REPORT

South Bank Quay

Supplementary environmental information report

Client: Tees Valley Combined Authority

Reference: PC1084-RHD-ZZ-XX-RP-Z-1115

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Project related

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1 INTRODUCTION

South Tees Development Corporation (STDC) is proposing to construct a new quay at South Bank in the Tees estuary (referred to hereafter as the preferred scheme). The proposed scheme is required to support STDC's landside proposals for general industry and storage or distribution uses within part of the South Industrial Zone. It is envisaged that the new quay would be utilised predominantly by the renewable energy industry, as well as supporting more general industrial and storage / distribution activities. In summary, the proposed scheme comprises demolition, capital dredging, offshore disposal of dredged material and construction and operation of a new quay to be set back into the riverbank.

The proposed scheme requires works in both the marine and terrestrial environment, and has been subject to Environmental Impact Assessment (EIA) under the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) and the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. An EIA Report (Royal HaskoningDHV, 2020) was submitted to Redcar and Cleveland Borough Council (RCBC) and the Marine Management Organisation (MMO) in November 2020 in support of planning and marine licence applications respectively for the proposed scheme. Planning permission has been granted by RCBC and the marine licence application is currently being determined by the MMO.

The marine sediment and water quality assessment, marine ecology assessment and fisheries assessment presented in the EIA Report was informed by existing publicly available survey data from other projects within the Tees as site-specific survey data was not available at the time of writing. The ornithology assessment presented in the EIA Report was based on a combination of existing publicly available information, as well as information from site-specific bird surveys from July to September 2020; these surveys have continued on a monthly basis up to and including March 2021.

It was recognised within the marine licence application that supplementary information would need to be provided to the MMO for the application to be fully determined. Indeed, the Environment Agency, Cefas and Natural England requested the provision of such information before final consultation responses to the application could be submitted to the MMO. Site-specific sediment quality, benthic ecology (including benthic trawls and fyke net surveys) and bird surveys have now been completed and the results are presented within this supplementary report, along with additional impact assessment where this is considered necessary on the basis of the findings of the surveys. This report should be read in conjunction with the EIA Report (Royal HaskoningDHV, 2020).

2 SEDIMENT AND WATER QUALITY

2.1 Supplementary data

2.1.1 Site-specific sediment quality survey

A site-specific sediment quality survey was undertaken between 30th November and the 7th December 2020. As directed by the MMO in its sampling plan (reference SAM/2020/00026), sediment samples were recovered from 25 sampling stations across the proposed dredge footprint (Figure 2.1). Samples were analysed for metals, polychlorinated biphenyl (PCBs), polyaromatic hydrocarbons (PAHs), organotins and polybrominated diphenyl ethers (PBDEs). All analyses were undertaken by SOCOTEC, with the exception of PBDE analysis which was undertaken by Cefas.

As prescribed by the MMO in SAM/2020/00026, samples were recovered at the surface (0m) and at 1m intervals to the maximum proposed dredge depth. Where the maximum proposed dredge depth exceeded the depth at which mudstone was encountered, in accordance with the sampling plan, samples were recovered to the depth at which mudstone was present (i.e. the MMO did not request samples of the mudstone to be recovered given the low risk of contamination in this geological material).

A further six samples of geological mudstone were, however, recovered from six boreholes within the navigation channel which were drilled for geotechnical purposes (see BH8 to BH13 on Figure 2.1). These samples were analysed for the same suite of analysis as detailed above. These samples were additional to the sampling requirements defined by the MMO in SAM/2020/00026, and were recovered to validate the previously agreed assumption that geological mudstone is highly unlikely to contain elevated concentrations of contaminants.

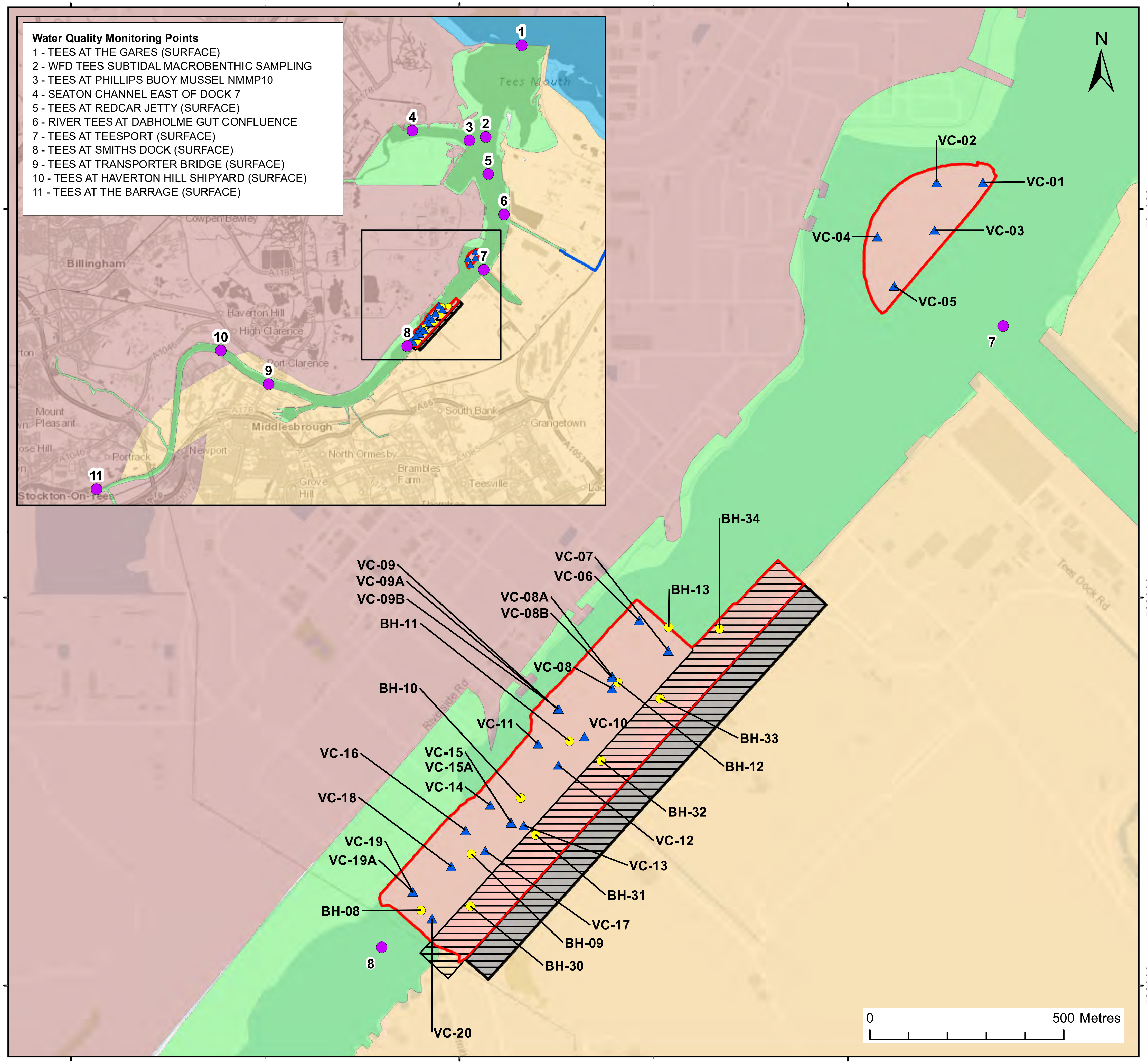
2.1.2 Additional water quality data from Environment Agency monitoring

The Environment Agency monitors water quality at a number of points in the estuary (Figure 2.1). Given the proximity of the Smiths Dock water quality monitoring station to the proposed scheme footprint, baseline water quality data for this monitoring station has been obtained for the available period 2016 to March 2020 (monitoring was paused during the Covid-19 pandemic and is due to recommence April 2021).

The results of the site-specific sediment quality data, water quality data and the updated water quality assessment are presented below.

2.1.2.1 Sediment results

The full set of sediment quality data is presented in Appendix 1. Table 2.1 provides a summary of the sediment quality data for the samples requested by the MMO; Table 2.2 provides a summary of the results of chemical analysis on the geological mudstone, which are additional to the samples requested by the MMO.



Legend

- Proposed Dredge and Excavation Envelope (including side slopes)
- Proposed Quay Envelope
- Proposed Demolition Area
- Borehole
- Vibrocore
- Water Quality Monitoring Points

WFD River Water Body

- Tees Estuary (S Bank) (GB103025072320)

WFD Coastal Waterbody

- Tees Coastal (GB650301500005)

WFD Transitional Waterbody

- Tees (GB510302509900)

WFD Ground Waterbody

- Tees Mercia Mudstone & Redcar Mudstone (GB40302G701300)
- Tees Sherwood Sandstone (GB40301G702000)

Client:	Project:
Tees Valley Combined Authority	South Bank Quay - Supplementary Report

Title:

Sediment Sampling Locations and Water Quality Monitoring Points and WFD water bodies

Figure: 3.1

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	27/01/2021	TC	CP	A3	1:10,000

Co-ordinate system: British National Grid

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Table 2.1 Summary of site-specific sediment quality data used in water quality assessment (collected 2020) (excludes results from the geological mudstone, but includes data from BH34)

Parameter	Minimum	Maximum	Average
	Units – mg/kg		
Arsenic (As)	2.2	60.4	13.9
Cadmium (Cd)	0.1	14.9	0.9
Chromium (Cr)	9.0	429.0	60.2
Copper (Cu)	5.4	429	64.7
Mercury (Hg)	<0.01	12.8	0.8
Nickel (Ni)	10.0	47.3	29.6
Lead (Pb)	3.5	828.0	101.2
Zinc (Zn)	28.0	2,835	236.7
Acenaphthene	<0.001	58.20	2.46
Acenaphthylene	<0.001	4.59	0.41
Anthracene	<0.001	7.91	0.53
Benzo(a)anthracene	<0.001	4.76	0.69
Benzo(a)pyrene	<0.001	4.53	0.69
Benzo(b)fluoranthene	<0.001	4.19	0.64
Benzo(ghi)perylene	<0.001	2.84	0.50
Benzo(e)pyrene	<0.001	3.68	0.58
Benzo(k)fluoranthene	<0.001	1.80	0.29
C1 Naphthalene	<0.001	47.60	2.97
C1 Phenanthrene	<0.001	10.90	1.18
C2 Naphthalene	<0.001	30.50	2.20
C3 Naphthalene	<0.001	16.30	1.62
Chrysene	<0.001	4.42	0.64
Dibenzo(ah)anthracene	<0.001	0.64	0.12
Fluoranthene	<0.001	12.30	1.30
Fluorene	<0.001	39.40	1.42
Indeno (1,2,3-c,d)pyrene	<0.001	2.87	0.45
Naphthalene	<0.001	28.40	1.55

Parameter	Minimum	Maximum	Average
	Units – mg/kg		
Perylene	<0.001	1.27	0.21
Phenanthrene	<0.001	24.90	1.55
Pyrene	<0.001	10.90	1.35
Total Hydrocarbons (THC)	<1	1.28	0.15
PCB – sum of ICES7	0.00056	0.0876	0.0078
PCB – sum of ICES25	0.00199	0.19626	0.01774
Tributyl Tin (TBT)	<0.005	0.117	0.039
Dibutyl Tin (DBT)	<0.05	0.072	0.023
BDE28 (2,4,4-Tribromodiphenyl ether)	<0.00002	0.00529	0.00061
BDE47 (2,2,4,4-Tetrabromodiphenyl ether)	<0.00002	0.01860	0.00247
BDE99 (2,2,4,4,5-Pentabromodiphenyl ether)	<0.00002	0.01870	0.00263
BDE100 (2,2,4,4,6-Pentabromodiphenyl ether)	<0.00002	0.00285	0.00036
BDE153 (2,2,4,4,5,5-Hexabromodiphenyl ether)	<0.00002	0.00498	0.00056
BDE154 (2,2,4,4,5,6-Hexabromodiphenyl ether)	<0.00002	0.00396	0.00032

Table 2.2 Summary of site-specific sediment data used in water quality assessment for additional mudstone samples (collected 2020)

Parameter	Minimum	Maximum	Average
	Units – mg/kg		
Arsenic (As)	1.5	6.2	3.2
Cadmium (Cd)	0.1	0.2	0.1
Chromium (Cr)	18.8	38.6	25.9
Copper (Cu)	8.4	126	36.2
Mercury (Hg)	<0.01	<0.01	<0.01
Nickel (Ni)	20.4	33.4	27.0
Lead (Pb)	2.5	12.6	5.6
Zinc (Zn)	33.4	49.9	43.3
Acenaphthene	<0.001	0.0066	0.0024
Acenaphthylene	<0.001	0.00252	0.00132

Parameter	Minimum	Maximum	Average
	Units – mg/kg		
Anthracene	<0.001	0.00861	0.0029025
Benzo(a)anthracene	<0.001	0.0221	0.00546
Benzo(a)pyrene	<0.001	0.0281	0.006528
Benzo(b)fluoranthene	<0.001	0.041	0.011845
Benzo(ghi)perylene	<0.001	0.0628	0.0121
Benzo(e)pyrene	<0.001	0.0702	0.0153
Benzo(k)fluoranthene	<0.001	0.01	0.00332
C1 Naphthalene	<0.001	0.247	0.0432
C1 Phenanthrene	<0.001	0.203	0.0356
C2 Naphthalene	<0.001	0.183	0.0325
C3 Naphthalene	<0.001	0.149	0.0267
Chrysene	<0.001	0.0502	0.0114
Dibenzo(ah)anthracene	<0.001	0.00583	0.0022075
Fluoranthene	<0.001	0.043	0.0104
Fluorene	<0.001	0.0231	0.0055
Indeno (1,2,3-c,d)pyrene	<0.001	0.016	0.00475
Naphthalene	<0.001	0.0688	0.0127
Perylene	<0.001	0.0102	0.0033
Phenanthrene	<0.001	0.166	0.0366
Pyrene	<0.001	0.0513	0.0112
Total Hydrocarbons (THC)	<1	0.034	0.0093
PCB – sum of ICES7	0.00067	0.00078	0.00072
PCB – sum of ICES25	0.00234	0.00296	0.00259
Tributyl Tin (TBT)	<0.05	<0.05	<0.05
Dibutyl Tin (DBT)	<0.05	<0.05	<0.05
BDE28 (2,4,4-Tribromodiphenyl ether)	<0.00002		
BDE47 (2,2,4,4-Tetrabromodiphenyl ether)	<0.00002		
BDE99 (2,2,4,4,5-Pentabromodiphenyl ether)	<0.00002		

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Parameter	Minimum	Maximum	Average
	Units – mg/kg		
BDE100 (2,2,4,4,6-Pentabromodiphenyl ether)	<0.00002		
BDE153 (2,2,4,4,5,5-Hexabromodiphenyl ether)	<0.00002		
BDE154 (2,2,4,4,5,6-Hexabromodiphenyl ether)	<0.00002		

Metals

All samples contained metal concentrations below Action Level 2, with the exception of samples recovered at depth from borehole (BH) 34, located within the proposed berth pocket. Concentrations of mercury, cadmium and zinc were particularly elevated above Action Level 2 at BH34, with chromium, copper and lead also present above Action Level 2. The concentrations of contaminants in BH34 indicates that material removed from this location would likely be deemed unsuitable for disposal at sea; Cefas confirmed this was the case following an interim review of the sediment quality data in April 2021.

It is therefore proposed that material in the vicinity of BH34 is excluded from the material to be disposed of to sea and that an enclosed grab or similar is used to dredge such material from this location to minimise the re-suspension of sediment as the material is removed. An enclosed grab results in virtually no release of sediment as the material is dredged. The results from this borehole (BH34) have therefore been excluded from the water quality calculations presented in Section 2.2 as they do not reflect contaminant concentrations across the rest of the proposed dredge footprint and the proposed means of dredging using an enclosed grab would avoid release of this material.

For the rest of the samples, some exceedances of Action Level 1 were identified, specifically for nickel which is elevated across the proposed dredge footprint, but the majority of exceedances are marginal only.

The samples of geological mudstone (BH08-BH13) show marginal exceedances of Action Level 1 for nickel and copper, the latter only in one sample. The concentrations of all other metals in the geological mudstone were below Action Level 1.

Organotins

Minor exceedances of Action Level 1 were recorded in material from the surface at BH31 and BH34 which are both located in the proposed berth pocket. However, the remaining data indicates that the majority of organotin concentrations across the proposed dredge footprint do not exceed Action Level 1 (with many results below the limit of detection).

All samples of geological mudstone recorded organotins in concentrations of less than the limit of detection.

Polyaromatic hydrocarbons (PAHs)

The results from BH34 show significant PAH concentrations throughout all depths, consistent with the metal concentrations (well in exceedance of Action Level 1). There are also significant concentrations of many PAHs in VC01, VC05, VC09, VC10, VC11 (particularly for naphthalene, fluoranthene, fluorene, pyrene and phenanthrene). Similarly, total hydrocarbon concentrations are elevated.

The concentration of PAH compounds in the geological mudstone were generally all below Action Level 1. The only exceedance of Action Level 1 was recorded in the sample from BH12 which was marginal.

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Polychlorinated biphenyl (PCBs)

Sediment from BH34 contained elevated concentrations of ICES7 (sum of seven congeners) and ICES25 (sum of 25 congeners) above Action Level 1, however there were no Action Level 2 exceedances for ICES 25 (ICES 7 does not have an Action Level 2 concentration). Action Level 1 exceedances were also identified locally in other samples from across the proposed dredge footprint (although none were present within the samples of geological mudstone). The exceedances of Action Level 1 were however, largely marginal.

Polybrominated diphenyl ethers (PBDEs)

There are no Action Levels for PBDEs and therefore an assessment against sediment quality guidelines is not possible. VC14 recorded the highest concentration of parameter BDE209 at 0.25300mg/kg at the surface, but many samples recorded levels below the detection limit. All samples were below the limit of detection in the mudstone samples.

The data reported above confirms the working assumption that the geological mudstone material does not contain elevated concentrations of contaminants.

2.1.3 Baseline water quality data

The marine elements of the proposed scheme (excluding offshore disposal of dredged material) are located within the Water Framework Directive (WFD) Tees transitional water body (GB GB510302509900) (see Figure 2.1). As noted in the EIA Report (Royal HaskoningDHV, 2020), the nearest WFD water quality monitoring point to the main scheme footprint is Smiths Dock (see Figure 2.1). Updated water quality information has been obtained for this sampling location, which includes results of samples collected in 2019 and 2020 which were not available at the time of drafting the EIA Report (Royal HaskoningDHV, 2020). A summary for the parameters included in the water quality assessment is presented in Table 2.3.

Table 2.3 Summary of water quality data for parameters included in the water quality assessment (2016 until present day)

Parameter	Minimum	Maximum	Average
	Units - µg/l		
Arsenic	1	1.14	1.028
Cadmium	0.03	0.034	0.030
Chromium	<0.3	<0.3	<0.3
Copper	0.743	1.49	0.978
Mercury	<0.01	<0.01	<0.01
Nickel	0.614	3.35	1.502
Lead	0.15	1.83	0.666
Zinc	2.24	5.06	3.82
Benzo(a)pyrene	0.00033	0.0272	0.0027
Benzo(b)fluoranthene	0.00036	0.0272	0.0028
Benzo(g-h-i)perylene	0.00037	0.0311	0.0029
Benzo(k)fluoranthene	0.00018	0.0143	0.0014

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Parameter	Minimum	Maximum	Average
	Units - µg/l		
Fluoranthene	0.00002	0.05	0.0179
Tributyl Tin (TBT)	0.0002	0.00125	0.0003
2,4,4-TribromoDiphenylEther	<0.00006	<0.00006	<0.00006
2,2,4,4-Tetrabromodiphenyl ether	<0.00006	0.00012	0.00007
2,2,4,4,5-Pentabromodiphenyl ether	<0.00006	<0.00008	<0.00006
2,2,4,4,6-Pentabromodiphenyl ether	<0.00006	<0.00006	<0.00006
2,2,4,4,5,5-Hexabromodiphenyl ether	<0.00006	<0.00006	<0.00006
2,2,4,4,5,6-Hexabromodiphenyl ether	<0.00006	<0.00006	<0.00006

It should be noted that concentrations of chromium, mercury and all PBDEs (with the exception of 2,2,4,4-Tetrabromodiphenyl ether) are recorded as 'below limit of detection' in all water samples[1].

2.2 Supplementary water quality assessment

2.2.1 Introduction

The assessment presented in the EIA Report (Royal HaskoningDHV, 2020) used simple calculations of sediment losses from dredging equipment and concentrations of contaminants within the sediments to be dredged to provide an indication of the amount of contamination that could be released into the water environment. The volume of water into which the contamination is released was then used to calculate the potential dilution and indicate potential water concentrations. These were then compared to Environmental Quality Standards (EQSs).

The updated assessment presented in this report uses the Environment Agency's SeDiChem spreadsheet assessment tool (referred to through the subsequent sections as the 'tool'), which is designed to provide a simple quantitative assessment of potential sediment disturbance on water quality in the context of EQS values (Environment Agency. 2019). The assessment uses the predicted concentrations of suspended solids released as a result of the proposed dredge to define the scale of water quality effects. It should be noted that the tool investigates a subset of WFD Specific Pollutants, Priority Substances and Priority Hazardous Substances, which have been selected on the basis of having defined water quality EQS values, as well as being amongst the suite of chemicals routinely required for marine licence applications. Consequently, the parameters considered in this revised assessment are:

- Metals - arsenic, cadmium, chromium, copper, lead, nickel, mercury and zinc.
- PAHs - benzo(a)pyrene, benzo(b)fluoranthene, benzo(g-h-i)perylene, benzo(k)fluoranthene and fluoranthene.
- PBDEs - 2,4,4-Tribromodiphenyl ether, 2,2,4,4-Tetrabromodiphenyl ether, 2,2,4,4,5-Pentabromodiphenyl ether, 2,2,4,4,6-Pentabromodiphenyl ether, 2,2,4,4,5,5-Hexabromodiphenyl ether and 2,2,4,4,5,6-Hexabromodiphenyl ether, summed to allow comparison to the EQS.

[1] To calculate whether PBDEs have exceeded the EQS, the total sum per sample is based on the individual ethers with any < value set to the equivalent of zero (0.0000001)

2.2.2 Mechanism of assessment

The tool characterises multiple transfers of chemicals from sediment to water which cumulatively determine the predicted concentration in the water column. The principal contributions are derived from:

- estimation of chemical load contributed by released pore water;
- estimation of chemical load associated with disturbed sediment partitioning (once sediments are disturbed into the water column);
- incorporation of background aqueous concentrations; and,
- where applicable, incorporation of the chemical load that remains associated with (e.g. adhered to) those sediment particles that are disturbed into the water column.

The resultant predicted aqueous concentration is then compared against the relevant EQS value.

With respect to metals, the risks to water quality relating to sediment disturbance activities primarily derive from the potential shift of chemicals from the particulate state into the dissolved state (i.e. dissolved concentrations in the sample). For organic chemicals, the partition equilibrium of organic species is defined using the dissolved concentration and the concentration bound to the organic matter, given the strong tendency for sorption to organic matter for hydrophobic species (i.e. the unfiltered total fraction). The tool assessment process is therefore different for each type of parameter.

2.2.3 Suspended solid concentrations

The tool requires the input of predicted suspended solids concentrations arising from the dredge plume. For this assessment, hydrodynamic modelling undertaken to assess the potential for hydromorphological effects on the Tees estuary (presented in Section 6.5 of the EIA Report (Royal HaskoningDHV, 2020)) has been used.

Modelling predicts that the Smiths Dock water quality monitoring location would only experience elevated levels of suspended solids over baseline during Stage 2 of the proposed dredging schedule, when the backhoe dredger and trailing suction hopper dredger would be working in parallel to dredge soft material below -5m Chart Datum (CD) in the berth pocket and river channel. Stage 2 of the proposed dredge is predicted to last for a duration of approximately four weeks. The likely plume extent during this phase is shown in Figure 2.2.

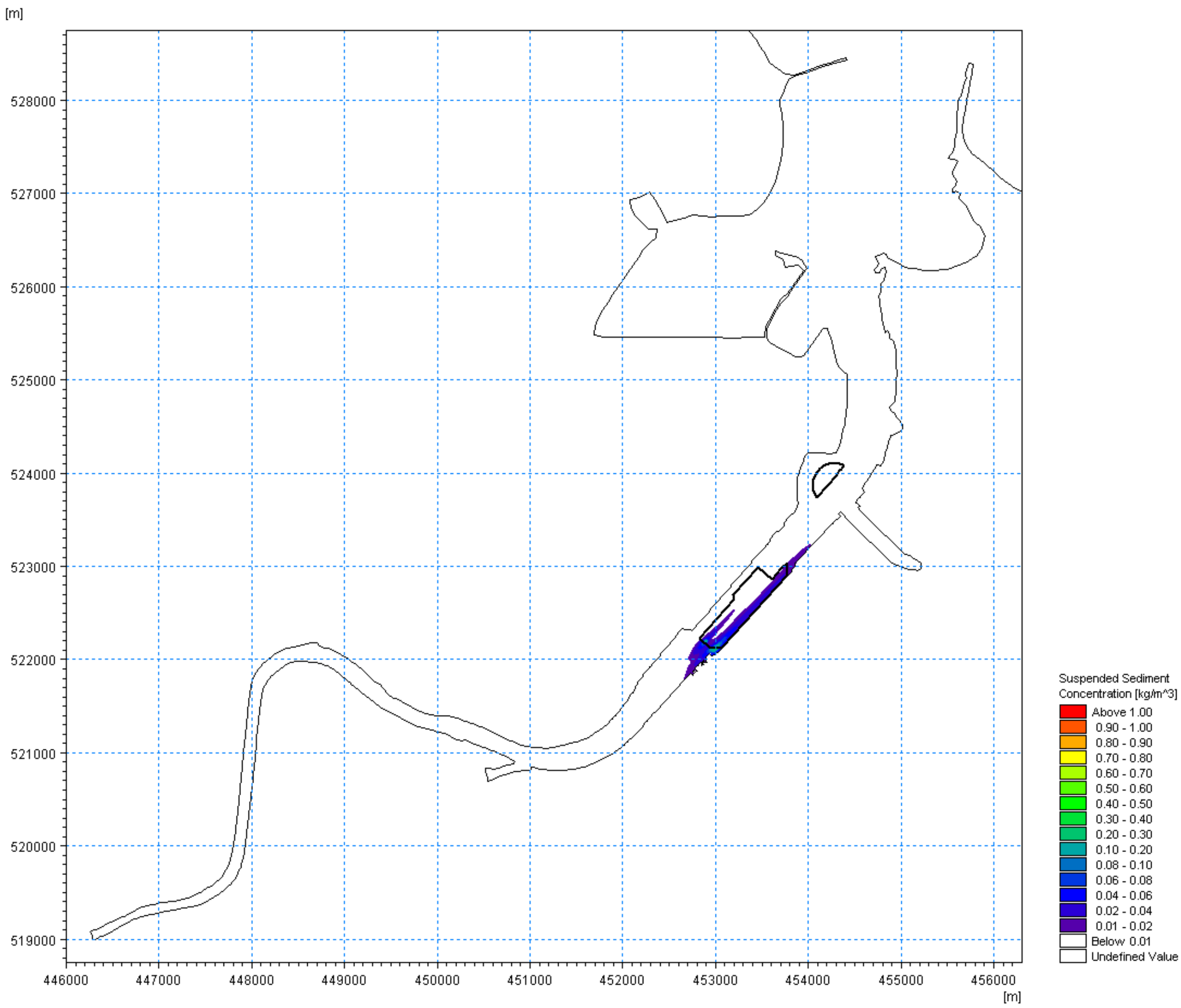

Figure 2.2 Stage 2 dredging results for suspended solids concentrations when dredger is located on the south-western dredging transect (taken from Section 6.5 of the EIA, Royal HaskoningDHV, 2020)

Figure 2.3 shows the predicted suspended solid concentrations at selected water quality monitoring points in the Tees estuary. For Smiths Dock (monitoring point 3 in the figure), peak concentrations are predicted to reach 85mg/l before reducing back to baseline concentrations within an hour followed by subsequent, but lower, concentration peaks, again reducing to baseline concentrations within an hour. Given the peak of 85mg/l is transitory and only predicted to occur once during this period, a more representative suspended sediment concentration of 40mg/l is used in the tool (see Figure 2.3).

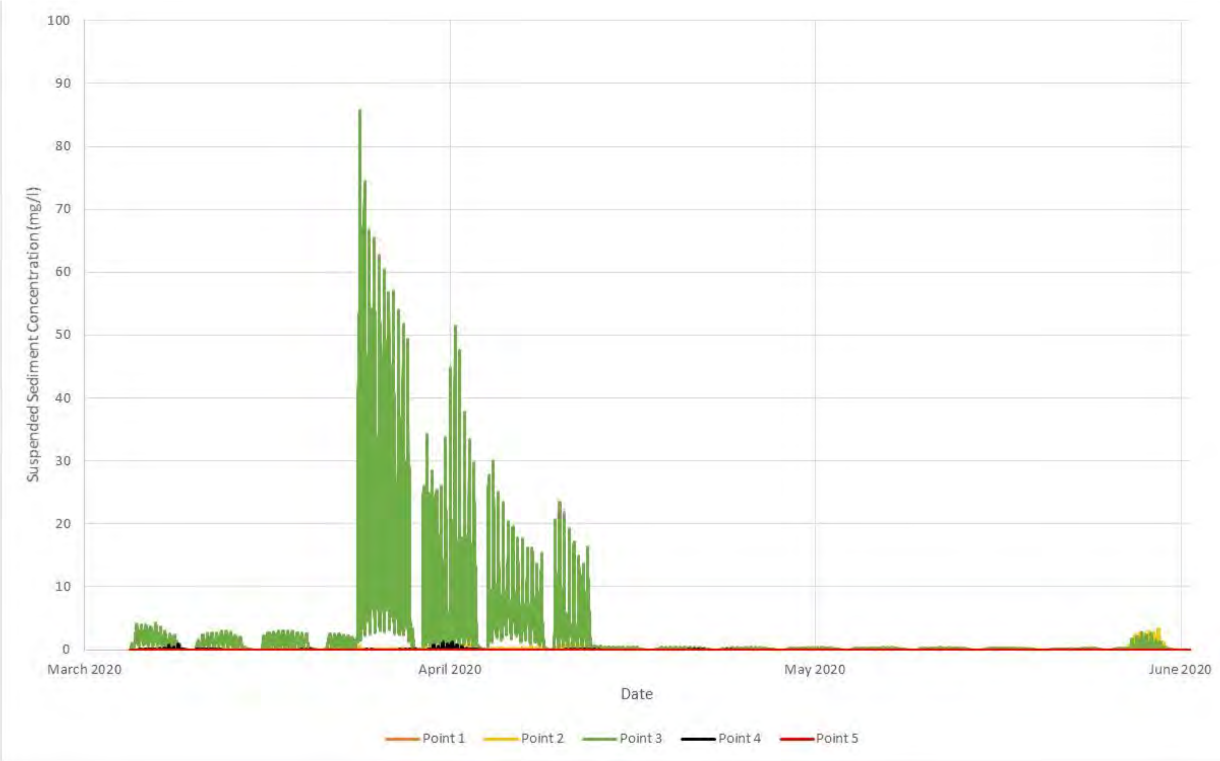

Figure 2.3 Time series of changes in suspended sediment concentrations at water quality monitoring points in the Tees estuary (point 3 is Smiths Dock), taken from Section 6.5 of the EIA Report (Royal HaskoningDHV, 2020)

2.2.4 Other input parameters

All other input parameters required to run the tool were taken from the tool's recommended default values. A net tidal flux value was calculated from the hydrodynamic modelling for mean flows in the estuary; this equates to 1,080,000m^3/day.

2.2.5 SeDiChem tool results

A copy of the SeDiChem spreadsheet is provided in Appendix 2.

The results for the metal and organotin parameters do not indicate any risk to EQSs as a result of the proposed dredge. For the organic parameters, the results indicate that for benzo[b]fluoranthene, when sediment concentrations are at 40mg/l, there is the risk of an EQS failure, however, compliance would be achieved when suspended sediment concentrations reduce to 31mg/l (see maximum acceptable sediment uplift column in Appendix 2). It can be seen in Figure 2.2 that the suspended sediment plume is predicted to be relatively localised to the dredging activity and suspended sediment concentrations reduce to typically <30mg/l close to the point of initial release.

Benzo[ghi]perylene already exceeds the maximum allowable concentration (MAC) EQS in the baseline (pre-dredge situation) and therefore there is no headroom [2] for additional sources of this parameter. Benzo[a]pyrene and benzo[k]fluoranthene do have some headroom at 40mg/l but it should be noted that when suspended solid concentrations reach the predicted peak at 85mg/l, EQS failure is possible. Concentrations of fluoranthene are only predicted to reach EQS when suspended solids concentrations exceed 120mg/l, which is not predicted to occur at the Smiths Dock monitoring point. For PBDEs, these

[2] *EQS headroom is defined as the available increase in concentration that is possible before the EQS is breached.*

parameters already fail in the baseline; however, WFD compliance is assessed on biota sample concentrations rather than water quality concentrations, hence this not being flagged in the baseline water quality data. SeDiChem does not indicate a risk to the water quality EQS associated with the proposed dredging.

2.2.6 Conclusions

In line with the results presented in the EIA Report (Royal HaskoningDHV, 2020), the tool indicates that there is a possibility that some PAH parameters could exceed their respective EQS during capital dredging. However, sediment plume modelling does not predict long term and large scale extents of elevated concentrations of suspended solids; rather, they are predicted to remain in close proximity to the dredging vessel(s). Additionally, time series data extracted for the Smiths Dock water quality monitoring point predicts a set of short-lived peaks in concentrations which return to baseline concentrations within hours. Consequently, the risk of EQS failure is small scale and temporary. Additionally, a relatively large proportion of the total volume of dredged material comprises geological material (i.e. mudstone) which contains much lower levels of contaminants, therefore the risk to EQS is only during dredging of the finer sediments in the upper layers.

Overall, therefore, the conclusions remain the same as those presented in the EIA Report (Royal HaskoningDHV, 2020), in that the magnitude of effect is deemed to be low which gives rise to an overall impact of **minor adverse** significance.

Mitigation measures and residual impact

An enclosed grab is proposed to dredge material in the vicinity of BH34 given the elevated concentrations of contaminants in sediment at that location. As reported earlier, and enclosed grab results in virtually no release of sediment as the material is dredged. No further mitigation measures are required. The residual impact is predicted to be of **minor adverse** significance.

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3 MARINE ECOLOGY

3.1 Supplementary data

A site-specific benthic ecology survey was undertaken during November 2020. The survey comprised the following activities within and adjacent to the proposed scheme footprint:

- 20 subtidal $0.1m^2$ Day grabs and six $0.035m^2$ hand haul Van Veen grabs (it was originally intended that 26 subtidal Day grabs would be recovered, however access restrictions meant that six samples had to be recovered using a hand haul Van Veen. In addition, one of the sampling locations could not be completed due to the coarse nature of the material on the bed, despite multiple attempts, resulting in 25 samples in total).
- 10 intertidal quadrats ($0.25m^2$ each).
- 10 intertidal cores (11.3cm diameter, $0.01m^2$ corer).
- Five tows of 2m scientific beam trawls, using a 10mm mesh with a 5mm cod end.
- 30 scrapes from infrastructure to be demolished.
- Four fyke net deployments (which have been reported in Section 4).

The sampling locations of relevance to this section of the supplementary report are shown on Figure 3.1 and the survey results are detailed below. A full dataset is provided in Appendix 3.

3.1.1 Grab data

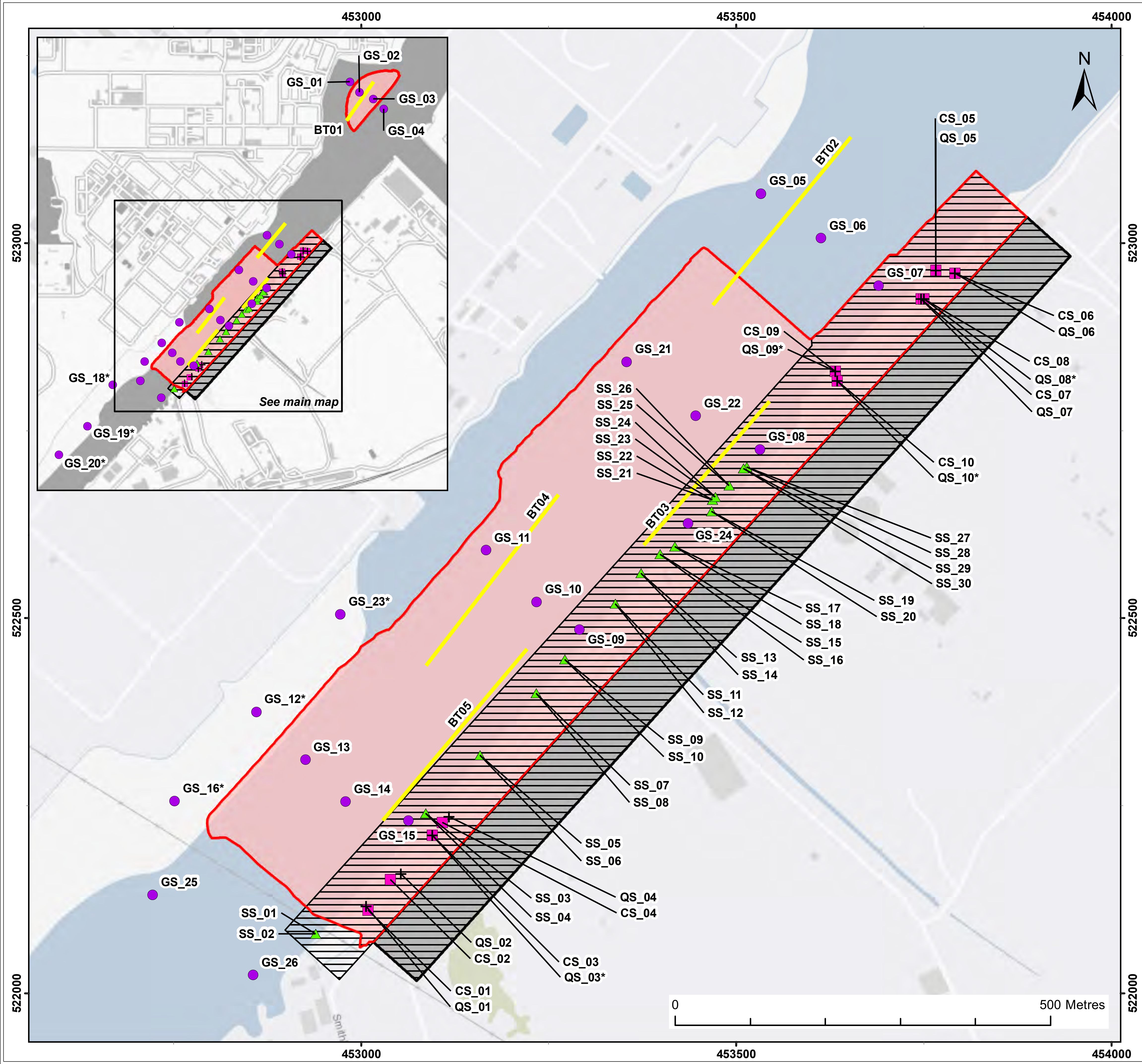
Benthic composition

Grab samples (GS) were analysed for benthic infauna and particle size distribution (PSD). Overall, 147 species were identified in the samples collected across the 25 stations, which comprised the phyla Cnidaria, Nemertea, Annelida, Arthropoda and Mollusca. The most species-rich sample was GS14 with 61 species recorded; this sample was recovered from within the navigation channel towards the upstream end of the proposed dredge footprint. The least species-rich sample was GS12 with 19 species recorded; this sample was recovered from the downstream end of North Tees Mudflat. The number of individuals (total abundance) per sample varied from 87 (from GS07 within the downstream end of the proposed berth pocket) to 3,227 (at GS19 located within the central part of North Tees Mudflat), with a total of 15,765 individuals recorded across all 25 samples.

The two most abundant species across all samples were *Chaetozone gibber* (2,849 individuals), recorded at all sites except for GS16, GS18 and GS20 (all on North Tees Mudflat); and *Peringia ulvae* (2,830 individuals) recorded in 11 of the 25 samples. These species made up 18% and 17% of all individuals recorded, respectively.

The presence of *Capitella* spp. within the benthic grabs was low (ranging from one to 31 individuals in only seven of the 25 samples). As reported in the EIA Report (Royal HaskoningDHV, 2020), this opportunistic species was widespread in the 2006 and 2014 benthic surveys undertaken in the Tees, but was only recorded in high numbers at one station in the 2019 benthic survey.

Eight biotopes and/or biotope complexes were identified across the survey area, of which the intertidal within the footprint of the proposed scheme included rocky and sedimentary habitats (elaborated on in Section 3.1.5), whereas the North Tees Mudflat and subtidal sections featured sedimentary habitats.



Legend

- Proposed Dredge and Excavation Envelope (including side slopes)
- Proposed Quay Envelope
- Proposed Demolition Area
- Beam trawl
- Intertidal quadrat
- Intertidal core
- Grab sample
- Environmental scrape

Client:	Project:
Tees Valley Combined Authority	South Bank Quay - Supplementary Report

Title:

Benthic survey sample locations

Figure: 3.1

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	08/02/2021	TC	CP	A3	1:5,000

Co-ordinate system: British National Grid

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The biotope that was identified in the North Tees Mudflat section of the survey area was *Hediste diversicolor* and *Corophium volutator* in littoral gravelly sandy mud (LS.LMx.GvMu.HedMx.Cvol - A2.4115), and *Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud (SS.SMu.ISaMu.MelMagThy - A5.334) for the subtidal section of the survey area. These biotopes are representative of organically enriched estuarine environments of the east coast of the UK. The former of these biotopes is part of the UK Biodiversity Action Plan habitat 'Intertidal mudflats', which is also listed on Oslo and Paris (OSPAR) list of threatened and/or declining habitats and species.

As the biotope *Hediste diversicolor* and *Corophium volutator* in littoral gravelly sandy mud was only identified at the North Tees Mudflat (which as reported in the EIA Report would not be impacted as a result of the proposed scheme), this biotope is not considered any further within this assessment. As requested by Natural England in its consultation response to the MMO, a slope stability assessment is being undertaken to validate the current position that the proposed scheme would not impact on the North Tees Mudflat; this is to be provided under separate cover once complete.

