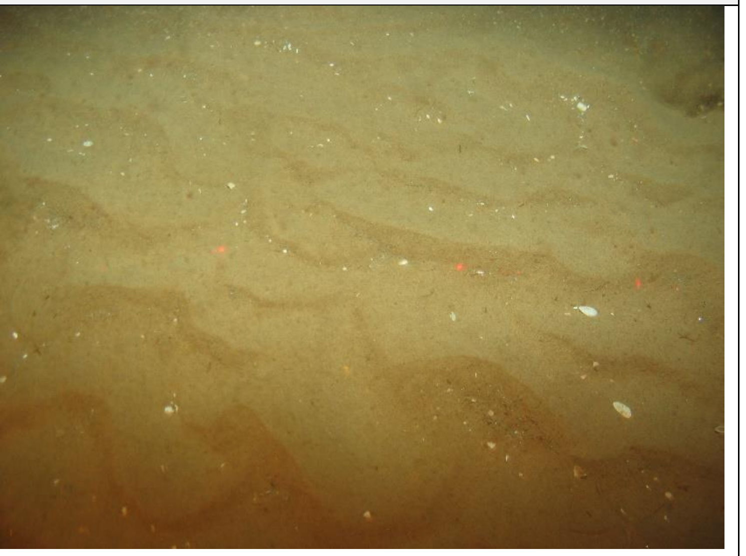
Geodetic datum: ETRS89 UTM Z31N

Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR03	488 809.8	5 867 994.3	488 812.4	5 867 801.9	192	Sand	Rippled shelly sand with a small proportion of gravel Spatangoida tests	*Ophiura albida* *Ophiura ophiura* *Asterias rubens* *Echiichthys vipera* Pleuronectiformes	F F O O F	
TR04	493 834.2	5 867 805.6	493 806.3	5 868 008.9	205	Sand	Rippled shelly sand Spatangoida tests	*Ophiura ophiura* Paguridae *Hydractinia echinata* Pleuronectiformes *Asterias rubens*	F O P F O	
TR05	500 026.0	5 869 949.5	499 968.8	5 870 116.2	176	Sand	Shelly gravelly sand. The percentage cover of *Sabellaria spinulosa* gradually reduces from 499 999E, 5 869 996N	*Sabellaria spinulosa* *Sagartia* sp. *?Sagartiogeton laceratus* *Ophiura albida* *Ophiura ophiura* *Asterias rubens* *Callionymus* sp. *Liocarcinus* sp. *Paguridae* *Scyliorhinus canicula* *Buccinum undatum* *Merlangius merlangus* *Pleuronectiformes* *Gadidae* *Microstomus kitt*	C - R C C A S C C F O F O F F P F	

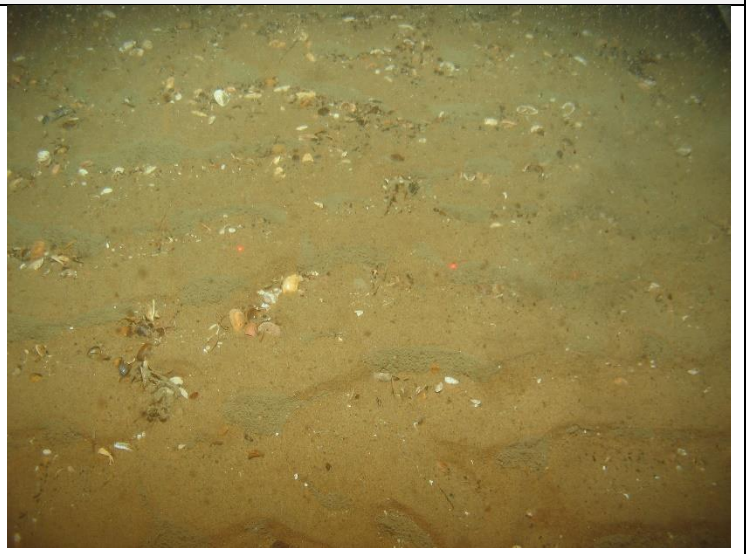
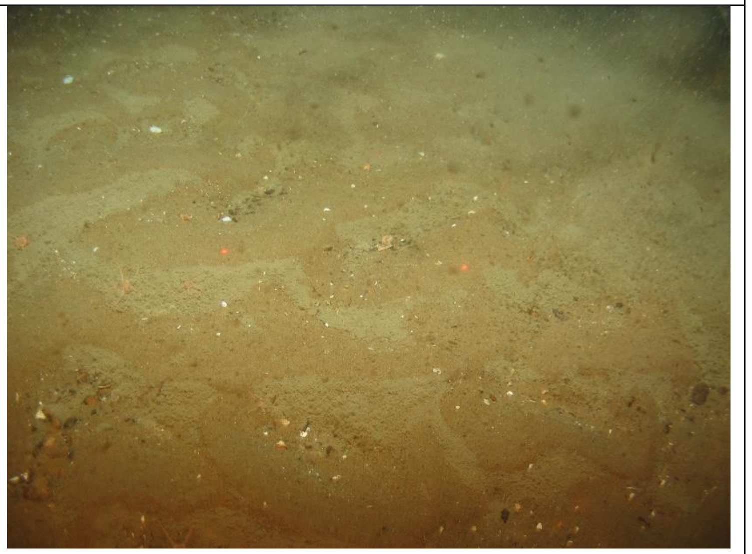
Geodetic datum: ETRS89 UTM Z31N

Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR05A	500 055.7	5 869 735.8	500 011.2	5 869 924.2	194	Sand	Shelly gravelly sand	*Sabellaria spinulosa* *Sagartia* sp. *?Sagartiogeton laceratus* *Ophiura albida* *Ophiura ophiura* *Asterias rubens* *Liocarcinus* sp. *Callionymus* sp. *?Microstomus kitt* *Gadidae* *Merlangius merlangus* *Scyliorhinus canicula* Pleuronectiformes *Cancer pagurus* Paguridae *Buglossidium luteum*	A C C A S C F F F P P F F F O F	
TR05B	500 164.1	5 869 514.5	500 112.4	5 869 691.1	184	Sand	Shelly gravelly sand	*Sabellaria spinulosa* *Sagartia* sp. *?Sagartiogeton laceratus* *Ophiura albida* *Ophiura ophiura* *Asterias rubens* Gadidae *Merlangius merlangus* Liocarcinus sp. *Thuiaria thuja* *Callionymus* sp. Pleuronectiformes *Microstromus kitt* *Agonus cataphractus* *Cancer pagurus* *Buglossidium luteum*	S C C A S O P P O R F F F O F F	
TR05C	500 051.5	5 869 844.7	500 208.6	5 869 416.2	456	Sand	Shelly gravelly sand Sand covering *Sabellaria spinulosa* tubes in places One large cobble	*Sabellaria spinulosa* *?Sagartia* sp. *?Sagartiogeton laceratus* *Ophiura albida* *Ophiura ophiura* *Asterias rubens* *Agonus catapractus* *Callionymus* sp. *Cancer pagurus* Pleuronectiformes Paguridae *Liocarcinus* sp. Gadidae *Merlangius merlangus* Gobiidae *Buglossidium luteum*	A - O C C A S C O F F C O O P P O P	

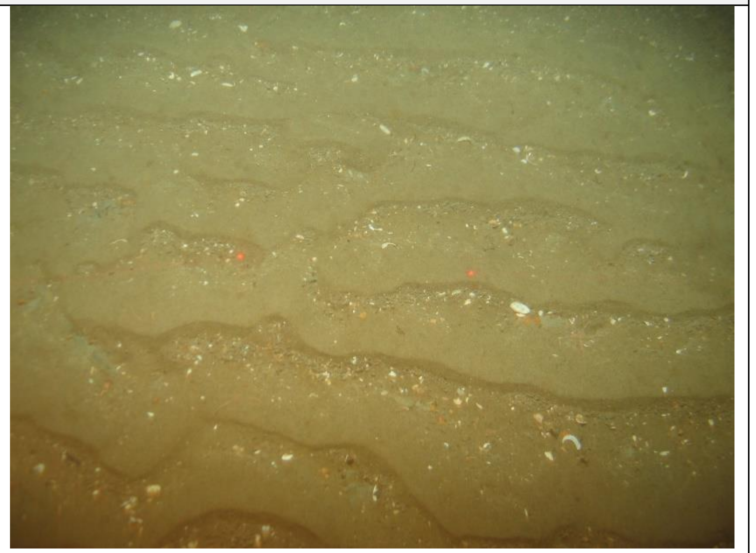
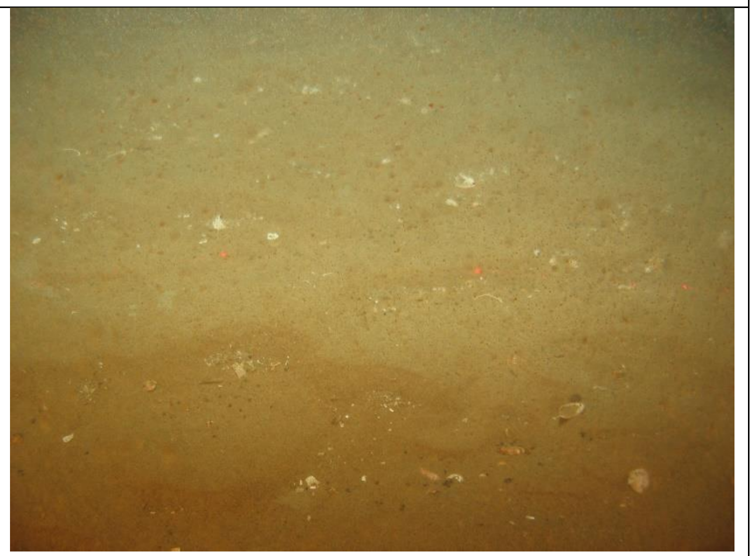
Geodetic datum: ETRS89 UTM Z31N

Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR06	503 864.5	5 867 798.1	503 763.7	5 868 015.1	239	Sand	Rippled shelly sand A varying proportion of gravel throughout the transect	Pleuronectiformes *Liocarcinus* sp. *Asterias rubens* *Cancer pagurus* Paguridae *Ophiura albida* *Ophiura ophiura* *Lanice conchilega*	F O O F O A A P	
TR06A	503 843.6	5 867 870.9	503 784.6	5 867 933.6	86	Sand	Rippled shelly sand A varying proportion of gravel throughout the transect	*Ophiura albida* *Ophiura ophiura* PISCES *Asterias rubens* Pleuronectiformes	A A F O F	
TR07	508 891.4	5 867 903.6	508 682.5	5 867 900.9	209	Sand	Rippled shelly sand A varying proportion of gravel throughout the transect Spatangoida tests	*Ophiura albida* *Ophiura ophiura* Paguridae *Asterias rubens* Pleuronectiformes *Lanice conchilega* PISCES Rajidae Hydroid/Bryozoan turf *Hydractinia echinata*	C C O O F P F F R P	