Species of conservation interest and non-natives

The non-native polychaete *Streblospio benedicti / gynobranchiata* occurred frequently in the samples, being recorded in 23 of the 25 samples. The non-native species *Mya arenaria* was recorded in low densities across six of the 25 sites; five of the sampling stations where this species was encountered were on North Tees Mudflat, with the sixth adjacent to the mudflat.

Overall, the following invasive non-native species (INNS) and/or three cryptogenic species were recorded:

- *Alitta virens.*
- *Euchone limnicola.*
- *Streblospio benedicti.*
- *Streblospio gynobranchiata.*
- *Austrominius modestus.*
- *Yoldia limatula.*
- *Dipolydora quadrilobate.*
- *Polydora cornuta.*
- *Monocorophium insidiosum.*

Of these, *Y. limatula* is believed to represent a first record for the UK waters (Fugro, 2021).

The species of conservation interest *Sabellaria spinulosa* was recorded at three of the sampling stations, with individual worms noted at GS25 and GS26 (both upstream of the proposed dredge footprint) and 23 individuals at site GS14 (within the upstream end of the proposed dredge footprint).

Comparison with the 2019 NGCT survey data

The species recorded during the 2019 survey mainly comprised of polychaetes and molluscs. Other taxa such as crustaceans and echinoderms were present in lower numbers. There was no obvious dominance of a single taxon in the microbenthic community. The polychaete *Dialychone* was the most abundant taxon.

The results from the 2019 NGCT survey are similar to those found from the site-specific survey in 2020, in that there was a dominance of polychaete and molluscs. The most dominant species in the 2020 survey did, however, differ to those encountered during the 2019 survey. As such, a review of the sensitivities of the dominant species has been undertaken with any differences considered within the supplementary assessment presented in Section 3.2.

The biotopes recorded during the 2019 survey were more diverse than those recoded in the 2020 site-specific survey. The 2019 survey identified the EUNIS biotope A5.323 '*Nephtys hombergii* and *Tubificoides* spp. in variable salinity infralittoral soft mud' most frequently. In addition, one station from the 2019 survey was classified as EUNIS biotope A5.325 '*Capitella capitata* and *Tubificoides* spp. in reduced salinity infralittoral muddy sediment'. Although these biotopes are different to those recorded in the 2020 site-specific survey, they are still considered to be representative and typical of an estuarine environment of this geographic region and as such the findings of the two surveys in relation to biotopes are not considered to be materially different.

Sabellaria spinulosa was identified within the 2019 benthic survey in very low numbers (maximum of eight individuals in one sample), within seven of the 25 grabs recovered as part of that survey. The individuals recorded were not deemed to meet the Annex I reef qualifying criteria as described by Gubbay (2007). It was therefore concluded that the *S. spinulosa* tube aggregations sampled in the Tees estuary during 2019 were not representative of biogenic reef habitat. Based on the findings of the 2020 site-specific survey, it is considered that this conclusion remains valid (i.e. *Sabellaria spinulosa* present within the proposed scheme footprint does not comprise biogenic reef habitat).

The 2019 survey also identified juvenile species of the ocean quahog *Arctica islandica*; this species was not identified during the 2020 site-specific survey.

With regard to invasive species, very low numbers of *Theora lubrica* were found within the Tees Dock turning circle during the 2019 benthic survey. As reported above, invasive and/or cryptogenic species were also identified during the 2020 site-specific survey. Although the invasive species and species of conservation interest identified during the 2019 and 2020 surveys differed, it is concluded that the findings from the two surveys are not materially different.

3.1.2 Trawl data

A total of 22 marine faunal species (excluding fish) were recorded within the five beam trawls deployed within and adjacent to the proposed dredge footprint. Species recorded were from the taxonomic groups Porifera, Cnidaria, Arthropoda, Bryoza, Echinodermata and Tunicata. Accounting for the greater sampling effort in the 2019 NGCT survey (during which 16 beam trawls were taken), this result is considered comparable with the 40 species that were recorded in the 2019 NGCT survey, reported in the EIA Report (Royal HaskoningDHV, 2020).

The most species-rich trawl (i.e. that with the most species recorded) was BT01 located within the proposed dredge footprint at Tees Dock turning circle; this recorded 20 species (excluding fish). This trawl was also the most abundant trawl, with 307 individuals recorded. The two most abundant species recorded were the brown shrimp *Crangon crangon*, which was recorded within all trawl samples and constituted 43% of all individuals, and *Carcinus maenas*, recorded across all trawl samples and constituting 32% of all individuals.

Comparison with the 2019 NGCT survey data

A similar number of species were recorded during the 2019 survey as in the 2020 survey (22 species, excluding fish in 2021 and 40 species in 2019). The most abundant species were the same across both surveys, also in line with previous data sets from the Tees. As such, the data and relevant conclusions presented within the EIA Report (Royal HaskoningDHV, 2020) remain valid.

3.1.3 Scrape sample data

The purpose of the scrape samples was to determine the biological diversity of the vertical artificial structures that are proposed to be removed as part of the proposed scheme.

Diversity across the 30 scrape samples recovered from infrastructure to be demolished as part of the proposed scheme (see Figure 3.1) was low, with a total of 27 species recorded. Barnacles (mainly *Austrominius modestus, Semibalanus balanoides*) were the most abundant species. Juvenile *Littorina* spp. were the second most abundant species, followed by the taxon Acari (mites and ticks) and *Littorina arcana/saxatalis*. The most diverse scrape sample was SS_04 located at the upstream end of the South Bank Wharf, which contained 13 species.

Comparison with the 2019 NGCT survey data

Scrapes of structures to be demolished as part of the NGCT were not recovered during the 2019 survey (as they were not requested during discussions on survey scope) and therefore there are no equivalent data for 2019.

3.1.4 Intertidal sampling

Intertidal core data

A total of 56 species were recorded within the 10 intertidal core samples recovered from within the proposed scheme footprint (**Figure 3.1**), with the most abundant species being *Tubificoides pseudogaster*, comprising 25% of all individuals recorded across the 10 samples. The most species-rich sample was from CS_09 (located towards the downstream end of the proposed berth pocket), with 26 species recorded. The most abundant sample was CS_04 (located towards the upstream end of the proposed berth pocket), with 1,507 individuals recorded. The second most abundant species was *Capitella* spp., comprising 16% of all individuals.

Species recorded most frequently (i.e. recorded across the most samples) were *Capitella* spp., *Tubificoides benedii* and *Peringia ulvae;* all were recorded in all 10 samples. All species recorded were typical of an estuarine environment that is subject to a degree of pollution (Fugro, 2021).

A single individual of the non-native bivalve *M. arenaria* was recorded at CS_01 at the upstream end of the proposed berth pocket.

Intertidal quadrats and walkover

Ten quadrat samples were recovered from the lower shore and mid shore (with one sample recovered on the upper shore). The quadrats were recovered in areas that could be safely accessed at low tide.

Filamentous green algae were dominant in the upper shore, while fucoid species (*Fucus spiralis, F. ceranoides, F. vesiculosis*) dominated the mid and lower shore. Patches of the red alga *Chondrus crispus* were recorded in the lower shore. Tube worms, barnacles and gastropods were common epifauna associated with the intertidal area. Debris of natural and anthropogenic nature (wood, plastic, rubber, etc.) were recorded across the intertidal.

The intertidal walkover survey confirmed that the majority of the shore throughout the intertidal comprised pebble and cobble sized sediments in an admixture of mud, sand and gravel. Much of this material is likely to comprise slag deposits from the adjacent steel works (Fugro, 2021). Predominantly sand and gravel areas are moderately widespread in the upstream part of the intertidal (landward of the South Bank Wharf), becoming less frequent downstream. The core samples obtained are described in situ as either muddy sand or muddy gravel. Plate 3.1 illustrates the nature of the intertidal within the proposed scheme footprint. Although localised areas of mudflat habitat are reported to be present within the intertidal at South Bank on Defra (Magic) mapping, no such areas were identified during the site walkover.

Plate 3.1 Example photographs of the intertidal habitat and epibiota (A: view north-east along the shore in the upstream end, landward of South Bank; B – view north east along the shore at the downstream end; C – steeply sloping shore at the downstream end; D – Quadrat QS_01)

The following biotopes were recorded in the intertidal within the footprint of the proposed scheme:

- Lichens or small green algae on supralittoral and littoral fringe rock (LR.FLR.Lic – B3.11).
- *Fucus spiralis* on sheltered variable salinity upper eulittoral rock (LR.LLR.FVS.FspiVS - A1.322).
- *Fucus vesiculosus* on mid eulittoral variable salinity boulders and stable mixed substrata (LR.LLR.FVS.FvesVS - A1.323).
- *Fucus ceranoides* on reduced salinity eulittoral rock (LR.LLR.FVS.Fcer - A1.327).
- *Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles (LR.HLR.IMusB.Sem.LitX - A1.1133).
- Oligochaetes in variable salinity littoral mobile sand (LS.LSa.MoSa.Ol.VS - A2.2222).

The top four of these biotopes are part of the UK Biodiversity Action Plan (BAP) priority habitat 'Estuarine Rocky Habitats'.

None of the biotopes recorded within the intertidal were identified as the priority habitat 'Mudflat'.

Comparison with the site-specific intertidal observations reported in the EIA Report

The intertidal biotopes identified from the site-specific 2020 surveys are broadly in line with those detailed in the EIA Report (which were based on the results of the 2019 NGCT survey). The intertidal biotopes identified in the 2019 NGCT surveys include Fucoids in variable salinity, and other littoral substrate (rock

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and sediment) biotopes. The main species and algal cover reported in the EIA Report for the proposed scheme footprint are confirmed by the 2020 survey results, and no key differences are observed. As such, the results presented in the EIA report, which the impact assessment was based on, remain valid.

3.2 Supplementary assessment

As illustrated in Section 3.1, the results from the 2020 site-specific surveys are not considered to be materially different to the those recorded during the 2019 NGCT survey, which the EIA Report for the proposed scheme was based on. However, it is acknowledged that there are some differences in the characteristic species and biotopes recorded and, therefore, further consideration regarding the implications of these differences on the previously reported impacts is required.

The magnitude of all relevant construction phase impacts (namely direct loss of habitat due to demolition and capital dredging, effects from increased suspended sediment concentrations, and effects from smothering) remains the same as assessed in the EIA Report.

Updated sensitivity information based on characterising species and biotopes recorded during the 2020 site-specific survey is shown in Table 3.1. It is clear from this table that although the characteristic species and biotopes recorded during the 2019 NGCT survey and the 2020 site-specific survey differ, there is minimal difference in the sensitivity of characterising receptors (species and biotopes). Any changes in sensitivities due to the presence of new characterising species are highlighted in the table with green cells, and an update of the impact assessment in relation to these is presented in the sections below.

It is noted that some INNS were recorded in the 2020 site-specific surveys; however, due to the low numbers of these species, it is considered that the proposed scheme is not likely to result in a greater risk of spreading INNS than that assessed within the EIA Report (Royal HaskoningDHV, 2020). As such, the assessment and mitigation proposed in relation to INNS within the EIA Report remain valid and no update to the assessment is required.

Table 3.1 Comparison of the sensitivity of key species and biotopes to the pressures induced by the relevant impacts within the EIA report. Receptors highlighted in grey cells are ones that the assessment in the EIA Report was based on (i.e. key features recorded in the 2019 NGCT survey), and receptors in light blue cells are ones that the supplementary assessment in this report is based on (i.e. key features recorded in the 2020 site-specific survey). Changes in sensitivities are highlighted in green.

Type of receptor	Name of specific receptor[3]	Relevant pressures to the impact "*Direct loss of habitat due to capital dredging*" (Section 3.2.1)		Relevant pressures to the impact "*Effects of increased suspended sediment concentrations during dredging on marine species and habitats*" (Section 3.2.2)	Relevant pressures to the impact "*Effects of smothering following dredging on marine species and habitats*" (Section 3.2.3)
		Abrasion and physical disturbance	Substratum loss / removal of substratum	Changes in suspended sediment	Smothering
Key species	*Abra alba*	Low	Moderate	Very low	Not sensitive
	Sabellaria spinulosa	Low	Moderate	Not sensitive	Not sensitive
	Arctica islandica	High	High	Not sensitive	Not sensitive
	Peringia ulvae	Very low	Moderate	Not sensitive	Low
	Corophium volutator	Low	Moderate	Low	Moderate
Characterising biotopes	*Nephtys hombergii* and *Tubificoides* spp. in variable salinity infralittoral soft mud	Low	Medium	Not sensitive	Not sensitive to smothering of up to 5cm Low sensitivity to smothering of up to 30cm
	Melinna palmata with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud	Low	Medium	Low	Not sensitive to smothering of up to 5cm Low sensitivity to smothering of up to 30cm
	Fucus spiralis on sheltered variable salinity upper eulittoral rock	Medium	Not relevant	Medium	Medium
	Fucus vesiculosus on mid eulittoral variable salinity boulders and stable mixed substrata	Medium	High	Medium	Medium

[3] *There is no sensitivity information on MarLIN available for the intertidal biotope "Lichens or small green algae on supralittoral and littoral fringe rock", therefore it is not presented within this table.*

Type of receptor	Name of specific receptor[3]	Relevant pressures to the impact "*Direct loss of habitat due to capital dredging*" (Section 3.2.1)		Relevant pressures to the impact "*Effects of increased suspended sediment concentrations during dredging on marine species and habitats*" (Section 3.2.2)	Relevant pressures to the impact "*Effects of smothering following dredging on marine species and habitats*" (Section 3.2.3)
		Abrasion and physical disturbance	Substratum loss / removal of substratum	Changes in suspended sediment	Smothering
	Fucus ceranoides on reduced salinity eulittoral rock	Medium	Not relevant	Not sensitive	Medium
	Semibalanus balanoides and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles	Low	Not relevant	Low	Medium
	Oligochaetes in variable salinity littoral mobile sand	Low	Medium	Low	Not sensitive to smothering of up to 5cm Low sensitivity to smothering of up to 30cm

3.2.1 Direct loss of habitat due to capital dredging

As can be seen from Table 3.1, the characterising species recorded during the 2020 site-specific survey, *P. ulvae* and *C. volutator*, have similar sensitivities to the characterising species considered within the EIA Report. The intertidal biotopes identified during the 2020 site-specific survey have medium sensitivities to pressures related to capital dredging, linked to habitat loss and disturbance (which is the same as the sensitivity of the biotope which the assessment in the EIA Report was based on).

It should be noted that the 2019 survey was not undertaken within the footprint of the proposed scheme; rather, the 2019 survey was undertaken approximately 2km downstream with the data from that survey used as a proxy given the lack of site-specific data available at the time.

The sensitivity of the benthic receptors (species and biotopes) considered in the EIA Report (Royal HaskoningDHV, 2020) was conservatively classified as 'high' due to the high sensitivity of *A. islandica* to substratum loss and physical disturbance. However, based on the key characteristic species and biotopes identified within the 2020 site-specific survey (reported above), and the lack of *A. islandica*, the sensitivity of the receptors in this supplementary assessment (collectively – species and biotopes) can be downgraded to medium. This still accounts for the medium sensitivity of the intertidal biotopes. As such, it is concluded that the potential impact on the subtidal and intertidal habitats and benthic communities as a result of habitat loss caused by capital dredging would be of **minor adverse** significance.

As mentioned in Section 3.1.1, no mudflat habitat was recorded within the footprint of the proposed scheme during the 2020 site-specific survey. The proposed scheme is not anticipated to directly or indirectly affect the North Tees Mudflat, as stated within the EIA Report. As such, the minor adverse impact predicted in the EIA Report due to loss of intertidal mudflat can be downgraded to **no impact**.

No mitigation measures are considered necessary. There would be no residual impact.

3.2.2 Effects of increased suspended sediment concentrations during dredging on marine species and habitats

As can be seen from Table 3.1, there is an increase in the sensitivities between the characteristic species and biotopes recorded during the 2019 NGCT survey and the 2020 site-specific survey. The sensitivity of the species has increased very slightly from very low to low; and two of the intertidal fucoid biotopes are of medium sensitivity – higher than the sensitivity used in the EIA Report.

Fucus spp. are intertidal species and although they can photosynthesise both in the air and water; they are more productive when exposed to air. The species that characterise the fucoid biotopes as well as the microscopic stages of the seaweeds during recruitment can be affected by changes in suspended solids, at the benchmark used for the sensitivity assessment. This benchmark for changes in suspended solids is "a change in one rank on the WFD scale e.g. from clear to intermediate for one year" (The Marine Biological Association, 2021). As stated within the EIA Report (and Section 6 of this report), the predicted increase in suspended sediment during dredging is expected to be in the form of a narrow plume within the river, which is localised and short-lived. The proposed dredging activity is not expected to cause an increase in suspended sediment concentrations to a level that will change the WFD scale for one year (the benchmark for the sensitivity assessment of this pressure).

Although the intertidal fucoid biotopes are of medium sensitivity to changes to suspended sediments, the changes induced by the proposed scheme are expected to be below the benchmark. However, as these fucoid biotopes are part of the UK BAP priority habitat 'Estuarine Rocky Habitats', a collective sensitivity of medium for all intertidal and subtidal features related to this impact is assigned.

As the magnitude of this impact is predicted to be very low, the significance of the potential impact on benthic receptors from increased suspended sediments remains at **negligible** significance.

3.2.3 Effects of smothering following dredging on marine species and habitats

As can be seen from Table 3.1, there is a slight increase in the sensitivities between the characteristic species recorded during the 2019 NGCT survey and the 2020 site-specific survey, where the sensitivity has increased from not sensitive to low-medium. *P. ulvae* is of low sensitivity to smothering (light and heavy), and *C. volutator* is of medium sensitivity.

P. ulvae is reported by MarLIN to be relatively tolerant of smothering, however the survival of the species when smothered depends on several factors. If the silt content of the smothering sediment is high and water content low, then it is unlikely that the species will be able to migrate to the surface of the sediment if buried deeper than 5cm (Jackson, 2000). If, however, the smothering sediment is looser with more water content, then the species can burrow its way up to the surface. Adults are also able to travel away from the area on a floating mucous raft (Jackson, 2000). As such, it is considered to be of low sensitivity to smothering.

C. volutator can be heavily affected by smothering, where sedimentation rates of 2 to 2.5cm/month in an experimental setting reduced the densities of the species by more than three quarters (Turk & Risk, 1981). However, this experiment was carried out in a setting of sedimentation induced by the blockage or significant reduction in water flow, rather than deposition of sediments within the water column in an unobstructed setting. As such, although smothering can cause significant mortality to *C. volutator*, it has been shown that the recoverability of populations is high. As such, it is considered to be of medium sensitivity to smothering.

The intertidal fucoid biotopes, as well as *Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles, as shown in Table 3.1, are also of medium sensitivity to smothering (in addition to *Fucus ceranoides* on reduced salinity eulittoral rock, which was already included within the EIA Report). This is mainly because for fucoid biotopes, smothering can reduce the seaweed's ability to photosynthesise if sediment settles on the fronds. For the barnacle (*Semibalanus balanoides*) biotope, barnacles are filter feeders, so any settlement on sediment will reduce their ability to feed effectively. Based on this, and in line with the sensitivity assessments presented by MarLIN, the intertidal biotopes can be considered of medium sensitivity to smothering.

The benthic species on which the assessment in the EIA Report was based (which were recorded during the 2019 NGCT survey) were less sensitive to smothering than the characteristic species recorded in the 2020 site-specific survey. However, the medium sensitivity of the biotope *Fucus ceranoides* on reduced salinity eulittoral rock was accounted for in the EIA Report.

Based on the above information, a sensitivity score of medium has been assigned for impacts from smothering. The magnitude of the impact remains as low, as reported in the EIA Report. Considering this, and the upgraded sensitivity score, an impact significance of **minor adverse** is concluded for effects on marine ecological receptors from smothering. This is a higher impact significance than that reported within the EIA Report (which was assessed as negligible significance).

Based on the findings of the 2020 site-specific survey, it is not considered necessary to update the assessment with regard to impacts to priority habitats (saltmarsh and mudflat) from smothering.

In terms of mitigation, the footprint of the dredge will be kept to what is absolutely necessary, in order to minimise the scale of the impact where possible. No further mitigation is considered necessary or feasible. The residual impact will be of **minor adverse** significance.

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4 FISH AND FISHERIES

4.1 Supplementary data

4.1.1 Benthic trawls

4.1.1.1 Methodology

A total of five benthic trawls were undertaken on 17 and 18 November 2020 between the Tees Dock turning circle and the upstream end of the proposed dredge footprint, at the locations marked BT01 to BT05 in Figure 3.1. The samples were undertaken using an industry-standard 2m scientific beam trawl with a 10mm mesh and a 5mm cod end, which was towed behind the survey vessel at a speed of 1.5 to 2.0 knots for a period of approximately five to six minutes (a distance of between *c.*250m and *c.*300m).

On confirmation of a valid sample, fish and invertebrates (including commercial shellfish species) were extracted from the trawls and photographed. All species that could be identified in the field were counted and the lengths of commercial fish species were measured by fork length (i.e. length from anterior end of the fish to the median caudal ray). Once counted and measured, specimens were returned. Any species that could not be identified on board (i.e. some gobies and shrimp spp.) were fixed with a 10% buffered formal saline solution for laboratory identification and measurement.

4.1.1.2 Results

The fish species caught in the benthic trawls are presented in Table 4.1. A total of ten finfish species were identified, the most abundant and frequently occurring of which by far was plaice *Pleuronectes platessa* (366 individuals, present in all five trawls), followed by whiting *Merlangius merlangus* (26 individuals present in all five trawls) and sand gobies *Pomatoschistus minutus* (24 individuals present in four trawls). Of the commercial specimens measured for length (plaice, whiting, cod *Gadus morhua*, dab *Limanda limanda* and flounder *Platichthys flesus*), almost all were juveniles (i.e. they were smaller than the average size at first maturity). Of the species recorded, cod is a UK BAP priority species and is listed on the OSPAR list of threatened and / or declining species for OSPAR region II (of which the Tees estuary is part).

Of the commercial shellfish species present, the most abundant species in the trawls were brown shrimp *Crangon crangon* (371 individuals), green shore crab *Carcinus maenas* (276 individuals) and pink shrimp *Pandalus montagui* (209 individuals). There were relatively low numbers of other arthropods (mostly non-commercial species or species likely only caught for bait).

The data from the 2020 site-specific trawls reflects the results of the 2014 and 2019 trawls described in the EIA Report, in that the dominant fish species within the lower Tees estuary appears to be plaice, with notable numbers of cod, dab and whiting, and the most numerous commercial shellfish species were brown shrimp and pink shrimp. All of the fish species recorded in the 2020 site-specific trawls had been recorded in the 2014 and 2019 trawls.

The presence of a number of juvenile fish in the 2020 site-specific trawls also reaffirms the assumption drawn in the EIA Report that the lower Tees estuary acts as a nursery ground for, *inter alia*, plaice, whiting and cod.

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Table 4.1 Fish species present in the site-specific November 2020 beam trawls

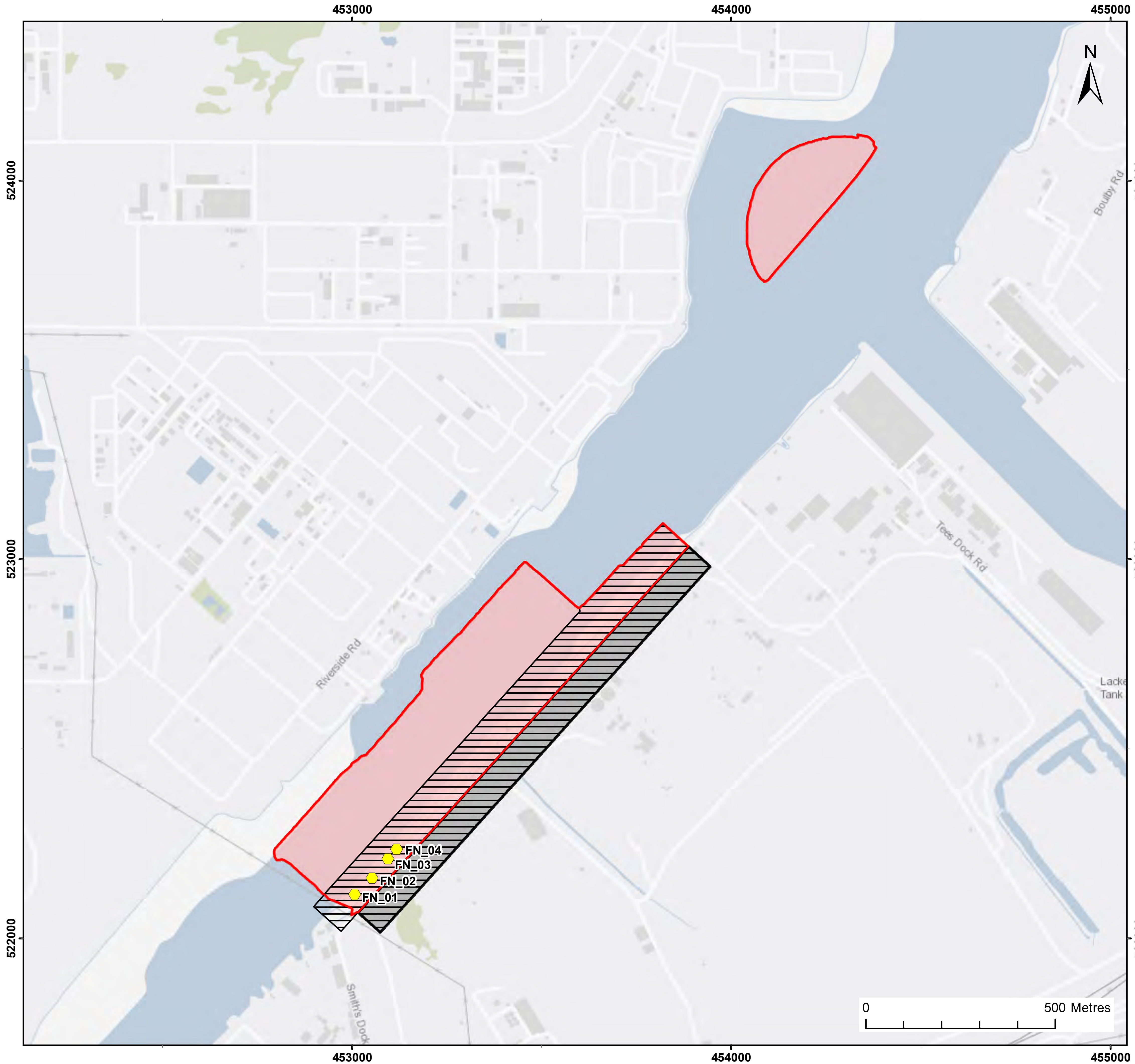
Species		Size class (mm)					Total
		<100	100-150	150-200	200-250	250-300	
Plaice	*Pleuronectes platessa*	366	-	-	-	-	**366**
Whiting	*Merlangius merlangus*	4	21	1	-	-	**26**
Sand goby	*Pomatoschistus minutus*	N/A					**24**
Bull-rout	*Myoxocephalus scorpius*	N/A					**15**
Cod	*Gadus morhua*	3	9	-	-	-	**12**
Dab	*Limanda limanda*	9	-	1	-	-	**10**
Unidentified juv. goby	*Pomatoschistus* spp.	N/A					**7**
Three-bearded rockling	*Gaidropsarus vulgaris*	N/A					**5**
Luzano's goby	*Pomatoschistus lozanoi*	N/A					**4**
Pogge	*Agonus cataphractus*	N/A					**3**
Flounder	*Platichthys flesus*	-	-	-	-	1	**1**

4.2 Fyke net survey

4.2.1.1 Methodology

Four fyke nets were deployed within the mid-shore zone on the landward side of the existing South Bank Wharf, with the centre point of each of the nets at the locations marked FN_01 to FN_04 in Figure 4.1. The nets were set as close as possible to the wharf in order to identify the fish species that may utilise the structure for shelter. For safety and accessibility reasons, however, it was not possible to set the nets directly underneath the structure.

The survey was undertaken in line with best practice guidance (Colclough *et al.*, 2005). Nets were set around 30 minutes after low water on 13 November 2020, with the ends of the nets staked in an up shore - down shore orientation. Given the limited daylight hours during the time of the survey, nets were left in situ for 24 hours (covering two flood and two ebb tides). Once recovered, all fish and invertebrates were removed from the nets, identified and counted, with finfish specimens measured by fork length. All specimens were then returned.



Legend

- Proposed Dredge and Excavation Envelope (including side slopes)
- Proposed Quay Envelope
- Proposed Demolition Area
- Fyke net locations

Client:	Project:
Tees Valley Combined Authority	South Bank Quay - Supplementary Report

Title: Fish survey - fyke net locations

Figure: 4.1

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	08/02/2021	TC	CP	A3	1:10,000

Co-ordinate system: British National Grid

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4.2.1.2 Results

A total of six species of fish were recorded, plus one arthropod species (green shore crab) (see Table 4.2). Four of the fish species are commercial, namely cod, flounder, plaice and pollack *Pollachius pollachius*). Green shore crab was the most abundant and frequently occurring species (181 individuals across all four nets).

Overall, there were low numbers of all fish species within the fyke nets, the most abundant being rockling *Gaidropsarus vulgaris* (five individuals in three nets), cod *Gadus morhua* and flounder *Platichthys flesus* (each four individuals in two nets). The majority of specimens recorded (including those of commercial species) were juveniles (i.e. below the average length at first maturity).

Table 4.2 Fish species recorded in the November 2020 fyke net survey

Species		Size class				Total
		<100mm	100 – 150mm	150 – 200m	200 – 250mm	
Three-bearded rockling	*Gaidropsarus vulgaris*	-	3	-	2	5
Cod	*Gadus morhua*	-	2	2	-	4
Flounder	*Platichthys flesus*	-	2	2	-	4
Pollack	*Pollachius pollachius*	-	-	1	-	1
Plaice	*Pleuronectes platessa*	1	-	-	-	1
Bull-rout	*Myoxocephalus scorpius*	-	-	-	-	1

In lieu of any existing data regarding the value of the habitat underneath the wharf (prior to completion of these surveys), the EIA assumed that the existing wharf would have value for sheltering fish, including juveniles; this assumption was agreed with the Environment Agency prior to the marine licence application being submitted. The 2020 fyke net survey was undertaken to provide more information on the usage of the structure. Given that the fyke nets retained a number of juvenile specimens of fish, including those of commercial species, it confirms the assumption set out in the EIA Report that the structure offers shelter for juvenile fish. However, based on the small number of individuals identified (recognising that the results provide a snapshot only), the value of the habitat as a shelter for juvenile fish may be relatively low.

4.2.2 Updates to River Tees upstream fish counts

The EIA Report presented the counts of upstream salmonid movements between the beginning of 2012 and June 2020, as taken from the Environment Agency's electronic fish counter at the Tees Barrage. The counts indicated that peak upstream movements occurred in the summer months, notably July and August, with the lowest number of movements generally in the months of December to March. For completeness, the electronic counts between June 2020 to January 2021 have been reviewed as part of this supplementary report to assess whether there were any changes in the seasonal trends. Peak counts in 2020 were again in July (74 upstream movements) and August (114 upstream movements). Since then, numbers reduced, with counts of 6 and 0 in December 2020 and January 2021 respectively. This aligns with the information presented in the EIA Report.

4.3 Supplementary assessment

Table 4.3 provides a summary of the significance of residual impacts on fish and shellfish resources that were assessed in the EIA Report, and describes the rationale for the updated assessment of impacts based on the supplementary data set out in Section 4.2 and 4.3. Cross reference has been made to the information presented in Section 3 and 4 when reviewing the previously reported impacts.

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Table 4.3 ***Review of the conclusions presented in the EIA Report regarding fish and shellfish resources in light of the supplementary data***

Impact	Impact significance in EIA Report	Significance of residual impact in EIA Report	Impact significance based on the supplementary data	Rationale
	Construction phase			
Changes in marine water quality	Moderate	Minor adverse	Minor adverse	The supplementary data presented in Section 4.2 and 4.3 reaffirms the baseline data that was used when assessing impacts in the EIA Report. Specifically, the site-specific survey results provide further evidence of the dominant fish species within the Tees, and the presence of juveniles underneath the existing South Bank Wharf. The surveys did not indicate any unforeseen sensitivities not considered in the EIA Report. In addition, as reported in Section 2 of this report, the potential impacts to water quality remain unchanged from those detailed in the EIA Report following review of the site-specific sediment quality data. As such, the conclusion presented in the EIA Report remains valid.
Entrainment of fish and fish eggs	Negligible	Negligible	Negligible	The negligible impact significant reported in the EIA Report was based on the fact that mobile individuals would temporarily relocate due to the presence / noise of the dredge head, minimising the risk of entrainment. The scope of the supplementary surveys reported in Section 4.2 and 4.3 was agreed with the Environment Agency in advance, and did not specifically target fish eggs / plankton. No changes to the conclusions presented in the EIA Report are therefore required with regard to this impact.
Underwater noise from dredging and land-based piling	Minor adverse (dredging); negligible (piling)	Minor adverse (dredging); negligible (piling)	Minor adverse (dredging); negligible (piling)	Based on the information presented in Section 4.3.2, there is no requirement to amend the previously reported trends of fish migrations within the estuary. The site-specific survey work undertaken and reported in Section 4.2 and 4.3 confirms that the dominant species present in the Tees estuary remain unchanged to those reported in the EIA Report. It is therefore concluded that there is no reason to amend the significance of this potential impact.
Direct loss / alteration of habitat	Moderate adverse (loss of sheltering / nursery habitat for juvenile fish)	Minor adverse	Minor adverse	Loss of habitat was considered in the EIA Report with specific regard to the removal of the existing wharf structure and adjacent intertidal area. In lieu of available data at that time, the assessment of impact significance was based on an assumption that the existing wharf structure was of value to sheltering juvenile fish. Given that the supplementary fyke net survey confirms this assumption (a low number of juvenile species was recorded) and did not identify any unforeseen sensitivities which were not previously considered, the conclusion set out in the EIA Report with regard to loss of habitat remains valid.
Impact	**Operational phase**			
Noise disturbance from increased vessel traffic	Negligible	Negligible	Negligible	The findings of site-specific surveys presented in Section 4.2 and 4.3 reaffirmed the baseline data that was used when assessing this impact in the EIA Report. The site-specific surveys did not indicate any unforeseen sensitivities that were not considered in the EIA Report. As such, the conclusions presented in the EIA Report remain valid.
Impacts from quayside lighting	Negligible	Negligible	Negligible	

4.4 Summary

Given that the findings of the site-specific surveys align with the baseline environment set out in the EIA Report and did not identify any new sensitivities that were previously unforeseen (e.g. presence of previously unrecorded species of conservation or ecological concern in the estuary), the conclusions of the assessment set out in the EIA Report are considered to remain valid.

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5 ORNITHOLOGY

5.1 Introduction

The ornithological assessment presented in the EIA Report was, in part, informed by an estuarine bird survey undertaken within the proposed scheme footprint and the adjacent North Tees Mudflat. The survey consisted of twice-monthly bird counts at both high and low tide at four sectors (Figure 5.1).

The purpose of the survey was to determine waterbird / seabird numbers between July 2020 and March 2021, inclusive. At the time the EIA Report was produced, data were available from survey visits up to and including September 2020. In the absence of counts from October 2020 onward, and given that existing information from Wetland Bird Survey (WeBS) low tide counts was relatively old, the EIA was undertaken following the precautionary assumption that, during wintering months (i.e. October to March), the North Tees Mudflat supports waterbirds, including non-breeding features of the Teesmouth and Cleveland Coast Special Protection Area (SPA) and Ramsar site.

Data are now available for all counts from the 2020/21 survey period. This section of the report presents the data from the main overwintering / passage period (i.e. counts from survey visits between October 2021 and March 2021, inclusive) and reviews the conclusions of the EIA regarding non-breeding waterbirds. As the new data are from the 2020/21 non-breeding season, and all data from the 2020 breeding season were considered in the EIA, the conclusions of the EIA regarding breeding birds are not revisited.

5.1.1 Summary of baseline set out in the EIA Report

Based on the survey data available at the time the EIA Report was produced, it was concluded that the intertidal areas adjacent to the proposed scheme footprint (i.e. North Tees Mudflat) appeared to provide important foraging opportunities for non-breeding waterbirds at low tide. Species that the North Tees Mudflat supported included a notable population of redshank (a qualifying feature of the Teesmouth and Cleveland Coast SPA / Ramsar site and underpinning Site of Special Scientific Interest (SSSI)), and lapwing (a component species of the SPA / Ramsar site and SSSI assemblage). At high tide, when the intertidal areas are submerged, waterbird numbers were considerably lower.

Bird usage of habitat at South Bank and the existing wharf structure during the surveyed period appeared to be very low at both high and low tide, indicating that this habitat is of comparatively low value.

5.2 Supplementary data

5.2.1 Methodology

The scope of the surveys was agreed with Natural England in June 2020 and comprised two low tide and two high tide counts each month from August 2020 to March 2021 at each of the following four sectors (see Figure 5.1):

- Sector 1: South Bank Wharf (i.e. the site of the timber quay demolition and new quay construction, plus riverbank habitat at South Bank).
- Sector 2: the main river channel adjacent to the site of the proposed quay (not including intertidal sections).
- Sector 3: North Tees Mudflat (north).
- Sector 4: North Tees Mudflat (south).

Figure 5.1 **Areas subject to bird survey from August 2020 to March 2021 (VP – vantage point)**

Single surveys at both high tide and low tide were undertaken during the second half of July 2020. During each survey visit, a surveyor counted waterbird numbers from vantage points at South Bank that allowed full coverage of all sectors.

At total of 34 survey visits were made between 14 July 2020 and 24 March 2021, comprising 17 high water and 17 low water visits. During the low tide survey visits, two counts were undertaken, one during the period -1.5 hrs to -0.5 hrs in relation to low water and one during the period -0.5 hrs to +0.5 hrs in relation to low water. During the high tide survey visits, one single count was undertaken during the period -0.5 hrs to +0.5 hrs in relation to high water. The survey programme covered different times of day, with a focus on the periods after dawn and before dusk. All waterbirds in the sectors were recorded, including terns but not including gulls.

From the survey visit on 22 September 2020 onwards, birds seen in Sector 1 (i.e. the riverbank / intertidal zone and artificial structures at South Bank) were defined in two ways: i) birds observed using the existing wharf structure; and ii) birds observed using the South Bank riverbank / intertidal zone.

5.2.2 Survey results

The data from the site-specific surveys, which include the data used in the EIA Report plus the data from the 2020/21 overwintering period (i.e. September 2020 to March 2021), have been presented in Appendix 4 and are summarised in this section.

Peak high tide and low tide counts over the survey period (July 2020 to March 2021) are provided in Table 5.1 and Table 5.2. In general, greater species richness and abundance was recorded during the low tide counts, driven by the birds present in Sectors 3 and 4 (i.e. those on the North Tees Mudflat). Where cells are highlighted in red, this indicates that the peak count exceeds 1% of the Tees estuary population for that species, based on the latest WeBS 5-year peak mean (2014/15 to 2018/19).

Table 5.1 High tide peak counts at Sectors 1 -4, July 2020 to March 2021 inclusive

Species	WeBS peak mean	Peak count per sector (as a % of WeBS peak mean)			
		Sector 1 (South Bank Wharf and riverbank)	Sector 2 (River Tees)	Sector 3 (North Tees Mudflat north)	Sector 4 (North Tees Mudflat south)
Cormorant	360	1 (0.3%) Aug, Sep	16 (4.4%) Jul	1 (0.3%) Aug, Nov, Jan	6 (1.7%) Aug
Curlew	797	2 (0.3%) Sep, Dec, Jan	0	3 (0.4%) Aug	0
Gadwall	695	2 (0.3%) Feb	2 (0.3%) Jan	2 (0.3%) Jan	21 (3.0%) Jan
Grey heron	45	2 (4.4%) Sep	0	10 (22.2%) Aug	7 (15.6%) Jul
Mallard	354	0	0	2 (0.6%) Dec, Feb	0
Oystercatcher	1,161	3 (0.3%) Feb	0	4 (0.3%) Aug	2 (0.2%) Aug, Mar
Redshank	841	7 (0.8%) Oct	0	26 (3.1%) Nov	6 (0.7%) Mar
Shelduck	458	8 (1.7%) Mar	2 (0.4%) Jan, Mar	13 (2.8%) Mar	19 (4.1%) Jan
Turnstone	165	2 (1.2%) Nov, Feb	0	3 (1.8%) Sep	0
Assemblage	**19,141**	**10 (0.1%) Sep**	**16 (0.1%) Jul**	**27 (0.1%) Nov**	**41 (0.2%) Jan**

Table 5.2 Low tide peak counts at Sectors 1-4, July 2020 to March 2021 inclusive

Species	WeBS peak mean	Peak count per sector (as a % of WeBS peak mean)			
		Sector 1 (South Bank Wharf and riverbank)	**Sector 2 (River Tees)**	**Sector 3 (North Tees Mudflat north)**	**Sector 4 (North Tees Mudflat south)**
Bar-tailed godwit	50	0	0	0	1 (2.0%) Sep
Cormorant	360	5 (1.4%) Aug	6 (1.7%) Mar	8 (2.2%) Dec	12 (3.3%) Nov
Curlew	797	6 (0.8%) Oct	0	26 (3.3%) Nov	16 (2.0%) Aug
Dunlin	1,056	0	0	9 (0.9%) Jan	9 (0.9%) Jan
Gadwall	695	2 (0.3%) Jan	8 (1.2%) Jan	34 (4.9%) Jan	18 (2.6%) Jan
Grey heron	45	2 (4.4%) Sep, Dec	0	3 (6.7%) Oct, Dec	3 (6.7%) Jul
Grey plover	163	0	0	1 (0.6%) Dec	0
Lapwing	3,669	0	0	3 (0.1%) Oct	99 (2.7%) Dec
Little egret	61	0	0	1 (1.6%) Aug, Sep	1 (1.6%) Jul
Mallard	354	3 (0.8%) Mar	0	3 (0.8%) Mar	0
Oystercatcher	1,161	3 (0.3%) Jan, Mar	0	5 (0.4%) Jul, Mar	4 (0.3%) Mar
Redshank	841	4 (0.5%) Dec	0	35 (4.1%) Oct, Dec	68 (8.1%) Nov
Ringed plover	255	0	0	0	1 (0.4%) Feb
Shelduck	458	3 (0.7%) Mar	11 (2.4%) Jan	14 (3.1%) Feb	51 (11.1%) Jan, Feb
Turnstone	165	1 (0.6%) Nov	0	9 (5.5%) Sep	12 (7.3%) Aug

Species	WeBS peak mean	Peak count per sector (as a % of WeBS peak mean)			
		Sector 1 (South Bank Wharf and riverbank)	Sector 2 (River Tees)	Sector 3 (North Tees Mudflat north)	Sector 4 (North Tees Mudflat south)
Assemblage	19,141	9 (0.1%) Oct	12 (0.1%) Jan	78 (0.4%) Jan	187 (0.9%) Jan

5.2.2.1 High tide surveys

The data from the high tide counts (summarised in Table 5.1) indicate that, even during the wintering period, overall bird numbers using the four sectors is insignificant in terms of the Tees estuary population – cumulatively, the peak counts of the assemblage in each sector represent less than 1% of the Tees estuary population, based on the WeBS 2014/15 to 2018/19 mean peak.

Of the nine species recorded, one (redshank) is a qualifying feature of the SPA / Ramsar site and SSSI and one (gadwall) is a major component species of the qualifying assemblage. The peak count of redshank (across the four sectors combined) in a single month was 33 roosting individuals during a count in November 2020, which represented 2.0% of the SPA reference population and 3.9% of the Tees estuary WeBS mean peak. The peak count of gadwall was 23 during a January 2021 count, which represented 5.4% of the SPA reference population and 3.3% of the Tees estuary WeBS mean peak.

Sector 1 (South Bank quay and riverbank)

Eight species were recorded in Sector 1 (South Bank Quay and riverbank) during the survey period. Three species (grey heron, shelduck and turnstone) were present in numbers, albeit low numbers, that exceeded 1% of the Tees estuary population: grey heron and turnstone had a peak count of two, and shelduck had a peak count of 8 in March 2021 (although this was the only survey visit during which shelduck were recorded in the sector). In general, waterbirds recorded in Sector 1 at high tide tended to be present on the riverbank, although turnstone, grey heron, curlew and oystercatcher were all recorded on the existing wharf structure over the course of the survey period.

Sector 2 (River Tees)

Three species were recorded roosting and/or foraging on the water at high tide during the survey period, namely cormorant, gadwall and shelduck. Of these, only cormorant was recorded in numbers exceeding 1% of the Tees estuary WeBS mean peak, notably during the period between July and October 2020.

Sector 3 and Sector 4 (North Tees Mudflat north and south)

Even at high tide, the highest numbers of birds were recorded from the two North Tees Mudflats sectors, particularly Sector 4 (the upstream part of the mudflat), which is the furthest sector from the proposed scheme footprint. These sectors were the most species-rich, with nine species recorded during the high tide surveys in one or both of the North Tees Mudflats sectors during the survey period. Peak counts of six species (cormorant, gadwall, grey heron, redshank, shelduck and turnstone) exceeded 1% of the Tees estuary WeBS mean peak.

5.2.2.2 Low tide surveys

During low tide, the data (summarised in Table 5.2) indicate that significant numbers of waterbirds use the survey area in the context of the Tees estuary population (based on the WeBS 2014/15 to 2018/19 mean peak). The peak assemblage count of 280 individuals across the four sectors, during a count in January 2021, represented 1.5% of the Tees estuary population and 1.1% of the SPA reference population.

Considering the sectors separately, peak assemblage counts were in October 2020 (Sector 1) and January 2021 (Sectors 2, 3 and 4). Figure 5.2 presents the monthly low tide peak counts recorded during the survey period, which illustrates the importance of the North Tees Mudflat (Sectors 3 and 4) in driving overall bird numbers and indicates that, in general, December 2020 to February 2021 are the months with highest waterbird abundance.

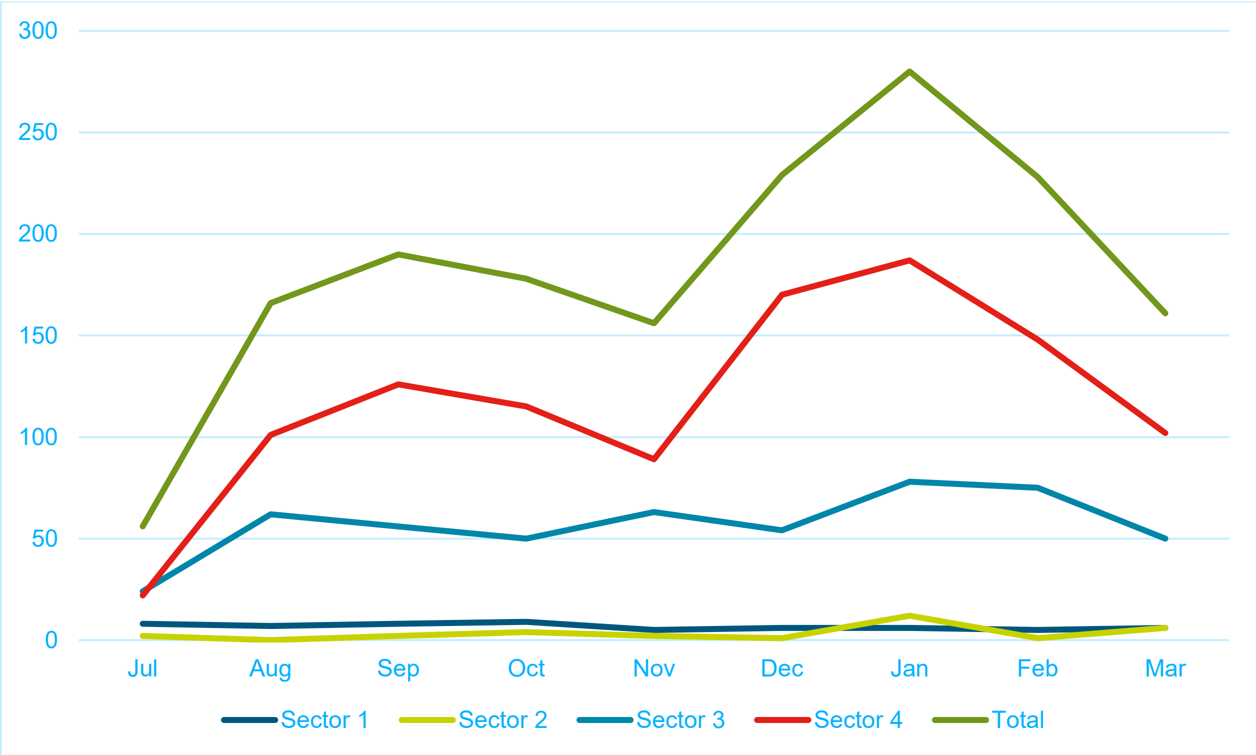

Figure 5.2 Peak monthly low tide counts of waterbirds over the period July 2020 to March 2021

Of the fourteen species recorded at low tide during the survey period, one (redshank) is a qualifying feature of the SPA / Ramsar site and SSSI, and two species (lapwing and gadwall) are listed as component species of the qualifying assemblage. While the peak count of redshank across the four sectors in a single month was 98 individuals (December 2020) (which represented 5.9% of the SPA reference population and 11.7% of the Tees estuary population), similarly high numbers were recorded at low tide each month between August 2020 and March 2021. The peak count of lapwing was 99 individuals (December 2020), which represented 2.7% of the Tees estuary population. The peak count of gadwall was 52 individuals, during a January 2021 count, which represented 7.5% of the Tees estuary population.

Sector 1 (South Bank quay and riverbank)

Nine species were recorded in Sector 1 (South Bank Quay and riverbank), of which two (cormorant and grey heron) were present in numbers that exceeded 1% of the Tees estuary population. In almost all instances, waterbirds recorded in Sector 1 at low tide tended to be present on the riverbank, with very few recorded on the existing wharf structure over the course of the survey period.

Sector 2 (River Tees)

Three species were recorded in the main river channel at low tide, namely cormorant, gadwall and shelduck, which were roosting and / or on foraging from the surface of the water. Peak counts of all three marginally exceeded 1% of the Tees estuary population, although gadwall and shelduck were only present in the sector during the January 2021 counts (they were absent throughout the rest of the survey period).

Sector 3 and Sector 4 (North Tees Mudflat north and south)

At low tide, by far the greatest abundance and species richness was recorded from North Tees Mudflat (compare peak assemblages of 78 and 187 at Sectors 3 and 4, respectively, with a peak assemblage of 9 at Sector 1 and 12 at Sector 2). A total of fifteen species were recorded in the two sectors, of which the peak counts of ten species (bar-tailed godwit, cormorant, curlew, gadwall, grey heron, lapwing, little egret, redshank, shelduck and turnstone) exceeded 1% of the Tees estuary population. In both sectors, peak counts for most species were recorded during the traditional overwintering season (i.e. between October and March).

5.2.3 Summary of new data and comparison with that reported in the EIA Report

In summary, the data from the surveys undertaken since the EIA Report provides evidence to support the following key points:

- In general, non-breeding waterbird populations within the surveyed area are significant (in terms of the wider Tees estuary population) at low tide but are not significant at high tide.
- North Tees Mudflat (i.e. Sectors 3 and 4) is considerably more important for non-breeding waterbirds than the river channel and the habitats within the proposed scheme footprint at South Bank (i.e. Sectors 1 and 2).
- Bird numbers at low tide peaked during the overwintering period, with the assemblage in each sector highest during the months of December 2020 to February 2021.
- SPA / Ramsar site qualifying features, namely redshank, and assemblage components use the North Tees Mudflat in high numbers at low tide (i.e. greater than 1% of the SPA reference population) throughout the overwintering period.

The above aligns with the baseline detailed in the EIA Report, in that it illustrates preferential usage of the North Tees Mudflat rather than the habitats within the proposed scheme footprint at South Bank, and it indicates the importance of the North Tees Mudflat at low tide. The EIA Report, which lacked data from recent site-specific surveys over the winter months, based all assessments on an assumption (agreed at the time with Natural England) that the North Tees Mudflat would be used by high numbers of overwintering waterbirds from the Tees estuary assemblage. The data reported above provide clear evidence that this is the case, therefore the assessments based on this assumption remain valid.

In terms of high value species (i.e. SPA / Ramsar site qualifying features), the only species recorded was redshank (SPA / Ramsar site qualifying feature). This was recorded in the summer surveys and was reported in the EIA baseline, hence there are no previously unconsidered sensitivities present within the general area.

5.3 Supplementary assessment of impacts on overwintering waterbirds

Table 5.3 provides a summary of the significance of impacts on non-breeding waterbirds that were assessed in the EIA Report, and describes the rationale for the updated assessment of impacts based on the supplementary data set out in Section 5.2.

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Table 5.3 Review of the conclusions of the EIA Report regarding overwintering waterbird receptors based on supplementary data

Impact	Impact significance in EIA Report	Significance of residual impact in EIA Report	Significance based on the supplementary data	Rationale
Construction phase				
Loss of supporting habitat due to dredging / excavation and demolition works	Minor adverse	Minor adverse	Minor adverse	The impact significance reported in the EIA Report was based on the fact that the habitat anticipated to be lost, namely the intertidal area at South Bank and the existing wharf structure itself, was considered to be of low importance to waterbirds in the Tees, with ample preferential habitat available elsewhere at North Tees Mudflat and other nearby sites, such as Vopak foreshore, Bran Sands, Seal Sands and Dabholm Gut. The overwintering surveys undertaken in 2020/2021 reassert this conclusion since there is now site-specific evidence that Sector 1 (i.e. that within which the proposed new quay is located) is of low importance to non-breeding waterbirds, especially when compared with the use of the North Tees Mudflats by the same species. As such, the impact significance detailed in the EIA Report is considered to remain valid.
Impacts on feeding and food resources due to reductions in water quality	Minor adverse	Minor adverse	Minor adverse	The assessment of this impact reported in the EIA Report focused on the foraging and feeding capability of tern species, given that the surveys available at the time indicated little usage of the river channel (i.e. Sector 2) by other species. The overwintering surveys have provided further evidence that there is not significant usage of the water column by foraging waterbirds, therefore it is considered that foraging terns remain the key receptor when considering this impact. Since the new surveys were undertaken during the overwintering period, there is no additional information on the usage of the area by terns, therefore the impact significance detailed in the EIA Report is unchanged.
Effects of deposition on intertidal food resources	Negligible	Negligible	Negligible	Given that numerical modelling indicated no measurable deposition at North Tees Mudflat, where waterbirds would principally forage, it was concluded that there would be a negligible impact on food resources. Whilst the data from surveys presented in Section 5.2 provide evidence that the North Tees Mudflat offers foraging opportunities for a substantial number of waterbirds, this would have no bearing on the assessment drawn from the modelling (as there is predicted to be no measurable deposition on North Tees Mudflat). It is therefore concluded that the negligible significance impact reported in the EIA Report remains valid.
Construction phase disturbances	Moderate adverse	Minor adverse	Minor adverse	In the absence of up-to-date site-specific low tide count data at the time of writing the EIA Report, the assessment of noise and visual disturbance impacts on waterbirds at North Tees Mudflat was based upon the assumption – agreed with Natural England – that the mudflat supports a number (in terms of the Tees estuary population) of foraging and / or roosting waterbirds during the non-breeding season. With site-specific low tide survey data now available for North Tees Mudflat on a twice-monthly basis over the wintering period, the evidence presented in Section 5.2 supports this assumption, given that the North Tees Mudflat typically hosted more than 1% of the Tees estuary population during the survey period (including SPA / Ramsar site qualifying features and assemblage components). As

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Impact	Impact significance in EIA Report	Significance of residual impact in EIA Report	Significance based on the supplementary data	Rationale
Construction phase				
				such, the assumption used in the EIA Report is considered appropriate and accurate, and hence the conclusions drawn in the EIA Report remain valid.
Operation phase				
Noise disturbances	Negligible	Negligible	Negligible	Airborne noise modelling undertaken to support the EIA indicated that the L_{Amax} levels at North Tees Mudflat during the operation phase would be classified as 'low to moderate' stimuli by Cutts *et al.* (2009 and 2013) and would be similar in type and level to those typical of the wider environment in the Tees estuary. Again, the assessment was based on the assumption that the North Tees Mudflat supports a number of wintering waterbirds. As with construction phase impacts, the data presented in Section 5.2 provide evidence that the assumption used in the EIA Report is appropriate and accurate, and hence the conclusions drawn in the EIA Report remain valid.
Disturbance due to increased vessel activity	Negligible	Negligible	Negligible	The impact significance detailed in the EIA Report was based on the fact that the magnitude of vessel traffic increase would be very low in the context of existing vessel activity in the Tees. The supplementary data provided in this report does not alter the expected magnitude of impact. Given that the assessment detailed in the EIA Report was based on the assumption that the North Tees Mudflat supports non-breeding waterbirds, the impact significance detailed in the EIA Report remains valid.
Effects of artificial lighting	Negligible	Negligible	Negligible	The negligible impact significance detailed in the EIA Report was based around the fact that the habitats at South Bank are of low importance compared to those at North Tees Mudflat, which would be largely unaffected by light spill during the operational phase. The new data presented in Section 5.2 support this conclusion, given that the number of waterbirds in Sectors 1 and 2 are low (each less than 0.1% of the Tees estuary assemblage). Furthermore, some waterbirds may use artificial light sources to extend feeding opportunities in darkness (e.g. Dwyer *et al.*, 2013), therefore it may actively increase feeding opportunities in an area with otherwise low foraging activity. Given the above, the negligible impact significance reported in the EIA Report remains valid.
Effects on intertidal habitats due to hydrodynamic changes	Negligible	Negligible	Negligible	The bird survey data presented in Section 5.2 does not alter the outputs of predictive modelling used to inform the assessment of impacts to intertidal habitat. Given that all assessments were based on the assumption that the North Tees Mudflat supports non-breeding waterbirds, the negligible impact significance detailed in the EIA Report remains valid.

5.4 Summary

The supplementary data aligns with the baseline information set out in the EIA Report by providing evidence from (twice-monthly) surveys over a complete wintering season that the North Tees Mudflat supports a number of non-breeding waterbirds, particularly at low tide, including SPA features such as redshank and assemblage components. Furthermore, there was no indication of other high value species (e.g. SPA qualifying features) other than those already identified within the EIA Report. As such, the conclusions of the assessment in the EIA Report are considered to remain valid.

6 WATER FRAMEWORK DIRECTIVE

The WFD Compliance Assessment presented in the EIA Report (Royal HaskoningDHV, 2020) was informed by data available at the time of writing, particularly that available for the NGCT scheme. Site-specific data is now available for the following WFD compliance parameters:

- Sediment data quality to inform the water quality assessment (Section 2).
- Marine ecology (including benthic ecology grabs and trawls) to inform the biology assessment (Section 3).
- Fish data to inform the biology assessment (Section 4).

Full details of the findings of these surveys are presented in the individual sections on each topic and, therefore, only a summary is provided here. Conclusions are presented regarding whether the findings of the WFD Compliance Assessment remain valid.

6.1 Water quality assessment

The site-specific sediment quality data is presented in Section 2 (and Appendix 1) of this report alongside an updated water quality assessment using the SeDiChem tool (Appendix 2) provided by the Environment Agency. Given that Section 2 of this report considers the sediment quality data in the context of WFD EQSs, no further information / assessment is presented here.

In summary, the assessment in Section 2 concluded that whilst there is a risk to EQS for several PAH parameters, the short term nature of the sediment plume and limited spatial extent would limit any EQS exceedances to only short periods of time and are likely to be contained within the vicinity of the dredging vessel(s). This was in line with the findings of the original WFD Compliance Assessment (Royal HaskoningDHV, 2020).

The updated assessment presented in Section 2 also confirmed that there are unlikely to be any risks to trace metal EQS which were highlighted as a possible risk in the WFD Compliance Assessment presented in the EIA Report (Royal HaskoningDHV, 2020). With regard to PBDEs, the data did not indicate that the sediment concentrations that were likely to exceed EQS. As a consequence, a non-temporary deterioration in the status classification of the water body is not predicted.

6.2 Marine ecology assessment

The site-specific ecology data is presented in Section 3 and Appendix 3 of this report. In summary, the site-specific benthic ecological survey results are not considered to be materially different to the those found within the 2019 NGCT survey, which the WFD Compliance Assessment presented in the EIA Report was based on. There are some differences in the characteristic species and biotopes recorded, but there is minimal difference in the sensitivity of characterising receptors (species and biotopes) (see Section 3).

As a result, the conclusions in the WFD Compliance Assessment presented in the EIA Report (Royal HaskoningDHV, 2020) relating to the risks scoped in remain valid (i.e. whilst there may be a temporary deterioration in species composition and numbers following dredging, it is predicted that the sediment communities would recover quickly). A non-temporary deterioration in status classification of benthic invertebrates in the WFD water body is not, therefore, predicted.

Royal HaskoningDHV

6.3 Fish assessment

The site-specific fish data are presented in Section 4 of this report. In summary, the results of the site-specific trawls reflect the results of the 2014 and 2019 trawls described in the EIA Report (Royal HaskoningDHV, 2020). In lieu of any existing data regarding the value of the habitat underneath South Bank Wharf (prior to completion of the site-specific surveys), the assessment in the EIA Report was undertaken on a worst-case basis whereby the structure would provide habitat for fish species.

A site-specific fyke net survey was undertaken as part of the survey work undertaken in 2020. The data confirm that the structure offers shelter for juvenile fish; however, given the small number of individuals identified the value of the habitat as a shelter for juvenile fish is considered to be relatively low (see Section 4).

Given that the site-specific surveys did not identify significant numbers of juveniles sheltering, the conclusions of the WFD Compliance Assessment set out in the EIA Report are considered to remain valid (i.e. that a non-temporary deterioration in fish species which could lead to a deterioration in classification status is not predicted).

6.4 INNS

INNS were recorded in the 2020 site-specific surveys; however, due to the low numbers, it is considered that the proposed scheme is not likely to result in a greater risk of spreading INNS than that already assessed within the EIA Report (Royal HaskoningDHV, 2020). As such, the assessment and mitigation proposed within the EIA Report remain valid and no update to the assessment is required.

7 CONCLUSIONS

A marine licence application was submitted to the MMO in November 2020 for the proposed South Bank Quay scheme. It was recognised within the supporting EIA Report that site-specific survey data was not available at the time the application was submitted.

The site-specific surveys have now been undertaken, and have been fully reported within Appendix 1 – 4. The survey results have been reviewed and the impact assessment updated where required within this report.

As detailed in Section 2 to 6, the results of the site-specific surveys have not materially altered the findings of the previously reported impact assessment. The only additional mitigation measure required following completion of the additional assessment is use of an enclosed grab to dredge material in the vicinity of BH34 (located within the proposed berth pocket). No significant environmental impacts are predicted.

Royal HaskoningDHV

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Appendix 1

Sediment quality data

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00825
Issue Version	1
Customer	Fugro Geoservices Ltd, Fugro House, Hithercroft Road, Wallingford, Oxfordshire, OX10 9RB
Customer Reference	MMO Marine Sediment Analysis
Date Sampled	06-08/11/2020
Date Received	10-Nov-20
Date Reported	04-Mar-21
Condition of samples	Frozen Satisfactory

Authorised by: Marya Hubbard

Position: Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	pH Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	SOCOTEC Env Chem*	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	No	MMO	MMO	MMO	MMO	MMO
				45mm	**31.5mm**	**22.4mm**	**16mm**	**11.2mm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**pH Units**	**-5.5**	**-5.0**	**-4.5**	**-4.0**	**-3.5**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	8.1	0.00	0.00	0.00	0.00	0.00
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	8.2	0.00	0.00	0.00	0.00	0.00
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	7.7	0.00	0.00	0.00	0.00	0.00
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	8.3	0.00	0.00	0.00	0.00	0.00
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	8.8	0.00	0.00	0.00	0.00	0.00
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	7.8	0.00	0.00	0.00	0.00	0.00
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	8.2	0.00	0.00	0.00	0.00	0.00
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	8.8	0.00	0.00	0.00	0.94	4.83
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	9.2	0.00	0.00	0.00	3.28	2.98
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	7.8	0.00	0.00	0.00	0.00	0.00
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	8.7	0.00	0.00	8.72	0.00	5.68
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	8.0	0.00	0.00	0.00	0.00	0.00
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	8.6	0.00	0.00	9.07	0.00	0.00
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	8.5	0.00	0.00	0.00	0.00	0.00
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	7.9	0.00	0.00	0.00	0.00	0.00
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	8.3	0.00	0.00	0.00	0.00	0.00
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	8.0	0.00	0.00	0.00	0.00	0.00
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	8.1	0.00	0.00	0.00	0.00	0.00
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	8.2	0.00	0.00	0.00	1.87	0.43
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	9.0	0.00	0.00	0.00	6.59	3.09

* See Report Notes

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SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			8mm	5.6mm	4mm	2.8mm	2mm	1.4mm
Client Reference:	SOCOTEC Ref:	Matrix	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	2.32	2.56	2.63	2.04	1.63	1.52
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	1.44	2.38	1.82	1.79	1.54	1.69
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	1.25	2.24	2.11	2.59	2.01	1.93
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	4.53	1.52	0.98	1.28	1.19	1.26
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	0.00	0.00	0.00	0.00	0.00	1.44
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	2.57	0.85	0.69	1.53	1.56	1.86
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	1.30	2.07	2.83	2.62	2.49	2.27

* See Report Notes

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Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			1mm	707µm	500µm	353.6µm	250µm	176.8µm
Client Reference:	SOCOTEC Ref:	Matrix	0.0	0.5	1.0	1.5	2.0	2.5
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	0.00	0.00	0.00	0.00	0.00	0.71
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	0.00	0.00	0.00	0.05	2.64	6.51
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	0.00	0.00	0.00	0.00	0.00	0.49
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	0.00	0.00	0.00	0.00	0.00	0.19
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	0.90	3.47	1.07	2.99	17.78	21.83
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	0.00	0.00	0.00	0.00	0.00	0.99
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	0.00	0.00	0.00	0.00	0.00	0.30
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	1.26	1.65	9.37	20.86	19.31	12.54
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	1.52	3.54	3.57	6.92	8.70	7.19
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	0.00	0.00	0.00	0.00	0.24	2.05
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	1.67	0.00	0.00	0.04	0.86	2.38
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	0.00	0.00	0.00	0.00	0.00	0.47
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	1.01	0.09	3.12	3.46	3.72	6.04
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	2.10	1.02	5.97	28.48	35.18	13.11
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	0.00	0.00	0.00	0.00	0.00	0.45
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	0.00	0.00	0.00	0.00	0.07	0.98
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	0.00	0.00	0.00	0.00	0.01	0.95
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	0.00	0.00	0.00	0.00	0.01	1.19
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	1.44	0.10	2.60	3.27	1.72	4.67
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	1.78	0.94	3.80	3.84	2.25	6.30

* See Report Notes

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SOCOTEC

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Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			125µm	88.39µm	63µm	44.2µm	31.3µm	22.1µm
Client Reference:	SOCOTEC Ref:	Matrix	3.0	3.5	4.0	4.5	5.0	5.5
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	4.06	0.93	1.47	7.47	8.89	10.22
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	5.13	2.30	0.21	3.21	6.70	7.72
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	4.17	1.54	0.89	7.13	9.42	10.75
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	3.19	3.81	0.62	3.23	7.87	9.56
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	9.83	2.23	0.42	0.91	2.36	3.06
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	6.00	1.92	0.94	6.83	8.57	9.78
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	3.29	0.91	0.30	5.08	8.15	9.35
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	5.80	1.88	0.61	1.01	0.58	0.91
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	7.80	4.11	2.10	3.71	3.21	3.56
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	5.46	1.46	0.64	6.23	8.05	9.53
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	3.36	2.70	0.48	1.38	3.65	5.09
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	4.46	2.89	0.23	3.83	7.96	9.44
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	5.91	4.62	1.37	2.96	3.97	4.38
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	4.14	1.05	0.43	0.72	0.49	0.65
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	2.85	1.82	0.65	6.00	9.20	10.99
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	4.46	1.93	0.44	5.16	8.09	9.15
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	3.83	1.22	1.06	6.70	8.41	9.96
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	4.71	1.04	0.44	5.48	7.97	9.26
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	6.19	3.93	0.57	3.92	5.10	6.06
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	4.79	3.78	1.84	1.98	3.71	4.26

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			15.6μm	11μm	7.8μm	5.5μm	3.9μm	2.75μm
Client Reference:	SOCOTEC Ref:	Matrix	6.0	6.5	7.0	7.5	8.0	8.5
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	10.40	10.01	10.00	9.41	7.49	5.08
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	7.84	8.28	8.99	8.94	7.61	5.62
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	10.39	10.23	10.16	9.19	7.16	4.91
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	9.12	10.41	9.76	8.80	7.57	5.93
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	2.96	3.80	4.12	4.12	3.68	2.81
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	9.37	9.78	9.66	8.77	7.04	5.04
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	9.65	9.84	10.66	10.43	8.56	6.02
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	0.55	0.85	0.71	0.63	0.62	0.45
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	3.21	3.41	3.34	3.06	2.53	1.86
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	9.44	9.38	9.78	9.28	7.46	5.20
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	5.37	6.48	6.60	6.04	4.94	3.65
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	9.03	10.04	10.44	9.79	8.10	5.96
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	4.18	5.00	4.70	4.21	3.60	2.79
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	0.50	0.62	0.65	0.64	0.58	0.42
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	9.73	10.23	9.78	8.76	7.14	5.30
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	9.11	9.34	10.04	9.76	8.09	5.81
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	9.78	9.70	9.97	9.46	7.63	5.34
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	9.49	9.57	10.10	9.74	7.96	5.61
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	6.02	6.87	7.01	6.35	5.14	3.78
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	4.19	4.98	4.57	4.06	3.49	2.74

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO
			1.95µm	1.38µm	0.98µm	0.69µm	0.49µm
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**9.0**	**9.5**	**10.0**	**10.5**	**11.0**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	3.09	2.08	1.70	1.54	1.42
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	3.91	3.01	2.53	2.17	1.88
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	3.12	2.17	1.73	1.50	1.33
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	4.31	3.31	2.72	2.30	2.01
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	2.12	1.90	1.72	1.46	1.23
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	3.36	2.41	1.94	1.68	1.50
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	3.92	2.84	2.32	2.00	1.76
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	0.34	0.40	0.39	0.29	0.18
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	1.47	1.45	1.45	1.31	1.12
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	3.42	2.52	2.07	1.78	1.58
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	2.83	2.66	2.60	2.40	2.14
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	4.05	2.92	2.30	1.93	1.67
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	2.23	2.10	2.02	1.84	1.67
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	0.33	0.35	0.36	0.29	0.20
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	3.70	2.77	2.26	1.94	1.70
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	3.93	2.94	2.37	2.00	1.77
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	3.48	2.51	2.05	1.79	1.61
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	3.69	2.70	2.24	1.96	1.77
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	2.70	2.17	1.87	1.62	1.41
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	2.19	2.01	1.85	1.62	1.43

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO
			0.34µm	0.24µm	0.17µm	0.12µm	0.09µm
Client Reference:	SOCOTEC Ref:	Matrix	11.5	12.0	12.5	13.0	13.5
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	1.25	1.03	0.76	0.54	0.33
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	1.59	1.26	0.87	0.58	0.33
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	1.15	0.94	0.69	0.49	0.30
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	1.73	1.39	0.98	0.65	0.37
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	1.05	0.84	0.60	0.40	0.23
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	1.33	1.11	0.84	0.61	0.37
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	1.52	1.22	0.85	0.57	0.32
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	0.11	0.08	0.06	0.05	0.04
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	0.93	0.74	0.54	0.39	0.23
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	1.39	1.14	0.83	0.57	0.34
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	1.86	1.54	1.16	0.84	0.52
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	1.44	1.16	0.84	0.58	0.34
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	1.52	1.31	1.00	0.72	0.44
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	0.12	0.07	0.03	0.02	0.01
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	1.48	1.21	0.88	0.62	0.37
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	1.56	1.25	0.84	0.52	0.28
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	1.41	1.16	0.85	0.60	0.36
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	1.57	1.30	0.95	0.67	0.40
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	1.22	1.02	0.78	0.58	0.36
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	1.27	1.09	0.83	0.61	0.38

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO
			0.06µm	0.04µm	<0.04µm
Client Reference:	SOCOTEC Ref:	Matrix	14.0	14.5	>14.5
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	0.13	0.02	0.00
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	0.12	0.01	0.00
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	0.12	0.01	0.00
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	0.14	0.02	0.00
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	0.08	0.01	0.00
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	0.15	0.02	0.00
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	0.12	0.01	0.00
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	0.02	0.00	0.00
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	0.09	0.01	0.00
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	0.13	0.02	0.00
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	0.20	0.02	0.00
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	0.13	0.02	0.00
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	0.17	0.02	0.00
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	0.00	0.00	0.00
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	0.15	0.02	0.00
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	0.10	0.01	0.00
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	0.14	0.02	0.00
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	0.15	0.02	0.00
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	0.15	0.02	0.00
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	0.15	0.02	0.00

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)							
		Method No	SOCOTEC Env Chem*							
		Limit of Detection	0.5	0.04	0.5	0.5	0.01	0.5	0.5	2
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	SOCOTEC Ref:	Matrix	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Mercury (Hg)	Nickel (Ni)	Lead (Pb)	Zinc (Zn)
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	23.0	0.72	57.5	63.8	0.58	32.7	142	238
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	13.8	0.37	45.8	40.9	0.37	41.9	74.7	131
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	25.2	0.43	52.6	51.6	0.47	33.4	129	185
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	23.4	2.31	165	180	1.58	32.0	177	381
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	9.4	0.20	15.8	23.1	0.17	13.8	42.2	63.4
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	23.0	0.51	52.4	55.3	0.51	29.5	153	208
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	25.1	0.91	74.8	93.7	0.92	33.2	168	281
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	4.2	0.21	9.5	13.7	0.04	11.4	13.1	47.1
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	5.1	0.19	15.1	15.5	0.02	20.0	10.3	53.2
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	23.9	0.67	59.2	67.7	0.60	31.2	150	244
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	7.4	0.30	27.5	35.9	0.09	28.3	19.6	68.1
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	21.0	0.98	78.7	100	0.88	30.6	177	312
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	5.6	0.21	20.3	18.8	0.02	24.1	14.5	59.8
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	3.2	0.13	9.0	10.6	<0.01	10.0	8.2	46.7
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	23.5	0.79	74.0	79.7	0.76	34.1	162	264
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	23.6	0.81	73.3	78.4	0.91	30.8	171	282
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	23.0	0.79	65.0	68.7	0.67	31.0	160	262
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	23.9	0.85	71.1	77.8	0.77	33.5	184	292
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	11.0	0.26	32.8	36.3	0.20	25.4	65.1	110
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	7.3	0.18	24.3	24.4	<0.01	29.0	15.1	63.0
Certified Reference Material SETOC 774 (% Recovery)			99	99	91.0	99	95	96	97	100
QC Blank			<0.5	<0.04	<0.5	<0.5	<0.01	<0.5	<0.5	<2

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	0.014	<0.005
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	0.013	<0.005
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	0.024	<0.005
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	0.038	<0.005
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	<0.005	<0.005
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	0.014	<0.005
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	0.036	<0.005
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	<0.005	<0.005
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	<0.005	<0.005
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	0.019	<0.005
Certified Reference Material BCR-646 (% Recovery)			96	80
QC Blank			<0.001	<0.001

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	<0.005	0.020
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	0.048	0.030
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	0.008	0.011
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	0.006	0.017
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	0.031	0.030
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	0.065	0.043
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	0.027	0.016
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	0.036	0.025
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	0.009	0.015
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	<0.005	0.020
Certified Reference Material BCR-646 (% Recovery)			102	83
QC Blank			<0.001	<0.001

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	274	227	373	823	835	800
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	230	161	306	583	633	623
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	219	194	320	806	798	798
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	796	806	882	1630	1440	1420
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	117	83.8	326	676	653	558
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	331	219	350	767	805	818
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	554	353	524	1000	1060	1110
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	6.34	14.1	7.96	16.1	17.4	21.6
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	6.42	2.51	6.93	19.8	23.2	35.2
VC-07 MMO1 000-0.30	MAR00825.010	Sediment	499	300	396	759	808	818
Certified Reference Material QPH098MS (% Recovery)			86	100	95	75	77	74
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	SOCOTEC Ref:	Matrix	BENZGHIP	BEP	BKF	C1N	C1PHEN	C2N~
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	655	780	381	3480	1630	2760
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	489	601	243	2740	1310	2150
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	666	782	365	3670	1720	2840
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	1150	1420	528	7780	3300	6050
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	476	514	242	1150	908	938
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	669	778	332	3270	1540	2630
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	803	979	512	3830	1880	2960
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	31.4	33.6	5.64	97.1	91.0	85.6
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	45.8	56.6	4.69	191	171	156
VC-07 MMO1 000-0.30	MAR00825.010	Sediment	649	769	452	3400	1540	2600
Certified Reference Material QPH098MS (% Recovery)			76	74	79	100	80	110~
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N~**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	2250	753	132	1350	429	559
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	1750	563	103	948	351	413
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	2280	865	133	1330	388	541
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	4530	1320	247	2190	1220	964
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	807	674	100	1170	205	371
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	2210	738	141	1280	453	569
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	2520	989	178	1610	692	729
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	85.1	28.6	4.51	21.6	15.2	9.7
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	151	42.5	10.4	32.5	21.5	11.4
VC-07 MMO1 000-0.30	MAR00825.010	Sediment	2200	731	138	1340	569	525
Certified Reference Material QPH098MS (% Recovery)			81~	88	81	87	95	61
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	1220	240	1440	1450	214
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	1040	182	1210	1230	174
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	1260	223	1510	1300	182
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	3010	420	2980	2680	124
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	514	180	1020	1470	118
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	1160	234	1430	1400	217
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	1500	338	1780	1880	106
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	22.4	3.93	64.1	33.0	33.6
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	56.7	8.48	137	41.9	30.4
VC-07 MMO1 000-0.30	MAR00825.010	Sediment	1250	236	1470	1490	48.9
Certified Reference Material QPH098MS (% Recovery)			91	82	90	89	92~
QC Blank			<1	<1	<1	<1	<1

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For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	54.6	10.4	17.9	33.3	41.9	58.4
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	748	578	834	1320	1450	1330
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	11.4	5.75	11.1	34.4	43.0	55.5
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	2.12	2.24	1.87	4.46	5.32	6.14
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	399	320	489	1030	1080	1070
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	765	348	667	1390	1480	1340
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	406	292	402	881	975	965
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	389	281	471	1000	1030	1140
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	67.6	193	77.3	123	131	139
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	10.0	4.06	6.89	24.5	35.7	59.3
Certified Reference Material QPH098MS (% Recovery)			86	100	92	77	78	93
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BEP**	**BKF**	**C1N**	**C1PHEN**	**C2N~**
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	66.0	80.5	14.6	229	129	157
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	1040	1260	622	4700	2090	3550
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	84.1	91.5	12.1	288	208	204
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	9.51	11.1	1.93	36.3	32.9	32.2
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	830	971	472	3490	1690	2700
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	1110	1360	611	4130	2090	3300
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	759	896	482	3080	1490	2430
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	792	950	423	3430	1640	2650
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	114	135	58.3	607	330	441
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	81.7	101	10.1	257	153	152
Certified Reference Material QPH098MS (% Recovery)			80	75	86	93	76	114~
QC Blank			<1	<1	<1	<1	<1	<1

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Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N~**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	111	56.7	10.7	56.3	48.0	25.4
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	2570	1300	227	2060	905	963
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	181	65.2	12.0	59.6	34.4	22.9
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	32.9	8.97	1.41	6.65	5.12	2.69
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	2380	984	174	1760	541	740
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	2710.0	1320	240	2290	842	1020
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	2080	851	162	1460	510	681
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	2140.0	979	172	1690	528	716
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	336	138	23.0	205	126	86.7
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	101.0	65.1	11.8	41.9	34.1	20.0
Certified Reference Material QPH098MS (% Recovery)			86~	95	86	80	95	73
QC Blank			<1	<1	<1	<1	<1	<1