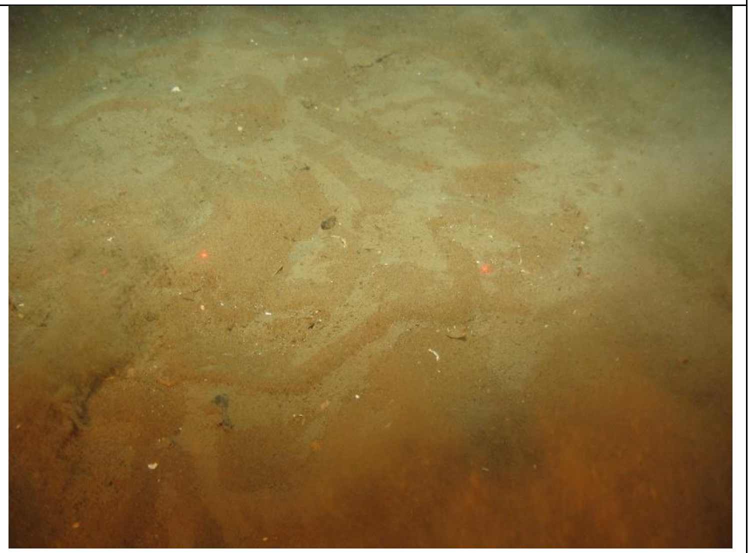
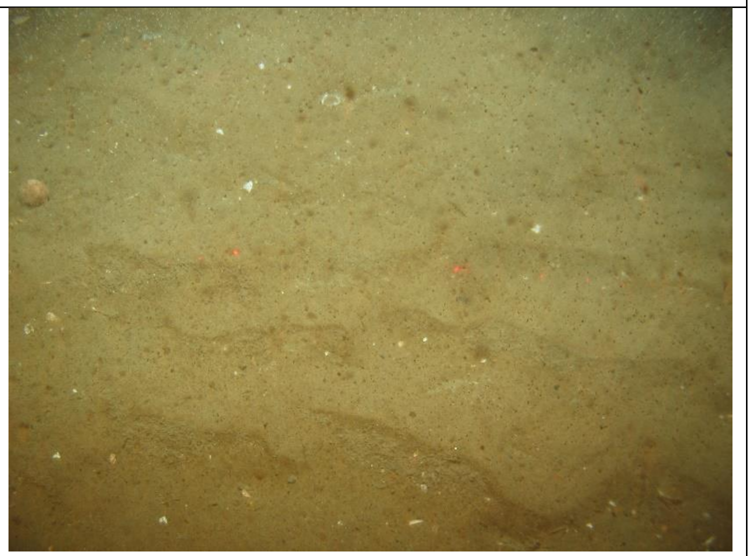
Geodetic datum: ETRS89 UTM Z31N

Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR08	484 558.6	5 873 029.3	484 554.3	5 872 795.4	234	Sand	Rippled shelly sand A varying proportion of gravel throughout the transect Spatangoida tests	*Ophiura albida* *Ophiura ophiura* Hydroid/Bryozoan turf Paguridae Ophiuridae ?*Merlangius merlangus*	C C R O C F	
TR09	488 820.7	5 873 002.8	488 815.8	5 872 810.1	193	Sand	Rippled shelly sand A varying proportion of gravel throughout the transect	Pleuronectiformes *Scyliorhinus canicula* Ophiuiridae *Liocarcinus* sp. Hydroid/Bryozoan turf *Asterias rubens* *Buglossidium luteum* *Ophiura albida*	F F F O R O F C	
TR10	493 819.3	5 872 826.9	493 783.8	5 873 053.4	229	Sand	Rippled shelly sand, with a small proportion of gravel Spatangoida tests	*Asterias rubens* Ophiuridae Asteroidea Paguridae	O F O O	

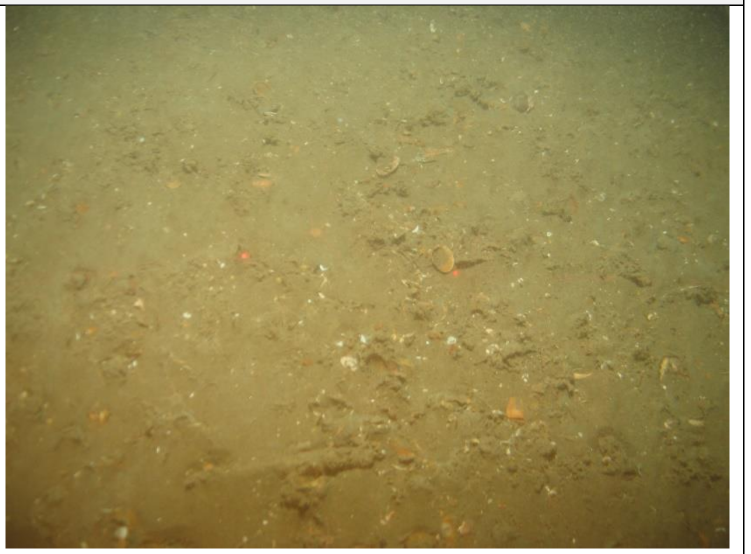
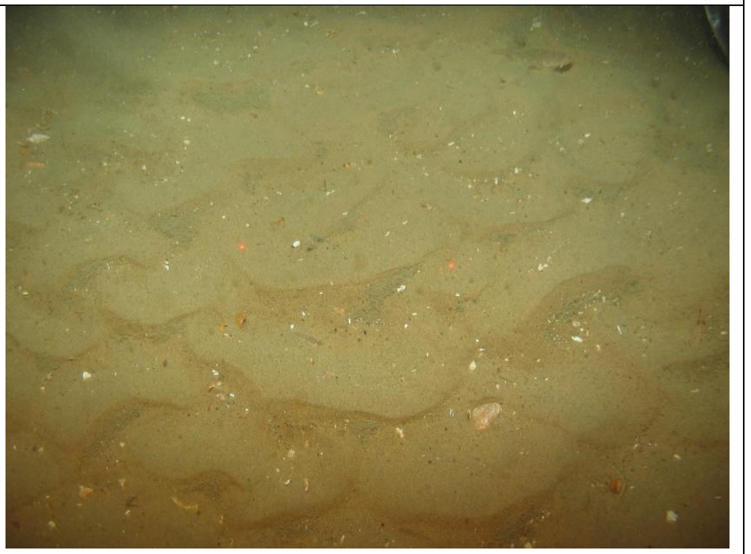
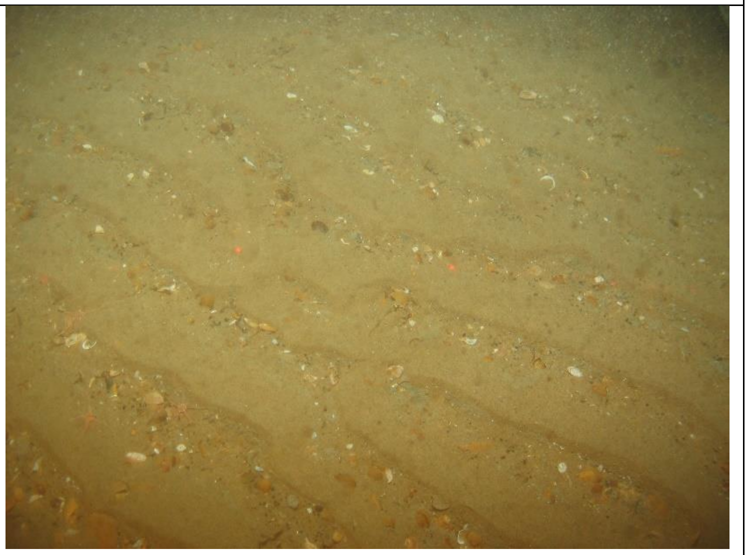
Geodetic datum: ETRS89 UTM Z31N

Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR11	498 665.0	5 872 983.4	498 755.3	5 872 739.4	260	Sand	Rippled shelly sand, with a small proportion of gravel, and occasional cobbles	*Asterias rubens* Pleuronectiformes Ophiuridae *Ophiura albida*	O F F C	
TR12	503 856.5	5 873 023.7	503 787.2	5 872 807.7	227	Sand	Rippled shelly sand. A varying proportion of gravel throughout the transect	*Liocarcinus* sp. Ophiuridae Pleuronectiformes Triglidae Paguridae *Asterias rubens* *?Limanda limanda* *Corystes cassivelaunus* *Buglossidium luteum* *Ophiura ophiura* *Ophiura albida* *?Atelecyclus rotundatus*	O C C F O O F O F C C O	
TR13	484 665.8	5 877 831.3	484 509.7	5 878 006.7	235	Sand	Rippled shelly sand Spatangoida tests	Pleuronectiformes *Ophiura ophiura* *Ophiura albida*	F C C	

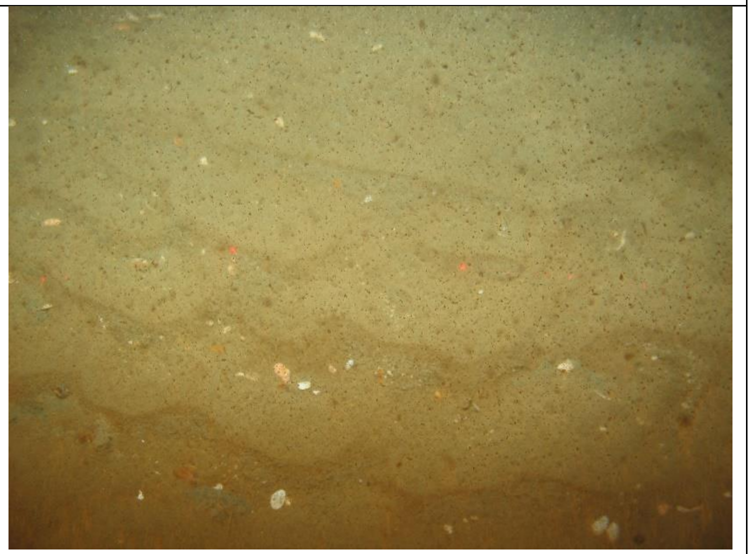
Geodetic datum: ETRS89 UTM Z31N

Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR14	488 878.1	5 878 028.6	488 850.3	5 877 988.0	49	Sand	Shelly gravelly sand	*Sabellaria spinulosa* *Necora puber* *Cancer pagurus* *Liocarcinus* sp. *Sagartia* sp. *Asterias rubens* Gadidae *Urticina* sp.	F F F O O O F O	
TR14	488 850.3	5 877 988.0	488 776.3	5 877 809.0	1964	Sand	Rippled slightly shelly sand	*Sabellaria spinulosa* Pleuronectiformes Hydroid/Bryozoan turf Paguridae *Raja clavata* Gadidae Triglidae ?*Merlangius merlangus* *Buglossidium luteum* *Actiniaria*	R F R O F F F F F O	
TR15	493 820.9	5 877 830.0	493 819.4	5 878 021.7	192	Sand	Rippled shelly sand Spatangoida tests	Paguridae *Asterias rubens* *Liocarcinus sp.* *Ophiuridae* *Ophiura ophiura* *Ophiura albida*	O O O C C C	