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For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	SOCOTEC Ref:	Matrix	NAPTH	PERYLENE	PHENANT	PYRENE	THC
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	63.4	10.5	134	76.6	10.2
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	2060	454	2230	2730	498
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	77.8	13.7	170	70.3	21.9
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	8.15	1.23	26.1	10.3	50.0
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	1340	292	1660	1970	312
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	1880	531	2190	2690	224
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	1190	284	1400	1650	237
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	1320	293	1630	1920	150
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	236	38.1	288	245	127
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	66.7	7.78	150	50.5	15.0
Certified Reference Material QPH098MS (% Recovery)			87	82	88	83	90~
QC Blank			<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
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For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**	**PCB 149**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	0.00116	0.00041	0.00117	0.00081	0.00010	0.00094	0.00009	0.00094
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	0.00100	0.00034	0.00087	0.00089	0.00015	0.00058	0.00016	0.00088
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	0.00102	0.00035	0.00099	0.00106	0.00011	0.00102	0.00019	0.00074
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	0.00286	0.00085	0.00264	0.00242	0.00030	0.00252	0.00039	0.00214
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	0.00052	0.00012	0.00049	0.00030	<0.00008	0.00045	0.00011	0.00049
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	0.00112	0.00041	0.00113	0.00116	0.00022	0.00129	0.00021	0.00102
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	0.00189	0.00056	0.00114	0.00155	0.00013	0.00174	0.00018	0.00172
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	0.00125	0.00051	0.00126	0.00110	0.00031	0.00106	0.00016	0.00100
Certified Reference Material CRM QOR136MS (% Recovery)			103	98	113~	110	107~	100	103~	112~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**	**PCB 180**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	0.00021	0.00165	0.00011	0.00021	0.00022	0.00078	0.00078
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	0.00016	0.00107	<0.00008	<0.00008	0.00011	0.00057	0.00059
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	0.00017	0.00127	0.00008	<0.00008	0.00017	0.00041	0.00039
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	0.00058	0.00393	0.00025	0.00039	0.00055	0.00184	0.00191
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	0.00014	0.00081	<0.00008	<0.00008	<0.00008	0.00031	0.00017
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	0.00032	0.00181	0.00010	0.00014	0.00025	0.00105	0.00080
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	0.00038	0.00208	0.00012	0.00021	0.00034	0.00113	0.00109
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00015	<0.00008
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00038	<0.00008
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	0.00030	0.00169	0.00012	0.00017	0.00028	0.00075	0.00068
Certified Reference Material CRM QOR136MS (% Recovery)			112~	131	108	99~	112~	99~	70
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 183**	**PCB 187**	**PCB 194**	**PCB 28**	**PCB 31**	**PCB 44**	**PCB 47**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	0.00020	0.00056	0.00021	0.00076	0.00199	0.00060	0.00013
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	<0.00008	0.00029	<0.00008	0.00045	0.00123	0.00052	0.00015
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	0.00013	0.00037	0.00014	0.00050	0.00128	0.00045	0.00013
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	0.00051	0.00129	0.00076	0.00196	0.00475	0.00149	0.00044
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	<0.00008	<0.00008	<0.00008	0.00017	0.00044	0.00015	<0.00008
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	0.00011	0.00049	0.00021	0.00077	0.00196	0.00060	0.00021
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	0.00032	0.00063	0.00030	0.00089	0.00227	0.00066	0.00029
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	<0.00008	<0.00008	<0.00008	0.00010	0.00017	<0.00008	<0.00008
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	<0.00008	<0.00008	<0.00008	0.00016	0.00045	<0.00008	<0.00008
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	0.00014	0.00057	0.00019	0.00063	0.00176	0.00056	0.00022
Certified Reference Material CRM QOR136MS (% Recovery)			101~	97~	105~	77	144	111~	110~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 49**	**PCB 52**	**PCB 66**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	0.00084	0.00142	0.00111
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	0.00056	0.00108	0.00064
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	0.00051	0.00087	0.00073
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	0.00203	0.00326	0.00239
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	0.00025	0.00041	0.00024
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	0.00076	0.00150	0.00090
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	0.00103	0.00186	0.00131
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	0.00011	0.00013	<0.00008
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	0.00015	0.00035	<0.00008
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	0.00068	0.00126	0.00072
Certified Reference Material CRM QOR136MS (% Recovery)			113~	133	119~
QC Blank			<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**	**PCB 149**
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	0.00021	<0.00008	0.00018	0.00012	<0.00008	0.00015	<0.00008	0.00015
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	0.00170	0.00062	0.00135	0.00112	0.00019	0.00141	0.00018	0.00122
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	0.00010	<0.00008	0.00006	<0.00008	<0.00008	0.00004	<0.00008	<0.00008
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	0.00199	0.00063	0.00156	0.00158	0.00035	0.00266	0.00031	0.00154
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	0.00181	0.00064	0.00174	0.00144	0.00027	0.00181	0.00027	0.00106
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	0.00132	0.00050	0.00106	0.00114	0.00026	0.00147	0.00014	0.00104
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	0.00166	0.00060	0.00160	0.00167	0.00027	0.00160	0.00029	0.00134
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	0.00045	0.00011	0.00040	0.00036	<0.00008	0.00039	0.00009	0.00027
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Certified Reference Material CRM QOR136MS (% Recovery)			88	102	99~	101	98~	91	89~	107~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**	**PCB 180**
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	<0.00008	0.00026	<0.00008	<0.00008	<0.00008	0.00058	<0.00008
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	0.00040	0.00241	0.00017	0.00023	0.00034	0.00101	0.00107
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00064	<0.00008
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	0.00042	0.00279	0.00018	0.00034	0.00046	0.00067	0.00176
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	0.00055	0.00247	0.00012	0.00020	0.00057	0.00097	0.00138
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	0.00038	0.00214	0.00015	0.00021	0.00026	0.00059	0.00088
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	0.00043	0.00244	0.00009	0.00037	0.00036	0.00073	0.00097
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00047	0.00022
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00033	<0.00008
Certified Reference Material CRM QOR136MS (% Recovery)			103~	128	94	98~	113~	103~	73
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 183**	**PCB 187**	**PCB 194**	**PCB 28**	**PCB 31**	**PCB 44**	**PCB 47**
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	<0.00008	<0.00008	<0.00008	0.00029	0.00074	0.00023	<0.00008
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	0.00028	0.00088	0.00028	0.00090	0.00237	0.00087	0.00024
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	<0.00008	<0.00008	<0.00008	0.00024	0.00070	0.00019	<0.00008
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00010	<0.00008	<0.00008
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	0.00037	0.00118	0.00044	0.00070	0.00177	0.00056	0.00021
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	0.00036	0.00088	0.00042	0.00102	0.00249	0.00089	0.00028
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	0.00025	0.00060	0.00023	0.00068	0.00170	0.00054	0.00019
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	0.00021	0.00072	0.00026	0.00077	0.00202	0.00072	0.00025
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	<0.00008	0.00019	<0.00008	0.00027	0.00075	0.00029	0.00009
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	<0.00008	<0.00008	<0.00008	0.00015	0.00033	0.00012	<0.00008
Certified Reference Material CRM QOR136MS (% Recovery)			93~	94~	104~	75	149	103~	103~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 49**	**PCB 52**	**PCB 66**
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	0.00027	0.00056	0.00016
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	0.00113	0.00181	0.00134
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	0.00023	0.00048	0.00012
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	<0.00008	<0.00008	<0.00008
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	0.00083	0.00128	0.00098
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	0.00118	0.00194	0.00147
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	0.00078	0.00126	0.00105
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	0.00092	0.00168	0.00111
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	0.00032	0.00060	0.00037
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	0.00011	0.00027	0.00009
Certified Reference Material CRM QOR136MS (% Recovery)			109~	126	107~
QC Blank			<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02
		Limit of Detection	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BDE17**	**BDE28**	**BDE47**	**BDE66**	**BDE85**	**BDE99**	**BDE100**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	0.00071	0.00060	0.00346	0.00058	0.00021	0.00405	0.00046
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	0.00132	0.001040	0.00525	0.000969	0.000345	0.00565	0.00064
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	0.00049	0.00040	0.00264	0.000367	0.000153	0.00296	0.00040
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	0.001440	0.00195	0.00622	0.001770	0.000428	0.00702	0.00079
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	0.00075	0.00059	0.00352	0.00054	0.00022	0.00379	0.00047
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	0.00140	0.00113	0.00585	0.00109	0.00041	0.00629	0.00079
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	0.00074	0.00057	0.00340	0.000532	0.000214	0.00392	0.00051
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	0.000046	0.00002	0.00019	0.000050	<0.00002	0.00018	0.00002
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	0.00326	0.00263	0.01110	0.00269	0.000650	0.01100	0.00130
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	<0.00002	0.00003	0.00005	<0.00002	<0.00002	0.00006	<0.00002
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	0.00087	0.00069	0.00364	0.000713	0.000221	0.00411	0.00047
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	0.001870	0.00149	0.00816	0.001880	0.000601	0.00919	0.00099
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	0.00075	0.00058	0.00321	0.00058	0.000187	0.00333	0.00044
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	0.00088	0.00067	0.00422	0.00075	0.00027	0.00517	0.00067
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	0.00007	0.00008	0.00033	0.00009	0.00002	0.00032	0.00004
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	0.00002	0.00003	0.00006	<0.00002	<0.00002	0.00006	<0.00002

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02
		Limit of Detection	0.00002	0.00002	0.00002	0.00002	0.0001
		Accreditation	MMO	MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BDE138**	**BDE153**	**BDE154**	**BDE183**	**BDE209**
VC-02 MMO1 0.00-0.30	MAR00825.001	Sediment	<0.00002	0.00074	0.00042	0.00055	0.139
VC-02 MMO2 1.00-1.30	MAR00825.002	Sediment	<0.00002	0.00103	0.000492	0.000899	0.090
VC-04 MMO1 0.00-0.30	MAR00825.003	Sediment	<0.00002	0.00053	0.000355	0.000436	0.109
VC-04 MMO2 1.00-1.30	MAR00825.004	Sediment	0.00005	0.00131	0.000567	0.000682	0.054
VC-04 MMO3 2.00-2.30	MAR00825.005	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
VC-06 MMO1 0.00-0.30	MAR00825.006	Sediment	<0.00002	0.00075	0.00041	0.00080	0.127
VC-06 MMO2 1.00-1.30	MAR00825.007	Sediment	<0.00002	0.00124	0.00058	0.00082	0.164
VC-06 MMO3 2.00-2.30	MAR00825.008	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.003
VC-06 MMO4 2.50-2.80	MAR00825.009	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
VC-07 MMO1 0.00-0.30	MAR00825.010	Sediment	<0.00002	0.00072	0.000415	0.000591	0.159
VC-07 MMO2 1.00-1.30	MAR00825.011	Sediment	<0.00002	0.00004	<0.00002	0.000030	0.005
VC-08B MMO1 0.00-0.20	MAR00825.012	Sediment	0.00004	0.00216	0.00112	0.002350	0.230
VC-08B MMO2 1.00-1.20	MAR00825.013	Sediment	<0.00002	0.00004	<0.00002	0.00002	0.002
VC-08B MMO3 2.00-2.20	MAR00825.014	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
VC-09 MMO1 0.00-0.30	MAR00825.015	Sediment	0.00002	0.00069	0.000378	0.000571	0.202
VC-09 MMO2 1.00-1.30	MAR00825.016	Sediment	0.00006	0.00163	0.000670	0.002110	0.220
VC-10 MMO1 0.00-0.30	MAR00825.017	Sediment	0.00002	0.00058	0.00035	0.000563	0.250
VC-11 MMO1 0.00-0.30	MAR00825.018	Sediment	<0.00002	0.00089	0.00046	0.00070	0.243
VC-15A MMO1 0.00-0.30	MAR00825.019	Sediment	<0.00002	0.00007	0.00003	0.00007	0.033
VC-17 MMO1 0.00-0.30	MAR00825.020	Sediment	<0.00002	<0.00002	<0.00002	0.000039	0.005

* See Report Notes

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00825
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
*SUB_01	MAR00825.001-020	Analysis was conducted by an approved subcontracted laboratory.
*SUB_02	MAR00825.001-020	Analysis was conducted by an approved subcontracted laboratory.
SOCOTEC Env Chem*	MAR00825.001-020	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ASC/SOP/301	MAR00825.001-011, .020	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/303/304	MAR00825.001-020	Chrysene is known to coelute with Triphenylene and these peaks can not be resolved in the PAHSED UKAS accredited method. Chrysene and Triphenylene are resolved for MMO but this is currently not UKAS accredited therefore Chrysene is reported without this acccreditation.

DEVIATING SAMPLE STATEMENT

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Handling Time Exceeded	N/A	N/A
D3	Sample Contaminated through Damaged Packaging	N/A	N/A
D4	Sample Contaminated through Sampling	N/A	N/A
D5	Inappropriate Container/Packaging	N/A	N/A
D6	Damaged in Transit	N/A	N/A
D7	Insufficient Quantity of Sample	N/A	N/A
D8	Inappropriate Headspace	N/A	N/A
D9	Retained at Incorrect Temperature	N/A	N/A
D10	Lack of Date & Time of Sampling	N/A	N/A
D11	Insufficient Sample Details	N/A	N/A
D12	Sample integrity compromised or not suitable for analysis	N/A	N/A

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00825
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

Method	Sample and Fraction Size	Method Summary
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Total Organic Carbon (TOC)	Air dried	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.
Metals	Air dried	Aqua-regia extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Ultra-violet fluorescence spectroscopy
Polychlorinated Biphenyls (PCBs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.

Analyte Definitions					
Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorocyclohexane
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorocyclohexane
BAA	Benzo[a]anthracene	DBENZAH	Dibenzo[ah]anthracene	GHCH	gamma-Hexachlorocyclohexane
BAP	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	HCB	Hexachlorobenzene
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	PPDDE	p,p'-Dichorodiphenyldichloroethylene
BENZGHIP	Benzo[ghi]perylene	NAPTH	Naphthalene	PPDDT	p,p'-Dichorodiphenyltrichloroethane
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene	PPTDE	p,p'-Dichorodiphenyldichloroethane
C1N	C1-naphthalenes	PHENANT	Phenanthrene		
C1PHEN	C1-phenanthrene	PYRENE	Pyrene		

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829	
Issue Version	1	
Customer	Fugro Geoservices Ltd, Fugro House, Hithercroft Road, Wallingford, Oxfordshire, OX10 9RB	
Customer Reference	MMO Marine Sediment Analysis	
Date Sampled	07-09/11/2020	
Date Received	12-Nov-20	
Date Reported	26-Mar-21	
Condition of samples	Frozen	Satisfactory

M. Hubbard

Authorised by: Marya Hubbard

Position: Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	pH Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	SOCOTEC Env Chem*	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	No	MMO	MMO	MMO	MMO	MMO
				45mm	31.5mm	22.4mm	16mm	11.2mm
Client Reference:	SOCOTEC Ref:	Matrix	pH Units	-5.5	-5.0	-4.5	-4.0	-3.5
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	7.7	0.00	0.00	0.00	0.00	0.00
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	8.1	0.00	0.00	0.00	0.00	0.00
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	8.6	0.00	0.00	0.00	0.00	2.52
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	7.7	0.00	0.00	0.00	0.00	0.00
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	8.0	0.00	0.00	0.00	0.00	0.00
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	8.9	0.00	5.26	0.00	2.10	4.90
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	8.9	0.00	0.00	0.00	4.18	11.06
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	9.1	0.00	0.00	0.00	0.00	0.00
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	7.7	0.00	0.00	0.00	0.00	0.00
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	8.2	0.00	0.00	0.00	0.00	0.00
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	8.3	0.00	0.00	0.00	0.00	0.00
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	8.5	0.00	0.00	0.00	0.00	0.00
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	8.5	0.00	0.00	0.00	0.00	3.49
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	8.5	0.00	0.00	0.00	5.09	0.00
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	8.0	0.00	4.55	0.00	0.00	3.25
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	8.5	0.00	0.00	0.00	7.30	1.51
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	8.3	0.00	0.00	0.00	1.35	0.61
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	8.9	0.00	0.00	0.00	7.01	6.52
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	8.8	0.00	11.60	0.00	0.00	6.74
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	7.8	0.00	0.00	0.00	0.00	0.00
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	8.6	0.00	0.00	0.00	0.00	2.70
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	7.7	0.00	0.00	0.00	0.00	0.00
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	8.4	0.00	0.00	0.00	0.00	3.79
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	8.0	0.00	0.00	0.00	0.00	0.00
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	8.5	0.00	12.19	1.50	1.01	5.08
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	8.5	0.00	0.00	0.00	0.00	4.62
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	8.1	0.00	0.00	0.00	0.00	1.70
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	8.8	0.00	0.00	7.77	0.00	0.00
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	8.4	0.00	0.00	0.00	0.00	0.00

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			8mm	**5.6mm**	**4mm**	**2.8mm**	**2mm**	**1.4mm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**-3.0**	**-2.5**	**-2.0**	**-1.5**	**-1.0**	**-0.5**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	2.37	3.77	4.74	5.61	6.30	7.12
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	6.05	5.02	5.54	6.43	6.06	6.33
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	5.66	4.68	5.43	6.27	6.00	5.96
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	0.00	1.92	1.05	1.48	0.86	0.83
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	0.00	1.93	0.72	0.63	0.88	0.75
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	0.00	1.71	1.60	1.45	1.73	1.58
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	1.13	0.99	1.97	2.38	1.79	1.64
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	0.69	1.02	1.36	0.97	0.99	0.94
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	2.88	2.80	3.19	3.12	3.11	3.18
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	5.82	5.28	4.96	3.75	3.28	3.18
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	1.16	2.16	2.95	3.25	3.96	4.89
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	2.94	1.65	1.84	2.11	1.69	1.53
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	4.60	3.12	2.75	2.48	2.04	1.76
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	3.25	4.93	5.45	5.00	4.62	4.01
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	2.62	3.58	5.02	6.13	7.45	7.17
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	0.00	0.32	0.70	2.29	4.65	7.71
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	4.46	5.13	4.06	3.53	3.25	3.64
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	4.97	6.64	5.72	5.98	5.37	4.67
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	0.33	1.24	0.99	1.07	1.37	1.76
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	1.82	1.63	1.92	2.76	2.28	2.30
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	2.56	2.08	1.88	1.70	1.71	1.50

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			1mm	707µm	500µm	353.6µm	250µm	176.8µm
Client Reference:	SOCOTEC Ref:	Matrix	0.0	0.5	1.0	1.5	2.0	2.5
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	0.00	0.00	0.00	0.00	0.13	1.74
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	0.00	0.00	0.00	0.00	0.18	3.65
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	6.66	12.79	11.31	7.89	5.36	2.76
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	0.00	0.00	0.00	0.00	0.00	0.57
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	0.00	0.00	0.00	0.00	0.00	0.57
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	4.97	4.72	7.60	4.07	2.80	2.61
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	4.61	5.56	6.67	2.77	2.44	1.49
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	0.62	0.00	0.00	0.00	0.31	3.80
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	0.00	0.00	0.00	0.00	0.00	0.55
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	0.00	0.00	0.00	0.00	0.00	0.28
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	0.51	0.00	0.00	0.00	0.00	0.00
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	1.37	0.00	0.00	0.78	3.95	4.32
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	1.11	0.00	0.00	0.00	0.77	4.54
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	0.87	0.20	2.74	2.08	4.55	2.63
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	2.63	0.00	0.00	0.32	1.55	1.60
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	2.23	0.00	0.00	0.91	3.38	1.94
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	3.99	14.34	12.91	5.88	3.00	2.17
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	1.24	0.00	0.00	0.55	2.33	3.64
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	1.01	0.02	1.19	1.06	1.14	2.27
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	0.00	0.00	0.00	0.00	0.71	4.70
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	2.85	0.77	3.64	3.75	2.28	2.59
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	0.00	0.00	0.00	0.00	0.08	2.17
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	5.56	6.79	6.16	5.55	3.21	2.26
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	7.51	6.64	5.09	4.56	6.05	6.76
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	2.87	4.79	4.09	4.50	6.56	6.25
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	3.25	4.92	7.66	5.45	2.32	2.63
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	1.73	0.01	0.75	1.03	2.12	2.30
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	1.94	0.07	2.70	3.41	0.68	3.13
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	1.19	0.00	0.00	0.00	0.44	5.44

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			125µm	88.39µm	63µm	44.2µm	31.3µm	22.1µm
Client Reference:	SOCOTEC Ref:	Matrix	3.0	3.5	4.0	4.5	5.0	5.5
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	6.48	2.33	1.67	8.05	9.06	10.11
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	5.38	2.17	0.19	3.08	7.05	8.73
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	2.81	0.85	0.72	1.80	1.67	1.88
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	3.43	0.65	1.43	7.27	8.56	10.40
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	3.91	0.70	0.45	5.89	8.48	10.28
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	2.21	1.48	0.41	1.19	1.69	2.03
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	1.97	0.92	0.23	1.62	1.78	2.18
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	3.55	3.52	1.84	3.22	5.45	7.08
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	4.35	1.36	0.67	6.49	8.61	10.36
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	3.27	2.31	0.45	4.47	7.67	10.33
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	0.00	0.00	0.00	0.01	1.70	5.88
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	5.50	4.38	1.20	3.83	5.35	6.14
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	3.86	3.69	1.36	1.90	4.68	6.22
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	7.07	5.45	3.67	7.20	6.17	6.44
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	2.70	2.41	0.87	1.67	3.92	5.65
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	2.47	2.19	0.36	0.93	2.75	4.25
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	2.27	0.71	0.22	1.92	2.51	3.37
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	3.96	3.22	0.61	2.37	3.74	5.26
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	2.10	0.48	0.11	2.04	4.03	5.47
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	6.28	1.45	0.77	6.22	7.76	9.38
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	2.47	1.09	0.18	1.90	3.22	4.43
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	5.51	2.40	0.81	6.21	7.99	9.88
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	2.35	1.03	0.12	0.32	1.40	2.48
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	7.49	2.39	1.72	3.33	2.81	3.55
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	4.53	1.02	0.55	1.70	1.66	2.12
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	2.19	0.85	0.08	1.13	1.83	2.48
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	6.14	2.77	1.49	5.74	6.11	7.71
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	5.14	2.81	0.50	3.36	3.73	5.23
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	5.65	4.15	2.91	3.24	4.94	6.53

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			15.6µm	11µm	7.8µm	5.5µm	3.9µm	2.75µm
Client Reference:	SOCOTEC Ref:	Matrix	6.0	6.5	7.0	7.5	8.0	8.5
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	9.28	9.49	9.28	8.30	6.52	4.55
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	8.46	9.13	9.22	8.73	7.44	5.70
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	1.62	1.56	1.47	1.32	1.07	0.80
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	10.00	9.45	9.69	9.40	7.71	5.40
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	9.53	9.41	10.10	9.70	7.94	5.69
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	2.04	2.36	2.12	1.82	1.53	1.23
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	2.33	2.15	2.21	2.23	1.92	1.44
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	6.25	7.42	7.66	7.28	6.25	4.82
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	9.43	9.32	9.75	9.15	7.40	5.31
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	8.90	10.03	10.54	9.75	7.99	5.86
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	5.76	8.60	8.50	8.64	8.56	7.09
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	5.89	6.88	6.36	5.78	5.13	4.15
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	6.16	7.89	7.52	6.59	5.42	4.19
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	4.78	5.46	4.92	4.15	3.49	2.75
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	5.59	7.16	6.63	5.83	4.93	3.78
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	4.20	4.95	5.39	5.28	4.55	3.47
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	3.63	3.71	3.72	3.37	2.60	1.78
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	5.18	6.13	6.14	5.54	4.49	3.30
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	5.76	6.44	6.14	5.30	4.19	3.08
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	8.46	9.02	9.24	8.55	6.99	5.11
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	4.75	5.75	5.82	5.10	3.90	2.68
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	8.92	9.80	10.06	9.13	7.25	5.13
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	2.70	3.62	3.58	3.21	2.72	2.11
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	3.34	3.17	3.40	3.53	3.10	2.28
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	2.06	2.08	2.22	2.15	1.75	1.23
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	3.03	3.27	3.42	3.31	2.73	1.92
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	7.07	7.06	7.99	7.97	6.55	4.56
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	5.13	5.47	5.84	5.57	4.54	3.24
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	5.71	6.97	6.64	5.91	5.01	3.99

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO
			1.95µm	**1.38µm**	**0.98µm**	**0.69µm**	**0.49µm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**9.0**	**9.5**	**10.0**	**10.5**	**11.0**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	2.94	2.06	1.65	1.44	1.28
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	4.27	3.54	3.04	2.55	2.15
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	0.61	0.55	0.51	0.43	0.35
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	3.42	2.40	2.00	1.81	1.65
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	3.86	2.87	2.35	1.99	1.73
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	1.00	0.91	0.83	0.70	0.56
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	1.12	1.05	1.00	0.85	0.68
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	3.80	3.46	3.25	2.97	2.73
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	3.57	2.61	2.14	1.90	1.76
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	4.04	3.01	2.42	2.04	1.81
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	5.75	5.44	5.16	4.82	4.76
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	3.31	3.00	2.77	2.50	2.28
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	3.35	3.08	2.90	2.59	2.27
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	2.20	2.04	1.96	1.78	1.59
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	2.93	2.70	2.54	2.22	1.85
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	2.64	2.31	2.10	1.85	1.65
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	1.32	1.24	1.20	1.04	0.84
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	2.54	2.37	2.30	2.12	1.91
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	2.29	1.96	1.76	1.55	1.37
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	3.47	2.50	1.97	1.66	1.48
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	1.92	1.74	1.72	1.62	1.47
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	3.38	2.41	1.92	1.63	1.43
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	1.63	1.42	1.26	1.08	0.93
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	1.55	1.20	1.05	0.92	0.79
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	0.83	0.64	0.56	0.49	0.42
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	1.41	1.32	1.33	1.24	1.11
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	2.96	2.17	1.76	1.44	1.19
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	2.51	2.44	2.39	2.16	1.90
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	3.25	2.97	2.75	2.43	2.13

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO
			0.34µm	0.24µm	0.17µm	0.12µm	0.09µm
Client Reference:	SOCOTEC Ref:	Matrix	11.5	12.0	12.5	13.0	13.5
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	1.11	0.92	0.68	0.49	0.30
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	1.79	1.41	0.98	0.65	0.37
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	0.27	0.20	0.14	0.10	0.06
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	1.46	1.20	0.89	0.64	0.39
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	1.48	1.19	0.83	0.56	0.32
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	0.45	0.35	0.26	0.19	0.12
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	0.52	0.39	0.27	0.19	0.11
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	2.50	2.16	1.66	1.21	0.74
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	1.61	1.36	1.00	0.70	0.42
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	1.59	1.29	0.89	0.59	0.33
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	4.64	3.95	2.66	1.60	0.78
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	2.07	1.78	1.36	0.98	0.60
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	1.95	1.62	1.23	0.91	0.57
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	1.41	1.19	0.91	0.67	0.41
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	1.50	1.15	0.80	0.54	0.31
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	1.48	1.27	0.98	0.72	0.45
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	0.65	0.49	0.34	0.24	0.14
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	1.69	1.43	1.10	0.82	0.51
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	1.21	1.03	0.81	0.61	0.38
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	1.31	1.09	0.81	0.58	0.35
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	1.29	1.08	0.83	0.62	0.39
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	1.23	1.00	0.73	0.51	0.30
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	0.81	0.68	0.52	0.39	0.24
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	0.67	0.54	0.39	0.28	0.17
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	0.34	0.27	0.20	0.14	0.09
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	0.96	0.79	0.59	0.44	0.27
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	0.97	0.75	0.53	0.36	0.21
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	1.66	1.40	1.07	0.79	0.49
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	1.86	1.56	1.20	0.88	0.55

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO
			0.06µm	**0.04µm**	**<0.04µm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**14.0**	**14.5**	**>14.5**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	0.12	0.01	0.00
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	0.14	0.02	0.00
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	0.02	0.00	0.00
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	0.15	0.02	0.00
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	0.12	0.01	0.00
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	0.05	0.01	0.00
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	0.04	0.01	0.00
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	0.29	0.03	0.00
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	0.16	0.02	0.00
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	0.12	0.01	0.00
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	0.25	0.03	0.00
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	0.23	0.03	0.00
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	0.23	0.03	0.00
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	0.16	0.02	0.00
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	0.12	0.01	0.00
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	0.18	0.02	0.00
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	0.06	0.01	0.00
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	0.20	0.02	0.00
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	0.15	0.02	0.00
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	0.14	0.02	0.00
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	0.16	0.02	0.00
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	0.12	0.01	0.00
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	0.10	0.01	0.00
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	0.06	0.01	0.00
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	0.04	0.00	0.00
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	0.10	0.01	0.00
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	0.08	0.01	0.00
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	0.19	0.02	0.00
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	0.22	0.03	0.00

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00829
Issue Version 1

Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)							
		Method No	SOCOTEC Env Chem*							
		Limit of Detection	0.5	0.04	0.5	0.5	0.01	0.5	0.5	2
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Arsenic (As)**	**Cadmium (Cd)**	**Chromium (Cr)**	**Copper (Cu)**	**Mercury (Hg)**	**Nickel (Ni)**	**Lead (Pb)**	**Zinc (Zn)**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	25.0	0.63	50.0	62.5	0.45	30.7	143	222
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	23.6	0.81	76.5	99.9	0.63	31.2	129	204
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	4.9	0.08	35.5	13.9	0.07	41.9	13.1	60.1
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	27.1	0.36	50.6	51.7	0.45	33.2	124	184
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	26.6	0.84	71.4	89.8	0.94	26.9	141	236
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	8.3	0.24	31.2	18.9	0.08	39.1	21.8	77.5
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	4.8	0.20	22.7	17.1	<0.01	29.1	8.7	52.4
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	5.7	0.24	25.2	21.4	<0.01	33.9	14.1	51.9
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	26.7	0.42	46.2	46.1	0.38	30.8	153	192
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	26.2	1.00	77.9	113	0.86	33.4	169	311
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	8.3	0.32	35.0	30.2	0.02	47.3	29.2	81.8
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	6.9	0.23	29.4	23.5	<0.01	40.8	21.9	64.7
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	5.8	0.20	23.5	27.6	<0.01	28.4	11.2	52.7
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	5.7	0.24	22.6	24.1	<0.01	27.3	14.0	57.4
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	8.6	0.70	72.4	174	0.61	29.3	45.4	147
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	4.6	0.11	25.2	20.6	<0.01	32.8	6.7	60.1
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	3.9	0.10	18.8	9.3	0.02	21.5	8.9	39.3
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	5.9	0.15	20.3	24.3	<0.01	24.5	10.9	49.7
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	5.4	0.12	20.6	22.0	<0.01	23.1	4.7	38.9
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	21.3	1.31	113	120	1.06	30.6	200	340
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	4.2	0.10	21.6	107	<0.01	26.6	8.5	47.7
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	22.3	0.87	72.3	78.5	0.84	31.2	171	274
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	5.0	0.10	21.4	13.9	<0.01	24.2	7.7	44.8
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	2.2	0.09	16.9	9.4	<0.01	18.9	3.7	28.0
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	5.5	0.12	20.4	71.8	<0.01	22.9	6.3	40.9
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	7.7	0.07	26.6	11.6	<0.01	29.8	9.3	45.5
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	20.1	1.05	91.4	98.1	1.02	29.0	175	304
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	6.2	0.22	21.3	33.2	<0.01	25.7	13.9	53.8
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	6.2	0.30	23.2	34.9	<0.01	28.7	14.6	59.3
Certified Reference Material SETOC 774 (% Recovery)			100	99	92	101	95	96	97	102
QC Blank			<0.5	<0.04	<0.5	<0.5	<0.01	<0.5	<0.5	<2

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	0.023	<0.005
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	0.052	0.013
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	0.006	<0.005
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	0.014	<0.005
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	0.009	<0.005
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	0.008	<0.005
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	<0.005	<0.005
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	<0.005	0.007
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	0.017	<0.005
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	0.027	<0.005
Certified Reference Material BCR-646 (% Recovery)			74	77
QC Blank			<0.001	<0.001

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	<0.005	<0.005
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	<0.005	<0.005
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	0.006	0.006
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	0.006	<0.005
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	0.021	0.013
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	0.006	<0.005
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	0.008	<0.005
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	0.006	<0.005
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	0.006	<0.005
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	0.039	<0.005
Certified Reference Material BCR-646 (% Recovery)			66	65
QC Blank			<0.001	<0.001

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	0.007	<0.005
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	0.021	<0.005
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	0.008	<0.005
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	<0.005	<0.005
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	0.006	<0.005
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	0.006	<0.005
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	0.041	0.037
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	0.006	<0.005
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	0.009	<0.005
Certified Reference Material BCR-646 (% Recovery)			93	86
QC Blank			<0.001	<0.001

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	217	155	293	665	680	685
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	1060	1240	1170	1380	1090	996
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	3.28	7.46	3.97	4.87	4.62	3.06
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	213	175	288	635	648	615
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	320	196	330	629	623	650
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	9.40	3.90	14.9	16.7	19.3	20.3
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	1.25	<1	1.61	2.39	2.60	6.47
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	11.9	2.45	11.9	34.1	43.1	47.9
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	218	189	264	562	557	540
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	608	491	674	1180	1130	1220
Certified Reference Material QPH098MS (% Recovery)			86	100	92	77	78	93
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BEP**	**BKF**	**C1N**	**C1PHEN**	**C2N~**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	588	673	326	3300	1570	2610
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	801	1090	568	12000	4940	8610
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	3.86	4.79	2.40	47.0	22.7	35.8
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	552	627	307	2980	1460	2300
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	449	566	271	2680	1270	2050
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	19.8	22.4	8.85	103	52.2	76.8
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	4.01	5.98	1.43	19.1	10.2	13.4
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	82.6	64.2	12.2	146	184	146
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	509	576	251	3340	1550	2640
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	952	1130	418	6580	2790	4780
Certified Reference Material QPH098MS (% Recovery)			80	75	86	93	76	114~
QC Blank			<1	<1	<1	<1	<1	<1

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no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	SOCOTEC Ref:	Matrix	C3N~	CHRYSENE	DBENZAH	FLUORANT	FLUORENE	INDPYR
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	2290	713	121	1160	358	478
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	6150	1510	118	2840	1730	544
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	26.5	5.53	<1	9.64	8.14	2.20
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	2090	706	112	1140	344	435
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	1690	709	97.7	1250	468	400
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	55.2	22.1	3.66	34.4	16.3	12.9
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	9.6	4.68	<1	4.73	2.69	1.64
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	180	49.4	6.67	52.1	27.1	26.0
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	2320	639	102	995	349	389
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	3840	1160	192	1730	862	751
Certified Reference Material QPH098MS (% Recovery)			86~	95	86	80	95	73
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	1140	184	1340	1170	85.7
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	4820	271	4570	2830	89.8
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	13.90	1.13	20.8	14.8	5.00
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	1020	177	1380	1150	219
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	1020	196	1290	1270	290
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	46.5	4.91	53.3	62.2	38.8
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	7.40	<1	10.0	6.94	3.87
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	24.9	14.1	138	67.2	8.47
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	1130	146	1310	999	231
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	2710	391	2490	2010	71.8
Certified Reference Material QPH098MS (% Recovery)			87	82	88	83	90~
QC Blank			<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	43.1	12.4	32.4	135	211	287
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	40.9	11.6	30.1	131	195	266
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	3.96	1.75	3.36	13.7	18.3	36.6
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	8.89	2.88	9.15	35.4	42.3	57.7
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	646	474	547	615	647	590
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	<1	<1	<1	<1	<1	3.82
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	56.2	65.1	78.6	143	165	163
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	4.12	1.83	3.30	13.1	18.9	37.6
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	<1	1.38	<1	<1	<1	<1
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	1300	1930	2020	4490	4530	4190
Certified Reference Material QPH098MS (% Recovery)			90	100	90	92	95	70
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BEP**	**BKF**	**C1N**	**C1PHEN**	**C2N~**
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	450	514	47.8	2100	1050	1110
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	437	487	47.7	2010	1040	1050
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	46.6	55.6	6.65	112	85.6	74.5
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	88.6	96.4	11.3	246	241	213
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	435	564	263	2470	1080	1770
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	1.89	3.56	<1	4.54	3.81	3.48
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	121	145	69.7	428	199	310
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	46.4	60.2	6.10	157	102	89.5
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	<1	1	<1	5.42	3.72	5.37
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	2840	3680	1800	9790	4610	6910
Certified Reference Material QPH098MS (% Recovery)			77	85	88	111	74	110~
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N~**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	684	342	62.5	200	323	123
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	675	334	49.4	187	305	112
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	52.7	34.7	7.03	22.7	20.7	13.5
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	202	70.1	12.4	53.5	30.0	25.2
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	1430	621	95.5	1070	837	404
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	2.57	2.90	<1	1.42	1.12	<1
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	244	143	26.3	207	75.1	112
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	56.4	43.9	5.85	23.5	21.5	12.7
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	3.80	<1	<1	1.22	1.28	<1
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	6120	3790	638	8190	1830	2870
Certified Reference Material QPH098MS (% Recovery)			85~	106	89	89	102	72
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	665	29.6	995	285	21.6
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	771	27.5	940	279	9.88
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	25.5	3.98	82.6	28.4	98.5
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	52.8	15.0	195	63.9	49.6
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	1070	195	1240	1470	36.1
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	1.70	<1	2.89	2.04	<1
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	181	47.3	207	268	42.0
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	45.7	3.48	94.9	30.2	5.94
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	3.13	<1	3.21	1.61	<1
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	3850	1270	5550	9040	1280
Certified Reference Material QPH098MS (% Recovery)			95	87	95	93	89~
QC Blank			<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	14.9	14.2	15.9	26.5	22.9	42.8
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	503	281	644	1110	1250	1270
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	1.96	2.36	1.21	1.45	1.34	1.70
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	3.19	3.15	1.03	1.30	1.04	2.50
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	<1	3.53	<1	1.03	1.02	1.34
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	<1	1.88	<1	<1	<1	<1
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	427	415	424	684	817	739
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	9.46	6.07	7.03	20.3	24.3	46.4
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	5.67	3.16	4.98	17.6	23.0	51.0
Certified Reference Material QPH098MS (% Recovery)			95	103	92	93	84	86
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BEP**	**BKF**	**C1N**	**C1PHEN**	**C2N~**
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	27.7	46.2	10.9	404	109	271
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	895	1070	503	3630	1920	2940
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	<1	1.78	<1	6.79	4.09	8.59
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	1.41	2.36	1.01	11.0	4.78	10.6
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	1.01	1.69	<1	8.50	3.68	6.78
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	<1	<1	<1	3.69	2.19	3.73
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	535	628	425	1550	695	1100
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	47.7	69.1	10.4	200	124	128
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	53.5	77.0	8.28	208	134	122
Certified Reference Material QPH098MS (% Recovery)			86	88	96	103	81	100
QC Blank			<1	<1	<1	<1	<1	<1

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For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N~**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	208	57.5	5.16	39.7	21.4	15.1
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	2510	1150	191	1980	611	829
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	4.56	1.87	<1	2.21	2.59	<1
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	8.27	3.21	<1	2.87	2.71	<1
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	5.49	1.69	<1	2.92	1.37	<1
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	2.88	1.19	<1	<1	1.06	<1
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	778	664	123	1250	447	516
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	89.9	53.2	6.42	37.3	28.4	13.3
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	82.8	52.8	6.29	33.4	25.9	12.2
Certified Reference Material QPH098MS (% Recovery)			79	106	87	88	99	81
QC Blank			<1	<1	<1	<1	<1	<1

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For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	184	7.00	90.4	52.3	16.8
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	1410	358	2100	2200	408
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	3.23	<1	4.38	3.27	2.21
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	5.43	<1	6.53	3.73	1.14
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	3.25	<1	3.84	2.64	<1
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	1.31	<1	2.12	<1	<1
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	767	230	1030	1550	372
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	61.4	6.81	114	42.0	6.09
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	62.1	5.80	123	37.0	11.2
Certified Reference Material QPH098MS (% Recovery)			95	86	98	92	88~
QC Blank			<1	<1	<1	<1	<1

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For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**	**PCB 149**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	0.00093	0.00038	0.00091	0.00081	0.00012	0.00095	<0.00008	0.00078
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	0.00203	0.00071	0.00200	0.00163	0.00030	0.00179	0.00015	0.00177
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	0.00081	0.00024	0.00086	0.00079	0.00016	0.00078	<0.00008	0.00064
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	0.00208	0.00060	0.00172	0.00159	0.00022	0.00154	0.00015	0.00138
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	0.00020	<0.00008	0.00019	0.00017	<0.00008	<0.00008	<0.00008	0.00009
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	0.00067	0.00030	0.00082	0.00069	<0.00008	0.00054	0.00012	0.00064
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	0.00502	0.00067	0.00312	0.00234	0.00052	0.00436	0.00099	0.00376
Certified Reference Material CRM QOR136MS (% Recovery)			93	100	93~	96	107~	95	102~	91~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**	**PCB 180**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	0.00020	0.00135	<0.00008	0.00018	0.00026	0.00040	0.00066
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	0.00038	0.00300	0.00018	0.00027	0.00048	0.00095	0.00122
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00011	<0.00008
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	0.00019	0.00123	<0.00008	0.00023	0.00015	0.00034	0.00041
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	0.00042	0.00252	0.00016	0.00021	0.00033	0.00104	0.00095
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	<0.00008	0.00021	<0.00008	<0.00008	<0.00008	0.00019	<0.00008
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00016	<0.00008
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00039	<0.00008
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	0.00017	0.00128	0.00011	0.00015	0.00020	0.00035	0.00051
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	0.00156	0.00670	0.00023	0.00055	0.00083	0.00078	0.00174
Certified Reference Material CRM QOR136MS (% Recovery)			89~	121	88	102~	109~	97~	97
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

Client Reference:	SOCOTEC Ref:	Matrix	PCB 183	PCB 187	PCB 194	PCB 28	PCB 31	PCB 44	PCB 47
		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	0.00014	0.00046	0.00014	0.00050	0.00143	0.00037	0.00012
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	0.00027	0.00095	0.00039	0.00113	0.00282	0.00095	0.00029
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00017	<0.00008	<0.00008
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	<0.00008	0.00024	0.00015	0.00043	0.00108	0.00032	0.00012
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	0.00017	0.00072	0.00026	0.00098	0.00264	0.00086	0.00035
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	<0.00008	<0.00008	<0.00008	0.00011	0.00028	<0.00008	<0.00008
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00025	<0.00008	<0.00008
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	<0.00008	<0.00008	<0.00008	0.00014	0.00044	0.00010	<0.00008
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	0.00018	0.00029	0.00020	0.00037	0.00103	0.00037	0.00013
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	0.00045	0.00124	0.00030	0.00089	0.00226	0.00071	0.00026
Certified Reference Material CRM QOR136MS (% Recovery)			103~	104~	110~	70	116~	107~	105~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 49**	**PCB 52**	**PCB 66**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	0.00052	0.00091	0.00070
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	0.00129	0.00200	0.00153
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	<0.00008	0.00011	<0.00008
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	0.00044	0.00079	0.00056
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	0.00131	0.00199	0.00136
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	0.00016	0.00031	0.00009
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	0.00010	0.00011	<0.00008
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	0.00012	0.00028	<0.00008
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	0.00043	0.00075	0.00057
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	0.00119	0.00248	0.00134
Certified Reference Material CRM QOR136MS (% Recovery)			107~	133	105~
QC Blank			<0.00008	<0.00008	<0.00008

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Certificate of Analysis

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SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**	**PCB 149**
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	0.00020	<0.00008	0.00011	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	0.00122	0.00029	0.00107	0.00086	0.00015	0.00087	<0.00008	0.00083
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	0.00013	0.00009	0.00018	0.00012	<0.00008	<0.00008	<0.00008	<0.00008
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	0.00179	0.00054	0.00198	0.00161	0.00032	0.00195	0.00035	0.00162
Certified Reference Material CRM QOR136MS (% Recovery)			90	91	88~	92	105~	98	100~	89~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	MMO*	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**	**PCB 180**
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00080	<0.00008
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00026	<0.00008
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00028	<0.00008
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00034	<0.00008
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	0.00021	0.00147	<0.00008	0.00011	0.00017	0.00073	0.00051
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00014	<0.00008
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00014	<0.00008
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00016	<0.00008
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	<0.00008	0.00009	0.00009	0.00012	<0.00008	0.00027	<0.00008
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	0.00052	0.00283	0.00019	0.00025	0.00059	0.00084	0.00149
Certified Reference Material CRM QOR136MS (% Recovery)			86~	121	92	107~	106~	101~	77
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 183**	**PCB 187**	**PCB 194**	**PCB 28**	**PCB 31**	**PCB 44**	**PCB 47**
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	<0.00008	<0.00008	<0.00008	0.00039	0.00100	0.00044	0.00010
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	<0.00008	<0.00008	<0.00008	0.00011	0.00036	0.00008	<0.00008
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	<0.00008	<0.00008	<0.00008	0.00009	0.00027	0.00010	<0.00008
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	<0.00008	<0.00008	<0.00008	0.00012	0.00037	0.00010	<0.00008
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	0.00009	0.00034	0.00012	0.00069	0.00174	0.00068	0.00022
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00012	<0.00008	<0.00008
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	<0.00008	<0.00008	<0.00008	0.00009	0.00023	0.00008	<0.00008
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00022	<0.00008	<0.00008
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	<0.00008	<0.00008	<0.00008	0.00011	0.00028	0.00014	0.00008
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	0.00032	0.00090	0.00044	0.00100	0.00230	0.00084	0.00028
Certified Reference Material CRM QOR136MS (% Recovery)			102~	102~	105~	71	131	107~	104~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 49**	**PCB 52**	**PCB 66**
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	0.00035	0.00067	0.00026
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	0.00017	0.00022	<0.00008
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	<0.00008	0.00020	<0.00008
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	0.00011	0.00024	<0.00008
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	0.00094	0.00141	0.00090
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	<0.00008	<0.00008	<0.00008
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	<0.00008	0.00014	<0.00008
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	<0.00008	0.00013	<0.00008
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	0.00018	0.00029	0.00016
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	0.00112	0.00167	0.00130
Certified Reference Material CRM QOR136MS (% Recovery)			106~	122	108~
QC Blank			<0.00008	<0.00008	<0.00008

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* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**	**PCB 149**
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	0.00009	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	0.00152	0.00054	0.00146	0.00121	0.00027	0.00122	0.00014	0.00127
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	0.00195	0.00050	0.00152	0.00190	0.00026	0.00154	0.00023	0.00180
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Certified Reference Material CRM QOR136MS (% Recovery)			97	86	109~	93	102~	102	113~	110~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**	**PCB 180**
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00031	<0.00008
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	0.00029	0.00229	0.00011	0.00022	0.00034	0.00054	0.00092
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	<0.00008	<0.00008	<0.00008	0.00002	<0.00008	0.00011	<0.00008
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00011	<0.00008
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00011	<0.00008
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00025	<0.00008
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	0.00042	0.00305	0.00012	0.00020	0.00050	0.00063	0.00126
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00024	<0.00008
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00022	<0.00008
Certified Reference Material CRM QOR136MS (% Recovery)			102~	123	88	114~	106~	108~	74
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 183**	**PCB 187**	**PCB 194**	**PCB 28**	**PCB 31**	**PCB 44**	**PCB 47**
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	<0.00008	<0.00008	<0.00008	0.00013	0.00032	0.00012	<0.00008
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	0.00020	0.00051	0.00030	0.00069	0.00165	0.00054	0.00021
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00010	<0.00008	<0.00008
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00009	<0.00008	<0.00008
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00010	<0.00008	<0.00008
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	<0.00008	<0.00008	<0.00008	0.00009	0.00023	0.00010	<0.00008
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	0.00035	0.00095	0.00046	0.00084	0.00188	0.00067	0.00025
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00023	<0.00008	<0.00008
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	<0.00008	<0.00008	<0.00008	0.00009	0.00030	0.00011	<0.00008
Certified Reference Material CRM QOR136MS (% Recovery)			97~	109~	111~	75	144	112~	104~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 49**	**PCB 52**	**PCB 66**
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	0.00014	0.00025	0.00002
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	0.00085	0.00132	0.00107
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	<0.00008	<0.00008	<0.00008
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	<0.00008	0.00008	<0.00008
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	<0.00008	0.00008	<0.00008
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	0.00010	0.00018	<0.00008
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	0.00111	0.00172	0.00146
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	0.00008	0.00018	<0.00008
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	0.00008	0.00019	<0.00008
Certified Reference Material CRM QOR136MS (% Recovery)			104~	128	113~
QC Blank			<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02
		Limit of Detection	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BDE17**	**BDE28**	**BDE47**	**BDE66**	**BDE85**	**BDE99**	**BDE100**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	0.00053	0.00048	0.00295	0.00047	0.00018	0.00324	0.00046
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	0.00063	0.001210	0.00463	0.001140	0.000291	0.00478	0.00067
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	0.000457	0.00034	0.00282	0.000355	0.000164	0.00313	0.00049
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	0.00134	0.00135	0.00671	0.00153	0.000450	0.00739	0.00089
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	0.00035	0.00030	0.00214	0.000327	0.000119	0.00243	0.00036
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	0.003330	0.00320	0.01520	0.003430	0.000951	0.01570	0.00199
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	0.000677	0.00083	0.00247	0.000928	0.000175	0.00290	0.00036
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	0.00023	0.00019	0.00096	0.00019	<0.00002	0.00116	0.00015
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	0.004380	0.00366	0.01250	0.003650	0.000810	0.01200	0.00164
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	0.00138	0.001090	0.00568	0.001180	0.000361	0.00558	0.00070
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	0.00270	0.00181	0.00837	0.00182	0.00050	0.00798	0.00095
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00829
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02
		Limit of Detection	0.00002	0.00002	0.00002	0.00002	0.0001
		Accreditation	MMO	MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BDE138**	**BDE153**	**BDE154**	**BDE183**	**BDE209**
VC-01 MMO1 0.00-0.30	MAR00829.001	Sediment	<0.00002	0.00058	0.00040	0.00057	0.209
VC-01 MMO2 1.00-1.30	MAR00829.002	Sediment	<0.00002	0.00080	0.000398	0.000425	0.033
VC-01 MMO3 2.00-2.30	MAR00829.003	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
VC-03 MMO1 0.00-0.30	MAR00829.004	Sediment	<0.00002	0.00053	0.000422	0.000459	0.123
VC-03 MMO2 1.00-1.30	MAR00829.005	Sediment	<0.00002	0.00127	0.00060	0.001080	0.107
VC-03 MMO3 2.00-2.30	MAR00829.006	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
VC-03 MMO4 2.30-2.60	MAR00829.007	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
VC-04 MMO4 2.50-3.00	MAR00829.008	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
VC-05 MMO1 0.00-0.30	MAR00829.009	Sediment	<0.00002	0.00041	0.000310	0.000356	0.126
VC-05 MMO2 1.00-1.30	MAR00829.010	Sediment	<0.00002	0.00283	0.001510	0.002140	0.157
VC-05 MMO3 2.00-2.30	MAR00829.011	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
VC-05 MMO4 2.30-2.60	MAR00829.012	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
VC-07 MMO3 1.50-1.80	MAR00829.013	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
VC-08B MMO4 2.20-2.50	MAR00829.014	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
VC-09 MMO3 2.05-2.35	MAR00829.015	Sediment	0.00004	0.00060	0.000246	0.000324	0.012
VC-10 MMO2 1.30-1.60	MAR00829.016	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
VC-11 MMO2 0.70-1.00	MAR00829.017	Sediment	<0.00002	0.00023	0.00013	0.00025	0.009
VC-12 MMO1 0.00-0.30	MAR00829.018	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
VC-12 MMO2 0.80-1.10	MAR00829.019	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
VC-13 MMO1 0.00-0.30	MAR00829.020	Sediment	0.00012	0.00335	0.001920	0.004800	0.147
VC-13 MMO2 0.50-0.80	MAR00829.021	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
VC-14 MMO1 0.00-0.30	MAR00829.022	Sediment	<0.00002	0.00101	0.000489	0.000789	0.253
VC-15A MMO2 0.80-1.10	MAR00829.023	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
VC-16 MMO1 0.00-0.30	MAR00829.024	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
VC-18 MMO1 0.00-0.30	MAR00829.025	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
VC-18 MMO2 0.30-0.85	MAR00829.026	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
VC-19 MMO1 0.00-0.30	MAR00829.027	Sediment	0.00002	0.00146	0.00080	0.00173	0.234
VC-20 MMO1 0.00-0.30	MAR00829.028	Sediment	<0.00002	<0.00002	<0.00002	0.00004	0.004
VC-20 MMO2 0.80-1.10	MAR00829.029	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.001

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00829
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
*SUB_01	MAR00829.001-029	Analysis was conducted by an approved subcontracted laboratory.
*SUB_02	MAR00829.001-029	Analysis was conducted by an approved subcontracted laboratory.
SOCOTEC Env Chem*	MAR00829.001-029	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ASC/SOP/301	MAR00829.001-029	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/302	MAR00829.011-020	The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. The remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected.However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (PCB151) . These circumstances should be taken into consideration when utilising the data.
ASC/SOP/303/304	MAR00829.001-029	Chrysene is known to coelute with Triphenylene and these peaks can not be resolved in the PAHSED UKAS accredited method. Chrysene and Triphenylene are resolved for MMO but this is currently not UKAS accredited therefore Chrysene is reported without this acccreditation.

DEVIATING SAMPLE STATEMENT

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Handling Time Exceeded	N/A	N/A
D3	Sample Contaminated through Damaged Packaging	N/A	N/A
D4	Sample Contaminated through Sampling	N/A	N/A
D5	Inappropriate Container/Packaging	N/A	N/A
D6	Damaged in Transit	N/A	N/A
D7	Insufficient Quantity of Sample	N/A	N/A
D8	Inappropriate Headspace	N/A	N/A
D9	Retained at Incorrect Temperature	N/A	N/A
D10	Lack of Date & Time of Sampling	N/A	N/A
D11	Insufficient Sample Details	N/A	N/A
D12	Sample integrity compromised or not suitable for analysis	N/A	N/A

Certificate of Analysis

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Test Report ID	MAR00829
Issue Version	1
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Method	Sample and Fraction Size	Method Summary
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Total Organic Carbon (TOC)	Air dried	Carbonate removal and sulphurous acid/combustion at 1600°C/NDIR.
Metals	Air dried	Aqua-regia extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Ultra-violet fluorescence spectroscopy
Polychlorinated Biphenyls (PCBs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.

Analyte Definitions					
Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorocyclohexane
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorocyclohexane
BAA	Benzo[a]anthracene	DBENZAH	Dibenzo[ah]anthracene	GHCH	gamma-Hexachlorocyclohexane
BAP	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	HCB	Hexachlorobenzene
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	PPDDE	p,p'-Dichorodiphenyldichloroethylene
BENZGHIP	Benzo[ghi]perylene	NAPTH	Naphthalene	PPDDT	p,p'-Dichorodiphenyltrichloroethane
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene	PPTDE	p,p'-Dichorodiphenyldichloroethane
C1N	C1-naphthalenes	PHENANT	Phenanthrene		
C1PHEN	C1-phenanthrene	PYRENE	Pyrene		

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856	
Issue Version	1	
Customer	Fugro Geoservices Ltd, Fugro House, Hithercroft Road, Wallingford, Oxfordshire, OX10 9RB	
Customer Reference	MMO Marine Sediment Analysis	
Date Sampled	23-28/11/2020	
Date Received	02-Dec-20	
Date Reported	29-Mar-21	
Condition of samples	Cold	Satisfactory

M. Hubbard

Authorised by: Marya Hubbard

Position: Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	pH Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	SOCOTEC Env Chem*	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	No	MMO	MMO	MMO	MMO	MMO
				45mm	31.5mm	22.4mm	16mm	11.2mm
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**pH Units**	**-5.5**	**-5.0**	**-4.5**	**-4.0**	**-3.5**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	8.5	13.63	9.42	2.80	0.78	7.72
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	8.6	0.00	0.00	15.95	6.96	10.65
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	8.6	0.00	0.00	0.00	0.00	0.00
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	8.4	0.00	0.00	0.00	0.00	0.00
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	8.5	0.00	0.00	0.00	0.00	0.00
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	8.3	0.00	0.00	0.00	0.00	0.00
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	8.2	0.00	0.00	0.00	0.00	0.00
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	8.3	0.00	0.00	0.00	0.00	0.00
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	7.7	0.00	0.00	0.00	6.11	0.00
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	8.5	0.00	0.00	0.00	3.27	0.00
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	8.4	0.00	0.00	0.00	3.41	1.25
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	8.6	0.00	0.00	0.00	0.00	1.74

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			8mm	5.6mm	4mm	2.8mm	2mm	1.4mm
Client Reference:	SOCOTEC Ref:	Matrix	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	4.45	7.46	6.54	4.49	3.59	3.08
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	9.46	8.03	7.29	6.39	4.78	3.97
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	0.85	0.10	0.04	0.21	0.12	0.20
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	1.68	1.88	3.38	3.03	2.68	2.35
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	3.94	1.51	4.30	3.14	3.14	3.19
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	2.33	3.25	3.04	2.37	1.87	1.62

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			1mm	707µm	500µm	353.6µm	250µm	176.8µm
Client Reference:	SOCOTEC Ref:	Matrix	0.0	0.5	1.0	1.5	2.0	2.5
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	2.08	3.96	4.85	2.71	1.63	1.34
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	3.02	2.86	2.99	1.96	1.01	1.01
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	0.00	0.00	0.00	0.00	0.00	0.50
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	0.00	0.00	0.00	0.04	0.79	1.86
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	0.00	0.00	0.00	0.00	0.00	0.20
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	0.00	0.00	0.00	0.00	0.00	0.26
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	0.00	0.00	0.00	0.00	0.00	0.11
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	0.00	0.00	0.00	0.00	0.00	0.43
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	0.13	0.00	0.00	0.00	0.00	0.19
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	1.95	0.00	0.54	1.61	2.63	4.29
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	2.69	0.00	0.00	0.02	1.44	2.52
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	1.12	0.00	0.00	0.01	1.16	3.88

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			125µm	88.39µm	63µm	44.2µm	31.3µm	22.1µm
Client Reference:	SOCOTEC Ref:	Matrix	3.0	3.5	4.0	4.5	5.0	5.5
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	1.33	0.91	0.10	0.98	1.48	1.70
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	0.89	0.88	0.18	0.40	0.86	1.04
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	4.37	5.81	1.20	3.98	8.12	9.07
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	5.07	5.32	0.80	3.15	6.66	7.96
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	3.85	5.39	0.79	3.66	7.78	9.05
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	4.04	4.91	2.11	2.77	7.17	8.82
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	3.56	5.15	0.62	2.92	7.77	8.83
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	3.98	5.02	1.64	2.00	7.44	8.36
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	3.15	1.44	0.54	5.50	8.08	9.02
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	5.25	4.71	1.86	2.84	4.81	5.23
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	3.82	3.72	1.36	1.01	3.87	4.72
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	5.80	4.58	1.99	1.76	4.45	5.50

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00856
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			15.6µm	11µm	7.8µm	5.5µm	3.9µm	2.75µm
Client Reference:	SOCOTEC Ref:	Matrix	6.0	6.5	7.0	7.5	8.0	8.5
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	1.73	1.71	1.71	1.63	1.37	1.03
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	1.08	1.31	1.30	1.15	0.94	0.71
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	8.52	9.82	9.55	8.84	7.57	5.67
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	7.66	9.03	9.33	8.79	7.60	5.88
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	8.75	10.17	10.26	9.44	7.79	5.72
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	8.32	10.35	9.86	8.87	7.59	5.84
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	8.62	10.15	10.35	9.64	7.98	5.86
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	8.53	10.54	9.82	9.03	7.85	6.06
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	9.70	10.02	10.44	9.85	7.69	5.02
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	5.16	6.12	5.49	4.90	4.27	3.35
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	4.73	6.81	6.43	5.64	4.74	3.73
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	5.59	7.30	6.85	5.92	4.86	3.76

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO
			1.95µm	**1.38µm**	**0.98µm**	**0.69µm**	**0.49µm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**9.0**	**9.5**	**10.0**	**10.5**	**11.0**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	0.77	0.66	0.59	0.49	0.39
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	0.55	0.50	0.46	0.40	0.32
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	3.87	2.85	2.31	1.97	1.74
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	4.29	3.39	2.82	2.38	2.04
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	3.90	2.87	2.33	1.98	1.72
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	4.12	3.15	2.64	2.28	1.98
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	4.02	3.03	2.55	2.22	1.91
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	4.21	3.13	2.60	2.28	2.01
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	2.89	1.83	1.42	1.25	1.12
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	2.63	2.42	2.29	2.07	1.85
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	2.99	2.75	2.58	2.32	2.06
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	3.03	2.81	2.66	2.39	2.11

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00856
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO
			0.34µm	0.24µm	0.17µm	0.12µm	0.09µm
Client Reference:	SOCOTEC Ref:	Matrix	11.5	12.0	12.5	13.0	13.5
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	0.30	0.23	0.16	0.11	0.07
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	0.25	0.18	0.13	0.09	0.05
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	1.50	1.17	0.76	0.46	0.24
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	1.73	1.37	0.94	0.62	0.34
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	1.47	1.16	0.79	0.52	0.29
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	1.68	1.31	0.90	0.59	0.33
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	1.59	1.23	0.85	0.57	0.33
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	1.70	1.34	0.92	0.61	0.35
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	0.98	0.79	0.57	0.40	0.24
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	1.64	1.38	1.04	0.75	0.46
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	1.82	1.54	1.17	0.86	0.53
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	1.84	1.54	1.18	0.87	0.54

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO
			0.06µm	**0.04µm**	**<0.04µm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**14.0**	**14.5**	**>14.5**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	0.03	0.00	0.00
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	0.02	0.00	0.00
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	0.08	0.01	0.00
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	0.13	0.01	0.00
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	0.11	0.01	0.00
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	0.12	0.01	0.00
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	0.12	0.01	0.00
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	0.13	0.02	0.00
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	0.09	0.01	0.00
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	0.18	0.02	0.00
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	0.21	0.02	0.00
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	0.22	0.03	0.00

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)							
		Method No	SOCOTEC Env Chem*							
		Limit of Detection	0.5	0.04	0.5	0.5	0.01	0.5	0.5	2
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Arsenic (As)**	**Cadmium (Cd)**	**Chromium (Cr)**	**Copper (Cu)**	**Mercury (Hg)**	**Nickel (Ni)**	**Lead (Pb)**	**Zinc (Zn)**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	1.6	0.09	28.0	126	0.02	28.8	3.4	48.2
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	3.7	0.06	38.6	9.6	0.02	33.4	5.8	42.7
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	27.9	2.68	144	188	1.56	36.8	311	767
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	60.4	14.9	492	429	12.8	41.1	828	2835
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	31.2	3.68	187	218	2.54	38.1	354	972
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	38.2	6.59	288	284	4.73	39.5	488	1502
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	35.5	6.58	280	290	4.36	37.9	503	1488
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	38.5	8.00	302	311	5.15	39.0	562	1695
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	26.9	1.38	85.5	88.3	0.87	37.9	198	426
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	5.4	0.20	26.2	24.0	0.04	27.9	12.8	59.1
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	5.0	0.17	24.2	25.6	0.02	24.7	10.4	50.5
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	5.5	0.24	24.4	23.7	0.03	27.1	12.8	55.8
Certified Reference Material SETOC 774 (% Recovery)			101	102	96	99	102	97	98	100
QC Blank			<0.5	<0.04	<0.5	<0.5	<0.01	<0.5	<0.5	<2

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	<0.005	<0.005
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	<0.005	<0.005
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	0.047	0.111
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	0.060	0.060
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	0.013	0.072
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	0.072	0.094
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	0.025	0.069
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	0.041	0.063
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	<0.005	0.019
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	<0.005	<0.005
Certified Reference Material BCR-646 (% Recovery)			112	126
QC Blank			<0.001	<0.001

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	<0.005	<0.005
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	<0.005	<0.005
Certified Reference Material BCR-646 (% Recovery)			113	126
QC Blank			<0.001	<0.001

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00856
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	<1	1.08	<1	2.20	1.54	8.83
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	<1	<1	<1	<1	<1	3.79
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	3190	1310	1590	2410	2730	2460
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	58200	4590	7910	4760	3580	3160
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	6210	1550	1710	2130	2500	2560
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	13900	2670	3030	3100	3160	2940
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	14900	2370	3210	3840	3700	3340
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	10200	1970	2410	2620	2450	2390
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	2850	346	550	938	1110	1120
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	15.2	10.5	7.92	23.2	35.0	56.7
Certified Reference Material QPH098MS(% Recovery)			83	150	95	63	63	56
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BEP**	**BKF**	**C1N**	**C1PHEN**	**C2N**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	4.43	11.1	<1	4.02	4.30	4.42
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	1.18	2.51	<1	2.14	1.48	1.98
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	1880	2140	849	7540	3400	6110
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	2230	2770	1200	47600	10900	30500
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	1750	1960	987	9310	3490	6890
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	2050	2390	928	13000	4960	9650
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	2400	2750	1550	14400	5420	10800
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	1630	1890	815	10500	3940	7990
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	873	943	400	3960	1700	3380
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	74.4	86.2	6.75	272	154	176
Certified Reference Material QPH098MS(% Recovery)			57	69	61	94	84	130
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	4.01	10.5	<1	13.2	1.89	<1
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	1.64	1.75	<1	2.09	<1	<1
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	4910	2060	437	3730	2510	1820
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	16300	4420	513	12300	39400	2020
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	5030	2070	411	3770	4130	1670
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	6920	2830	499	6600	9160	2040
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	7620	3480	582	7900	9730	2120
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	5410	2360	385	5890	7070	1520
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	2800	906	200	1920	1520	722
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	122	46.4	11.4	43.4	42.7	21.3
Certified Reference Material QPH098MS(% Recovery)			112	73	52	76	98	49
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00856
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	2.65	<1	35.8	9.94	<1
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	1.40	<1	6.70	1.84	<1
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	3840	815	3700	4580	787
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	28400	943	24900	10900	499
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	6340	717	4500	4850	384
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	8280	880	7520	6680	720
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	8810	985	8150	6930	344
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	6600	635	6050	5150	382
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	1680	355	1730	1830	111
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	82.0	5.47	144	50.1	4
Certified Reference Material QPH098MS(% Recovery)			98	67	81	79	86~
QC Blank			<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	15.6	8.96	8.00	22.2	33.9	59.6
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	2.49	6.16	5.71	18.4	27.1	54.1
Certified Reference Material QPH098MS(% Recovery)			103	103	88	70	75	81
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BEP**	**BKF**	**C1N**	**C1PHEN**	**C2N**
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	75.9	94.5	8.88	294	174	189
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	69.9	86.7	7.03	261	158	170
Certified Reference Material QPH098MS(% Recovery)			75	73	87	98	88	138
QC Blank			<1	<1	<1	<1	<1	<1

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no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	131	59.5	11.4	43.4	46.6	19.7
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	107	54.8	11.0	35.5	36.6	16.6
Certified Reference Material QPH098MS(% Recovery)			104	84	79	80	109	69
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as no Certified Reference Materials are avaliable.

For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	86.6	6.49	162	52.5	1.80
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	75.4	5.79	144	43.6	36.2
Certified Reference Material QPH098MS(% Recovery)			105	82	87	83	86~
QC Blank			<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**	**PCB 149**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	0.00010	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	0.00473	0.00152	0.00452	0.00381	0.00069	0.00425	0.00050	0.00401
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	0.01255	0.00343	0.01211	0.01109	0.00233	0.01145	0.00125	0.01175
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	0.00508	0.00151	0.00537	0.00510	0.00082	0.00509	0.00065	0.00509
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	0.00712	0.00251	0.00734	0.00591	0.00114	0.00559	0.00082	0.00664
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	0.00660	0.00192	0.00700	0.00621	0.00118	0.00583	0.00074	0.00635
Certified Reference Material CRM QOR136 MS(% Recovery)			100	146	105~	129	105~	106	104~	105~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**	**PCB 180**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00037	<0.00008
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00027	<0.00008
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	0.00116	0.00585	0.00039	0.00060	0.00101	0.00171	0.00292
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	0.00326	0.01478	0.00082	0.00118	0.00235	0.00980	0.00667
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	0.00151	0.00663	0.00057	0.00067	0.00107	0.00202	0.00331
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	0.00183	0.00954	0.00059	0.00110	0.00155	0.00381	0.00404
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	0.00195	0.00777	0.00058	0.00073	0.00164	0.00401	0.00474
Certified Reference Material CRM QOR136 MS(% Recovery)			102~	117	92	109~	104~	103~	93
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 183**	**PCB 187**	**PCB 194**	**PCB 28**	**PCB 31**	**PCB 44**	**PCB 47**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	<0.00008	<0.00008	<0.00008	0.00018	0.00043	0.00014	<0.00008
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	<0.00008	<0.00008	<0.00008	0.00014	0.00021	0.00011	0.00008
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	0.00060	0.00146	0.00092	0.00283	0.00523	0.00208	0.00067
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	0.00155	0.00404	0.00196	0.02010	0.02322	0.00717	0.00280
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	0.00086	0.00177	0.00096	0.00428	0.00686	0.00207	0.00082
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	0.00089	0.00232	0.00125	0.00871	0.01247	0.00379	0.00115
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	0.00101	0.00283	0.00124	0.00867	0.01212	0.00391	0.00124
Certified Reference Material CRM QOR136 MS(% Recovery)			107~	105~	96~	126	103~	101~	103~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 49**	**PCB 52**	**PCB 66**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	0.00012	0.00020	<0.00008
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	0.00009	0.00018	0.00011
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	0.00236	0.00344	0.00294
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	0.00878	0.01096	0.01086
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	0.00270	0.00365	0.00314
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	0.00417	0.00570	0.00540
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	0.00431	0.00567	0.00536
Certified Reference Material CRM QOR136 MS(% Recovery)			104~	135	108~
QC Blank			<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**	**PCB 149**
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	0.00685	0.00207	0.00688	0.00629	0.00124	0.00617	0.00074	0.00627
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	0.00197	0.00086	0.00230	0.00227	0.00057	0.00221	0.00018	0.00205
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	0.00010	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	0.00011	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			106	155	102~	137	110~	108	108~	104~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00856
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**	**PCB 180**
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	0.00171	0.00819	0.00069	0.00058	0.00149	0.00432	0.00417
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	0.00061	0.00276	0.00052	0.00040	0.00096	0.00123	0.00173
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00031	<0.00008
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00043	<0.00008
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00048	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			107~	116	122	109~	107~	99~	116
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00856
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 183**	**PCB 187**	**PCB 194**	**PCB 28**	**PCB 31**	**PCB 44**	**PCB 47**
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	0.00100	0.00270	0.00127	0.00881	0.01197	0.00348	0.00119
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	0.00041	0.00091	0.00096	0.00166	0.00337	0.00124	0.00031
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	<0.00008	<0.00008	<0.00008	0.00023	0.00040	0.00010	<0.00008
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	<0.00008	<0.00008	<0.00008	0.00028	0.00053	0.00016	<0.00008
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	<0.00008	<0.00008	<0.00008	0.00027	0.00056	0.00014	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			106~	108~	103~	120	102~	105~	106~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 49**	**PCB 52**	**PCB 66**
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	0.00440	0.00590	0.00555
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	0.00109	0.00169	0.00163
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	0.00012	0.00024	<0.00008
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	0.00019	0.00034	0.00011
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	0.00018	0.00033	0.00015
Certified Reference Material CRM QOR136 MS(% Recovery)			108~	125	116~
QC Blank			<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02
		Limit of Detection	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BDE17**	**BDE28**	**BDE47**	**BDE66**	**BDE85**	**BDE99**	**BDE100**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	0.00514	0.00529	0.01860	0.005070	0.001110	0.01870	0.00285
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	0.000269	0.00147	0.00119	0.000284	0.000105	0.00126	0.00027
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	0.00312	0.00333	0.01210	0.00311	0.000804	0.01270	0.00174
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	0.00161	0.00221	0.00682	0.00213	0.00054	0.00780	0.00109
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	0.00119	0.00185	0.00492	0.00170	0.00038	0.00566	0.00081
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	0.00168	0.002590	0.00662	0.002230	0.000514	0.00758	0.00114
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	0.00061	0.00052	0.00317	0.000553	0.000193	0.00335	0.00048
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02
		Limit of Detection	0.00002	0.00002	0.00002	0.00002	0.0001
		Accreditation	MMO	MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BDE138**	**BDE153**	**BDE154**	**BDE183**	**BDE209**
BH-08 / ES201 / 1.60m-1.80m	MAR00856.001	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-09 / ES202 / 2.30m-3.00m	MAR00856.002	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-34 / ES203 / 0.00m-0.50m	MAR00856.003	Sediment	0.00004	0.00498	0.003960	0.008350	0.201
BH-34 / ES204 / 1.00m-1.50m	MAR00856.004	Sediment	<0.00002	0.00029	0.000146	0.000255	0.015
BH-34 / ES205 / 2.00m-2.50m	MAR00856.005	Sediment	0.00003	0.00318	0.00190	0.003250	0.201
BH-34 / ES206 / 3.00m-3.50m	MAR00856.006	Sediment	0.00005	0.00188	0.00090	0.00160	0.091
BH-34 / ES207 / 4.00m-4.50m	MAR00856.007	Sediment	0.00005	0.00137	0.00072	0.00132	0.043
BH-34 / ES208 / 5.00m-5.50m	MAR00856.008	Sediment	0.00005	0.00186	0.001000	0.001410	0.067
BH-33 / ES214 / 0.00m-1.00m	MAR00856.009	Sediment	<0.00002	0.00063	0.000431	0.000507	0.221
BH-33 / ES215 / 1.00m-1.70m	MAR00856.010	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
BH-33 / ES216 / 2.00m-2.50m	MAR00856.011	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.000
BH-33 / ES217 / 3.00m-3.30m	MAR00856.012	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00856
Issue Version 1

Customer Reference MMO Marine Sediment Analysis

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
*SUB_01	MAR00856.001-012	Analysis was conducted by an approved subcontracted laboratory.
*SUB_02	MAR00856.001-012	Analysis was conducted by an approved subcontracted laboratory.
SOCOTEC Env Chem*	MAR00856.001-012	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ASC/SOP/301	MAR00856.001-002, .010-012	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/303/304	MAR00856.001-012	Chrysene is known to coelute with Triphenylene and these peaks can not be resolved in the PAHSED UKAS accredited method. Chrysene and Triphenylene are resolved for MMO but this is currently not UKAS accredited therefore Chrysene is reported without this acccreditation.

DEVIATING SAMPLE STATEMENT

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Handling Time Exceeded	N/A	N/A
D3	Sample Contaminated through Damaged Packaging	N/A	N/A
D4	Sample Contaminated through Sampling	N/A	N/A
D5	Inappropriate Container/Packaging	N/A	N/A
D6	Damaged in Transit	N/A	N/A
D7	Insufficient Quantity of Sample	N/A	N/A
D8	Inappropriate Headspace	N/A	N/A
D9	Retained at Incorrect Temperature	N/A	N/A
D10	Lack of Date & Time of Sampling	N/A	N/A
D11	Insufficient Sample Details	N/A	N/A
D12	Sample integrity compromised or not suitable for analysis	N/A	N/A

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00856
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

Method	Sample and Fraction Size	Method Summary
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Metals	Air dried	Aqua-regia extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Ultra-violet fluorescence spectroscopy
Polychlorinated Biphenyls (PCBs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.

Analyte Definitions					
Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorocyclohexane
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorocyclohexane
BAA	Benzo[a]anthracene	DBENZAH	Dibenzo[ah]anthracene	GHCH	gamma-Hexachlorocyclohexane
BAP	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	HCB	Hexachlorobenzene
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	PPDDE	p,p'-Dichorodiphenyldichloroethylene
BENZGHIP	Benzo[ghi]perylene	NAPTH	Naphthalene	PPDDT	p,p'-Dichorodiphenyltrichloroethane
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene	PPTDE	p,p'-Dichorodiphenyldichloroethane
C1N	C1-naphthalenes	PHENANT	Phenanthrene		
C1PHEN	C1-phenanthrene	PYRENE	Pyrene		

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874	
Issue Version	1	
Customer	Fugro Geoservices	
Customer Reference	MMO Marine Sediment Analysis	
Date Sampled	30/11-07/12/2020	
Date Received	10-Dec-20	
Date Reported	13-Apr-21	
Condition of samples	Frozen	Satisfactory

Authorised by:	Marya Hubbard
Position:	Laboratory Manager

Any additional opinions or interpretations found in this report, are outside the scope of UKAS accreditation.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	pH Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	SOCOTEC Env Chem*	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	No	MMO	MMO	MMO	MMO	MMO
				45mm	**31.5mm**	**22.4mm**	**16mm**	**11.2mm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**pH Units**	**-5.5**	**-5.0**	**-4.5**	**-4.0**	**-3.5**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	7.9	0.00	0.00	0.00	0.00	0.00
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	8.5	0.00	11.71	0.00	1.92	2.58
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	8.3	0.00	0.00	0.00	0.00	3.38
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	8.4	0.00	0.00	0.00	0.00	0.00
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	8.6	0.00	0.00	0.00	0.01	0.00
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	8.3	0.00	0.00	0.00	0.00	0.00
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	8.3	0.00	0.00	0.00	0.00	2.15
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	8.2	0.00	0.00	0.00	0.00	0.00
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	8.5	0.00	28.34	0.00	0.00	0.00
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	8.5	0.00	33.25	0.00	0.00	0.00
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	8.4	0.00	0.00	0.00	5.77	2.23
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	8.8	0.00	0.00	0.00	0.00	1.51
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	9.0	0.00	0.00	0.00	0.00	2.44
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	8.7	0.00	0.00	0.00	0.00	0.00
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	8.5	0.00	0.00	0.00	0.00	2.71
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	8.6	0.00	0.00	0.00	3.52	3.93
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	8.4	0.00	0.00	0.00	0.00	2.73
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	8.1	0.00	0.00	0.00	0.00	1.28
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	7.9	0.00	0.00	17.94	5.51	9.91
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	8.0	0.00	0.00	0.00	0.00	0.00
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	8.2	0.00	0.00	0.00	0.00	0.00
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	8.4	0.00	0.00	0.00	0.00	0.00
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	8.3	0.00	0.00	0.00	0.00	2.06

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			8mm	**5.6mm**	**4mm**	**2.8mm**	**2mm**	**1.4mm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**-3.0**	**-2.5**	**-2.0**	**-1.5**	**-1.0**	**-0.5**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	0.60	0.86	0.65	0.77	0.84	0.63
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	2.16	1.91	2.52	3.22	2.87	2.57
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	3.25	3.52	1.04	3.00	1.77	1.85
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	0.00	2.27	2.66	3.29	1.97	1.32
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	0.00	0.12	0.20	0.17	0.15	0.20
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	1.22	1.51	1.23	1.20	1.75	1.97
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	0.00	0.88	2.50	1.88	1.79	1.65
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	2.47	1.62	1.85	3.39	3.45	3.60
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	2.26	1.95	1.50	1.75	1.39	1.39
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	0.76	1.99	2.29	1.63	1.23	1.01
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	2.04	3.53	3.40	3.36	3.44	2.80
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	0.00	1.51	1.15	1.10	1.12	0.98
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	0.65	0.47	0.96	1.70	0.92	0.88
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	0.84	2.14	1.71	1.96	1.76	1.49
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	3.55	2.65	2.28	2.61	2.33	1.82
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	2.78	4.60	2.62	2.64	2.19	2.02
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	2.44	3.44	2.11	2.39	1.85	1.68
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	5.69	1.50	1.71	1.88	1.76	1.50
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	9.38	8.57	7.83	5.33	3.84	3.57
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	1.57	0.33	0.89	0.58	0.86	0.93
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	5.04	2.55	1.78	1.78	1.41	1.46
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	2.93	3.93	3.24	2.45	1.71	1.54

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			1mm	**707µm**	**500µm**	**353.6µm**	**250µm**	**176.8µm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**0.0**	**0.5**	**1.0**	**1.5**	**2.0**	**2.5**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	0.39	0.00	0.00	0.00	0.09	0.65
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	2.07	0.00	0.00	0.00	0.00	0.78
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	1.41	0.00	0.00	0.16	1.74	4.17
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	0.67	0.00	0.00	0.00	0.00	0.00
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	0.19	0.00	0.00	0.00	0.53	2.28
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	1.58	0.00	0.00	0.77	4.91	3.84
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	1.21	0.00	0.00	0.02	1.39	3.66
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	3.10	0.00	0.00	0.01	0.70	2.36
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	0.88	0.00	0.00	0.01	0.49	1.48
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	0.70	0.00	0.00	0.02	0.65	1.63
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	1.86	0.00	0.00	0.01	1.35	2.65
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	1.01	0.00	0.00	0.01	0.86	2.60
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	0.71	0.11	3.17	5.13	3.09	3.41
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	0.99	0.00	0.00	0.00	0.00	0.56
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	1.21	0.00	0.00	0.00	0.00	0.57
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	1.41	0.00	0.00	0.01	0.56	2.06
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	1.26	0.00	0.00	0.04	1.85	3.53
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	1.05	0.00	0.00	0.08	1.81	3.12
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	2.75	1.37	2.80	2.17	1.50	1.25
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	0.00	0.00	0.00	0.00	0.00	0.00
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	0.63	0.00	0.00	0.00	0.00	0.53
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	1.24	0.00	0.00	0.14	2.62	3.65
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	1.09	0.00	0.00	0.00	0.00	0.17

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			125µm	**88.39µm**	**63µm**	**44.2µm**	**31.3µm**	**22.1µm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**3.0**	**3.5**	**4.0**	**4.5**	**5.0**	**5.5**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	4.11	1.65	0.53	5.40	7.95	8.96
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	3.70	3.52	0.94	0.76	3.46	4.44
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	5.52	5.13	2.29	1.88	4.54	5.30
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	0.58	1.18	0.09	0.08	2.59	5.95
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	3.61	4.73	0.47	4.03	7.20	8.17
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	4.50	5.51	1.68	2.99	5.18	5.88
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	3.92	5.12	1.52	3.01	5.47	6.45
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	4.47	3.67	1.65	1.82	4.19	5.53
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	3.03	2.89	0.44	1.72	3.44	4.22
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	2.40	2.85	0.54	1.36	2.92	3.68
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	1.70	2.64	0.34	0.22	2.24	3.90
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	3.98	4.36	0.65	2.43	5.42	6.61
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	3.75	4.10	1.01	4.46	5.42	5.61
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	3.90	3.22	0.45	0.86	4.42	6.60
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	3.08	2.72	0.37	1.05	4.35	5.93
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	4.43	4.00	2.04	2.10	4.67	5.49
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	4.08	4.95	1.27	2.75	4.87	5.71
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	4.97	4.87	1.22	2.83	4.78	5.89
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	1.13	0.78	0.07	0.64	1.01	1.24
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	0.00	0.06	5.94	18.77	15.97	11.73
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	3.52	3.49	0.65	1.10	5.87	8.16
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	4.63	4.44	2.52	2.39	4.78	5.60
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	1.71	2.14	0.13	0.06	2.36	5.35

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO
			15.6µm	11µm	7.8µm	5.5µm	3.9µm	2.75µm
Client Reference:	SOCOTEC Ref:	Matrix	6.0	6.5	7.0	7.5	8.0	8.5
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	9.65	9.77	10.06	9.63	7.77	5.29
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	4.76	6.49	6.21	5.45	4.50	3.49
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	5.27	6.59	6.08	5.35	4.51	3.53
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	8.11	12.02	11.95	9.98	7.38	5.07
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	8.47	8.95	9.82	9.83	8.31	5.97
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	5.53	6.21	6.32	6.10	5.35	4.18
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	6.26	7.08	6.99	6.42	5.39	4.04
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	5.61	6.86	6.93	6.35	5.26	3.91
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	4.40	5.02	5.21	4.94	4.11	3.01
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	4.18	4.65	4.89	4.80	4.08	2.97
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	5.19	7.59	8.35	7.53	5.68	3.79
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	6.67	7.00	7.52	7.50	6.51	4.87
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	5.46	5.10	5.54	5.97	5.53	4.26
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	7.25	9.27	9.20	8.06	6.42	4.69
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	6.33	7.98	8.15	7.45	6.03	4.43
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	5.19	6.40	5.95	5.19	4.34	3.42
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	5.51	6.40	6.47	6.02	5.05	3.81
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	5.63	6.48	6.52	6.08	5.14	3.90
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	1.31	1.36	1.41	1.37	1.17	0.87
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	8.98	7.23	5.94	4.92	3.81	2.86
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	7.07	8.44	9.29	9.27	8.08	6.17
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	5.47	6.81	6.35	5.79	5.02	3.89
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	6.54	9.50	9.82	8.62	6.64	4.58

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO
			1.95µm	**1.38µm**	**0.98µm**	**0.69µm**	**0.49µm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**9.0**	**9.5**	**10.0**	**10.5**	**11.0**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	3.20	2.12	1.70	1.52	1.37
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	2.82	2.64	2.51	2.26	1.98
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	2.88	2.73	2.63	2.37	2.09
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	3.71	3.36	3.27	3.00	2.60
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	3.92	2.82	2.28	1.92	1.65
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	3.33	3.08	2.88	2.55	2.25
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	3.17	3.02	2.92	2.65	2.37
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	3.04	2.86	2.80	2.61	2.40
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	2.34	2.24	2.20	2.02	1.81
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	2.26	2.18	2.17	2.00	1.78
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	2.76	2.64	2.69	2.50	2.16
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	3.73	3.49	3.37	3.09	2.80
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	3.30	3.04	2.79	2.41	2.13
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	3.57	3.32	3.27	3.04	2.75
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	3.38	3.10	3.03	2.83	2.55
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	2.80	2.64	2.51	2.27	2.04
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	3.04	2.91	2.81	2.52	2.20
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	3.10	2.95	2.86	2.58	2.28
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	0.68	0.62	0.56	0.48	0.41
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	2.21	1.93	1.82	1.70	1.54
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	4.57	3.86	3.43	2.88	2.32
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	3.04	2.81	2.72	2.53	2.33
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	3.29	3.06	3.17	3.09	2.82

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO	MMO	MMO
			0.34µm	**0.24µm**	**0.17µm**	**0.12µm**	**0.09µm**
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**11.5**	**12.0**	**12.5**	**13.0**	**13.5**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	1.20	0.98	0.71	0.50	0.30
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	1.72	1.43	1.08	0.80	0.49
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	1.82	1.51	1.14	0.82	0.50
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	2.16	1.72	1.27	0.93	0.58
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	1.37	1.06	0.72	0.47	0.26
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	1.97	1.65	1.23	0.88	0.53
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	2.11	1.78	1.35	0.98	0.60
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	2.18	1.87	1.44	1.06	0.65
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	1.61	1.37	1.05	0.78	0.48
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	1.55	1.29	0.97	0.70	0.43
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	1.78	1.40	1.02	0.74	0.45
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	2.50	2.10	1.54	1.08	0.64
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	1.92	1.65	1.24	0.89	0.54
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	2.42	2.04	1.57	1.17	0.73
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	2.23	1.86	1.42	1.05	0.66
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	1.81	1.54	1.18	0.87	0.54
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	1.90	1.58	1.19	0.87	0.53
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	1.98	1.65	1.24	0.90	0.55
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	0.36	0.30	0.22	0.16	0.09
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	1.34	1.12	0.87	0.66	0.42
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	1.81	1.38	0.99	0.70	0.43
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	2.12	1.82	1.38	1.01	0.62
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	2.43	1.99	1.49	1.10	0.68

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	% (at 0.5phi intervals)	% (at 0.5phi intervals)	% (at 0.5phi intervals)
		Method No	*SUB_01	*SUB_01	*SUB_01
		Accreditation	MMO	MMO	MMO
			0.06µm	0.04µm	<0.04µm
Client Reference:	SOCOTEC Ref:	Matrix	14.0	14.5	>14.5
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	0.12	0.01	0.00
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	0.20	0.02	0.00
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	0.20	0.02	0.00
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	0.23	0.03	0.00
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	0.09	0.01	0.00
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	0.20	0.02	0.00
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	0.23	0.03	0.00
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	0.26	0.03	0.00
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	0.19	0.02	0.00
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	0.16	0.02	0.00
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	0.18	0.02	0.00
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	0.24	0.03	0.00
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	0.20	0.02	0.00
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	0.29	0.03	0.00
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	0.26	0.03	0.00
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	0.21	0.03	0.00
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	0.21	0.02	0.00
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	0.21	0.03	0.00
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	0.04	0.00	0.00
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	0.18	0.02	0.00
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	0.17	0.02	0.00
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	0.24	0.03	0.00
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	0.27	0.03	0.00