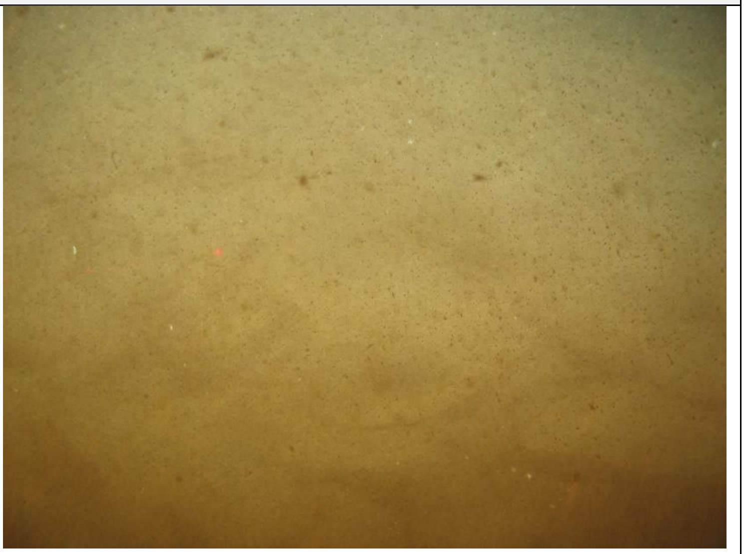
Geodetic datum: ETRS89 UTM Z31N

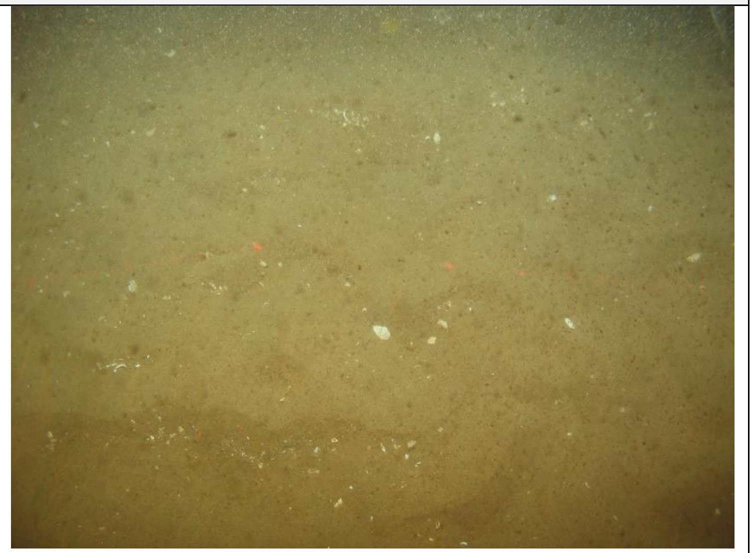
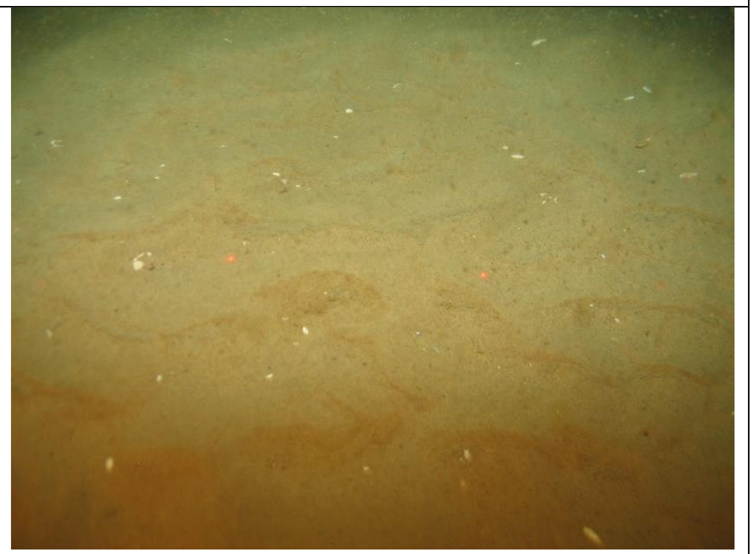
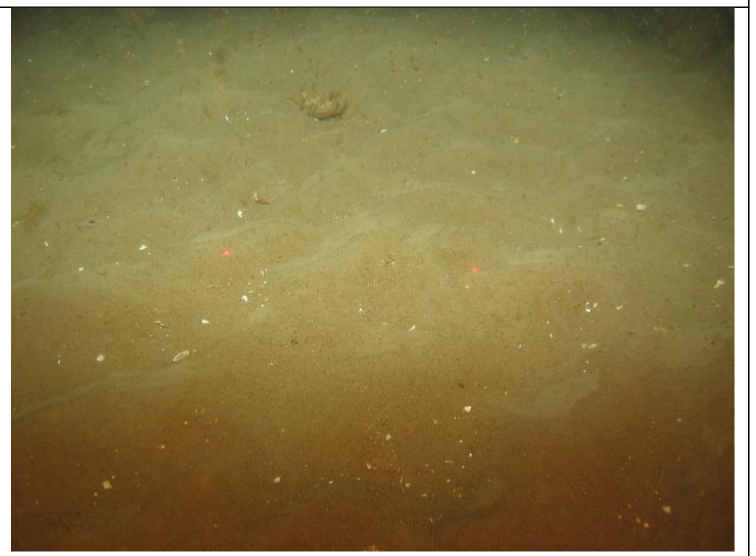
Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR16	498 769.5	5 878 049.0	498 868.3	5 877 769.5	296	Sand	Shelly gravelly sand	*Asterias rubens* Hydroid/Bryozoan turf *Ophiura ophiura* *Ophiura albida*	O R C C	
TR17	503 865.5	5 878 011.2	503 780.6	5 877 807.6	221	Sand	Rippled shelly sand A varying proportion of gravel throughout the transect Spatangoida tests	*Liocarcinus* sp. Pleuronectiformes Triglidae Ophiuridae Paguridae *Asterias rubens* *Buglossidium luteum* *Ophiura albida*	O F F F O O F C	
TR18	488 868.9	5 882 800.0	488 736.0	5 882 995.5	236	Sand	Rippled shelly sand A varying proportion of gravel throughout the transect	Gadidae Ammodytidae Pleuronectiformes *Liocarcinus* sp. Gobiidae *Asterias rubens* *Ophiura albida*	F F F O P O C	

Geodetic datum: ETRS89 UTM Z31N

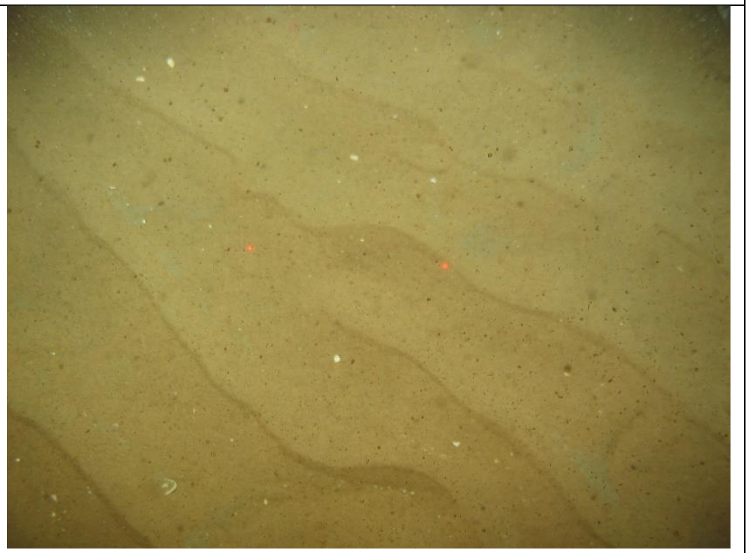
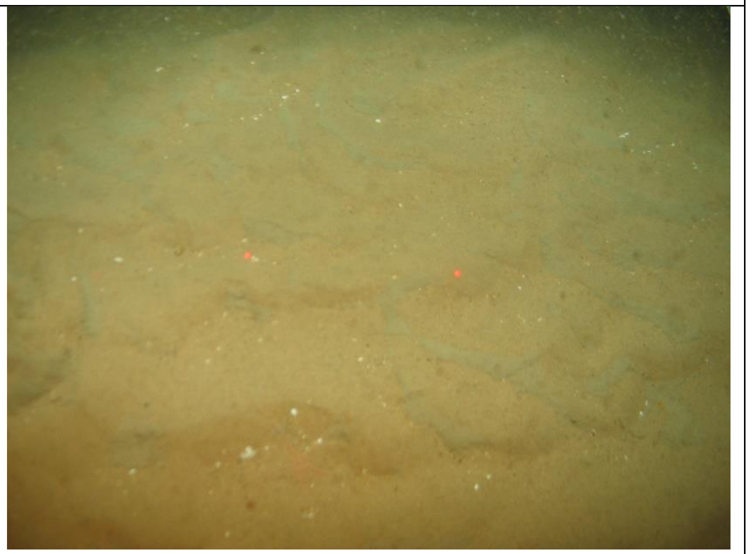
Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR19	493 872.1	5 882 791.1	493 750.9	5 882 985.7	229	Sand	Rippled shelly sand Spatangoida tests	*Asterias rubens* Pleuronectiformes *Echiichthys vipera* *Liocarcinus* sp. Paguridae *Ophiura ophiura* *Ophiura albida* *Callionymus* sp.	O F F O O C C F	
TR20	498 819.6	5 883 044.7	498 814.7	5 882 798.1	247	Sand	Rippled shelly sand A varying proportion of gravel throughout the transect	*Asterias rubens* *Hydroid/Bryozoan turf* *Ophiura albida*	O R C	
TR21	503 868.0	5 883 040.3	503 778.9	5 882 804.1	252	Sand	Rippled shelly sand	Ophiuridae *Liocarcinus* sp. Pleuronectiformes Hydroid/Bryozoan turf *Ophiura ophiura*	F O F R C	

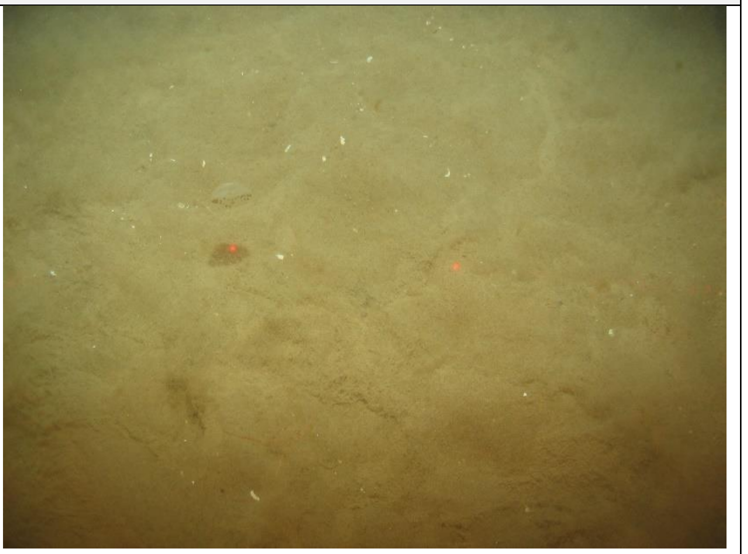
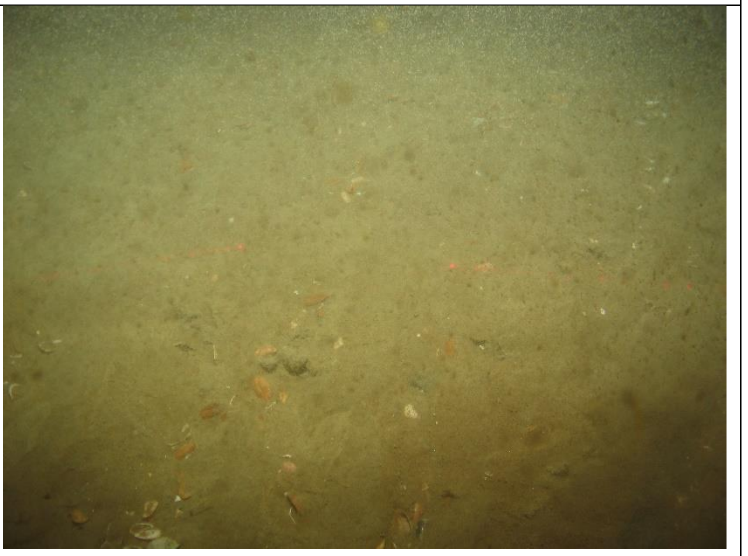
Geodetic datum: ETRS89 UTM Z31N

Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR22	488 782.1	5 887 710.7	488 631.3	5 887 885.6	231	Sand	Rippled shelly sand. Spatangoida tests	Gadidae Paguridae Polychaete tubes Pleuronectiformes Hydroid/Bryozoan turf *Ophiura ophiura*	F O P F R F	
TR23	493 903.5	5 887 791.0	493 740.4	5 887 989.4	257	Sand	Rippled shelly sand. Spatangoida tests	Paguridae Ophiuridae Hydroid/Bryozoan turf *Ophiura ophiura* Ammodytidae	O F R C F	
TR24	503 844.1	5 887 997.2	503 789.5	5 887 865.2	143	Sand	Rippled shelly sand, with a small proportion of gravel	Ophiuridae Paguridae *Hydractinia echinata* *Ophiura ophiura*	F O P C	

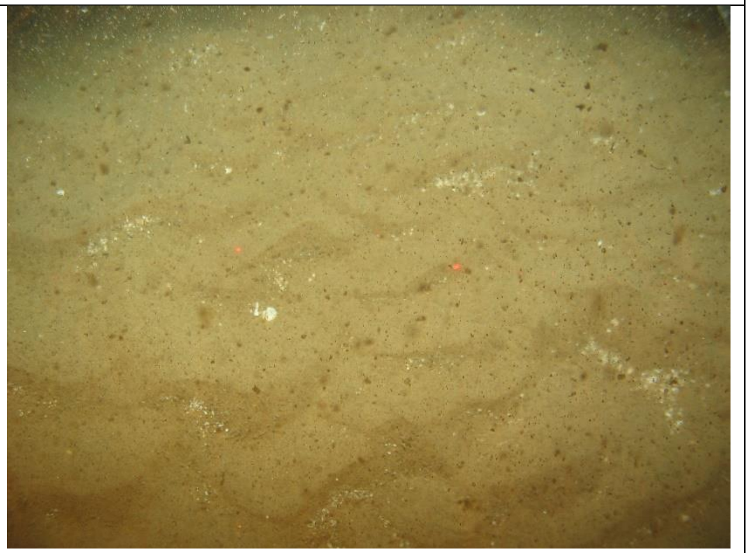
Geodetic datum: ETRS89 UTM Z31N										
Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR24.2	503 886.8	5 888 123.1	503 778.6	5 887 802.4	338	Sand	Rippled shelly sand	Ophiuridae	F	
TR25	498 973.1	5 892 912.0	498 699.3	5 892 883.3	275	Sand	Rippled slightly shelly sand	Ophiuridae	F	
TR26	504 529.5	5 897 456.7	503 716.3	5 897 948.6	950	Sand	Rippled shelly sand A varying proportion of gravel throughout the transect Spatangoida tests	Ophiuridae Hydroid/Bryozoan turf Sertularidae Gobiidae *Echiichthys vipera* *Ophiura ophiura*	F R R O O C	

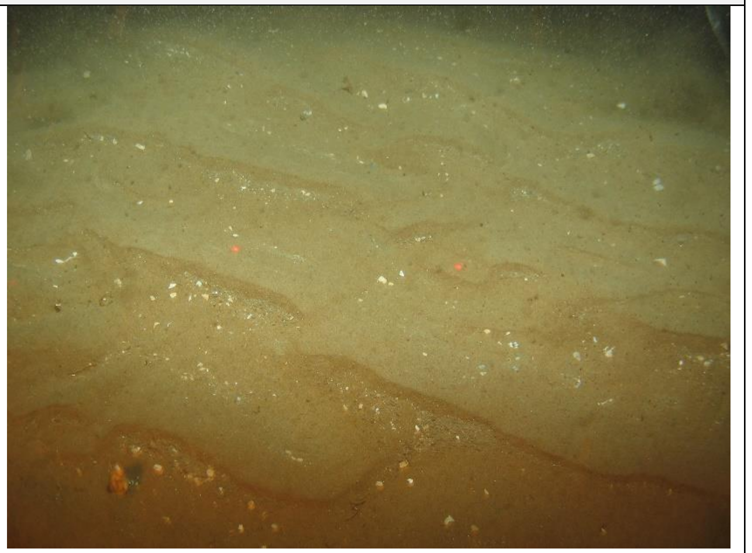
Geodetic datum: ETRS89 UTM Z31N

Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR27	494 040.2	5 891 538.7	493 819.4	5 891 520.5	222	Sand	Rippled shelly sand Spatangoida tests	Ophiuridae Paguridae *Asterias rubens* *Ophiura ophiura*	F O O C	
TR28	488 864.9	5 860 357.1	488 947.2	5 860 148.4	224	Sand	Rippled shelly sand Spatangoida tests	Ophiuridae Paguridae *Asterias rubens* *Ophiura ophiura*	F O O C	
TR29	499 204.2	5 887 950.4	499 182.4	5 887 658.1	293	Sand	Rippled shelly sand A varying proportion of gravel throughout the transect	*Echiichthys vipera* Paguridae *Ophiura ophiura* *Thuiaria thuja*	O O C R	

Geodetic datum: ETRS89 UTM Z31N										
Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR30	504 166.8	5 892 836.7	504 051.6	5 892 946.3	159	Sand	Rippled shelly sand, with a small proportion of gravel	Ophiuridae PISCES Paguridae	F F O	
TR30.3	504 251.1	5 892 831.8	504 005.9	5 892 935.9	266	Sand	Rippled shelly sand, with a small proportion of gravel	Ophiuridae Hydroid/Bryozoan turf Pectinidae *Echiichthys vipera* *Liocarcinus* sp. *Callionymus* sp. *Ophiura albida*	F R O O O F C	
TR31	484 779.6	5 859 772.7	484 778.0	5 859 550.9	222	Sand	Rippled shelly sand, with a small proportion of gravel Spatangoida tests	Ophiuridae Paguridae *Ophiura ophiura*	F O C	

Geodetic datum: ETRS89 UTM Z31N

Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR32	484 932.4	5 863 691.7	484 931.5	5 863 498.4	193	Sand	Rippled shelly sand, with a small proportion of gravel Spatangoida tests	Hydroid/Bryozoan turf	R	
TR33	487 545.1	5 863 822.4	487 545.8	5 863 599.9	223	Sand	Rippled shelly sand Spatangoida tests	*Corystes cassivelaunus* *Paguridae* *Echiichthys vipera* *Hydractinia echinata* *Ophiura ophiura*	O O O P C	
TR34	498 916.8	5 863 845.7	498 814.6	5 864 059.3	237	Sand	Rippled shelly sand	*Liocarcinus* sp. *Cancer pagurus* Ophiuridae Pleuronectiformes Paguidae *Asterias rubens* PISCES *Necora puber* Hydroid/Bryozoan turf *Ophiura ophiura* *Ophiura albida* *Buglossidium luteum*	O F C F O O F O R C C F	

Geodetic datum: ETRS89 UTM Z31N										
Transect	Start of Transect		End of Transect		Distance	General Description	Detailed Sediment Notes	Conspicuous Species	Estimated Abundance SACFOR	Representative Image
	Easting [m]	Northing [m]	Easting [m]	Northing [m]						
TR35	504 787.5	5 864 800.7	504 677.9	5 864 953.8	188	Sand	Rippled shelly sand	Ophiuridae *Asterias rubens* Paguridae Pleuronectiformes *Liocarcinus* sp. *Corystes cassivelaunus* *Hydractinia echinata* *Echiichthys vipera* *Cancer pagurus* *Ophiura ophiura* *Ophiura albida* *Bugglosidium luteum* *Limanda limanda*	C O O F O O P O F C C F F	

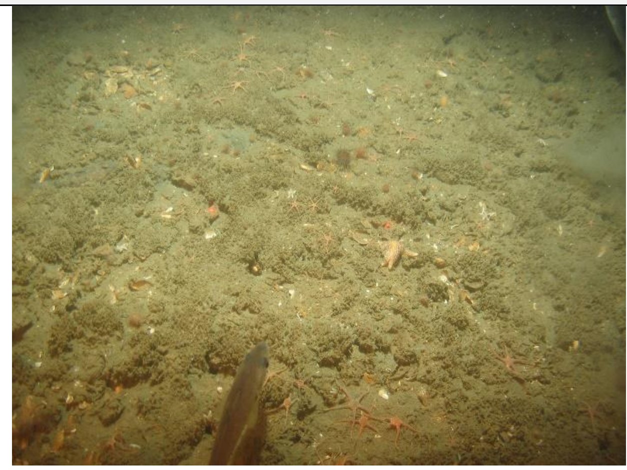
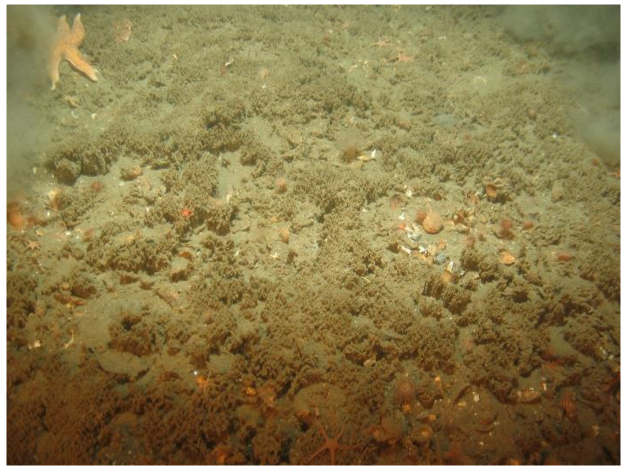
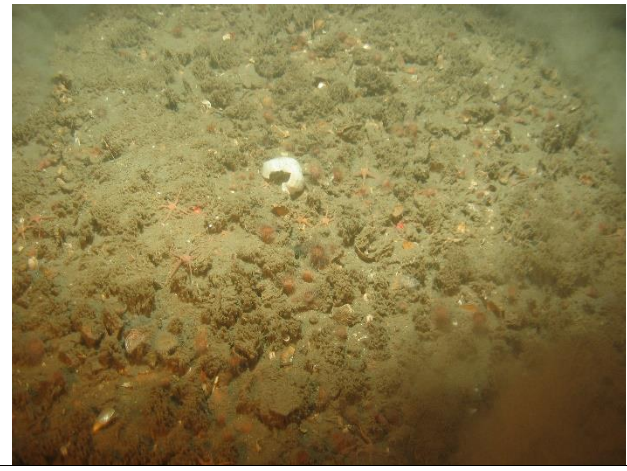
F. SABELLARIA ASSESSMENT

Geodetic datum: ETRS89 UTM Z31N

Station	Sediment description	*Sabellaria* form present					*Sabellaria* characteristics			Representative Image	Reef definition based on			Overall Assessment
		Absent	Moribund tubes	Crusts	Clumps	Potential Reef	Elevation	Patchiness	Brief description of *Sabellaria* recorded		Elevation	Patchiness	Consolidation	
TR05 Between 500 026E, 5 869 949N and 499 961E, 5 870 078N	Shelly gravelly sand	N	N	Y	Y	Y	2 – 5 cm	33 %	Low-lying consolidated aggregations of *Sabellaria spinulosa* tubes. Extensive areas of low-lying aggregations, and small clumps of consolidated tubes. Elevation of tubes varied between <2, and 2 cm to 5 cm throughout the transect, with the average tube height of 2 cm to 5 cm	  	LOW	HIGH	LOW - MEDIUM	LOW