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)							
		Method No	SOCOTEC Env Chem*							
		Limit of Detection	0.5	0.04	0.5	0.5	0.01	0.5	0.5	2
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Arsenic (As)**	**Cadmium (Cd)**	**Chromium (Cr)**	**Copper (Cu)**	**Mercury (Hg)**	**Nickel (Ni)**	**Lead (Pb)**	**Zinc (Zn)**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	24.1	0.80	67.4	77.3	0.71	32.9	166	264
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	7.4	0.19	29.8	29.1	0.05	28.8	19.7	65.4
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	4.8	0.23	21.3	19.6	0.02	24.8	12.2	48.0
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	2.6	0.06	21.3	5.4	0.03	20.4	4.1	29.8
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	23.2	1.74	123	139	1.24	34.5	239	461
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	6.3	0.23	26.0	20.9	0.04	30.2	13.9	49.5
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	5.4	0.21	23.1	18.4	0.02	27.7	13.5	48.5
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	7.7	0.24	27.9	20.0	0.02	34.0	14.7	55.8
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	5.1	0.16	22.6	22.3	0.01	25.4	9.1	45.6
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	4.3	0.13	24.3	19.1	0.02	24.6	8.1	45.4
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	2.9	0.08	20.4	6.1	0.03	19.4	3.5	30.2
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	8.5	0.45	47.1	36.0	0.25	34.4	25	89.0
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	10.1	0.31	29.8	24.2	0.03	31.9	17.5	79.2
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	5.4	0.16	26.7	28.7	0.03	28.0	9.9	49.9
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	5.3	0.12	24.3	21.5	0.02	27.5	9.1	48.7
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	4.9	0.15	20.4	22.3	0.02	22.1	296	39.3
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	5.2	0.18	23.1	18.2	0.01	27.5	15.2	51.5
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	6.5	0.29	25.3	26.4	0.02	28.4	15.4	59.0
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	7.9	0.13	28.6	7.9	0.02	27.5	6.9	42.6
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	3.4	0.09	28.0	8.4	0.02	32.4	6.1	49.9
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	1.5	0.10	23.2	29.8	<0.01	24.7	2.5	38.9
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	6.2	0.21	18.8	16.5	0.01	22.3	12.6	46.7
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	2.9	0.12	19.0	26.9	<0.01	20.4	3.2	33.4
Certified Reference Material SETOC 774 (% Recovery)			108	108	102	107	103	105	109	107
QC Blank			<0.5	<0.04	<0.5	<0.5	<0.01	<0.5	<0.5	<2

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	0.024	0.031
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	<0.005	<0.005
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	<0.005	<0.005
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	<0.005	<0.005
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	0.033	0.117
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	<0.005	<0.005
Certified Reference Material BCR-646 (% Recovery)			105	115
QC Blank			<0.001	<0.001

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	<0.005	<0.005
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	<0.005	<0.005
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	<0.005	<0.005
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	<0.005	<0.005
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	<0.005	<0.005
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	<0.005	<0.005
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	<0.005	<0.005
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	<0.005	<0.005
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	<0.005	<0.005
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	<0.005	<0.005
Certified Reference Material BCR-646 (% Recovery)			118	130
QC Blank			<0.001	<0.001

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	
		Method No	ASC/SOP/301	
		Limit of Detection	0.001	0.001
		Accreditation	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**Dibutyltin (DBT)**	**Tributyltin (TBT)**
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	<0.005	<0.005
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	<0.005	<0.005
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	<0.005	<0.005
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	<0.005	<0.005
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	<0.005	<0.005
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	<0.005	<0.005
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	<0.005	<0.005
Certified Reference Material BCR-646 (% Recovery)			113	125
QC Blank			<0.001	<0.001

* See report notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	35800	1920	2180	1540	1260	917
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	234	12.7	15.7	22.7	31.2	50.8
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	12.3	2.70	6.80	22.0	36.4	76.3
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	<1	<1	<1	<1	<1	2.32
Certified Reference Material QPH098MS(% Recovery)			83	101	83	71	73	76
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BEP**	**BKF**	**C1N**	**C1PHEN**	**C2N**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	876	1080	903	6380	2740	7160
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	60.6	77.1	11.7	221	129	151
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	88.9	126	7.66	367	232	203
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	1.46	2.59	<1	2.21	1.08	1.76
Certified Reference Material QPH098MS(% Recovery)			76	76	91	102	81	141
QC Blank			<1	<1	<1	<1	<1	<1

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no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N~**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	5720	1410	177	4930	10800	611
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	105	53.4	8.99	51.3	93.0	19.6
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	126	85.0	13.7	48.1	49.8	21.0
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	1.06	1.97	<1	<1	<1	<1
Certified Reference Material QPH098MS(% Recovery)			106	87	57	79	92	66
QC Blank			<1	<1	<1	<1	<1	<1

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no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	5290	489	7130	4130	232
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	83.4	6.81	140	53.8	3.42
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	105	4.93	214	59.3	11.7
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	<1	<1	<1	<1	<1
Certified Reference Material QPH098MS(% Recovery)			82	81	87	83	92~
QC Blank			<1	<1	<1	<1	<1

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no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	SOCOTEC Ref:	Matrix	ACENAPTH	ACENAPHY	ANTHRACN	BAA	BAP	BBF
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	13800	1350	1640	2930	3310	2740
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	18.8	3.95	9.82	21.7	26.7	30.3
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	14.3	3.84	17.0	34.2	43.1	46.8
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	27.6	6.68	11.1	20.3	26.8	30.7
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	3.56	1.24	4.05	16.0	20.0	34.3
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	2.33	<1	2.70	7.68	11.5	22.6
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	1.35	<1	1.31	3.48	5.25	14.9
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	6390	219	466	176	161	151
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	6.10	1.27	2.63	2.35	3.77	4.65
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	7.16	1.29	3.87	9.82	15.1	29.4
Certified Reference Material QPH098MS(% Recovery)			88	108	98	70	79	77
QC Blank			<1	<1	<1	<1	<1	<1

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no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BEP**	**BKF**	**C1N**	**C1PHEN**	**C2N**
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	1890	2420	1790	6190	2690	5260
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	59.0	45.3	10.4	167	149	149
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	78.5	69.5	13.5	290	246	244
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	50.4	46.3	8.78	198	121	148
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	41.4	55.3	7.00	137	118	80.7
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	27.9	37.4	4.74	103	64.2	59.3
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	14.0	21.3	2.75	38.5	28.7	24.5
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	161	158	80.8	2480	559	1610
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	35.4	8.83	1.95	38.7	14.7	26.2
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	35.4	48.6	5.38	120	77.7	74.5
Certified Reference Material QPH098MS(% Recovery)			79	76	93	116	82	111
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	4200	2800	364	5680	3550	1870
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	162	32.8	5.33	35.5	23.1	14.2
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	246	51.8	8.89	50.1	39.3	23.0
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	130	35.7	5.94	38.6	32.6	15.4
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	60.5	38.3	6.11	37.0	17.5	11.6
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	38.8	24.1	4.10	14.7	12.5	7.21
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	16.2	13.3	2.37	7.89	5.88	3.41
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	813	202	<1	575	2880	82.3
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	32.8	2.97	<1	7.82	9.90	4.62
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	47.5	31.7	4.55	18.6	19.1	9.39
Certified Reference Material QPH098MS(% Recovery)			86	89	95	86	94	60
QC Blank			<1	<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	3630	1060	3340	6050	511
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	47.4	7.76	105	47.2	25.2
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	67.0	11.7	212	65.9	11.0
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	60.4	8.99	106	47.0	12.1
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	37.5	3.54	104	34.9	3.77
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	30.1	2.37	59.0	17.9	4.90
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	8.21	1.03	25.5	10.2	1.37
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	3970	60	2380	489	42.7
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	27.1	2.04	14.6	9.26	9.12
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	27.3	2.33	74.7	23.2	10.3
Certified Reference Material QPH098MS(% Recovery)			94	85	90	92	92~
QC Blank			<1	<1	<1	<1	<1

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.
For full analyte name see method summaries

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**ACENAPTH**	**ACENAPHY**	**ANTHRACN**	**BAA**	**BAP**	**BBF**
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	2.85	<1	2.27	5.18	7.99	15.6
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	3.23	<1	3.52	8.41	12.9	27.4
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	5.26	1.75	5.17	15.5	23.2	44.2
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	7.68	1.96	6.30	18.7	29.3	49.1
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	<1	<1	<1	<1	<1	<1
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	<1	<1	<1	<1	<1	3.25
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	<1	<1	<1	<1	<1	1.32
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	6.60	2.52	8.61	22.1	28.1	41.0
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	<1	<1	<1	<1	<1	1.81
Certified Reference Material QPH098MS(% Recovery)			91	115	100	64	68	66
QC Blank			<1	<1	<1	<1	<1	<1

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SOCOTEC

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BENZGHIP**	**BEP**	**BKF**	**C1N**	**C1PHEN**	**C2N**
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	18.4	25.6	3.16	73.8	44.6	42.1
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	32.2	43.1	5.20	102	72.3	63.2
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	53.7	73.4	7.51	219	147	125
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	66.9	85.2	9.65	244	155	135
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	<1	<1	<1	<1	<1	<1
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	1.83	3.88	<1	<1	<1	<1
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	<1	1.30	<1	<1	<1	<1
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	62.8	70.2	10.0	247	203	183
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	1.83	2.83	1.28	4.05	3.34	3.89
Certified Reference Material QPH098MS(% Recovery)			70	67	87	107	81	103
QC Blank			<1	<1	<1	<1	<1	<1

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SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304
		Limit of Detection	1	1	1	1	1	1
		Accreditation	MMO	MMO	UKAS/MMO	UKAS/MMO	MMO*	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**C3N~**	**CHRYSENE**	**DBENZAH**	**FLUORANT**	**FLUORENE**	**INDPYR**
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	25.9	16.3	2.41	10.0	8.87	4.54
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	38.0	28.5	4.57	17.1	15.8	8.24
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	78.3	46.5	7.11	33.5	26.9	11.3
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	88.0	53.9	8.71	36.6	29.6	16.9
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	<1	<1	<1	<1	<1	<1
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	<1	3.56	<1	2.19	<1	<1
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	<1	<1	<1	<1	<1	<1
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	149	50.2	5.83	43.0	23.1	16.0
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	3.80	1.91	<1	1.29	<1	<1
Certified Reference Material QPH098MS(% Recovery)			90	80	84	81	101	51
QC Blank			<1	<1	<1	<1	<1	<1

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Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	µg/Kg (Dry Weight)	mg/Kg
		Method No	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/303/304	ASC/SOP/305
		Limit of Detection	1	1	1	1	1
		Accreditation	UKAS/MMO	MMO	UKAS/MMO	UKAS/MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**NAPTH**	**PERYLENE**	**PHENANT**	**PYRENE**	**THC**
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	20.0	1.59	40.1	12.4	12.99
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	20.5	1.99	65.1	21.2	16.6
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	58.6	3.85	138	40.0	9.90
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	68.2	6.20	150	44.9	15.8
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	<1	<1	2.08	<1	<1
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	<1	<1	7.86	1.96	<1
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	<1	<1	<1	<1	<1
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	68.8	10.2	166	51.3	34.4
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	1.73	<1	2.83	1.39	<1
Certified Reference Material QPH098MS(% Recovery)			97	70	91	84	92~
QC Blank			<1	<1	<1	<1	<1

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SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**	**PCB 149**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	0.00229	0.00071	0.00234	0.00254	0.00031	0.00254	0.00037	0.00211
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00010
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	0.00010	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	0.00359	0.00124	0.00376	0.00370	0.00041	0.00336	0.00062	0.00364
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	0.00013	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			101	115	106~	97	103~	118	103~	116~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**	**PCB 180**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	0.00049	0.00324	0.00021	0.00030	0.00048	0.00086	0.00156
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	<0.00008	0.00010	<0.00008	<0.00008	<0.00008	0.00017	<0.00008
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00053	<0.00008
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00026	<0.00008
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	0.00083	0.00538	0.00043	0.00077	0.00090	0.00128	0.00257
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00060	<0.00008
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00048	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			114~	118	111	110~	104~	100~	96
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 183**	**PCB 187**	**PCB 194**	**PCB 28**	**PCB 31**	**PCB 44**	**PCB 47**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	0.00031	0.00135	0.00033	0.00137	0.00250	0.00097	0.00032
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	<0.00008	<0.00008	<0.00008	0.00018	0.00023	0.00009	<0.00008
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	<0.00008	<0.00008	<0.00008	0.00026	0.00055	0.00021	<0.00008
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	<0.00008	<0.00008	<0.00008	0.00013	0.00022	<0.00008	<0.00008
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	0.00067	0.00212	0.00064	0.00237	0.00364	0.00176	0.00054
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	<0.00008	<0.00008	<0.00008	0.00031	0.00053	0.00022	0.00008
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	<0.00008	<0.00008	<0.00008	0.00028	0.00043	0.00010	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			106~	104~	109~	108	102~	109~	107~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 49**	**PCB 52**	**PCB 66**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	0.00112	0.00168	0.00129
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	0.00013	0.00017	<0.00008
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	0.00017	0.00037	0.00010
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	0.00010	0.00020	<0.00008
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	0.00194	0.00245	0.00200
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	0.00015	0.00034	0.00011
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	0.00014	0.00030	0.00010
Certified Reference Material CRM QOR136 MS(% Recovery)			103~	132	101~
QC Blank			<0.00008	<0.00008	<0.00008

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SOCOTEC

Test Report ID	MAR00874
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Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**	**PCB 149**
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	0.00069	0.00011	0.00060	0.00045	<0.00008	0.00051	0.00013	0.00036
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			104	92	107~	104	107~	96	110~	108~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**	**PCB 180**
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00014	<0.00008
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00022	<0.00008
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00035	<0.00008
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00017	<0.00008
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	<0.00008	0.00064	<0.00008	<0.00008	<0.00008	0.00043	0.00014
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00053	<0.00008
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00011	<0.00008
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00028	<0.00008
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00022	<0.00008
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00027	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			103~	106	91	100~	116~	108~	80
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 183**	**PCB 187**	**PCB 194**	**PCB 28**	**PCB 31**	**PCB 44**	**PCB 47**
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	<0.00008	<0.00008	<0.00008	0.00008	0.00016	<0.00008	<0.00008
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00017	<0.00008	<0.00008
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	<0.00008	<0.00008	<0.00008	0.00012	0.00030	0.00009	<0.00008
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00013	<0.00008	<0.00008
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	<0.00008	0.00016	<0.00008	0.00038	0.00068	0.00036	0.00013
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	<0.00008	<0.00008	<0.00008	0.00017	0.00038	0.00012	<0.00008
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00008	<0.00008	<0.00008
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	<0.00008	<0.00008	<0.00008	0.00012	0.00023	0.00008	<0.00008
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00016	<0.00008	<0.00008
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	0.00014	<0.00008	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			105~	108~	105~	77	138	102~	101~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 49**	**PCB 52**	**PCB 66**
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	<0.00008	0.00011	<0.00008
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	0.00009	0.00012	<0.00008
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	0.00012	0.00020	<0.00008
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	<0.00008	0.00013	<0.00008
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	0.00045	0.00063	0.00043
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	0.00014	0.00027	<0.00008
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	<0.00008	<0.00008	<0.00008
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	0.00009	0.00016	<0.00008
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	<0.00008	0.00012	<0.00008
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	<0.00008	0.00014	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			102~	105	129~
QC Blank			<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 101**	**PCB 105**	**PCB 110**	**PCB 118**	**PCB 128**	**PCB 138**	**PCB 141**	**PCB 149**
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	0.00009	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			105	103	118~	93	108~	95	104~	104~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 151**	**PCB 153**	**PCB 156**	**PCB 158**	**PCB 170**	**PCB 18**	**PCB 180**
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00035	<0.00008
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00026	<0.00008
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00039	<0.00008
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00022	<0.00008
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00025	<0.00008
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	0.00018	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			102~	104	93	108~	106~	98~	72
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

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no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 183**	**PCB 187**	**PCB 194**	**PCB 28**	**PCB 31**	**PCB 44**	**PCB 47**
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	<0.00008	<0.00008	<0.00008	0.00012	0.00023	<0.00008	<0.00008
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	<0.00008	<0.00008	<0.00008	0.00012	0.00029	<0.00008	<0.00008
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	<0.00008	<0.00008	<0.00008	0.00016	0.00025	0.00010	<0.00008
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	<0.00008	<0.00008	<0.00008	0.00012	0.00023	0.00010	<0.00008
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	<0.00008	<0.00008	<0.00008	0.00010	0.00020	0.00010	<0.00008
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	<0.00008	<0.00008	<0.00008	0.00012	0.00021	<0.00008	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			103~	104~	112~	77	127	118~	113~
QC Blank			<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

SOCOTEC

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	ASC/SOP/302	ASC/SOP/302	ASC/SOP/302
		Limit of Detection	0.00008	0.00008	0.00008
		Accreditation	UKAS/MMO	UKAS/MMO	UKAS/MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**PCB 49**	**PCB 52**	**PCB 66**
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	0.00009	0.00019	<0.00008
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	0.00011	0.00020	0.00009
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	0.00012	0.00022	<0.00008
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	0.00010	0.00017	<0.00008
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	<0.00008	0.00016	<0.00008
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	<0.00008	0.00015	<0.00008
Certified Reference Material CRM QOR136 MS(% Recovery)			118~	114	128~
QC Blank			<0.00008	<0.00008	<0.00008

~ Indicates result is for an In-house Reference Material as
no Certified Reference Materials are avaliable.

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02
		Limit of Detection	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
		Accreditation	MMO	MMO	MMO	MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BDE17**	**BDE28**	**BDE47**	**BDE66**	**BDE85**	**BDE99**	**BDE100**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	0.00069	0.00060	0.00362	0.00070	0.00023	0.00358	0.00053
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	<0.00002	0.000028	0.00008	<0.00002	<0.00002	0.00008	<0.00002
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	0.00177	0.00193	0.00900	0.00235	0.000716	0.01060	0.00132
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	<0.00002	<0.00002	0.00003	<0.00002	<0.00002	0.00003	<0.00002
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002

* See Report Notes

Certificate of Analysis

Issuing Laboratory SOCOTEC, Marine Department, Specialist Chemistry, Etwall House, Bretby Business Park, Ashby Road, Bretby, Burton-upon-Trent DE15 0YZ

Test Report ID	MAR00874
Issue Version	1
Customer Reference	MMO Marine Sediment Analysis

		Units	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)	mg/Kg (Dry Weight)
		Method No	*SUB_02	*SUB_02	*SUB_02	*SUB_02	*SUB_02
		Limit of Detection	0.00002	0.00002	0.00002	0.00002	0.0001
		Accreditation	MMO	MMO	MMO	MMO	MMO
Client Reference:	**SOCOTEC Ref:**	**Matrix**	**BDE138**	**BDE153**	**BDE154**	**BDE183**	**BDE209**
BH-32 / ES218 / 0.00m-0.50m	MAR00874.001	Sediment	<0.00002	0.00066	0.00045	0.00062	0.237
BH-32 / ES219 / 1.00m-1.50m	MAR00874.002	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.009
BH-32 / ES220 / 2.00m-2.50m	MAR00874.003	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-32 / ES221 / 3.00m-3.50m	MAR00874.004	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-31 / ES222 / 0.00m-0.80m	MAR00874.005	Sediment	0.00006	0.00226	0.00136	0.003020	0.167
BH-31 / ES223 / 1.00m-1.60m	MAR00874.006	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-31 / ES224 / 2.00m-2.30m	MAR00874.007	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.001
BH-31 / ES225 / 3.30m-3.70m	MAR00874.008	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	0.001
BH-31 / ES226 / 4.00m-4.30m	MAR00874.009	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-31 / ES227 / 5.00m-5.30m	MAR00874.010	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-31 / ES228 / 6.10m-6.40m	MAR00874.011	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-30 / ES229 / 0.00m-0.50m	MAR00874.012	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-30 / ES230 / 0.95m-1.25m	MAR00874.013	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-30 / ES231 / 2.00m-2.20m	MAR00874.014	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-30 / ES232 / 3.00m-3.20m	MAR00874.015	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-30 / ES233 / 4.00m-4.20m	MAR00874.016	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-30 / ES234 / 5.00m-5.20m	MAR00874.017	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-30 / ES235 / 6.00m-6.20m	MAR00874.018	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-30 / ES236 / 6.80m-7.00m	MAR00874.019	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-10 / ES237 / 2.30m-2.50m	MAR00874.020	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-11 / ES238 / 2.40m-2.60m	MAR00874.021	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-12 / ES239 / 2.25m-2.50m	MAR00874.022	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001
BH-13 / ES240 / 3.90m-4.10m	MAR00874.023	Sediment	<0.00002	<0.00002	<0.00002	<0.00002	<0.0001

* See Report Notes

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SOCOTEC

Test Report ID MAR00874
Issue Version 1
Customer Reference MMO Marine Sediment Analysis

REPORT NOTES

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
*SUB_01	MAR00874.001-023	Analysis was conducted by an approved subcontracted laboratory.
*SUB_02	MAR00874.001-023	Analysis was conducted by an approved subcontracted laboratory.
SOCOTEC Env Chem*	MAR00874.001-023	Analysis was conducted by an internal SOCOTEC laboratory. UKAS accredited analysis by this laboratory is under UKAS number 1252.
ASC/SOP/301	MAR00874.002-004, .006-023	The matrix of this sample has been found to interfere with the result for this test. The sample has therefore been diluted, but in doing so, the detection limit for this test has been elevated.
ASC/SOP/303/304	MAR00874.001-018, .020, .022, .023	Chrysene is known to coelute with Triphenylene and these peaks can not be resolved in the PAHSED UKAS accredited method. Chrysene and Triphenylene are resolved for MMO but this is currently not UKAS accredited therefore Chrysene is reported without this acccreditation.
ASC/SOP/303/304	MAR00874.015-023	The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. The remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected.However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (Fluorene) . These circumstances should be taken into consideration when utilising the data.

DEVIATING SAMPLE STATEMENT

Deviation Code	Deviation Definition	Sample ID	Deviation Details. The following information should be taken into consideration when using the data contained within this report
D1	Holding Time Exceeded	N/A	N/A
D2	Handling Time Exceeded	N/A	N/A
D3	Sample Contaminated through Damaged Packaging	N/A	N/A
D4	Sample Contaminated through Sampling	N/A	N/A
D5	Inappropriate Container/Packaging	N/A	N/A
D6	Damaged in Transit	N/A	N/A
D7	Insufficient Quantity of Sample	N/A	N/A
D8	Inappropriate Headspace	N/A	N/A
D9	Retained at Incorrect Temperature	N/A	N/A
D10	Lack of Date & Time of Sampling	N/A	N/A
D11	Insufficient Sample Details	N/A	N/A
D12	Sample integrity compromised or not suitable for analysis	N/A	N/A

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Method	Sample and Fraction Size	Method Summary
Particle Size Analysis	Wet Sediment	Wet and dry sieving followed by laser diffraction analysis.
Metals	Air dried	Aqua-regia extraction followed by ICP analysis.
Organotins	Wet Sediment	Solvent extraction and derivatisation followed by GC-MS analysis.
Polyaromatic Hydrocarbons (PAH)	Wet Sediment	Solvent extraction and clean up followed by GC-MS analysis.
Total Hydrocarbon Content (THC)	Wet Sediment	Ultra-violet fluorescence spectroscopy
Polychlorinated Biphenyls (PCBs)	Air dried and seived to <2mm	Solvent extraction and clean up followed by GC-MS-MS analysis.

Analyte Definitions					
Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name	Analyte Abbreviation	Full Analyte name
ACENAPTH	Acenaphthene	C2N	C2-naphthalenes	THC	Total Hydrocarbon Content
ACENAPHY	Acenaphthylene	C3N	C3-naphthalenes	AHCH	alpha-Hexachlorocyclohexane
ANTHRACN	Anthracene	CHRYSENE	Chrysene	BHCH	beta-Hexachlorocyclohexane
BAA	Benzo[a]anthracene	DBENZAH	Dibenzo[ah]anthracene	GHCH	gamma-Hexachlorocyclohexane
BAP	Benzo[a]pyrene	FLUORANT	Fluoranthene	DIELDRIN	Dieldrin
BBF	Benzo[b]fluoranthene	FLUORENE	Fluorene	HCB	Hexachlorobenzene
BEP	Benzo[e]pyrene	INDPYR	Indeno[1,2,3-cd]pyrene	PPDDE	p,p'-Dichorodiphenyldichloroethylene
BENZGHIP	Benzo[ghi]perylene	NAPTH	Naphthalene	PPDDT	p,p'-Dichorodiphenyltrichloroethane
BKF	Benzo[k]fluoranthene	PERYLENE	Perylene	PPTDE	p,p'-Dichorodiphenyldichloroethane
C1N	C1-naphthalenes	PHENANT	Phenanthrene		
C1PHEN	C1-phenanthrene	PYRENE	Pyrene		

Appendix 2

SeDiChem spreadsheet
[Provided electronically]

Royal HaskoningDHV

Appendix 3

Benthic ecology survey report

Tees South Bank Quay Marine Surveys Overwater Ground Investigation - Work Package 2

Environmental Report

Survey Period: 12 to 19 November 2020

C2124-R001-WP2 02 | 10 March 2021

Final

Tees Valley Combined Authority

Document Control

Document Information

Project Title	Tees South Bank Quay Marine Surveys Overwater Ground Investigation
Document Title	Tees South Bank Quay Marine Surveys Overwater Ground Investigation - Work Package 2 Environmental Report
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Client Information

Client	Tees Valley Combined Authority
Client Address	South Tees Development Corporation, Cavendish House, Teesdale Business Park, Stockton-on-Tees, TS176QY
Client Contact	John McNicholas

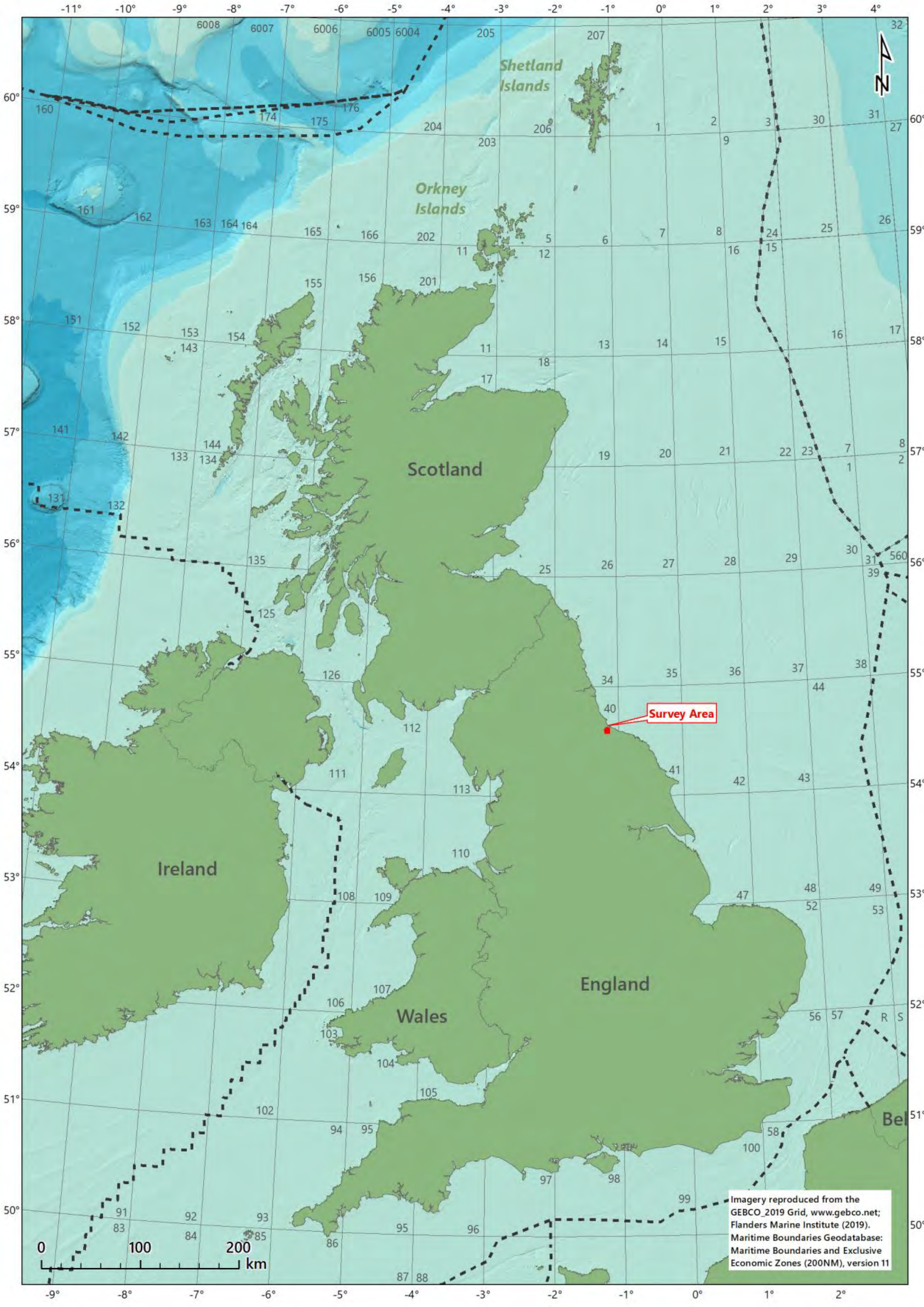
Revision History

Issue	Date	Status	Comments on Content	Prepared By	Checked By	Approved By
01	1 March 2021	Draft	Awaiting client comments	EXC, SDG	SXB, SGW	JF
02	10 March 2021	Final	Addressed client comments	EXC, SDG	JSG, SXB	JF

Project Team

Initials	Name	Role
JF	Jeanette Faulkner	Project Manager
EXC	Evelina Capasso	Marine Ecologist
JSG	Jessica Greig	Senior Environmental Scientist
SDG	Stefania De Gregorio	Principal Marine Ecologist
SXB	Susan Brittain	Principal Chemist (Inorganics Lead)
SGW	Séamus Whyte	Principal Marine Ecologist

Frontispiece



Executive Summary

Introduction

On the instruction of Tees Valley Combined Authority, Fugro performed an environmental site assessment as part of the overwater ground investigation in support of the development on the River Tees. The site is located close to the mouth of the River Tees near Sabic North Tees Refinery, north-east of Middlesbrough, UK.

Table S.1 presents the surface coordinates of the Tees South Bank Overwater Ground Investigation – Work Package 2.

Table S.1: Project location boundaries

Geodetic Parameters: British National Grid OSGB 1936 [m]				
Location	Easting	Northing	Latitude (WGS84)	Longitude (WGS84)
1	454 666.8	523 965.4	54° 36.474′ N	001° 09.310′ W
2	454 304.4	524 212.7	54° 36.610′ N	001° 09.644′ W
3	452 372.0	522 007.4	54° 35.433′ N	001° 11.463′ W
4	452 645.8	521 740.0	54° 35.287′ N	001° 11.211′ W

Survey Strategy

A walkover during low water spring tides was proposed to describe the intertidal survey area. This was supported by the collection of ten quadrat samples to describe the epifauna and/or conspicuous fauna associated with these and, on soft sediment areas, the collection of ten core samples for macrofauna and particle size distribution (PSD) analysis. Quadrat and coring sampling sites were to be selected in-situ from five mid-shore and five lower shore locations, providing as much spatial coverage across the area as possible.

A total of 26 environmental grab sampling stations was predetermined by the client within the survey area to describe the subtidal benthic habitats. Where possible, grab samples were acquired with a 0.1 m^2 Day grab operated from the survey vessel Marshall Art. Some grab stations were identified as being situated in an area of poor accessibility; therefore, it was proposed that these stations could be sampled using a 0.035 m^2 hand-haul van Veen grab operated from the survey vessel Tees Pioneer. At each grab station, one macrofaunal (FA) and one PSD sample were to be obtained.

Five benthic trawls of a duration of approximately five minutes and approximately 180 m were proposed to describe the fish community of the area.

A minimum of 30 scrape samples were to be obtained from the South Bank Wharf and two other jetty structures along the South Bank to describe the flora and fauna growing on these structures. This was requested to assess the potential impacts associated with demolition of these structures as part of the proposed scheme, particularly with regards to the potential dispersion of invasive non-native species (INNS). Fyke net sampling of the intertidal zone (in close proximity to South Bank Wharf) was also to be undertaken to assess the use of the area by sheltering fish species. Nets were to be set on a low water spring tide during daylight hours and recovered 24 hours later.

As part of Work Package 3 (Vibrocores) and Work Package 4 (Boreholes), sampling at 20 vibrocore locations and at 11 borehole locations were successfully completed. Depending on the penetration depth below riverbed level (BRL), a total of 49 environmental samples (ES) was taken from the vibrocore locations and a total of 35 ES was taken from the borehole locations.

Sediment Characteristics

The survey area was characterised by heterogeneous sediment, the coarseness of which decreased from the intertidal to the subtidal section of the survey area.

The intertidal section of the survey area on the southern bank comprised pebbles, cobbles, and boulders in a matrix of muddy sand and gravel, much of which was associated with historic construction activities. Results of PSD analysis of the core samples indicated coarse sediment comprising mainly gravel and sand, whereas fines were less represented with a maximum proportion of 11.78 %. The coarseness of the sediment resulted in most core samples being classified as gravel or muddy sandy gravel and three core samples classified as gravelly sand or gravelly muddy sand in line with the Folk (British Geological Survey (BGS) modified). On the Wentworth scale, intertidal sediments were described as medium and fine pebbles and medium to very coarse sand.

The North Tees Mudflat section of the survey comprised mostly sand and fines, with gravel being poorly represented with the highest proportion of 5.23 %. Most stations were described as muddy sand and one station was classified as gravelly muddy sand on the Folk (BGS modified) classification; on the Wentworth scale the North Tees Mudflat sediments were described as fine sand, very fine sand, and coarse silt.

The subtidal section of the survey area was characterised by the finest sediment, with most stations comprising mainly sand and fines; these stations were classified as sandy mud and muddy sand in line with the Folk (BGS) classification and described as coarse, medium, and fine silt on the Wentworth scale. At four stations the proportion of gravel was up to 66.74 % and were classified as muddy gravel, gravelly mud, and gravelly muddy sand on the Folk (BGS) classification. On the Wentworth scale, subtidal sediments were described as very coarse sand, fine sand, and medium silt.

Sediment Chemistry

Once the core sampling took place, core samples were taken and then divided into depth ranges BRL for a total of 31 sites and 84 samples. These were scheduled for PSD, pH and sediment chemistry analysis, specifically for hydrocarbons, metals, polychlorinated biphenyls (PCBs) and organotins.

Hydrocarbon concentrations were generally high, with the polycyclic aromatic hydrocarbons (PAHs) analysed exceeding Cefas action level 1 (AL1) threshold at most stations and depth ranges.

The concentration of metals in sediments exceeded the respective Cefas AL1 threshold at most stations: arsenic (29 samples over 18 stations), cadmium (30 samples over 19 stations), chromium (32 samples over 19 stations), copper (34 samples over 20 stations), mercury (31 samples over 18 stations), nickel (at nearly all samples and over all stations), lead (32 samples over 20 stations) and zinc (31 samples over 18 stations). At station BH-34, the concentrations of cadmium, chromium, copper, mercury, lead, and zinc also exceeded the respective Cefas action level 2 (AL2) thresholds at one or more depths.

The sum of the ICES 7 PCBs and the sum of 25 PCBs exceeded the Cefas AL1 threshold at 20 samples over 14 stations and did not exceed the Cefas AL2 threshold at any depth range at any station.

The concentration of DBT was below the Cefas AL1 threshold at all stations, in all samples. The concentration of tributyltin (TBT) exceeded the Cefas AL1 threshold in the surface sediment at stations BH-31 and BH-34. The Cefas action level 2 (AL2) was not exceeded at any station in any sample.

These results concur with evidence identified in the literature.

Biological Communities

Epibiota in the intertidal section of the survey area comprised fucoid algae, such as *Fucus spiralis*, *Fucus ceranoides* and *Fucus vesiculosus*. *F. spiralis* occurred on the upper eulittoral, *F. vesiculosus* occurred in the mid and lower eulittoral, whereas *F. ceranoides* dominated in areas with visible freshwater input. Green algae (Chlorophyta) were recorded across the upper and mid eulittoral zones, whereas dense patches of the red alga *Chondrus crispus* occurred in the lower eulittoral. Epifauna was represented by barnacles (Sessilia), gastropods such as *Patella vulgata* and *Littorina littorea* and less frequently the mussel *Mytilus edulis* and the polychaete *Spirobranchus lamarcki*.

The infauna of the intertidal section on the southern bank, assessed by means of core samples, was dominated by oligochaetes, such as *Tubificoides pseudogaster*, *Tubificoides benedii* and species of the family Enchytraeidae; and polychaetes of the genus *Capitella*, all typically occurring in estuaries subject to a degree of pollution. Other polychaetes recorded in the core samples included species of the genus *Polydora*, *Pygospio elegans* and *Manayunkia aestuarina*, the latter being characteristic of sandy and muddy sediments in brackish waters, along with the gastropod *Peringia ulvae*, which was amongst the most abundant and frequently occurring taxa. Arthropoda of the class Collembola were abundant but restricted in distribution.

The mean invertebrates' biomass from the intertidal section of the survey area on the southern bank was 12.2 ash free dry weight (AFDW) g/m^2 of which *L. littorea* was the highest contributor owing to its size. Notable contributors to the biomass included the polychaetes *Malacoceros tetracerus*, *Cirriformia tentaculata*, species of the genus *Capitella* and *Eteone longa;* oligochaetes, the crustaceans *Austrominius* (formerly *Elminius*) *modestus*, *Semibalanus balanoides* and amphipods of the family Gammaridae; and the gastropod *P. ulvae*.

The infauna of the North Tees Mudflat comprised *P. ulvae*, which was the most abundant and frequently occurring invertebrate, the amphipod *Corophium volutator*, the polychaetes *Polydora cornuta*, *P. elegans* and *M. aestuarina* and the oligochaetes *T. benedii* and *T. pseudogaster*. The polychaete *Hediste diversicolor* and the bivalve *Mya arenaria* were also recorded although at lower abundance and frequency of occurrence.

The mean invertebrates' biomass of the North Tees Mudflat was 4.29 AFDW g/m^2, of which the polychaete *Tharyx* species A was the highest contributor. Notable contributors to the biomass included *P. ulvae*, *Littorina saxatilis*, *C. volutator*, *H. diversicolor*, *P. elegans*, *P. cornuta* and *T. benedii*.

The infauna of the subtidal section of the survey area was characterised by *Chaetozone gibber*, which was the most abundant and frequently occurring invertebrate, and polychaetes such as *Euchone limnicola*, *Melinna palmata* and *Tharyx species A*, and the oligochaetes *Tubificoides galiciensis* and *Tubificoides swirencoides*.

The mean invertebrates' biomass of the subtidal section of the survey area was 3.82 AFDW g/m^2 of which the bivalve *Chamelea striatula* was the highest contributor owing to its size. Notable contributors to the biomass included the crustaceans *B. crenatus* and *Crangon crangon*; the bivalve *Yoldia limatula*; polychaetes of the genera *Nephtys* and *Terebellides*, *M. palmata*, *Alitta virens*, *C. gibber*, *Glycera alba*, *Gattyana cirrhosa* and *Ophelina acuminata*.

Faunal diversity, calculated with the Shannon-wiener index (H'Log_2) increased from the intertidal on the southern bank to the subtidal sections of the survey area, owing to the reduced abundance of selected taxa which resulted in faunal abundance being evenly distributed across the taxa recorded.

Seabed Habitats and Biotopes

One biotope complex, three biotopes and two biotope variants were identified in the intertidal section of the survey area on the southern bank:

- Lichens or small green algae on supralittoral and littoral fringe rock (LR.FLR.Lic – B3.11);
- *Fucus spiralis* on sheltered variable salinity upper eulittoral rock (LR.LLR.FVS.FspiVS - A1.322);
- *Fucus vesiculosus* on mid eulittoral variable salinity boulders and stable mixed substrata (LR.LLR.FVS.FvesVS - A1.323);
- *Fucus ceranoides* on reduced salinity eulittoral rock (LR.LLR.FVS.Fcer - A1.327);
- *Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles (LR.HLR.lMusB.Sem.LitX - A1.1133);
- Oligochaetes in variable salinity littoral mobile sand (LS.LSa.MoSa.Ol.VS - A2.2222).

No mudflat habitats were identified in the South Bank survey area.

One biotope variant was identified in the North Tees Mudflat section of the survey area:

- *Hediste diversicolor* and *Corophium volutator* in littoral gravelly sandy mud (LS.LMx.GvMu.HedMx.Cvol - A2.4115).

One biotope was identified in the subtidal section of the survey area:

- *Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud (SS.SMu.ISaMu.MelMagThy - A5.334).

These biotopes are representative of organically enriched estuarine environments of the UK east coast.

Of the biotopes identified, the biotope complexes 'Lichens or small green algae on supralittoral and littoral fringe rock (LR.FLR.Lic)' and 'Fucoids in variable salinity (LR.LLR.FVS - A1.32)', the latter encompassing the three fucoid biotopes, are part of the UK Biodiversity Action Plan (BAP) priority habitat 'Estuarine Rocky Habitats'.

The biotope '*Hediste diversicolor* and *Corophium volutator* in littoral gravelly sandy mud (LS.LMx.GvMu.HedMx.Cvol – A2.3222)' is part of the BAP priority habitat intertidal mudflats, which is also listed on Oslo and Paris (OSPAR) list of threatened and/or declining habitats and species. This biotope was identified on the North Tees Mudflat.

Fisheries

Motile invertebrates comprised crustaceans and echinoderms, whereas epifauna comprised solitary and colonial organisms. Fish recorded in the beam trawls included commercial species such *Gadus morhua*, *Merlangius merlangus*, *Limanda limanda*, *Platichthys flesus* and *Pleuronectes platessa*; and non-commercial species such as *Gaidropsarus vulgaris*, *Myoxocephalus scorpius*, *Agonus cataphractus*, *Pomatoschistus lozanoi* and *Pomatoschistus minutus*. Of these, *G. morhua*, *P. flesus*, *P. platessa*, *G. vulgaris* and *M. scorpius* were also recorded from the fyke nets along with *Pollachius pollachius*. The fish measurements were indicative of small juvenile species.

Of the species recorded in the beam trawls and fyke nets, *G. morhua* is a UK BAP priority species, and it is listed on the OSPAR list of threatened and/or declining habitats and species for regions II and III, the Tees estuary being part of OSPAR region II. It is also listed on the International Union for Conservation of Nature (IUCN) red list of threatened species.

The faunal communities recorded by the beam trawls were comparable to those reported to be typical of estuarine environments of the southern North Sea.

Biological Communities on Vertical Artificial Structures

Diversity of the scrape samples from vertical artificial structures was low and so was evenness, whereas dominance was high owing to the numerical dominance of taxa such as *A. modestus*, *S. balanoides*, *L. arcana/saxatils* and *Fabricia stellaris*. These results concur with evidence identified in the literature which indicate lower diversity of assemblages on artificial structures compared to natural habitats owing to environmental factors and biological interaction.

Green algae were the richest in number of taxa with *Prasiola stipitata* being the second most frequently occurring species after *Ulva intestinalis*. Other green algae included species of the genera *Ulva*, *Blidingia*, *Cladophora* and *Ulothrix*. Red algae included species of the genera *Porphyra* and *Osmundea*. Brown algae were the least represented and included *Pilayella littoralis*, *Elachista fucicola*, *F. spiralis*, and ?*Sphacelorbus nanus*, the latter lacking anatomical/morphological structures for certain taxonomic identification, and therefore preceded by a question mark.

Non-native Species (NNS)

Six non-native species (NNS) and three cryptogenic species were recorded:

- Non-native;
  - *Alitta virens;*
  - *Euchone limnicola;*
  - *Streblospio benedicti;*
  - *Streblospio gynobranchiata;*
  - *Austrominius modestus;*
  - *Yoldia limatula;*
- Cryptogenic;
  - *Dipolydora quadrilobate;*
  - *Polydora cornuta;*
  - *Monocorophium insidiosum.*

Of these *Y. limatula* is believed to represent a first record for the UK waters.

Contents

Appendices

Figures in the Main Text

Tables in the Main Text

Abbreviations

AFDW	Ash free dry weight
AL1/AL2	Action Level 1 or 2
ASB	Asbestos screening sample
BAP	Biodiversity action plan
BGS	British Geological Survey
BH	Borehole
BRL	Below riverbed level
BSL	Below sea level
BT	Beam trawl
CBD	Convention on Biological Diversity
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Coordinated Environmental Monitoring Programme
CM	Central meridian
CP	Cable percussion
CP&RC	Cable percussion with rotary follow on
CS	Core sample
DAISIE	Delivering Alien Invasive Species Inventories for Europe
DCM	Dichloromethane
DEFRA	Department for Environment, Food and Rural Affairs
DG	Day grab
EA	Environment Agency
EC	European Commission
EEA	European Environment Agency
EOL	End of line
EcoQOs	Ecological Quality Objectives
ERL	Effects range low
ES	Environmental sample
EU	European Union
EUNIS	European Nature Information System
FA	Faunal sample A
FN	Fyke net
GC-MS	Gas chromatography–mass spectrometry
GC-MS-MS	Gas Chromatography coupled to a triple quadrupole mass spectrometer
GS	Grab station
gsM	Gravelly sandy mud
HHG	Hand haul grab
ICES	International Council for the Exploration of the Sea
ICP-MS	Inductively coupled plasma-mass spectrometry
ICP-OES	Inductively coupled plasma-optical emission spectrometry
IDA	Industrial denatured alcohol
INNS	Invasive non-native species
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
M	Mud
MMO	Marine Management Organisation
mG	Muddy gravel

mS	Muddy sand
msG	Muddy sandy gravel
MSFD	The Marine Strategy Framework Directive
MPA	Marine Protected Area
MV	Motor vessel
NE	Natural England
NEMESIS	National Exotic Marine and Estuarine Species Information System
NL	No layering
NMBAQC	National Marine Biological Association Quality Control
nMDS	Non-metric multi-dimensional scaling
NNS	Non-native species
NS	No sample
OSGB 1936	Ordnance Survey of Great Britain 1936
OSPAR	Oslo and Paris Commission
PAH	Polycyclic Aromatic Hydrocarbons
PC	Physicochemical sample
PCA	Principal component analysis
PCB	Polychlorinated biphenyl
PRIMER	Plymouth Routines in Multivariate Ecological Research
PSD	Particle size distribution
QS	Quadrat sample
RC	Rotary core
RHDHV	Royal HaskoningDHV
SAC	Special Area of Conservation
SIMPROF	Similarity profiling
sM	Sandy mud
SOL	Start of line
SPA	Special Protection Area
SS	Scrape sample
SSSI	Site of Specific Scientific Interest
STEB	Sodium tetraethylborate
TBT	Tributyltin
THC	Total hydrocarbon content
TM	Transverse Mercator
UKBAP	UK Biodiversity Action Plan
UTC	Coordinated Universal Time
VC	Vibrocore
WoRMS	World Register of Marine Species

1. Introduction

1.1 General Project Description

On the instruction of Tees Valley Combined Authority, Fugro performed an environmental site assessment as part of the overwater ground investigation in support of the development on the River Tees. The site is located close to the mouth of the River Tees near Sabic North Tees Refinery, north-east of Middlesbrough, UK. The survey comprised intertidal aspects undertaken on foot and intertidal/subtidal aspects conducted onboard the vessels Marshall Art and Tees Pioneer. Operations were conducted during the survey period 12 to 19 November 2020.

Table 1.1 defines the surface coordinates of the project boundary at the South Bank Quay.

Table 1.1: Project locations

Geodetic Parameters: British National Grid OSGB 1936 [m]				
Location	Easting	Northing	Latitude (WGS84)	Longitude (WGS84)
1	454 666.8	523 965.4	54° 36.474′ N	001° 09.310′ W
2	454 304.4	524 212.7	54° 36.610′ N	001° 09.644′ W
3	452 372.0	522 007.4	54° 35.433′ N	001° 11.463′ W
4	452 645.8	521 740.0	54° 35.287′ N	001° 11.211′ W

The site survey included a shallow geophysical survey and an environmental site assessment. This report details the results of the environmental site assessment.

1.2 Scope of Work

The aim of the environmental aspects of this project was to obtain samples and data from pre-selected stations and targeted areas:

- Collection of twenty-six subtidal day grab samples;
- Collection of five benthic trawls of five minute duration each;
- Intertidal survey with ten quadrats and ten cores, evenly spaced, five of which from the mid-shore and five of which from the lower shore of the south bank. Core sampling to be taken from the North Tees Mudflat on the north bank if vessel sampling was deemed ‘unsafe’;
- Walkover survey around South Bank Wharf to cover all areas of the intertidal survey footprint;
- Use of fyke nets to capture and assess the nature of the habitat for juvenile fish beneath South Bank Wharf;
- Recovery of scrape samples from infrastructure to be demolished as part of the South Bank Quay project.

Appendix A outlines the guidelines for use of this report.

1.3 Environmental Legislation

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (EC Habitats Directive) is how the European Union (EU) meets its obligations as a signatory of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). The aim of the EC Habitats Directive is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species to a 'favourable conservation status', introducing protection for habitats and species of European importance, listed under Annex I and Annex II of the EC Habitats Directives. The Habitats and Birds Directives (Directive 2009/147/EC of the European Parliament and of the Council on the Conservation of Wild Birds) fulfil the EU's commitment to international conventions and provide a framework for the designation of a network of protected sites for species and features across all EU member states, known as the Natura 2000 network (recently changed to the national site network through the Conservation of Habitats and Species Regulations 2019 (as amended)) and include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). In the UK, the Habitats and the Offshore Regulations allow designation of SACs and SPAs. The Natura 2000 sites are complemented with international and regional level Marine Protected Areas (MPAs) designations under Oslo and Paris (OSPAR) Convention for the Protection of the Marine Environment of the North East Atlantic. The OSPAR list of threatened and/or declining species and habitats allows setting priorities to further conservation and protection of marine biodiversity. The Marine Strategy Framework Directive (MSFD) (Directive 2008/56/), transposed into UK law under the Marine Strategy Regulations, is another EU legislation to protect marine biodiversity.

The Wildlife and Countryside Act 1981, as amended primarily by the Countryside and Rights of Way Act 2000, regulates the designation of sites of special scientific interest (SSSI), areas of special interest in relation to their fauna, flora, geological or physiographical features. The SSSI notification underpins the designation of Ramsar sites, which are wetlands of international importance designated under the criteria of the Ramsar Convention on Wetlands (JNCC, 2019).

The UK Biodiversity Action Plan (BAP) produced a list of important (priority) habitats and species for the protection of the UK's biological resources, under the Convention on Biological Diversity (CBD). In 2012, the UKBAP was superseded by the UK Post-2010 Biodiversity Framework in response to the CBD's Strategic Plan for Biodiversity 2011-2020 and its 20 'Aichi Targets'. The UKBAP lists of priority species and habitats remain important and valuable reference sources (Biodiversity Reporting and Information Group [BRIG], (2011).

1.4 Regional Habitats, Species and Protected Areas

The survey sites are located within an area that has been reviewed by Natural England (NE) for its nature conservation designation in the Teesmouth and Cleveland Coast area, including the Teesmouth and Cleveland Coast SPA and Ramsar site and seven SSSI (Department for Environment, Food and Rural Affairs [DEFRA], 2020).

The Teesmouth and Cleveland Coast SPA is a wetland of European importance, located on the north-east England coast between Castle Eden Dene Mouth and Marske-by-the-Sea. The SPA comprises of a wide variety of habitats including intertidal sand and mudflats, rocky shore, saltmarsh, freshwater marsh, saline lagoons, sand dunes and estuarine and coastal waters on and around the Tees estuary, which has been considerably impacted by human activities. These habitats provide feeding and roosting opportunities for important number of waterbirds in winter and during passage periods including common redshank, red knot, and ruff, which occur in internationally important numbers. The saltmarsh and mudflat habitats are of great importance to a diverse assemblage of bird species, with mudflats supporting high densities of benthic invertebrates (e.g. worms, molluscs, and crustaceans), which provide an important food resource for migrant and overwintering SPA bird species. Areas of saltmarsh provide significant feeding and roosting opportunities for many species of waterbird including common redshank and red knot. In summer, little tern breed on the sandy beaches within the site and feed out at sea while the common tern, which breed at various locations, feed within the River Tees and associated water bodies and within the wider estuary mouth and bay. In late summer, Sandwich tern aggregate in important numbers at Coatham Sands, Seal Sands, North Gare Sands/Seaton Snook, and Bran Sands when on passage. Freshwater and brackish pools also support breeding avocet during summer (NE, 2014). From 2011/12 to 2015/16 it was estimated that the site was used by an average of 26 014 individual birds, therefore the sites qualifies under Article 4 of the Birds Directive (2009/147/EC) as it is used by over 20, 000 waterfowl or seabirds in any season (NE, 2014).

The seven SSSIs occurring in the wider area have been grouped in a new Teesmouth and Cleveland Coast SSSI, due to nationally important Jurassic and Quaternary geology, saltmarsh, sand dunes, breeding harbour seals, breeding and non-breeding birds, and invertebrates associated with sand dunes (NE, 2019).

Table 1.2 summarises the features for the site designation. Environmental protected areas relative to the survey site are presented in Figure 1.1.

Table 1.2: Protected features of Teesmouth and Cleveland Coast SPA

Species	Counts	Population [%]	Designation
Sandwich tern (*Thalasseus sandvicensi*)	1,900 individuals (1988 - 1992)	4.3 (UK)	Annex I (Habitat Directive) Criterion 6 (Ramsar Convention) contributes to Criterion 5
Common tern (*Sterna hirundo*)	399 pairs (2010 – 2014)	4.0 (UK)	
Little tern (*Sternula albifrons*)	81 pairs (2010 – 2014)	4.3 (UK)	
Ruff (*Calidris pugnax*)	19 individuals (2011/12 – 2015/16)	2.4 (UK)	
Pied avocet (*Recurvirostra avosetta*)	18 pairs (2010 – 2014)	1,2 (UK)	
Red knot (*Calidris canutus*)	5,509 individuals (1991/92 – 1995/96)	1.6 (NE Canada/Greenland/Iceland/UK)	Migratory*

Notes
SPA = Special Protection Area
Criterion 5: "A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds" (Natural England [NE], 2019
Criterion 6: "A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird". (NE, 2019)
* = In accordance with the UK SPA selection guidelines (Joint Nature Conservation Committee [JNCC], 2020)

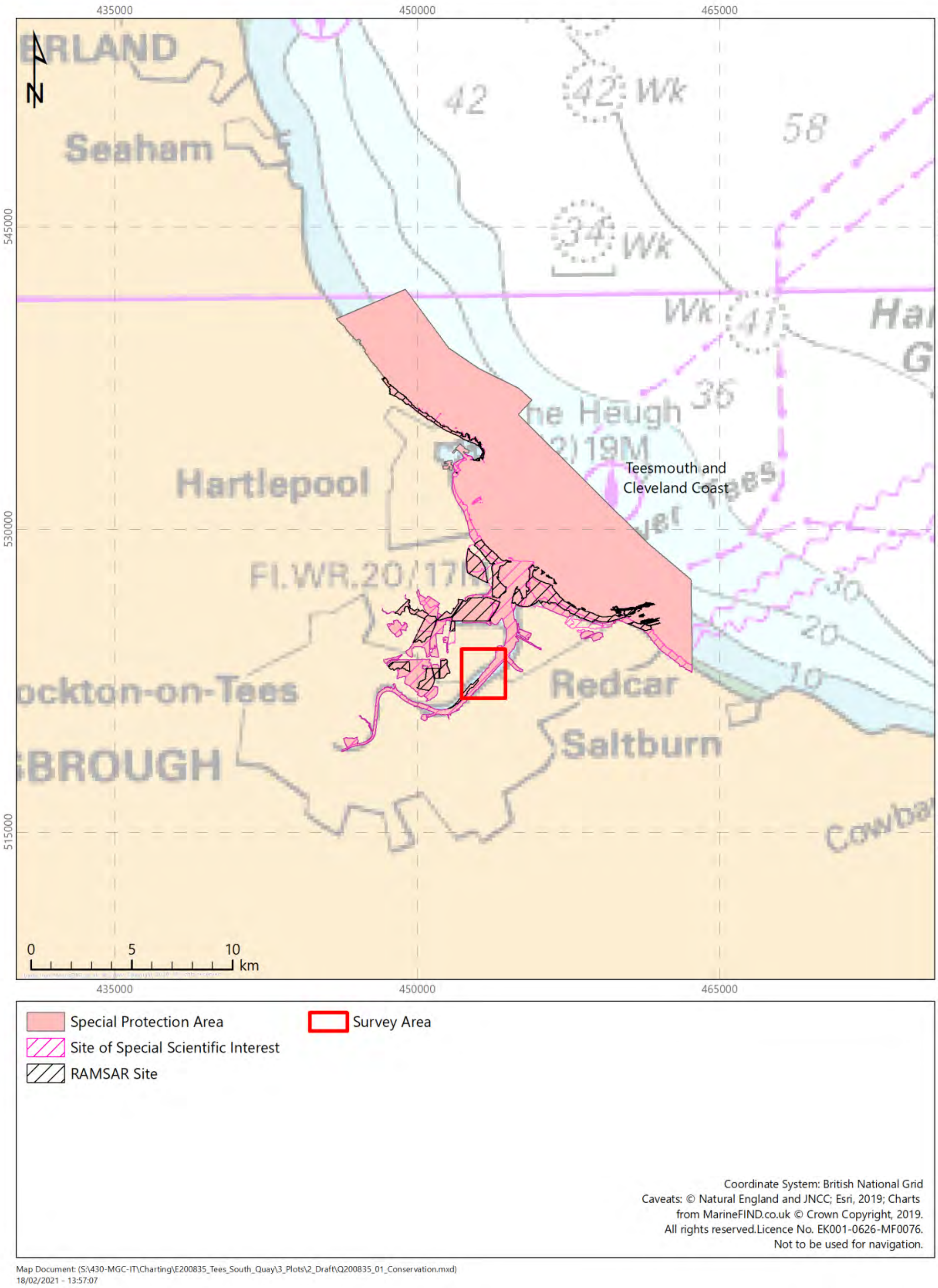


Figure 1.1: Protected areas relevant to the survey area

1.5 Environmental Quality Standards for Sediment Chemical Concentrations

The Centre for Environment, Fisheries and Aquaculture Science (Cefas) Guideline Action Levels for the disposal of dredged material are non-statutory guidelines for assessment of disposal of dredged materials at sea, against which reported contaminant concentrations were compared. In general, concentrations below Cefas Action Level 1 (AL1) are of no concern, whilst concentrations above Cefas Action Level 2 (AL2) indicate that dredged material is unsuitable for disposal at sea. Values between AL1 and AL2 may require further investigatory work prior to a disposal decision (Marine Management Organisation [MMO], 2015).

1.6 Coordinate Reference System

All coordinates detailed in this report are referenced to Ordnance Survey Great Britain 1936 (OSGB36) grid coordinates based on the Airy 1830 Spheroid, Transverse Mercator (TM) projection central meridian 2° West (CM 2° E).

Table 1.3 provides the detailed geodetic and projection parameters.

Table 1.3: Project geodetic and projection parameters

Project Geodetic Parameters	
Datum:	Ordnance Survey Great Britain 1936 (OSGB36)
Spheroid:	Airy 1830
Semi major axis:	a = 6 377 563.396 m
Reciprocal flattening:	1/f = 299.3249646
Project Projection Parameters	
Grid Projection:	Transverse Mercator (TM)
Central Meridian:	2° 00′ 00″ West
Latitude of Origin:	49° 00′ 00″ North
False Easting:	400 000 m
False Northing:	-100 000 m
Scale factor on Central Meridian:	0.99960127
Units:	metre

2. Survey Strategy

The intertidal survey on the southern bank of the river was proposed as a walkover during low water spring tides. An initial reconnaissance was undertaken to determine safe points of access to the shore, to perform a dynamic risk assessment of the hazards present and to identify representative areas for sampling. A more detailed walkover survey was to be undertaken to map the intertidal biotopes present and ten quadrats (0.25 m^2) were sampled to describe the epifauna and/or conspicuous infauna associated with these. On soft sediment areas, ten core sampling stations were to be sampled with an 11.3 cm diameter, 0.01 m^2, corer; for macrofauna and particle size distribution (PSD) analysis, with half of the PSD samples, subsampled for asbestos screening. Quadrat and coring stations were to be selected from five mid-shore and five lower shore locations, selected in the field, providing as much spatial coverage across the area as possible.

A total of 26 environmental grab sampling stations were predetermined by the client within the survey area (Royal HaskoningDHV [RHDHV], 2020). Where possible, grab samples were acquired with a 0.1 m^2 Day grab operated from the survey vessel Marshall Art. Grab stations GS_12, GS_16, GS_18, GS_19, GS_20 and GS_23 were known to be situated in an area of poor accessibility (notably North Tees Mudflat), due to the presence of a structure creating a hazardous barrier that is present above the surface at low water. It was proposed that these stations be accessed using the small vessel Tees Pioneer and sampled using a hand-haul van Veen grab (0.035 m^2). At each grab station, one macrofaunal (FA) and one PSD sample were to be obtained. To mitigate risks to laboratory staff of potential asbestos exposure, half of the PSD grab samples acquired were subsampled for asbestos screening.

Five benthic trawls of approximately five minutes in duration and 180 m in length were proposed to be undertaken using MV Marshall Art.

A minimum of 30 scrape samples was to be obtained from the South Bank Wharf and two other jetty structures (all of which are due to be removed as part of the South Bank Quay project) to describe the flora and fauna growing on these structures prior to removal. This was requested to assess environmental impacts associated with the removal activity, particularly with regards to the potential dispersion of invasive non-native species (INNS). The number of scrapes was to be decided during the survey, to account for an appropriate spatial spread and the full breadth of any variations in epibiota seen. These operations were to be undertaken from the small vessel Tees Pioneer.

Fyke net sampling of the intertidal zone was also to be undertaken, with two pairs of nets to be set as close to the South Bank Wharf as safely possible, to assess its use by sheltering fish species. Nets were to be set on a low water spring tide during daylight hours and recovered 24 hours later.

Tables 2.1 and 2.2 provide the proposed grab sampling and trawl sampling coordinates, data to be acquired and rationale for each proposed survey location. Figure 2.1 displays the proposed survey locations overlain on satellite imagery. The coordinates of all other sampling operations (quadrats, cores, fyke nets and scrape samples) were determined in the field and the actual locations are presented in Section 4.1.

Table 2.1: Proposed subtidal grab sampling stations

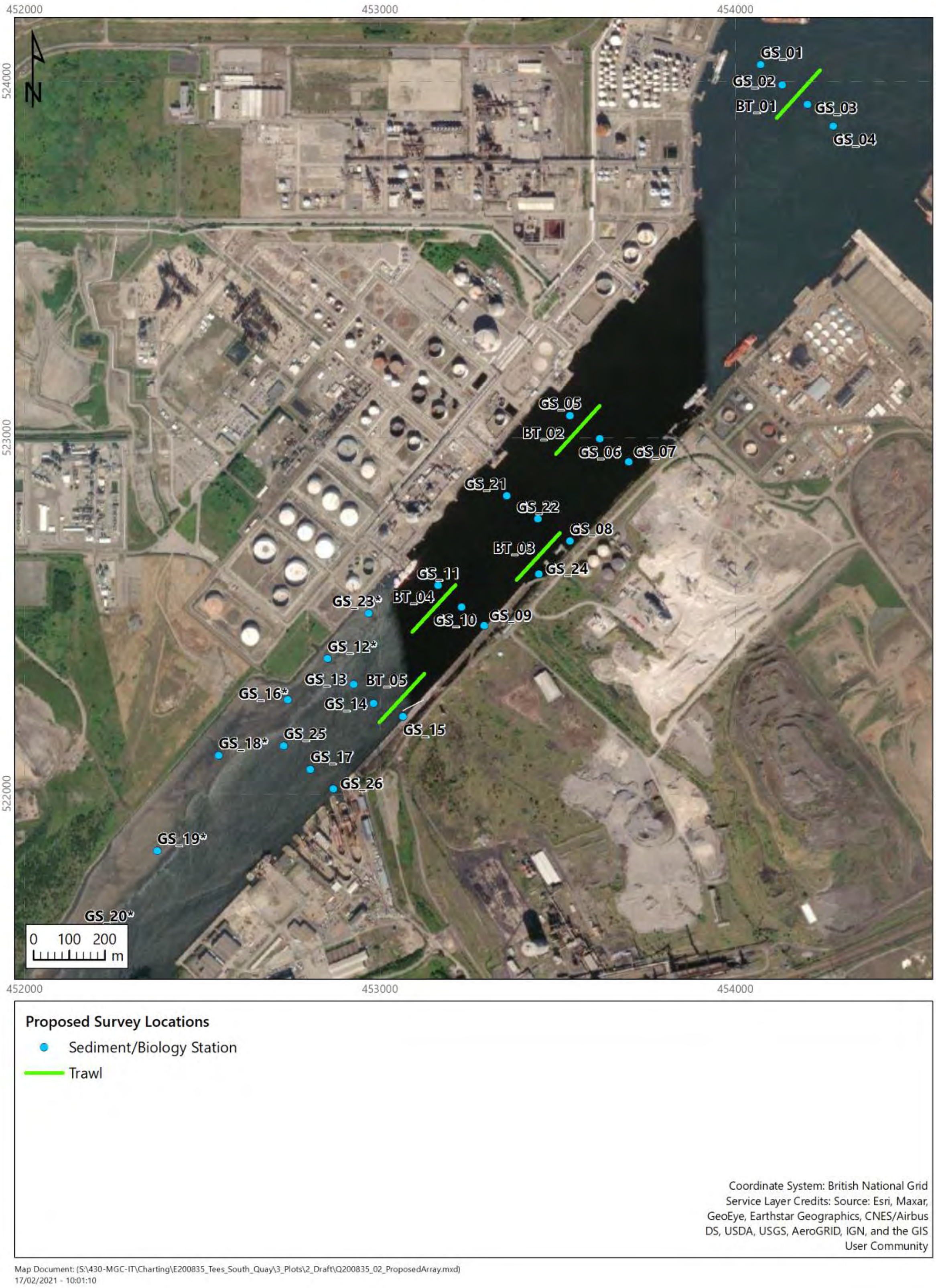
Geodetic Parameters: British National Grid OSGB 1936 [m]			
Station	Easting	Northing	Sample Acquisition
GS_01	454 070.0	524 047.0	PSD, FA
GS_02	454 131.0	523 990.0	PSD, FA
GS_03	454 203.0	523 935.0	PSD, FA
GS_04	454 275.0	523 874.0	PSD, FA
GS_05	453 535.0	523 062.0	PSD, FA
GS_06	453 618.0	522 997.0	PSD, FA
GS_07	453 700.0	522 932.0	PSD, FA
GS_08	453 535.0	522 710.0	PSD, FA
GS_09	453 293.0	522 472.0	PSD, FA
GS_10	453 230.0	522 525.0	PSD, FA
GS_11	453 164.0	522 585.0	PSD, FA
GS_12*	452 853.0	522 379.0	PSD, FA
GS_13	452 926.0	522 307.0	PSD, FA
GS_14	452 982.0	522 254.0	PSD, FA
GS_15	453 065.0	522 217.0	PSD, FA
GS_16*	452 741.0	522 264.0	PSD, FA
GS_17	452 804.0	522 069.0	PSD, FA
GS_18*	452 546.0	522 108.0	PSD, FA
GS_19*	452 374.0	521 840.0	PSD, FA
GS_20*	452 169.0	521 622.0	PSD, FA
GS_21	453 357.0	522 837.0	PSD, FA
GS_22	453 444.0	522 772.0	PSD, FA
GS_23*	452 968.0	522 506.0	PSD, FA
GS_24	453 447.0	522 617.0	PSD, FA
GS_25	452 729.0	522 134.0	PSD, FA
GS_26	452 869.0	522 014.0	PSD, FA

Notes
PSD = Particle size distribution
FA = Faunal sample A
GS = Grab station
* = To be surveyed using Tees Pioneer

Table 2.2: Proposed benthic trawls

Geodetic Parameters: British National Grid OSGB 1936 [m]				
Transect		Easting	Northing	Data Acquisition
BT_01	SOL	454 237.0	524 032.0	Quantitative benthic data
	EOL	454 115.0	523 897.0	
BT_02	SOL	453 617.0	523 089.0	Quantitative benthic data
	EOL	453 494.0	522 954.0	
BT_03	SOL	453 505.0	522 733.0	Quantitative benthic data
	EOL	453 383.0	522 600.0	
BT_04	SOL	453 212.0	522 586.0	Quantitative benthic data
	EOL	453 090.0	522 454.0	
BT_05	SOL	453 124.0	522 338.0	Quantitative benthic data
	EOL	452 997.0	522 201.0	

Notes
SOL = Start of line
EOL = End of line
BT = Beam trawl



Notes
BT = Beam trawl
GS = Grab station

Figure 2.1: Proposed survey locations

3. Methods

3.1 Survey Methods

This section summarises the sampling methodologies employed during the survey work. Further details on each survey methodology are available within the Tees South Bank field report (Fugro, 2021b).

3.1.1 Intertidal

3.1.1.1 Quadrat Sampling

Ten quadrat sampling stations were proposed and sampled using a 0.25 m^2 quadrat focussing on the intertidal on the southern bank. Stations were established in the field, within habitats/tidal zones and aimed to ground-truth all biotopes present. A photograph of each quadrat was taken, and field details recorded. Within each quadrat, colonial epifauna/flora were identified to the lowest practicable level and their percentage coverage recorded. Non-colonial invertebrates were identified to the lowest practicable level and enumerated. Where very large numbers of invertebrates were present (e.g. barnacles) these were counted within a representative subsample. Most quadrats were positioned on hard substrata (rock or mixed sediments containing pebbles/cobbles) and only epifauna was recorded. Four quadrats were positioned on sediment areas where epifauna was recorded as well as conspicuous infauna brought to surface by dig-over.

3.1.1.2 Core Sampling

On soft sediments, core samples were taken using an 11.3 cm diameter, 0.01 m^2, corer, positioned to provide spatial coverage across the accessible intertidal area, to sample all sediment types observed on both the upper and the lower shore. Due to the presence of coarse sediment/hard substratum, cores shallower than the normal acceptable depth of 15 cm below the surface were accepted.

A photograph was taken at each core sampling station and field details recorded. One macrofauna core sample was processed following the same methodology used for the grab samples (Section 3.1.3.1). Duplicate PSD samples (PSD1 and PSD2) were collected to 5 cm depth and five of the ten sampled cores were analysed for asbestos screening.

3.1.2 Intertidal Biotope Mapping

The intertidal biotope mapping survey was undertaken following the Joint Nature Conservation Committee (JNCC) *Marine Monitoring Handbook Procedural Guideline 3.1: In situ intertidal biotope recording* (Davies et al., 2001). The resolution of intertidal mapping using this method is between Phase 1 terrestrial mapping (JNCC, 2010) and the Marine Nature Conservation Review Phase 2 methods (Hiscock, 1996). The entire vertical profile of the shore was investigated, from the supralittoral zone to the accessible low water spring tide level. The modified Phase 1 walkover biotope mapping survey was conducted to record conspicuous intertidal fauna and flora and habitat. Where areas presented difficult access, due to safety reasons, a photograph was taken of the habitats observed, inferred by the findings of adjacent accessible areas. Colour satellite images covering the survey area were produced as field maps. Habitat boundaries were established and manually mapped onto field maps and any associated faunal and floral assemblages recorded. Photographs were captured within each biotope to facilitate detailed ground-truthing.

3.1.3 Subtidal

3.1.3.1 Grab Sampling

Seabed macrofauna, PSD and asbestos screening samples were acquired using a 0.1 m^2 Day grab sampler and a 0.035 m^2 hand haul van Veen sampler. On recovery to the deck, each sample was inspected and judged acceptable or otherwise in line with the criteria outlined in the field report (Fugro, 2021b). All accepted samples were photographed, and their details recorded. Macrofauna samples (FA) were washed over a 0.5 mm mesh sieve and fixed in 10 % buffered formal saline. Duplicate PSD samples (PSDA1 and PSDA2) were collected and (where applicable) asbestos screening samples (ASB) were taken from a separate physicochemical (PC) grab sample.

3.1.4 Fisheries

3.1.4.1 Beam Trawl Sampling

Trawl sampling was conducted using a 2 m scientific beam trawl based on the industry standard Lowestoft design. The trawls were fitted with a 10 mm mesh net with a 5 mm cod-end and each trawl was run for five minutes. Accepted samples were processed onboard. All catches were photographed, and their field details recorded. All species that could be practicably identified onboard the vessel were counted and returned to the sea. Specimens that could not be identified in the field were fixed with 10 % buffered formal saline solution for laboratory analysis. Commercial fish species were measured from the anterior-most part of the fish to the end of the median caudal fin rays (fork length), rounded down to the nearest mm.

3.1.4.2 Intertidal Fyke Net Sampling

Two pairs of fyke nets in two different areas were deployed within the mid-shore zone on the landward side of the existing South Bank Wharf. The fyke net survey was undertaken with reference to best practice methods set out by Colclough et al. (2005). The fyke nets were recovered after 24 hours owing to field operations being limited to daylight hours only for safety reasons.

3.1.5 Scrape Sampling

A total of 30 scrape samples was taken from the three structures to be removed as part of the South Bank Quay development. A total of 18 samples were acquired from the South Bank

Wharf, with an additional six samples were taken from each of the two smaller jetties located downstream. To minimise risks associated with approaching the jetties, pairs of samples were taken at 15 stations, with the tidal height of sampling varying at each to produce a near equal mix of upper shore, mid-shore, and lower shore samples.

For each sample area, a photograph was taken and field details were recorded. Scrape samples were taken from areas of approximately 100 cm^2 and samples collected and directly fixed in 10 % buffered formal saline solution for laboratory analysis.

3.2 Laboratory Methods

Brief analytical methodologies are described in the following subsections. These analyses have been undertaken by SOCOTEC and Cefas laboratories, accredited by the MMO to undertake sediment quality analysis in support of marine licence applications in England.

3.2.1 Sediment Characteristics

3.2.1.1 Particle Size Distribution (PSD)

Sediment samples from grab and intertidal core samples were analysed for PSD using a combination of two techniques: sieve analysis for all material retained by a 1.0 mm sieve followed by laser diffraction analysis of the finer material.

Sieve and laser data were merged and input into GRADISTAT to derive statistics including mass and percentage retained within each size fraction, mean and median grain size, bulk sediment classes (percentage gravel, sand and silt/clay), skewness, sorting coefficients and Folk classification.

The PSD parameters include the descriptive statistics derived in GRADISTAT (Blott, 2010), based on the Folk and Ward (1957) method. The sediment descriptions are based on the Wentworth (1922) scale and the British Geological Survey (BGS) modified Folk classification (Long, 2006).

Results were presented in 0.5 phi intervals and microns. The phi scale is a logarithmic scale that allows grain size data to be expressed in units of equal value.

Sediment samples from vibrocores (VC) and boreholes (BH) were analysed for PSD using wet and dry sieving followed by laser diffraction analysis.

3.2.2 Sediment Hydrocarbons

3.2.2.1 Total Hydrocarbon Content (THC)

Anhydrous sodium sulphate, sodium chloride and dichloromethane (DCM) are added to a portion of the sample and vigorously agitated. The sample is placed in an ultrasonic bath and then centrifuged. The extract is then analysed by UV fluorescence screening and quantified by comparing the results against a Forties Oil calibration curve.

3.2.2.2 Polycyclic Aromatic Hydrocarbons (PAHs)

Methanol and DCM are added to a portion of the sample and mixed on a magnetic stirring plate. The solvent extract is then water partitioned and concentrated to a low volume. A double clean-up stage is employed to remove contaminants that may interfere with the analysis. The extract is analysed by gas chromatography – mass spectrometry (GC-MS) and quantified by comparing the results against a calibration curve for each of the target analytes.

3.2.3 Metals

A portion of air-dried and ground sample is digested with aqua regia. Once cooled the extract is filtered and pre-diluted before being analysed. Analysis is performed by inductively coupled plasma-mass spectrometry (ICP-MS) or inductively coupled plasma-optical emission spectrometry (ICP-OES) and quantified by comparing the results against a calibration curve for each of the target analytes.

3.2.4 Polychlorinated Biphenyls (PCBs)

A portion of air-dried and sieved sample is spiked with ^{13}C labelled internal standards, ultrasonically solvent extracted and concentrated under nitrogen. A clean-up stage is employed to remove contaminants that may interfere with the analysis. The sample extract is analysed by gas chromatography coupled to a triple quadrupole mass spectrometer (GC-MS-MS). Quantification is performed by comparison with a solution containing each of the targeted compounds, normalised to the ^{13}C labelled internal standards.

3.2.5 Organotins

A portion of the sample is digested with hydrochloric acid and methanol before being extracted into toluene. The extract is then derivatised using sodium tetraethylborate (STEB) before concentration and a copper/silica clean-up is performed. The extract is analysed by GC-MS and quantified by comparing the results against a calibration curve for each of the target analytes.

3.2.6 pH

A portion of the sample is mixed with water and then shaken for 15 minutes. The pH of the suspension is measured using a Jenway Model 3510 pH meter fitted with a combination pH electrode and a temperature sensor. Results are automatically corrected for temperature by the meter.

3.2.7 Sediment Macrofauna from Grab and Core Samples

Macrofauna analysis was carried out by FGBML benthic laboratories which are members of the National Marine Biological Association Quality Control (NMBAQC) scheme of external quality assurance.

On return to the laboratory, the samples were removed from formalin and washed through 0.5 mm perforated plate round hole sieves. The material retained was then processed to remove fauna. The animals were separated by hand from the retained sediment by using a combination of stereo microscopes for the fine sediments and in white trays for any coarser material. Processed sediment was stored in the original formalin.

Following extraction, the animals were identified and enumerated by specialist taxonomists. Epifaunal species were assigned by presence/absence. Identification was to species level where possible. Specimens which, due to their immaturity were damaged during processing or due to lack of suitable taxonomic literature, could not be identified to species level were identified at higher taxonomic levels. After identification, samples were stored in 70 % industrial denatured alcohol (IDA). A minimum of 10 % of samples within the project were re-analysed (for extraction, species identification, enumeration, and data entry) as per NMBAQC quality control guidelines (Worsfold et al., 2010). Uncertainties of identification were indicated by a question mark before the species name (e.g. *Ulva* ?*intestinalis*) or the genus name (e.g. ?*Ulva*).

Species abundances were entered on file in a spreadsheet package or the Unicorn database, both of which store and sort entries into taxonomic order and provide output files for numerical analysis. Nomenclature follows that given on the World Register of Marine Species (WoRMS Editorial Board, 2021). The taxonomic order is based on Species Directory codes (Howson & Picton, 1997) to give an idea of 'evolutionary rank'.

3.2.8 Trawl Samples

Results of the laboratory analysis and field measurements were merged to obtain a single species list. This is presented in Appendix E.5.

3.2.9 Scrape Samples

Epibiota from scrape samples from artificial vertical structures were identified to the lowest possible taxonomic level; epifauna was enumerated whereas algae were recorded as present (P). Epifauna and epifloral species lists are provided in Appendix E.6.

3.3 Data Analysis

Summary statistics (minimum, maximum, mean, median and standard deviation) for all reported datasets were derived in MS Excel.

Table 3.1 summarises the sediment PSD statistics that were calculated using Gradistat V8 (Blott, 2010).

The Wentworth (1922) sediment classification is based on mean sediment particle size; the Folk (BGS modified) classification (Long, 2006) is based on percentages of main sediment fractions (fines, sand and gravel). Results are reported in micron (µm) and phi (ϕ) measurement units. Phi is a logarithmic scale which allows particle size data to be expressed in unit of equal value for graphical plotting and statistical calculations; the scale is based on the relationship:

$Phi\ (\phi) = -log2d$, where d is the particle size diameter in mm.

Table 3.1: Sediment particle size distribution statistics

Statistic	Definition and Descriptive Terminology
Mean	A measure of central tendency: sum of values, divided by number of observations; expressed in metric and phi units
Median	A measure of central tendency: central value of the grain size distribution where half of the sediment grains resides above this point and half below
Mode	A measure of central tendency: most frequently observed value
Modality	A measure of the number of peaks in the frequency distribution
Sorting	A measure of the grain size range and magnitude of their spread around the mean, presented as a coefficient and descriptor (as a range of values)
Skewness	A measure of the degree of symmetry, presented as a coefficient and descriptor (as a range of values)

3.3.1 Sediment Macrofauna Data Rationalisation

Prior to analysis, the macrofaunal dataset was rationalised. Damaged taxa were removed, and some taxa were merged to a higher corresponding taxonomic level 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 community. Meiofauna was also removed. Epifauna included solitary and sessile colonial taxa, the latter recorded as present (P).

3.3.2 Sediment Macrofaunal Univariate Analysis

Table 3.2 summarises the univariate statistics derived from Plymouth Routines in Multivariate Ecological Research (PRIMER) version 7 (v7) (Clarke and Gorley, 2015).

Table 3.2: Macrofaunal Univariate Statistics

Statistic	Definition
Number of taxa (S)	Count of taxa
Abundance (N)	Count of individuals
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)
Shannon-Wiener index of diversity ($H'log_2$)	A measure of the number of taxa in a sample and the distribution of abundance across these taxa; results were assessed in line with the threshold values in Dauvin et al. (2012): ▪ High diversity ($H'log_2 > 4.00$); ▪ Good diversity ($3.00 < H'log_2 < 4.00$); ▪ Moderate diversity ($2.00 < H'log_2 < 3.00$); ▪ Poor diversity ($1.00 < H'log_2 < 2.00$); ▪ Bad diversity ($H'log_2 < 1.00$).
Pielou's index of evenness (J')	A measure of how evenly distributed the individuals are among the different species
Simpsons 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 taxa present

3.3.3 Biomass Analysis

The macrofaunal blotted wet weight biomass dataset was converted to ash free dry weight (AFDW) by applying the appropriate standard corrections, as outlined in Eleftheriou and Basford (1989). Table 3.3 summarises the corrections applied.

Table 3.3: Macrofaunal standard biomass corrections by phyla

Phyla	Standard Biomass Correction [%]
Annelida	15.5
Arthropoda	22.5
Mollusca	8.5
Echinodermata	8.0
Other Taxa	15.5

Notes
Standard biomass corrections to convert blotted wet weight to ash free dry weight, from Eleftheriou & Basford (1989)

3.3.4 Multivariate Analysis

Multivariate statistical techniques were applied to the sediment characteristics from the grab and core samples PSD data to investigate patterns of similarity in PRIMER v7 (Table 3.4). For the sediment data, transformation is used to reduce skewness of data; for the macrofaunal data, transformation is used to reduce the influence of the dominant taxa. For the multivariate analysis PSD data were left untransformed.