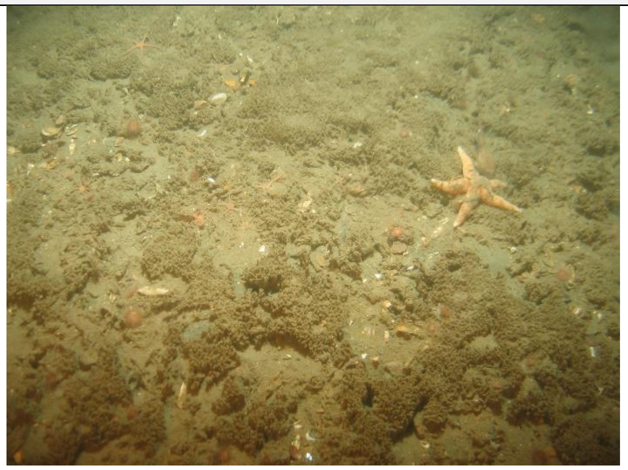
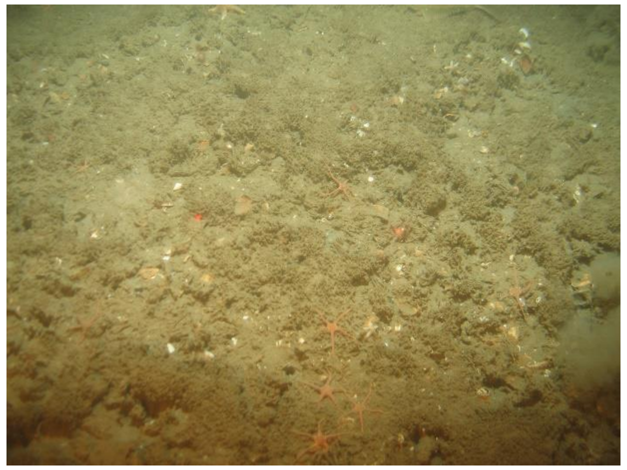
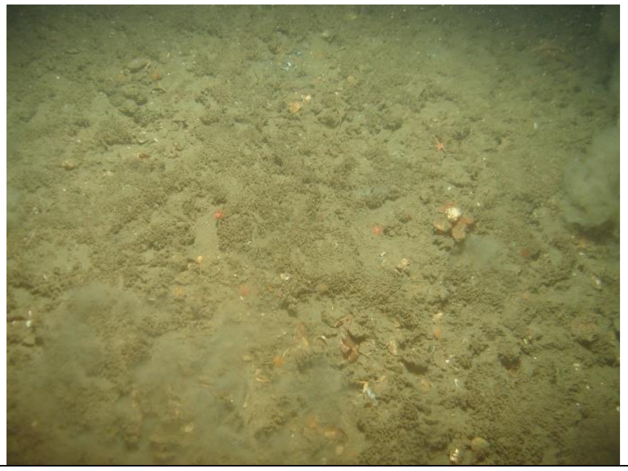
Geodetic datum: ETRS89 UTM Z31N														
Station	**Sediment description**	***Sabellaria* form present**					***Sabellaria* characteristics**			**Representative Image**	**Reef definition based on**			**Overall Assessment**
		Absent	**Moribund tubes**	**Crusts**	**Clumps**	**Potential Reef**	**Elevation**	**Patchiness**	**Brief description of *Sabellaria* recorded**		**Elevation**	**Patchiness**	**Consolidation**	
TR05 Between 499 961E, 5 870 078N and 499 968E, 5 870 116N	Shelly gravelly sand	N	N	Y	Y	Y	2 – 5 cm	<1 %	Rarely occurring small low-lying consolidated clumps of *Sabellaria spinulosa* tubes		**LOW**	**NOT REEF**	**LOW**	**NOT REEF**

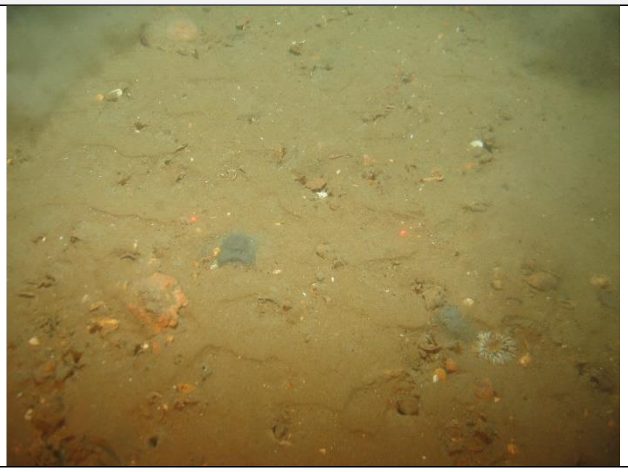
Geodetic datum: ETRS89 UTM Z31N

Station	Sediment description	*Sabellaria* form present					*Sabellaria* characteristics			Representative Image	Reef definition based on			Overall Assessment
		Absent	Moribund tubes	Crusts	Clumps	Potential Reef	Elevation	Patchiness	Brief description of *Sabellaria* recorded		Elevation	Patchiness	Consolidation	
TR05A	Shelly gravelly sand	N	N	Y	Y	Y	2 – 5 cm	68 %	Low-lying consolidated aggregations of *Sabellaria spinulosa* tubes. Extensive areas of low-lying aggregations, and small clumps of consolidated tubes. Elevation of tubes varied between <2 and 2 cm to 5 cm throughout the transect, with the average tube height of 2 cm to 5 cm	  	LOW	HIGH	LOW - MEDIUM	LOW

Geodetic datum: ETRS89 UTM Z31N														
Station	Sediment description	*Sabellaria* form present					*Sabellaria* characteristics			Representative Image	Reef definition based on			Overall Assessment
		Absent	Moribund tubes	Crusts	Clumps	Potential Reef	Elevation	Patchiness	Brief description of *Sabellaria* recorded		Elevation	Patchiness	Consolidation	
TR05B	Shelly gravelly sand	N	N	Y	Y	Y	< 2 cm	83 %	Low-lying consolidated aggregations of *Sabellaria spinulosa* tubes. Extensive areas of low-lying aggregations, and small clumps of consolidated tubes. Elevation of tubes for the majority of the transect was < 2 cm, with some areas with an elevation between 2 cm and 5 cm	  	NOT REEF	HIGH	LOW - MEDIUM	NOT REEF

Geodetic datum: ETRS89 UTM Z31N

Station	Sediment description	*Sabellaria* form present					*Sabellaria* characteristics			Representative Image	Reef definition based on			Overall Assessment
		Absent	Moribund tubes	Crusts	Clumps	Potential Reef	Elevation	Patchiness	Brief description of *Sabellaria* recorded		Elevation	Patchiness	Consolidation	
TR05C Between 500 051E, 5 869 844N and 500 195E, 5 869 457N	Shelly gravelly sand	N	N	Y	Y	Y	< 2 cm	63 %	Low lying consolidated aggregations of *Sabellaria spinulosa* tubes. Extensive areas of low-lying aggregations, and small clumps of consolidated tubes. Elevation of tubes for the majority of the transect was < 2 cm, with some areas with an elevation between 2 cm and 5 cm	  	NOT REEF	HIGH	LOW - MEDIUM	NOT REEF

Geodetic datum: ETRS89 UTM Z31N															
Station	Sediment description	***Sabellaria* form present**					***Sabellaria* characteristics**			Representative Image	Reef definition based on			Overall Assessment
		Absent	Moribund tubes	Crusts	Clumps	Potential Reef	Elevation	Patchiness	Brief description of *Sabellaria* recorded		Elevation	Patchiness	Consolidation	
TR05C Between 500 195E, 5 869 457N and 500 208E, 5 869 416N	Shelly gravelly sand	N	N	Y	Y	Y	< 2 cm	< 5 %	Small clumps of low-lying *Sabellaria spinulosa,* with an average elevation of < 2 cm		**NOT REEF**	**NOT REEF**	**LOW**	**NOT REEF**

<table>
<tr><th colspan="15">Geodetic datum: ETRS89 UTM Z31N</th></tr>
<tr><th rowspan="2">Station</th><th rowspan="2">Sediment description</th><th colspan="5">Sabellaria form present</th><th colspan="3">Sabellaria characteristics</th><th rowspan="2">Representative Image</th><th colspan="3">Reef definition based on</th><th rowspan="2">Overall Assessment</th></tr>
<tr><th>Absent</th><th>Moribund tubes</th><th>Crusts</th><th>Clumps</th><th>Potential Reef</th><th>Elevation</th><th>Patchiness</th><th>Brief description of Sabellaria recorded</th><th>Elevation</th><th>Patchiness</th><th>Consolidation</th></tr>
<tr><td>TR14</td><td>Shelly gravelly sand</td><td>N</td><td>N</td><td>Y</td><td>Y</td><td>Y</td><td>2 – 5 cm</td><td>14 %</td><td>Small consolidated clumps of Sabellaria spinulosa.
Elevation of tubes varied between < 2 cm, and > 5 cm. The average tube height was between 2 cm and 5 cm. Tubes recorded as > 5 cm in height, were rarely recorded.</td><td>


</td><td>LOW</td><td>LOW</td><td>LOW - MEDIUM</td><td>LOW</td></tr>
</table>

G. LABORATORY ANALYTICAL RESULTS

National Laboratory Service

Analytical Report

Final Report

Report ID - 20113340 - 1

UKAS TESTING 0754

Batch description: Sediment

Reported on: 10-Oct-2017

Client: Fugro EMU Ltd

Project: 14333 - Vattenfall - Stage 2.

Quote Description: Vattenfall Stage 2.

Folder No: 003960497

Sampled on: 14-Aug-17 @ 16:17

Comments: HCA2 HMA2 ST31

Quote No: 14333

Matrix: Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	4.29	mg/kg		0.9	UKAS	LE	402
Mercury : Dry Wt	<0.01	mg/kg		0.01	UKAS	LE	1042
Arsenic : Dry Wt	13.3	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	<0.04	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	12.2	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	1.75	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	4.39	mg/kg		2	UKAS	LE	1041
Lithium : Dry Wt	3.44	mg/kg		0.3	None	LE	1041
Manganese : Dry Wt	136	mg/kg		0.2	UKAS	LE	1041
Nickel : Dry Wt	5.40	mg/kg		1	UKAS	LE	1041
Vanadium : Dry Wt	18.8	mg/kg	QB	0.1	UKAS	LE	1041
Zinc : Dry Wt	15.2	mg/kg		2.5	UKAS	LE	1041
Acenaphthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Acenaphthylene : Dry Wt	<1	ug/kg		1	None	LE	1051
Anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(b)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(e) pyrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Benzo(ghi)perylene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(j)fluoranthene : Dry Wt	<10	ug/kg		10	None	LE	1051
Benzo(k)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Chrysene : Dry Wt	<3	ug/kg		3	UKAS	LE	1051
Chrysene + Triphenylene : Dry Wt	<3	ug/kg		3	None	LE	1051
Dibenzo(ah)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Dibenzothiophene : Dry Wt	<5	ug/kg		5	None	LE	1051
Fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Fluorene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Indeno(1,2,3-c,d)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Naphthalene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Perylene : Dry Wt	<5	ug/kg		5	None	LE	1051
Phenanthrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Triphenylene : Dry Wt	<2	ug/kg		2	None	LE	1051
PCB - 028 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 052 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685

PCB - 101 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 118 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 138 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 153 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 180 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
Dibutyl Tin : Dry Wt as Cation	<3	ug/kg		3	UKAS	LE	897
Tetrabutyl Tin : Dry Wt as Cation	<2	ug/kg		2	None	LE	897
Tributyl Tin : Dry Wt as Cation	<1	ug/kg		1	None	LE	897
Triphenyl Tin : Dry Wt as Cation	<2	ug/kg	QB	2	None	LE	897
Dry Solids @ 30°C	81.3	%		0.5	None	LE	1130
Accreditation Assessment	2	No.		1	None	LE	924
Additional Material Present	Report	Text				LE	924
Stones and Shell							
Drying Method	Report	Text				LE	924
Air dried at 30°C							
Rejected Matter Description	Report	Text				LE	924
No material removed							
Sample Colour	Report	Text				LE	924
Brown							
Sample Matrix	Report	Text				LE	924
Sandy Sediment							
Sample Preparation	Report	Text				LE	924
Homogenised, Jaw Crushed & Sieved to <2mm							

Client: Fugro EMU Ltd
Project: 14333 - Vattenfall - Stage 2.
Quote Description: Vattenfall Stage 2.
Folder No: 003960502
Sampled on: 14-Aug-17 @ 21:26
Comments: HCA2 HMA2 ST03
Quote No: 14333
Matrix: Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	2.35	mg/kg		0.9	UKAS	LE	402
Mercury : Dry Wt	<0.01	mg/kg		0.01	UKAS	LE	1042
Arsenic : Dry Wt	21.0	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	<0.04	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	10.0	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	1.19	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	7.17	mg/kg		2	UKAS	LE	1041
Lithium : Dry Wt	3.42	mg/kg		0.3	None	LE	1041
Manganese : Dry Wt	211	mg/kg		0.2	UKAS	LE	1041
Nickel : Dry Wt	4.41	mg/kg		1	UKAS	LE	1041
Vanadium : Dry Wt	24.7	mg/kg	QB	0.1	UKAS	LE	1041
Zinc : Dry Wt	22.3	mg/kg		2.5	UKAS	LE	1041
Acenaphthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Acenaphthylene : Dry Wt	<1	ug/kg		1	None	LE	1051
Anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(b)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(e) pyrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Benzo(ghi)perylene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(j)fluoranthene : Dry Wt	<10	ug/kg		10	None	LE	1051
Benzo(k)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Chrysene : Dry Wt	<3	ug/kg		3	UKAS	LE	1051
Chrysene + Triphenylene : Dry Wt	<3	ug/kg		3	None	LE	1051
Dibenzo(ah)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Dibenzothiophene : Dry Wt	<5	ug/kg		5	None	LE	1051
Fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Fluorene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Indeno(1,2,3-c,d)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Naphthalene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Perylene : Dry Wt	<5	ug/kg		5	None	LE	1051
Phenanthrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Triphenylene : Dry Wt	<2	ug/kg		2	None	LE	1051
PCB - 028 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 052 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685

PCB - 101 : Dry Wt	<0.1	ug/kg	*0.1*	UKAS	LE	685
PCB - 118 : Dry Wt	<0.1	ug/kg	*0.1*	UKAS	LE	685
PCB - 138 : Dry Wt	<0.1	ug/kg	*0.1*	UKAS	LE	685
PCB - 153 : Dry Wt	<0.1	ug/kg	*0.1*	UKAS	LE	685
PCB - 180 : Dry Wt	<0.1	ug/kg	*0.1*	UKAS	LE	685
Dibutyl Tin : Dry Wt as Cation	<4	ug/kg	*3*	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation				
Tetrabutyl Tin : Dry Wt as Cation	<3	ug/kg	*2*	None	LE	897
		ELEVATED_MRV : Dry weight calculation				
Tributyl Tin : Dry Wt as Cation	<1	ug/kg	*1*	None	LE	897
Triphenyl Tin : Dry Wt as Cation	<3	ug/kg	*2*	None	LE	897
		ELEVATED_MRV : Dry weight calculation				
Dry Solids @ 30°C	80.0	%	*0.5*	None	LE	1130
Accreditation Assessment	2	No.	*1*	None	LE	924
Additional Material Present	Report	Text			LE	924
	Stones and Shell					
Drying Method	Report	Text			LE	924
	Air dried at 30°C					
Rejected Matter Description	Report	Text			LE	924
	No material removed					
Sample Colour	Report	Text			LE	924
	Brown					
Sample Matrix	Report	Text			LE	924
	Sandy Sediment					
Sample Preparation	Report	Text			LE	924
	Homogenised, Jaw Crushed & Sieved to <2mm					

Analytical Report

Final Report

Report ID - 20113340 - 1

Batch description: Sediment

0754

Reported on: 10-Oct-2017

Client:	Fugro EMU Ltd	Project:	14333 - Vattenfall - Stage 2.
		Quote Description:	Vattenfall Stage 2.
Folder No:	003960504	Sampled on:	15-Aug-17 @ 00:14
Comments:	HCA2 HMA2 ST10		
Quote No:	14333	Matrix:	Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	6.97	mg/kg		0.9	UKAS	LE	402
Mercury : Dry Wt	<0.01	mg/kg		0.01	UKAS	LE	1042
Arsenic : Dry Wt	12.0	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	<0.04	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	7.43	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	1.14	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	4.67	mg/kg		2	UKAS	LE	1041
Lithium : Dry Wt	3.74	mg/kg		0.3	None	LE	1041
Manganese : Dry Wt	113	mg/kg		0.2	UKAS	LE	1041
Nickel : Dry Wt	4.57	mg/kg		1	UKAS	LE	1041
Vanadium : Dry Wt	17.9	mg/kg	QB	0.1	UKAS	LE	1041
Zinc : Dry Wt	17.3	mg/kg		2.5	UKAS	LE	1041
Acenaphthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Acenaphthylene : Dry Wt	<1	ug/kg		1	None	LE	1051
Anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(b)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(e) pyrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Benzo(ghi)perylene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(j)fluoranthene : Dry Wt	<10	ug/kg		10	None	LE	1051
Benzo(k)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Chrysene : Dry Wt	<3	ug/kg		3	UKAS	LE	1051
Chrysene + Triphenylene : Dry Wt	<3	ug/kg		3	None	LE	1051
Dibenzo(ah)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Dibenzothiophene : Dry Wt	<5	ug/kg		5	None	LE	1051
Fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Fluorene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Indeno(1,2,3-c,d)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Naphthalene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Perylene : Dry Wt	<5	ug/kg		5	None	LE	1051
Phenanthrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Triphenylene : Dry Wt	<2	ug/kg		2	None	LE	1051
PCB - 028 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 052 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685

PCB - 101 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 118 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 138 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 153 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 180 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
Dibutyl Tin : Dry Wt as Cation	<4	ug/kg	3	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation				
Tetrabutyl Tin : Dry Wt as Cation	<2	ug/kg	2	None	LE	897
Tributyl Tin : Dry Wt as Cation	<1	ug/kg	1	None	LE	897
Triphenyl Tin : Dry Wt as Cation	<2	ug/kg	2	None	LE	897
Dry Solids @ 30°C	80.1	%	0.5	None	LE	1130
Accreditation Assessment	2	No.	1	None	LE	924
Additional Material Present	Report	Text			LE	924
Stones and Shell						
Drying Method	Report	Text			LE	924
Air dried at 30°C						
Rejected Matter Description	Report	Text			LE	924
No material removed						
Sample Colour	Report	Text			LE	924
Brown						
Sample Matrix	Report	Text			LE	924
Sandy Sediment						
Sample Preparation	Report	Text			LE	924
Homogenised, Jaw Crushed & Sieved to <2mm						

Analytical Report

Final Report

Report ID - 20113340 - 1

UKAS TESTING 0754

Batch description: Sediment

Reported on: 10-Oct-2017

Client:	Fugro EMU Ltd	Project:	14333 - Vattenfall - Stage 2.
		Quote Description:	Vattenfall Stage 2.
Folder No:	003960505	Sampled on:	15-Aug-17 @ 01:24
Comments:	HCA2 ST14		
Quote No:	14333	Matrix:	Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	4.63	mg/kg		0.9	UKAS	LE	402
Mercury : Dry Wt	<0.01	mg/kg		0.01	UKAS	LE	1042
Arsenic : Dry Wt	32.7	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	<0.04	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	13.9	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	1.81	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	9.91	mg/kg		2	UKAS	LE	1041
Lithium : Dry Wt	5.70	mg/kg		0.3	None	LE	1041
Manganese : Dry Wt	290	mg/kg		0.2	UKAS	LE	1041
Nickel : Dry Wt	6.41	mg/kg		1	UKAS	LE	1041
Vanadium : Dry Wt	45.3	mg/kg	QB	0.1	UKAS	LE	1041
Zinc : Dry Wt	27.0	mg/kg		2.5	UKAS	LE	1041
Acenaphthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Acenaphthylene : Dry Wt	<1	ug/kg		1	None	LE	1051
Anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(b)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(e) pyrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Benzo(ghi)perylene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(j)fluoranthene : Dry Wt	<10	ug/kg		10	None	LE	1051
Benzo(k)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Chrysene : Dry Wt	<3	ug/kg		3	UKAS	LE	1051
Chrysene + Triphenylene : Dry Wt	<3	ug/kg		3	None	LE	1051
Dibenzo(ah)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Dibenzothiophene : Dry Wt	<5	ug/kg		5	None	LE	1051
Fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Fluorene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Indeno(1,2,3-c,d)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Naphthalene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Perylene : Dry Wt	<5	ug/kg		5	None	LE	1051
Phenanthrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Triphenylene : Dry Wt	<2	ug/kg		2	None	LE	1051
PCB - 028 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 052 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685

PCB - 101 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 118 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 138 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 153 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 180 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
Dibutyl Tin : Dry Wt as Cation	<4	ug/kg	3	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation				
Tetrabutyl Tin : Dry Wt as Cation	<2	ug/kg	2	None	LE	897
Tributyl Tin : Dry Wt as Cation	<1	ug/kg	1	None	LE	897
Triphenyl Tin : Dry Wt as Cation	<2	ug/kg	2	None	LE	897
Dry Solids @ 30°C	81.2	%	0.5	None	LE	1130
Accreditation Assessment	2	No.	1	None	LE	924
Additional Material Present	Report	Text			LE	924
Stones and Shell						
Drying Method	Report	Text			LE	924
Air dried at 30°C						
Rejected Matter Description	Report	Text			LE	924
No material removed						
Sample Colour	Report	Text			LE	924
Brown						
Sample Matrix	Report	Text			LE	924
Sandy Sediment						
Sample Preparation	Report	Text			LE	924
Homogenised, Jaw Crushed & Sieved to <2mm						

National Laboratory Service

Analytical Report

Final Report

Report ID - 20113340 - 1

UKAS TESTING 0754

Batch description: Sediment

Reported on: 10-Oct-2017

Client:	Fugro EMU Ltd	Project:	14333 - Vattenfall - Stage 2.
		Quote Description:	Vattenfall Stage 2.
Folder No:	003960509	Sampled on:	15-Aug-17 @ 04:41
Comments:	HCA2 HMA2 ST23		
Quote No:	14333	Matrix:	Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	10.8	mg/kg		0.9	UKAS	LE	402
Mercury : Dry Wt	<0.01	mg/kg		0.01	UKAS	LE	1042
Arsenic : Dry Wt	14.9	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	<0.04	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	12.9	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	1.35	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	5.09	mg/kg		2	UKAS	LE	1041
Lithium : Dry Wt	4.91	mg/kg		0.3	None	LE	1041
Manganese : Dry Wt	135	mg/kg		0.2	UKAS	LE	1041
Nickel : Dry Wt	5.22	mg/kg		1	UKAS	LE	1041
Vanadium : Dry Wt	22.7	mg/kg	QB	0.1	UKAS	LE	1041
Zinc : Dry Wt	18.3	mg/kg		2.5	UKAS	LE	1041
Acenaphthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Acenaphthylene : Dry Wt	<1	ug/kg		1	None	LE	1051
Anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(b)fluoranthene : Dry Wt	1.56	ug/kg		1	UKAS	LE	1051
Benzo(e) pyrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Benzo(ghi)perylene : Dry Wt	1.29	ug/kg		1	UKAS	LE	1051
Benzo(j)fluoranthene : Dry Wt	<10	ug/kg		10	None	LE	1051
Benzo(k)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Chrysene : Dry Wt	<3	ug/kg		3	UKAS	LE	1051
Chrysene + Triphenylene : Dry Wt	<3	ug/kg		3	None	LE	1051
Dibenzo(ah)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Dibenzothiophene : Dry Wt	<5	ug/kg		5	None	LE	1051
Fluoranthene : Dry Wt	1.55	ug/kg		1	UKAS	LE	1051
Fluorene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Indeno(1,2,3-c,d)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Naphthalene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Perylene : Dry Wt	<5	ug/kg		5	None	LE	1051
Phenanthrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Pyrene : Dry Wt	1.30	ug/kg		1	UKAS	LE	1051
Triphenylene : Dry Wt	<2	ug/kg		2	None	LE	1051
PCB - 028 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 052 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685

PCB - 101 : Dry Wt	<0.1	ug/kg	*0.1*	UKAS	LE	685
PCB - 118 : Dry Wt	<0.1	ug/kg	*0.1*	UKAS	LE	685
PCB - 138 : Dry Wt	<0.1	ug/kg	*0.1*	UKAS	LE	685
PCB - 153 : Dry Wt	<0.1	ug/kg	*0.1*	UKAS	LE	685
PCB - 180 : Dry Wt	<0.1	ug/kg	*0.1*	UKAS	LE	685
Dibutyl Tin : Dry Wt as Cation	<4	ug/kg	*3*	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation				
Tetrabutyl Tin : Dry Wt as Cation	<2	ug/kg	*2*	None	LE	897
Tributyl Tin : Dry Wt as Cation	<1	ug/kg	*1*	None	LE	897
Triphenyl Tin : Dry Wt as Cation	<2	ug/kg	*2*	None	LE	897
Dry Solids @ 30°C	82.1	%	*0.5*	None	LE	1130
Accreditation Assessment	2	No.	*1*	None	LE	924
Additional Material Present	Report	Text			LE	924
	Stones and Shell					
Drying Method	Report	Text			LE	924
	Air dried at 30°C					
Rejected Matter Description	Report	Text			LE	924
	No material removed					
Sample Colour	Report	Text			LE	924
	Brown					
Sample Matrix	Report	Text			LE	924
	Sandy Sediment					
Sample Preparation	Report	Text			LE	924
	Homogenised, Jaw Crushed & Sieved to <2mm					

National Laboratory Service

Analytical Report

Final Report

Report ID - 20113340 - 1

UKAS TESTING 0754

Batch description: Sediment

Reported on: 10-Oct-2017

Client: Fugro EMU Ltd

Project: 14333 - Vattenfall - Stage 2.

Quote Description: Vattenfall Stage 2.

Folder No: 003960513

Sampled on: 15-Aug-17 @ 09:07

Comments: HCA2 HMA2 ST30

Quote No: 14333

Matrix: Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	2.31	mg/kg		0.9	UKAS	LE	402
Mercury : Dry Wt	<0.01	mg/kg		0.01	UKAS	LE	1042
Arsenic : Dry Wt	10.5	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	<0.04	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	7.81	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	1.06	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	4.63	mg/kg		2	UKAS	LE	1041
Lithium : Dry Wt	4.00	mg/kg		0.3	None	LE	1041
Manganese : Dry Wt	124	mg/kg		0.2	UKAS	LE	1041
Nickel : Dry Wt	4.20	mg/kg		1	UKAS	LE	1041
Vanadium : Dry Wt	17.0	mg/kg	QB	0.1	UKAS	LE	1041
Zinc : Dry Wt	16.1	mg/kg		2.5	UKAS	LE	1041
Acenaphthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Acenaphthylene : Dry Wt	<1	ug/kg		1	None	LE	1051
Anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(b)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(e) pyrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Benzo(ghi)perylene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(j)fluoranthene : Dry Wt	<10	ug/kg		10	None	LE	1051
Benzo(k)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Chrysene : Dry Wt	<3	ug/kg		3	UKAS	LE	1051
Chrysene + Triphenylene : Dry Wt	<3	ug/kg		3	None	LE	1051
Dibenzo(ah)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Dibenzothiophene : Dry Wt	<5	ug/kg		5	None	LE	1051
Fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Fluorene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Indeno(1,2,3-c,d)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Naphthalene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Perylene : Dry Wt	<5	ug/kg		5	None	LE	1051
Phenanthrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Triphenylene : Dry Wt	<2	ug/kg		2	None	LE	1051
PCB - 028 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 052 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685

PCB - 101 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 118 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 138 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 153 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
PCB - 180 : Dry Wt	<0.1	ug/kg	0.1	UKAS	LE	685
Dibutyl Tin : Dry Wt as Cation	<4	ug/kg	3	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation				
Tetrabutyl Tin : Dry Wt as Cation	<2	ug/kg	2	None	LE	897
Tributyl Tin : Dry Wt as Cation	<1	ug/kg	1	None	LE	897
Triphenyl Tin : Dry Wt as Cation	<2	ug/kg	2	None	LE	897
Dry Solids @ 30°C	82.3	%	0.5	None	LE	1130
Accreditation Assessment	2	No.	1	None	LE	924
Additional Material Present	Report	Text			LE	924
	Stones and Shell					
Drying Method	Report	Text			LE	924
	Air dried at 30°C					
Rejected Matter Description	Report	Text			LE	924
	No material removed					
Sample Colour	Report	Text			LE	924
	Brown					
Sample Matrix	Report	Text			LE	924
	Sandy Sediment					
Sample Preparation	Report	Text			LE	924
	Homogenised, Jaw Crushed & Sieved to <2mm					

National Laboratory Service

Analytical Report

Final Report

Report ID - 20113340 - 1

Batch description: Sediment

UKAS TESTING 0754

Reported on: 10-Oct-2017

Client: Fugro EMU Ltd

Project: 14333 - Vattenfall - Stage 2.

Quote Description: Vattenfall Stage 2.

Folder No: 003960519

Sampled on: 15-Aug-17 @ 14:52

Comments: HMA2 HCA2 ST16

Quote No: 14333

Matrix: Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	23.7	mg/kg		0.9	UKAS	LE	402
Mercury : Dry Wt	<0.01	mg/kg		0.01	UKAS	LE	1042
Arsenic : Dry Wt	9.40	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	<0.04	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	14.5	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	3.17	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	6.62	mg/kg		2	UKAS	LE	1041
Lithium : Dry Wt	7.58	mg/kg		0.3	None	LE	1041
Manganese : Dry Wt	103	mg/kg		0.2	UKAS	LE	1041
Nickel : Dry Wt	6.95	mg/kg		1	UKAS	LE	1041
Vanadium : Dry Wt	21.8	mg/kg	QB	0.1	UKAS	LE	1041
Zinc : Dry Wt	23.7	mg/kg		2.5	UKAS	LE	1041
Acenaphthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Acenaphthylene : Dry Wt	<1	ug/kg		1	None	LE	1051
Anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)anthracene : Dry Wt	2.11	ug/kg		1	UKAS	LE	1051
Benzo(a)pyrene : Dry Wt	2.54	ug/kg		1	UKAS	LE	1051
Benzo(b)fluoranthene : Dry Wt	4.07	ug/kg		1	UKAS	LE	1051
Benzo(e) pyrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Benzo(ghi)perylene : Dry Wt	3.78	ug/kg		1	UKAS	LE	1051
Benzo(j)fluoranthene : Dry Wt	<10	ug/kg		10	None	LE	1051
Benzo(k)fluoranthene : Dry Wt	1.85	ug/kg		1	UKAS	LE	1051
Chrysene : Dry Wt	<3	ug/kg		3	UKAS	LE	1051
Chrysene + Triphenylene : Dry Wt	3.16	ug/kg		3	None	LE	1051
Dibenzo(ah)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Dibenzothiophene : Dry Wt	<5	ug/kg		5	None	LE	1051
Fluoranthene : Dry Wt	4.26	ug/kg		1	UKAS	LE	1051
Fluorene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Indeno(1,2,3-c,d)pyrene : Dry Wt	2.39	ug/kg		1	UKAS	LE	1051
Naphthalene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Perylene : Dry Wt	<5	ug/kg		5	None	LE	1051
Phenanthrene : Dry Wt	6.03	ug/kg		5	UKAS	LE	1051
Pyrene : Dry Wt	3.84	ug/kg		1	UKAS	LE	1051
Triphenylene : Dry Wt	<2	ug/kg		2	None	LE	1051
PCB - 028 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 052 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685

PCB - 101 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 118 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 138 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 153 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 180 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
Dibutyl Tin : Dry Wt as Cation	<4	ug/kg		3	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation					
Tetrabutyl Tin : Dry Wt as Cation	<3	ug/kg		2	None	LE	897
		ELEVATED_MRV : Dry weight calculation					
Tributyl Tin : Dry Wt as Cation	<1	ug/kg		1	None	LE	897
Triphenyl Tin : Dry Wt as Cation	<3	ug/kg	QB	2	None	LE	897
		ELEVATED_MRV : Dry weight calculation					
Dry Solids @ 30°C	77.9	%		0.5	None	LE	1130
Accreditation Assessment	2	No.		1	None	LE	924
Additional Material Present	Report	Text				LE	924
Stones and Shell							
Drying Method	Report	Text				LE	924
Air dried at 30°C							
Rejected Matter Description	Report	Text				LE	924
No material removed							
Sample Colour	Report	Text				LE	924
Brown							
Sample Matrix	Report	Text				LE	924
Sandy Sediment							
Sample Preparation	Report	Text				LE	924
Homogenised, Jaw Crushed & Sieved to <2mm							

National Laboratory Service

Analytical Report

Final Report

Report ID - 20113340 - 1

UKAS TESTING 0754

Batch description: Sediment

Reported on: 10-Oct-2017

Client:	Fugro EMU Ltd	Project:	14333 - Vattenfall - Stage 2.
		Quote Description:	Vattenfall Stage 2.
Folder No:	003960523	Sampled on:	15-Aug-17 @ 19:31
Comments:	HCA2 HMA2 ST05		
Quote No:	14333	Matrix:	Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	16.0	mg/kg		0.9	UKAS	LE	402
Mercury : Dry Wt	0.0108	mg/kg		0.01	UKAS	LE	1042
Arsenic : Dry Wt	12.9	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	<0.04	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	15.6	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	3.08	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	6.74	mg/kg		2	UKAS	LE	1041
Lithium : Dry Wt	7.71	mg/kg		0.3	None	LE	1041
Manganese : Dry Wt	136	mg/kg		0.2	UKAS	LE	1041
Nickel : Dry Wt	7.85	mg/kg		1	UKAS	LE	1041
Vanadium : Dry Wt	25.9	mg/kg	QB	0.1	UKAS	LE	1041
Zinc : Dry Wt	22.6	mg/kg		2.5	UKAS	LE	1041
Acenaphthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Acenaphthylene : Dry Wt	<1	ug/kg		1	None	LE	1051
Anthracene : Dry Wt	2.02	ug/kg		1	UKAS	LE	1051
Benzo(a)anthracene : Dry Wt	3.82	ug/kg		1	UKAS	LE	1051
Benzo(a)pyrene : Dry Wt	3.96	ug/kg		1	UKAS	LE	1051
Benzo(b)fluoranthene : Dry Wt	5.04	ug/kg		1	UKAS	LE	1051
Benzo(e) pyrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Benzo(ghi)perylene : Dry Wt	4.13	ug/kg		1	UKAS	LE	1051
Benzo(j)fluoranthene : Dry Wt	<10	ug/kg		10	None	LE	1051
Benzo(k)fluoranthene : Dry Wt	2.49	ug/kg		1	UKAS	LE	1051
Chrysene : Dry Wt	3.55	ug/kg		3	UKAS	LE	1051
Chrysene + Triphenylene : Dry Wt	4.52	ug/kg		3	None	LE	1051
Dibenzo(ah)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Dibenzothiophene : Dry Wt	<5	ug/kg		5	None	LE	1051
Fluoranthene : Dry Wt	9.01	ug/kg		1	UKAS	LE	1051
Fluorene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Indeno(1,2,3-c,d)pyrene : Dry Wt	3.15	ug/kg		1	UKAS	LE	1051
Naphthalene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Perylene : Dry Wt	7.88	ug/kg		5	None	LE	1051
Phenanthrene : Dry Wt	6.62	ug/kg		5	UKAS	LE	1051
Pyrene : Dry Wt	7.71	ug/kg		1	UKAS	LE	1051
Triphenylene : Dry Wt	<2	ug/kg		2	None	LE	1051
PCB - 028 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 052 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685

PCB - 101 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 118 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 138 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 153 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 180 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
Dibutyl Tin : Dry Wt as Cation	<4	ug/kg		3	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation					
Tetrabutyl Tin : Dry Wt as Cation	<3	ug/kg		2	None	LE	897
		ELEVATED_MRV : Dry weight calculation					
Tributyl Tin : Dry Wt as Cation	<1	ug/kg		1	None	LE	897
Triphenyl Tin : Dry Wt as Cation	<3	ug/kg	QB	2	None	LE	897
		ELEVATED_MRV : Dry weight calculation					
Dry Solids @ 30°C	72.0	%		0.5	None	LE	1130
Accreditation Assessment	2	No.		1	None	LE	924
Additional Material Present	Report	Text				LE	924
	Stones and Shell						
Drying Method	Report	Text				LE	924
	Air dried at 30°C						
Rejected Matter Description	Report	Text				LE	924
	No material removed						
Sample Colour	Report	Text				LE	924
	Brown						
Sample Matrix	Report	Text				LE	924
	Sandy Sediment						
Sample Preparation	Report	Text				LE	924
	Homogenised, Jaw Crushed & Sieved to <2mm						

National Laboratory Service

Analytical Report

Final Report

Report ID - 20113340 - 1

UKAS TESTING 0754

Batch description: Sediment

Reported on: 10-Oct-2017

Client: Fugro EMU Ltd

Project: 14333 - Vattenfall - Stage 2.

Quote Description: Vattenfall Stage 2.

Folder No: 003960526

Sampled on: 15-Aug-17 @ 22:37

Comments: HCA2 HMA2 ST35

Quote No: 14333

Matrix: Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	3.53	mg/kg		0.9	UKAS	LE	402
Mercury : Dry Wt	<0.01	mg/kg		0.01	UKAS	LE	1042
Arsenic : Dry Wt	8.76	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	<0.04	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	14.3	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	1.38	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	4.61	mg/kg		2	UKAS	LE	1041
Lithium : Dry Wt	5.44	mg/kg		0.3	None	LE	1041
Manganese : Dry Wt	98.6	mg/kg		0.2	UKAS	LE	1041
Nickel : Dry Wt	5.49	mg/kg		1	UKAS	LE	1041
Vanadium : Dry Wt	16.5	mg/kg	QB	0.1	UKAS	LE	1041
Zinc : Dry Wt	14.8	mg/kg		2.5	UKAS	LE	1041
Acenaphthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Acenaphthylene : Dry Wt	<1	ug/kg		1	None	LE	1051
Anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(b)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(e) pyrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Benzo(ghi)perylene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(j)fluoranthene : Dry Wt	<10	ug/kg		10	None	LE	1051
Benzo(k)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Chrysene : Dry Wt	<3	ug/kg		3	UKAS	LE	1051
Chrysene + Triphenylene : Dry Wt	<3	ug/kg		3	None	LE	1051
Dibenzo(ah)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Dibenzothiophene : Dry Wt	<5	ug/kg		5	None	LE	1051
Fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Fluorene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Indeno(1,2,3-c,d)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Naphthalene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Perylene : Dry Wt	<5	ug/kg		5	None	LE	1051
Phenanthrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Triphenylene : Dry Wt	<2	ug/kg		2	None	LE	1051
PCB - 028 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 052 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685

PCB - 101 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 118 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 138 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 153 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 180 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
Dibutyl Tin : Dry Wt as Cation	<4	ug/kg		3	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation					
Tetrabutyl Tin : Dry Wt as Cation	<3	ug/kg		2	None	LE	897
		ELEVATED_MRV : Dry weight calculation					
Tributyl Tin : Dry Wt as Cation	<1	ug/kg		1	None	LE	897
Triphenyl Tin : Dry Wt as Cation	<3	ug/kg	QB	2	None	LE	897
		ELEVATED_MRV : Dry weight calculation					
Dry Solids @ 30°C	78.2	%		0.5	None	LE	1130
Accreditation Assessment	2	No.		1	None	LE	924
Additional Material Present	Report	Text				LE	924
Stones and Shell							
Drying Method	Report	Text				LE	924
Air dried at 30°C							
Rejected Matter Description	Report	Text				LE	924
No material removed							
Sample Colour	Report	Text				LE	924
Brown							
Sample Matrix	Report	Text				LE	924
Sandy Sediment							
Sample Preparation	Report	Text				LE	924
Homogenised, Jaw Crushed & Sieved to <2mm							

Analytical Report

Final Report

Report ID - 20113340 - 1

0754

Batch description: Sediment

Reported on: 10-Oct-2017

Client: Fugro EMU Ltd

Project: 14333 - Vattenfall - Stage 2.

Quote Description: Vattenfall Stage 2.

Folder No: 003960531

Sampled on: 14-Aug-17 @ 05:47

Comments: HCA2 HMA2 ST22

Quote No: 14333

Matrix: Sediment

Analyte	Result	Units	Flag	MRV	Accred	Lab ID	Testcode
Hydrocarbons : Total : Dry Wt as Ekofisk	1.96	mg/kg		0.9	UKAS	LE	402
Mercury : Dry Wt	<0.01	mg/kg		0.01	UKAS	LE	1042
Arsenic : Dry Wt	14.4	mg/kg		1	UKAS	LE	1041
Cadmium : Dry Wt	<0.04	mg/kg		0.04	UKAS	LE	1041
Chromium : Dry Wt	11.0	mg/kg		2	UKAS	LE	1041
Copper : Dry Wt	1.70	mg/kg		1	UKAS	LE	1041
Lead : Dry Wt	4.87	mg/kg		2	UKAS	LE	1041
Lithium : Dry Wt	3.75	mg/kg		0.3	None	LE	1041
Manganese : Dry Wt	109	mg/kg		0.2	UKAS	LE	1041
Nickel : Dry Wt	6.10	mg/kg		1	UKAS	LE	1041
Vanadium : Dry Wt	19.6	mg/kg	QB	0.1	UKAS	LE	1041
Zinc : Dry Wt	14.7	mg/kg		2.5	UKAS	LE	1041
Acenaphthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Acenaphthylene : Dry Wt	<1	ug/kg		1	None	LE	1051
Anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(a)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(b)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(e) pyrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Benzo(ghi)perylene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Benzo(j)fluoranthene : Dry Wt	<10	ug/kg		10	None	LE	1051
Benzo(k)fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Chrysene : Dry Wt	<3	ug/kg		3	UKAS	LE	1051
Chrysene + Triphenylene : Dry Wt	<3	ug/kg		3	None	LE	1051
Dibenzo(ah)anthracene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Dibenzothiophene : Dry Wt	<5	ug/kg		5	None	LE	1051
Fluoranthene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Fluorene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Indeno(1,2,3-c,d)pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Naphthalene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Perylene : Dry Wt	<5	ug/kg		5	None	LE	1051
Phenanthrene : Dry Wt	<5	ug/kg		5	UKAS	LE	1051
Pyrene : Dry Wt	<1	ug/kg		1	UKAS	LE	1051
Triphenylene : Dry Wt	<2	ug/kg		2	None	LE	1051
PCB - 028 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 052 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685

NLS Leeds
Olympia House
Gelderd Lane
Gelderd Road
Leeds LS12 6DD

NLS Nottingham
Meadow Lane
Nottingham
NG2 3HN

NLS Starcross
Staplake Mount
Starcross
Exeter
EX6 8FD

PCB - 101 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 118 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 138 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 153 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
PCB - 180 : Dry Wt	<0.1	ug/kg		0.1	UKAS	LE	685
Dibutyl Tin : Dry Wt as Cation	<4	ug/kg		3	UKAS	LE	897
		ELEVATED_MRV : Dry weight calculation					
Tetrabutyl Tin : Dry Wt as Cation	<2	ug/kg		2	None	LE	897
Tributyl Tin : Dry Wt as Cation	<1	ug/kg		1	None	LE	897
Triphenyl Tin : Dry Wt as Cation	<2	ug/kg	QB	2	None	LE	897
Dry Solids @ 30°C	81.2	%		0.5	None	LE	1130
Accreditation Assessment	2	No.		1	None	LE	924
Additional Material Present	Report	Text				LE	924
	Stones and Shell						
Drying Method	Report	Text				LE	924
	Air dried at 30°C						
Rejected Matter Description	Report	Text				LE	924
	No material removed						
Sample Colour	Report	Text				LE	924
	Brown						
Sample Matrix	Report	Text				LE	924
	Sandy Sediment						
Sample Preparation	Report	Text				LE	924
	Homogenised, Jaw Crushed & Sieved to <2mm						

Method Description Summary for all samples in batch Number 20113340

402	LE I Hydrocardons by fluorescence
685	LE O OCP_PAH_PCB in Marine Biota and Sediment - solvent extracted, determined by GCMS QQQ
897	LE O Organotins (GCMS) 01 - acetic acid/methanol extracted; derivatised; determined GCMS (SIM); from "as received" sample
924	Sample Preparation; Dry Solids (30°C); from "as received" sample
1041	LE M Metals ICP-MS Sediment - microwave aqua regia digested, determined by ICPMS, samples are sieved to <2000um.
1042	LE M Mercury CSEMP - microwave aqua regia digeste, acidic SnCl2 reduced, determined by CV-AFS. Samples are sieved to <2000um.
1051	LE O OCP_PAH_PCB in Marine Biota and Sediment - solvent extracted, determined by GCMS QQQ
1130	LE P Soil Preparation 01: The sample is air-dried at <30ºC in a controlled environment until a constant weight it achieved.

[redacted]

Steve Moss
Laboratory Site Manager

Any additional accompanying reports received should be used in conjunction with the formal PDF and not as a standalone report. The formal PDF report provides full details of the accreditation status, sample deviation information and any other relevant related information.

All reporting limits quoted are those achievable for clean samples of the relevant matrix. No allowance is made for instances when dilutions are necessary owing to the nature of the sample or insufficient volume of the sample being available. In these cases higher reporting limits may be quoted and will be above the MRV.
Minimum Reporting Value (MRV). A minimum concentration selected for reporting purposes (i.e. the less than value), which is higher than the statistically derived method limit of detection.
Solid sample results are determined on a "dried" sample fraction except for parameters where the method description identifies that "as received" sample was used.

Uncertainty of Measurement information relating to sample results is supplied upon request. Uncertainty is estimated from the performance of routine quality control standards, using the calculation 2 X Relative Standard Deviation + Bias. This is based on the guidance issued by the UKTAG Chemistry task team - Guidance on the implementation of the Quality Assurance/Quality Control requirements' associated with Commission Directive 2009/90/EC, Article 4 (UoM = 2 X %RSD), with a contribution added for the bias.

Key to Results Flags:

QB QC Flag. Result accepted against QC breach

The analysis start date specified is the date of the first test, dates for other analysis are available on request.

Please note all samples will be retained for 10 working days for aqueous samples and 30 working days for solid samples after reporting unless otherwise agreed with Customer Services
Key to Accreditation: UKAS = Methodology accredited to ISO/IEC 17025:2005, MCertS = Methodology accredited to MCertS Performance Standard for testing of soils, none = Methodology not accredited
Key to Lab ID: LE = Leeds, NM = Nottingham, SX = Starcross, SC = Sub-Contracted outside NLS, FI = Field Data - outside NLS, NLS = Calculated
Any subsequent version of this report denoted with a higher version number will supersede this and any previous versions

END OF TEST REPORT

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