Table 3.4: Multivariate Statistics

Statistic	Definition
Cluster	Hierarchical clustering analysis 'Cluster' to group samples based on the nearest neighbour sorting of a matrix of sample similarities using Bray Curtis similarity (for biological datasets) or Euclidean distance measure (for environmental datasets)
Dendrogram and nMDS	Dendrogram and Non-metric multidimensional scaling (nMDS) ordination are outputs of Bray Curtis and Euclidean Distance similarity/distance matrices. The dendrogram is a tree-like diagram illustrating the relationships between samples based on their level of similarity. The nMDS ordinates the samples in a two-dimensional plane where the more similar samples are, the nearer they are. The extent to which these relations can be adequately represented in a two-dimensional map is expressed as the stress coefficient statistic, low values (< 0.1) indicating a good ordination with no real prospect of misleading interpretation (Clarke et al., 2014). Used together, dendrogram and nMDS allow checking adequacy and mutual consistency of both representations to ensure correct interpretation
SIMPROF	Similarity profiling ('SIMPROF' test), to identify statistically significant sample groupings from the cluster analysis; in ecological terms the statistical relevance of similarity profile testing is assessed in line with the recommendation of Clarke et al. (2008), thus *defining coarser grouping can be appropriate if the resulting groups are always supersets of the similarity profile groups*'
PCA	Principal component analysis (PCA), to identify spatial patterns and relationships between variables. Principal components that account for as much as 70-75 % of the original variation are likely describe the overall pattern rather well (Clarke et al., 2014)

3.3.5 Seabed Habitats and Biotopes

3.3.5.1 Seabed Habitat Classification

Habitats within the survey area were classified in accordance with 'The Marine Habitat Classification for Britain and Ireland – Version 15.03' (JNCC, 2015). The equivalent EUNIS habitat classification (European Nature Information Service [EUNIS], 2019), which has compiled habitat information from across Europe into a single database, was also noted. The JNCC classification formed the basis of the marine section of the EUNIS habitat classification scheme (Davies & Moss, 2004), resulting in broad similarities, despite some structural differences and habitat types. These classification systems are designed to incorporate small-scale temporal variations (e.g. seasonal) into the biotope/habitat categories. However, biological communities and marine environments can be highly dynamic and temporally variable, therefore the biotopes and habitats identified by the current assessment are intended to represent the survey area at the time of sampling.

Classifications were assigned to each habitat type observed and based on the data available for intertidal (walkover, quadrat, core samples for macrofauna and sediment) and subtidal areas (grabs for macrofauna and sediment). Although, theoretically, a biotope can be assigned to any sized area of seabed, for the purposes of this assessment the commonly accepted minimum habitat size of 25 m^2 was adopted. For distinct areas of mixed habitats/biotopes (e.g. rock interspersed with coarse sediment) where the overall area was at least 25 m^2, biotope mosaics were considered (Parry, 2019).

3.3.5.2 Sensitive Habitats

The habitats identified were assessed for their conservation importance using the correlation spreadsheet prepared by the JNCC which allows users to translate between the EUNIS marine classification, the Marine Habitat Classification for Britain and Ireland, and other marine habitats listed for conservation importance under current conservation legislation (JNCC, 2018).

3.3.6 Sensitive and Non-native Species (NNS)

Species were assessed for their conservation status using the BAP list of priority species (details in Section 1.3) and the OSPAR list of threatened and/or declining species and habitats (OSPAR, 2021), which allows setting priorities for further conservation and protection of marine biodiversity. The International Union for Conservation of Nature [IUCN] red list of threatened species (IUCN, 2021) was also consulted, although the latter is not a list of conservation priorities, rather a comprehensive inventory of the global conservation status of species and is used to assist with decision making about conserving biodiversity at local and global levels.

Several sources were used to assess the non-native species (NNS) including Cottier-Cook et al., (2017), Harrower et al., (2020), Hill et al. (2009), Roy et al. (2012), and databases including National Exotic Marine and Estuarine Species Information System [NEMESIS] (Fofonoff et al., 2021), National Biodiversity Network [NBN] (NBN, 2018), Non-Native Species Secretariat [NNSS] (NNS, 2021), Delivering Alien Invasive Species Inventories for Europe [DAISIE] (DAISIE, 2020) and World Register of Marine Species [WoRMS] (WoRMS Editorial Board, 2021).

4. Results

4.1 Field Operations

4.1.1 Intertidal Quadrat Sampling

Table 4.1 presents details of the ten quadrat samples undertaken within the intertidal along the southern bank of the river to gauge the abundance of intertidal epibiota. The quadrat sampling locations are spatially displayed in Figure 4.2.

Table 4.1: Intertidal quadrat samples

Geodetic Parameters: British National Grid OSGB 1936 [m]			
Station	Easting	Northing	Position on Shore/Substratum
QS_01	453 006.5	522 116.3	Lower mid-shore. Cobbles and boulders/gravelly sand
QS_02	453 053.1	522 159.6	Upper shore. Rock with muddy sand
QS_03*	453 094.9	522 211.0	Mid-shore. Slightly gravelly, muddy sand
QS_04	453 117.2	522 235.7	Upper mid-shore. Cobbles and boulders/muddy gravel with pebbles
QS_05	453 765.6	522 963.5	Lower shore. Boulders and pebbles
QS_06	453 791.5	522 960.1	Mid-shore. Rock/gravel
QS_07	453 746.0	522 925.7	Lower shore. Muddy, sandy gravel
QS_08*	453 750.0	522 925.7	Mid-shore. Muddy gravel with pebbles and cobbles
QS_09*	453 631.7	522 829.4	Lower shore. Muddy gravel with pebbles
QS_10*	453 634.5	522 816.3	Lower shore. Muddy gravel with pebbles
Notes QS = Quadrat sample * = Quadrat dig-over undertaken			

4.1.2 Intertidal Core Sampling

Table 4.2 presents details of the ten intertidal core samples acquired to assess the intertidal infauna. The core sampling locations are spatially displayed in Figure 4.2.

Table 4.2: Completed environmental intertidal coring stations

Geodetic Parameters: British National Grid OSGB 1936 [m]					
Station	Easting*	Northing*	Position on Shore	Substratum	Sample Acquisition
CS_01	453 009.4	522 111.2	Upper mid-shore	Muddy sand	FA, PSD, ASB
CS_02	453 039.0	522 151.8	Lower mid-shore	Muddy sand	FA, PSD
CS_03	453 094.9	522 211.0	Mid-shore	Muddy sand	FA, PSD, ASB
CS_04	453 108.1	522 227.8	Lower shore	Sandy gravel	FA, PSD
CS_05	453 765.6	522 963.5	Lower shore	Muddy gravel with pebbles	FA, PSD, ASB
CS_06	453 791.5	522 960.1	Mid-shore	Gravel	FA, PSD

Geodetic Parameters: British National Grid OSGB 1936 [m]					
Station	Easting*	Northing*	Position on Shore	Substratum	Sample Acquisition
CS_07	453 746.0	522 925.7	Lower shore	Muddy, sandy gravel with pebbles	FA, PSD
CS_08	453 750.0	522 925.7	Mid shore	Muddy gravel	FA, PSD, ASB
CS_09	453 631.7	522 829.4	Lower shore	Muddy gravel	FA, PSD, ASB
CS_10	453 634.5	522 816.3	Mid-shore	Muddy gravel	FA, PSD

Notes
ASB = asbestos screening sample
CS = Core sample
FA = Faunal sample A
PSD = Particle size distribution
* = All samples acquired at each station share the same nominal coordinates (all samples taken within 1 m^2 area)

4.1.3 Grab Sampling

Grab sampling was successfully completed at 25 of the 26 subtidal stations proposed; station GS_17 was abandoned as the coarse sediment prevented the collection of an acceptable sample.

Macrofaunal and PSD samples were acquired from all stations successfully sampled and samples for asbestos screening were collected from 13 stations. Six stations, located in too shallow water to allow safe remote sampling (the North Tees Mudflat), were sampled with the hand haul van Veen grab. At these locations the sampler penetration reached < 6 cm sample depth (this would typically be rejected under Fugro sample rejection criteria (Fugro, 2021b); however, as increasing the weight to the grab would have increased risks for the survey team, it was decided that two smaller macrofaunal samples (FA and FB) of 3 cm to 6 cm depth could be combined to create a single sample for analysis. This was done at four of the six stations sampled by hand haul grab. Samples of > 3 cm depth were also accepted for PSD and asbestos subsampling. Most stations were sampled within the agreed 15 m sampling accuracy radius set out in the scope of work (RHDHV, 2020). Station GS_20 was relocated approximately 50 m north-east, as the proposed location was at a depth of < 1 m. Some sampling sites located in proximity of the South Bank Wharf or shore were also acquired 15 m to 20 m north of the proposed location. This is unlikely to affect the usefulness of the samples acquired.

Table 4.3 presents the completed sampling locations, spatially displayed in Figure 4.3.

Table 4.3: Completed environmental grab sampling stations

Geodetic Parameters: British National Grid OSGB 1936 [m]				
Station	Easting†	Northing†	Depth [m BSL]	Sample Acquisition
North Tees Mudflat				
GS_12*	452 860.5	522 375.4	1.0	PSD, FA, FB
GS_16*	452 751.4	522 256.6	1.0	PSD, FA, ASB
GS_18*	452 546.2	522 107.6	2.0	PSD, FA, ASB
GS_19*	452 383.7	521 842.0	2.0	PSD, FA, FB, ASB
GS_20*	452 201.1	521 660.3	3.0	PSD, FA, FB, ASB
GS_23*	452 972.5	522 505.6	1.0	PSD, FA, FB
Subtidal				
GS_01	454 064.9	524 047.1	6.9	PSD, FA, ASB
GS_02	454 125.1	523 979.0	7.7	PSD, FA
GS_03	454 214.1	523 938.1	7.8	PSD, FA, ASB
GS_04	454 280.3	523 873.5	10.1	PSD, FA
GS_05	453 532.9	523 065.9	12.5	PSD, FA, ASB
GS_06	453 612.7	523 006.8	10.3	PSD, FA
GS_07	453 690.0	522 943.4	3.4	PSD, FA
GS_08	453 531.6	522 725.1	6.0	PSD, FA
GS_09	453 291.0	522 485.1	5.8	PSD, FA
GS_10	453 233.8	522 521.9	7.2	PSD, FA, ASB
GS_11	453 166.4	522 590.8	6.5	PSD, FA
GS_13	452 925.8	522 311.5	7.0	PSD, FA
GS_14	452 979.2	522 255.9	7.0	PSD, FA, ASB
GS_15	453 062.9	522 230.8	2.6	PSD, FA, ASB
GS_21	453 354.2	522 842.0	7.6	PSD, FA, ASB
GS_22	453 446.1	522 769.8	9.4	PSD, FA
GS_24	453 436.1	522 626.8	7.3	PSD, FA, ASB
GS_25	452 722.3	522 131.6	5.2	PSD, FA, ASB
GS_26	452 856.1	522 024.7	9.2	PSD, FA

Notes
ASB = Asbestos screening sample
BSL = Below sea level
FA/FB = Faunal sample A or B (FA and FB samples combined where insufficient sample depth achieved with hand haul van Veen grab)
GS = Grab station
PSD = Particle size distribution
* = Sampling undertaken using hand haul van Veen grab from Tees Pioneer, all remaining stations sampled using Day grab from Marshall Art
† = Coordinates provided are those of first successful sample taken from each station (typically sample FA)

4.1.4 Beam Trawl Sampling

All five proposed beam trawls were successfully completed. Variations in vessel speed and the effects of the tide resulted in trawls lengths ranging from 254.3 m to 304.2 m, which is longer than the approximately 180 m long trawls proposed.

Table 4.4 presents the completed beam trawls, spatially displayed in Figure 4.3.

Table 4.4: Completed environmental survey beam trawls

Geodetic Parameters: British National Grid OSGB 1936 [m]						
Trawl		Easting	Northing	Depth [m BSL]	Length [m]	Duration
BT01	SOL	454 217.5	524 047.3	7.5	304.2	5 min 42 s
	EOL	454 043.8	523 797.6	7.5		
BT02	SOL	453 652.9	523 141.2	17.0	289.8	5 min 02 s
	EOL	453 469.1	522 917.1	17.0		
BT03	SOL	453 544.1	522 789.0	12.8	254.3	5 min 12 s
	EOL	453 377.0	522 597.3	11.9		
BT04	SOL	453 263.4	522 664.5	9.3	288.1	5 min 27 s
	EOL	453 086.9	522 436.8	9.3		
BT05	SOL	453 221.1	522 458.9	8.0	298.7	5 min 05 s
	EOL	453 028.8	522 230.3	8.0		

Notes
BSL = Below sea level
BT = Beam trawl
SOL = Start of line
EOL = End of line

4.1.5 Intertidal Fyke Net Sampling

The four fyke nets (two pairs of nets) were deployed approximately 30 minutes after low water on the morning of 13 November 2020 and recovered at low water on the morning of the 14 November 2020. The ends of the net staked up and down the shore and the entrance hoops and curtain between the flood and ebb ends of the nets supported by additional stakes (Figure 4.1). Positions were taken at the centre point of the curtain of each net. The approximately 24-hour deployment duration resulted in sampling of two complete tidal cycles.

Table 4.5 provides the coordinates at which the fyke nets were deployed, spatially displayed in Figure 4.2.

Fyke nets FN_01 and FN_02 after deployment

Fugro personnel setting fyke nets FN_03 and FN_04

Notes
FN = Fyke net

Figure 4.1: Fyke nets survey sites

Table 4.5: Completed environmental fyke net deployments

Geodetic Parameters: British National Grid OSGB 1936 [m]			
Station	Easting*	Northing*	Position on Shore
FN_01	453 006.5	522 116.3	Mid-shore
FN_02	453 053.1	522 159.6	Mid-shore
FN_03	453 094.9	522 211.0	Mid-shore
FN_04	453 117.2	522 235.7	Mid-shore

Notes
FN = Fyke net
* = Position of middle of curtain between the flood and ebb nets

4.1.6 Scrape Sampling

The required 30 scrape samples were acquired from the three structures which will be removed as part of the South Bank Quay development (Figure 4.1). Table 4.6 provides the positions of samples taken, along with their tidal heights and substratum types, spatially displayed in Figure 4.2.

Table 4.6: Completed environmental scrape sample locations

Geodetic Parameters: British National Grid OSGB 1936 [m]			
Samples	Easting*	Northing*	Position on Shore/Substratum
SS_01	452 939.6	522 079.2	Low tide/Wood
SS_02	452 939.6	522 079.2	Mid tide/Wood
SS_03	453 086.1	522 240.1	High tide/Wood
SS_04	453 086.1	522 240.1	Low tide/Wood
SS_05	453 158.3	522 317.7	Mid tide/Wood
SS_06	453 158.3	522 317.7	High tide/Wood
SS_07	453 233.1	522 399.9	Mid tide/Metal
SS_08	453 233.1	522 399.9	Mid tide/Concrete
SS_09	453 271.5	522 445.0	Mid tide/Wood
SS_10	453 271.5	522 445.0	Low tide/Wood
SS_11	453 339.0	522 519.1	Mid tide/Wood
SS_12	453 339.0	522 519.1	Low tide/Steel
SS_13	453 373.0	522 559.7	Mid tide/Wood
SS_14	453 373.0	522 559.7	High tide/Wood
SS_15	453 398.6	522 585.4	Low tide/Wood
SS_16	453 398.6	522 585.4	Mid tide/Wood
SS_17	453 417.9	522 595.2	High tide/Steel beam
SS_18	453 417.9	522 595.2	Low tide/Steel support
SS_19	453 466.6	522 642.4	Low tide/Steel beam
SS_20	453 466.6	522 642.4	High tide/Steel beam
SS_21	453 468.2	522 657.5	Mid tide/Fender
SS_22	453 468.2	522 657.5	High tide/Fender
SS_23	453 471.7	522 661.7	Low tide/Steel support
SS_24	453 471.7	522 661.7	Low tide/Steel support
SS_25	453 490.1	522 676.9	Mid tide/Steel pile
SS_26	453 490.1	522 676.9	High tide/Steel pile
SS_27	453 514.1	522 701.8	Low/Steel ladder
SS_28	453 514.1	522 701.8	High tide/Steel ladder
SS_29	453 509.2	522 699.5	Mid tide/Fender
SS_30	453 509.2	522 699.5	High tide/Fender

Notes
SS = Scrape sample
* = Positions shared between pairs of samples

4.1.7 Vibrocore and Borehole Sampling

Sediment samples from the VCs and BHs were recovered for chemical analysis. Samples were recovered using the MV Voe Vanguard (VC locations) and from the jack-up barge Haven Seariser 2 (BH locations). The survey period was 6 November to 8 December 2020. Forty-nine VC environmental samples (ES) were taken from 20 locations. Thirty-five BH ES were taken from 11 locations. These samples were taken at specific depth ranges along the core samples, as directed by the MMO in its sampling plan issued to TVCA. Different penetration depths BRL were acquired at different sites due to the nature of the substrate. Details of the field work are reported in "Tees South Bank Marine Surveys Overwater Ground Investigation-Work Packages 3 and 4" (Fugro, 2021a).

Table 4.7: Completed environmental chemistry sampling locations

Geodetic Parameters: British National Grid OSGB 1936 [m]				
Location ID	Type	Penetration Depth [m BRL]	Easting [m]	Northing [m]
VC-01	VC	3.40	454 348.03	524 069.21
VC-02	VC	3.00	454 228.08	524 069.12
VC-03	VC	4.00	454 223.81	523 945.52
VC-04	VC	4.80	454 076.24	523 929.21
VC-05	VC	5.00	454 119.27	523 802.46
VC-06	VC	3.75	453 462.71	522 941.84
VC-07	VC	2.40	453 537.98	522 862.54
VC-08B	VC	2.50	453 392.84	522 793.83
VC-09	VC	2.70	453 253.99	522 712.16
VC-10	VC	1.90	453 322.10	522 642.13
VC-11	VC	1.40	453 203.09	522 622.45
VC-12	VC	1.30	453 254.28	522 568.08
VC-13	VC	1.10	453 165.63	522 513.66
VC-14	VC	0.60	453 079.49	522 465.64
VC-15A	VC	1.30	453 132.21	522 421.06
VC-16	VC	0.50	453 016.43	522 400.89
VC-17	VC	0.60	453 066.73	522 348.23
VC-18	VC	0.90	452 979.60	522 308.77
VC-19	VC	0.70	452 880.99	522 240.33
VC-20	VC	1.10	452 929.50	522 173.97
BH-08	RC	6.55	452 902.21	522 194.92
BH-09	RC	6.90	453 031.17	522 339.89
BH-10	RC	5.94	453 158.67	522 484.87
BH-11	CP&RC	5.16	453 283.32	522 631.17

Geodetic Parameters: British National Grid OSGB 1936 [m]				
Location ID	Type	Penetration Depth [m BRL]	Easting [m]	Northing [m]
BH-12	CP&RC	5.60	453 407.74	522 781.13
BH-13	CP&RC	5.60	453 539.53	522 923.78
BH-30	CP&RC	8.50	453 028.34	522 204.81
BH-31	CP&RC	7.10	453 196.63	522 389.87
BH-32	CP&RC	4.50	453 365.63	522 580.05
BH-33	CP&RC	3.82	453 516.85	522 739.77
BH-34	CP&RC	10.83	453 669.82	522 920.02

Notes
BH = Borehole
VC = Vibrocore
CP = Cable percussion
CP&RC = Cable percussion with rotary follow on
BRL = Below riverbed level
RC = Rotary core

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Notes

CS = Core sample

FN= Fyke Net site

QS = Quadrat sample

SS = Scrape sample

Figure 4.2: Completed in-situ survey locations overlaid on aerial photograph

Notes

GS = Grab station BH = borehole VC = Vibrocore BT = Beam trawl

Figure 4.3: Completed subtidal survey locations overlaid on aerial photograph

4.2 Sediment Characterisation

4.2.1 Univariate Analysis

Tables 4.8 and 4.9 present a summary of the particle size characteristics and sediment PSD. Figure 4.4 presents the histograms of particle size class summary for each core and grab station.

Within the survey area, including intertidal and subtidal sampling locations, proportions of gravel ranged from 0.00 % (stations GS_01, GS_02, GS_09 and GS_22) to 96.29 % (sample CS_06), with a mean of 21.59 %. Proportions of sand ranged from 2.25 % (sample CS_06) to 87.18 % (station GS_19), with a mean of 35.54 %. Proportions of fines ranged from 1.46 % (sample CS_06) to 86.18 % (station GS_09), with a mean of 42.87 %. Eight Folk (BGS modified) sediment classes were identified within the survey area with 'sandy mud' typifying 13 stations, 'muddy sand' typifying seven stations, 'gravel' and 'gravelly muddy sand' typifying four stations each, 'muddy sandy gravel' and 'muddy gravel' typifying three stations each and 'gravelly mud' and 'gravelly sand' typifying one station each (Table 4.8).

Sixteen stations had bimodal distributions, nine stations had unimodal distributions and ten stations had polymodal distributions (Table 4.9). At the sites where bimodal sediment distributions were recorded, the most frequently occurring peaks in the first mode were the 18.87 µm sediment fraction (medium silt) at eight sites and the 13.34 µm sediment fraction (fine silt) at six sites. The most frequently occurring peaks in the second mode were the 0.835 µm sediment fraction (clay) at 13 sites (Table 4.9; Figure 4.4).

The median sediment particle size ranged from 15 µm (fine silt) at station GS_09 to 26 290 µm (coarse pebble) for sample CS_07, with a mean of 2543 µm (granule). The mean particle size underpinned the Wentworth description, which identified four sediment classes, of which 'medium pebble' and 'fine pebbles' typified three stations each, 'coarse sand' typified two stations, 'very coarse sand' and 'medium sand' typified one station each, 'very fine sand' typified one stations and 'fine sand' typified four stations, 'fine silt' typified three stations, 'medium silt' typified eleven stations, 'coarse silt' typified two stations (Table 4.9).

Of the 35 stations assessed, 22 had 'very poorly sorted' sediments, 10 had 'poorly sorted' sediments, two had 'extremely poorly sorted' sediments and one had 'moderately sorted' sediments. The sediment distribution was 'symmetrical' (15 stations), 'very fine skewed' (10 stations), 'fine skewed' (7 stations), 'coarse skewed' (2 stations) and 'very coarse skewed' (1 station) (Table 4.9).

The survey area was overall characterised by heterogeneous sediment, the coarseness of which decreased from the intertidal to the subtidal section of the survey area. Figure 4.4 presents the main sediment fractional composition for intertidal on the south bank, North Tees Mudflat and subtidal areas. Figure 4.5 presents the distribution of the main sediment fractions (% gravel, % sand and % fines) across the survey area.

Table 4.8: Summary of sediment characteristics

Station/Sample	Fractional Composition			Fines		Folk Description (BGS modified)
	Gravel [%]	Sand [%]	Fines [%]	Silt [%]	Clay [%]	
Intertidal (South Bank)						
CS_01	26.19	68.33	5.48	4.21	1.27	Gravelly sand
CS_02	23.73	68.59	7.68	6.32	1.36	Gravelly muddy sand
CS_03	5.49	82.73	11.78	9.28	2.50	Gravelly muddy sand
CS_04	34.15	55.42	10.43	8.09	2.34	Muddy, sandy gravel
CS_05	73.71	20.13	6.16	5.41	0.74	Muddy, sandy gravel
CS_06	96.29	2.25	1.46	1.32	0.14	Gravel
CS_07	85.52	10.41	4.06	3.54	0.52	Gravel
CS_08	90.10	6.71	3.20	2.88	0.32	Gravel
CS_09	70.85	20.61	8.53	7.19	1.35	Muddy, sandy gravel
CS_10	84.26	12.54	3.20	2.80	0.40	Gravel
North Tees Mudflats						
GS_12	0.84	77.08	22.09	17.09	5.00	Muddy sand
GS_16	0.59	51.07	48.34	38.10	10.25	Muddy sand
GS_18	1.81	58.53	39.66	31.46	8.20	Muddy sand
GS_19	0.34	87.18	12.48	9.78	2.70	Muddy sand
GS_20	0.27	85.72	14.01	11.23	2.78	Muddy sand
GS_23	5.23	81.03	13.74	10.80	2.94	Gravelly muddy sand
Subtidal						
GS_01	0.00	14.83	85.17	68.97	16.21	Sandy mud
GS_02	0.00	14.28	85.72	70.24	15.47	Sandy mud
GS_03	0.47	16.70	82.83	67.47	15.36	Sandy mud
GS_04	0.43	20.42	79.15	62.91	16.24	Sandy mud
GS_05	1.19	16.14	82.68	68.40	14.28	Sandy mud
GS_06	0.13	17.51	82.36	66.85	15.51	Sandy mud
GS_07	0.45	26.56	72.99	58.30	14.70	Sandy mud
GS_08	66.74	12.74	20.52	16.91	3.62	Muddy gravel
GS_09	0.00	13.82	86.18	70.31	15.87	Sandy mud
GS_10	62.83	16.33	20.85	16.37	4.47	Muddy gravel
GS_11	7.31	18.66	74.03	59.87	14.16	Gravelly mud
GS_13	0.25	62.17	37.57	29.28	8.29	Muddy sand
GS_14	14.69	50.34	34.97	26.65	8.32	Gravelly muddy sand
GS_15	1.31	31.51	67.18	52.49	14.69	Sandy mud
GS_21	0.05	18.74	81.21	64.43	16.78	Sandy mud
GS_22	0.00	15.88	84.12	68.55	15.57	Sandy mud
GS_24	0.36	17.28	82.36	68.38	13.98	Sandy mud
GS_25	0.09	52.30	47.61	37.61	9.99	Muddy sand
GS_26	0.06	19.35	80.59	66.08	14.51	Sandy mud
Minimum	**0.00**	**12.74**	**20.52**	**16.37**	**3.62**	-
Maximum	**66.74**	**62.17**	**86.18**	**70.31**	**16.78**	
Median	**0.36**	**17.51**	**80.59**	**64.43**	**14.69**	
Mean	**8.23**	**23.98**	**67.79**	**54.74**	**13.05**	
Standard Deviation	**20.26**	**14.61**	**22.94**	**19.04**	**4.04**	

Notes

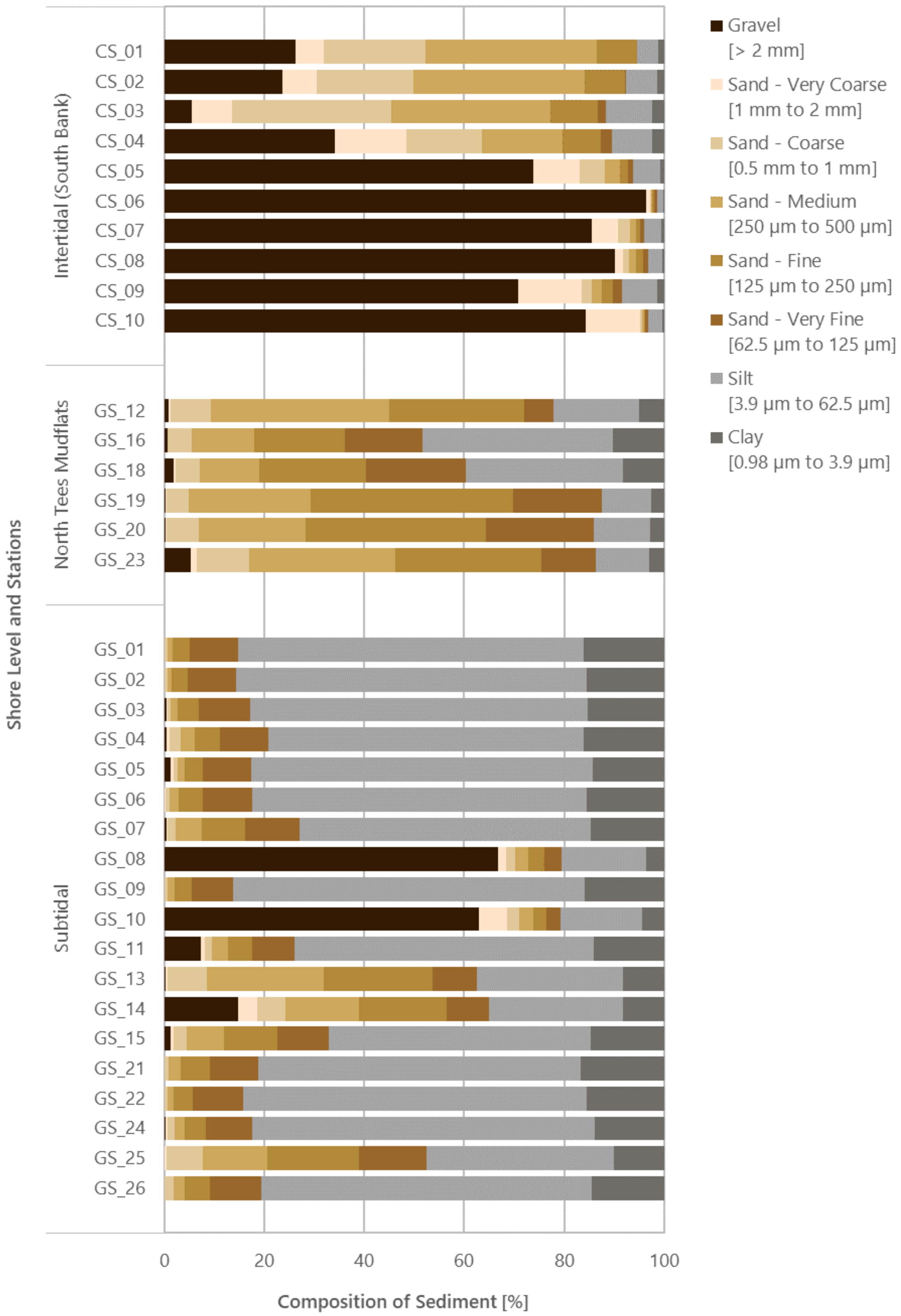
Fines = silt and clay content
Silt = < 4.0 phi to +8.0 phi units (<62.5 µm to 3.9 µm)
Clay = < 8.0 phi to +10.0 phi (<3.9 µm to 0.98 µm)
BGS = British Geological Survey
CS = Core sample
GS = Grab station

Table 4.9: Summary of particle size distribution

Station/Sample	Modality	Median [µm]	Mean Particle Size			Sorting Coefficient		Skewness	
			[µm]	[phi]	Wentworth (1922) Description	[µm]	Description	[µm]	Description
Intertidal (South Bank)									
CS_01	Polymodal	529	1031	−0.04	Very coarse sand	5.57	Very poorly sorted	0.36	Very coarse skewed
CS_02	Polymodal	499	841	0.25	Coarse sand	5.54	Very poorly sorted	0.25	Coarse skewed
CS_03	Unimodal	459	425	1.23	Medium sand	3.60	Poorly sorted	−0.30	Fine skewed
CS_04	Polymodal	923	901	0.15	Coarse sand	6.26	Very poorly sorted	−0.18	Fine skewed
CS_05	Polymodal	8156	5670	−2.50	Fine pebble	6.32	Very poorly sorted	−0.47	Very fine skewed
CS_06	Unimodal	9776	9797	−3.29	Medium pebble	1.73	Moderately sorted	−0.13	Fine skewed
CS_07	Unimodal	26290	13462	−3.75	Medium pebble	4.74	Very poorly sorted	−0.77	Very fine skewed
CS_08	Bimodal	10830	10056	−3.33	Medium pebble	3.24	Poorly sorted	−0.38	Very fine skewed
CS_09	Polymodal	7293	5350	−2.42	Fine pebble	7.34	Very poorly sorted	−0.45	Very fine skewed
CS_10	Polymodal	6901	7047	−2.82	Fine pebble	3.13	Poorly sorted	−0.06	Symmetrical
North Tees Mudflat									
GS_12	Unimodal	226	137	2.86	Fine sand	4.32	Very poorly sorted	−0.57	Very fine skewed
GS_16	Bimodal	68	49	4.34	Coarse silt	5.93	Very poorly sorted	−0.26	Fine skewed
GS_18	Unimodal	92	63	3.99	Very fine sand	5.47	Very poorly sorted	−0.32	Very fine skewed
GS_19	Unimodal	178	167	2.58	Fine sand	2.71	Poorly sorted	−0.32	Very fine skewed
GS_20	Unimodal	165	157	2.67	Fine sand	2.84	Poorly sorted	−0.24	Fine skewed
GS_23	Unimodal	231	212	2.24	Fine sand	3.82	Poorly sorted	−0.18	Fine skewed
Subtidal									
GS_01	Bimodal	16	15	6.02	Fine silt	3.90	Poorly sorted	−0.06	Symmetrical
GS_02	Bimodal	16	15	6.02	Fine silt	3.79	Poorly sorted	−0.05	Symmetrical
GS_03	Bimodal	17	17	5.91	Medium silt	4.09	Very poorly sorted	−0.03	Symmetrical
GS_04	Bimodal	18	18	5.80	Medium silt	4.94	Very poorly sorted	0.04	Symmetrical
GS_05	Bimodal	17	17	5.88	Medium silt	4.13	Very poorly sorted	0.01	Symmetrical

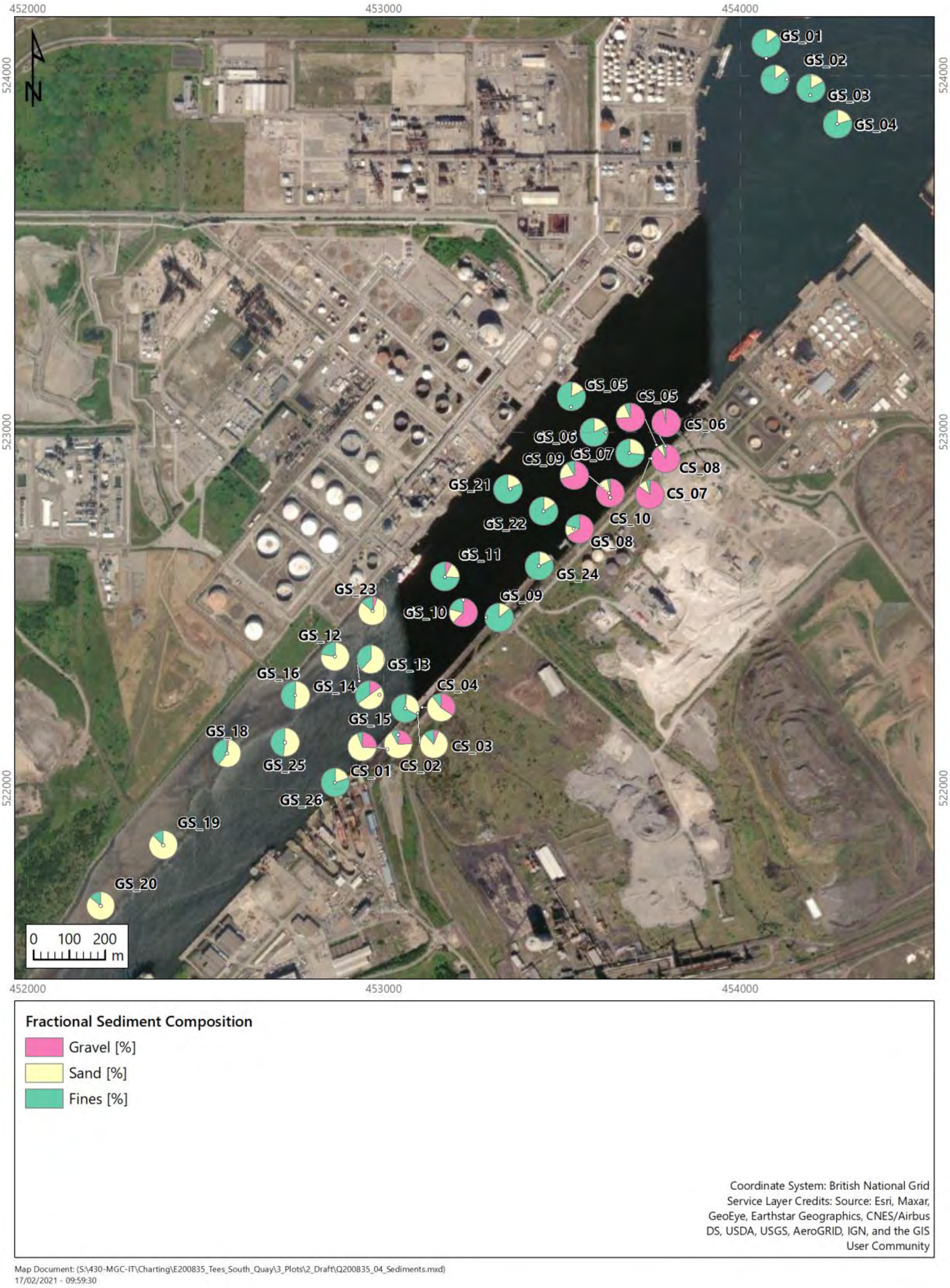
Station/Sample	Modality	Median [µm]	Mean Particle Size			Sorting Coefficient		Skewness	
			[µm]	[phi]	Wentworth (1922) Description	[µm]	Description	[µm]	Description
GS_06	Bimodal	17	17	5.91	Medium silt	4.18	Very poorly sorted	−0.01	Symmetrical
GS_07	Bimodal	20	22	5.50	Medium silt	5.29	Very poorly sorted	0.07	Symmetrical
GS_08	Unimodal	9065	1653	−0.73	Very coarse sand	17.05	Extremely poorly sorted	−0.80	Very fine skewed
GS_09	Bimodal	15	15	6.08	Fine silt	3.84	Poorly sorted	0.00	Symmetrical
GS_10	Bimodal	6707	1778	−0.83	Very coarse sand	23.56	Extremely poorly sorted	−0.58	Very fine skewed
GS_11	Polymodal	20	23	5.41	Medium silt	8.93	Very poorly sorted	0.29	Coarse skewed
GS_13	Bimodal	144	78	3.68	Very fine sand	6.01	Very poorly sorted	−0.48	Very fine skewed
GS_14	Polymodal	166	134	2.89	Fine sand	13.26	Very poorly sorted	−0.06	Symmetrical
GS_15	Polymodal	23	27	5.23	Medium silt	6.17	Very poorly sorted	0.08	Symmetrical
GS_21	Bimodal	16	16	5.93	Medium silt	4.49	Very poorly sorted	0.03	Symmetrical
GS_22	Bimodal	16	16	5.97	Medium silt	3.95	Poorly sorted	−0.04	Symmetrical
GS_24	Bimodal	17	17	5.87	Medium silt	4.16	Very poorly sorted	0.04	Symmetrical
GS_25	Polymodal	72	52	4.26	Coarse silt	6.25	Very poorly sorted	−0.24	Fine skewed
GS_26	Bimodal	17	18	5.81	Medium silt	4.33	Very poorly sorted	0.02	Symmetrical
Minimum		**15**	**15**	**−3.75**		**1.73**		**−0.80**	-
Maximum		**26290**	**13462**	**6.08**		**23.56**		**0.36**	
Median	-	**72**	**52**	**4.26**	-	**4.74**	-	**−0.05**	
Mean		**2543**	**1695**	**2.65**		**5.85**		**−0.17**	
Standard Deviation		**5352**	**3417**	**3.38**		**4.21**		**0.28**	

Notes
Statistics based on Folk and Ward (1957) method derived in Gradistat (Blott, 2010)
CS = Core sample
GS = Grab station



Notes
GS = Grab station
CS = Core sample

Figure 4.4: Sediment fractional composition



Notes

GS = Grab station

CS = Core sample

Figure 4.5: Spatial; distribution of major sediment fractions

4.2.2 Investigation of Granulometric Similarities

4.2.2.1 Cluster Analysis and Non-metric Multidimensional Scaling (nMDS)

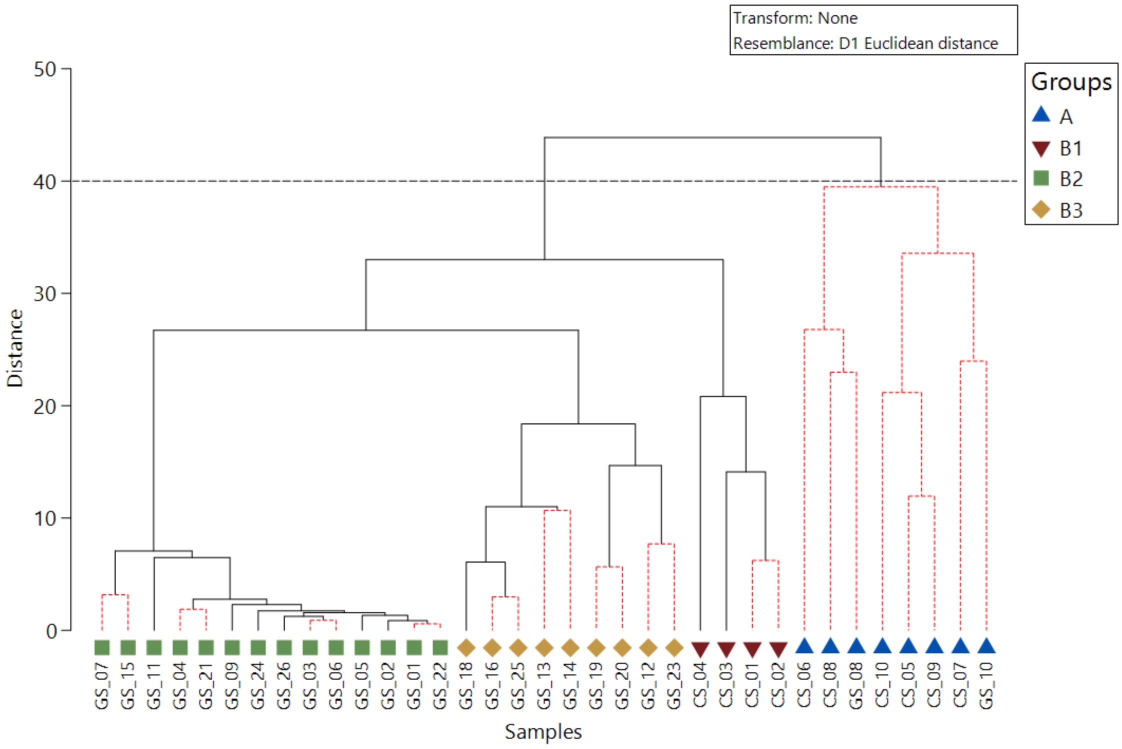
Hierarchical clustering (cluster analysis) using Euclidean distance, was applied to the sediment PSD to investigate sedimentological characteristics. Data were not transformed. The SIMPFROF test was used in conjunction with the cluster analysis to identify statistically significant (P = 0.05) groups.

Several multivariate groups were identified by the SIMPROF test. The differences observed were not considered to be of significance based on the analysis of the individual sample's sediment fractions composition. For this reason, the grouping of the stations was obtained by cutting a slice through the dendrogram at a chosen level, identified through applying the slice overlay at the Euclidean distance of 40. This process of defining coarser groups is appropriate provided that the resulting clusters are always supersets of the SIMPROF groups (Clarke et al., 2008). Figure 4.4a presents the dendrogram for untransformed sample data with the slice.

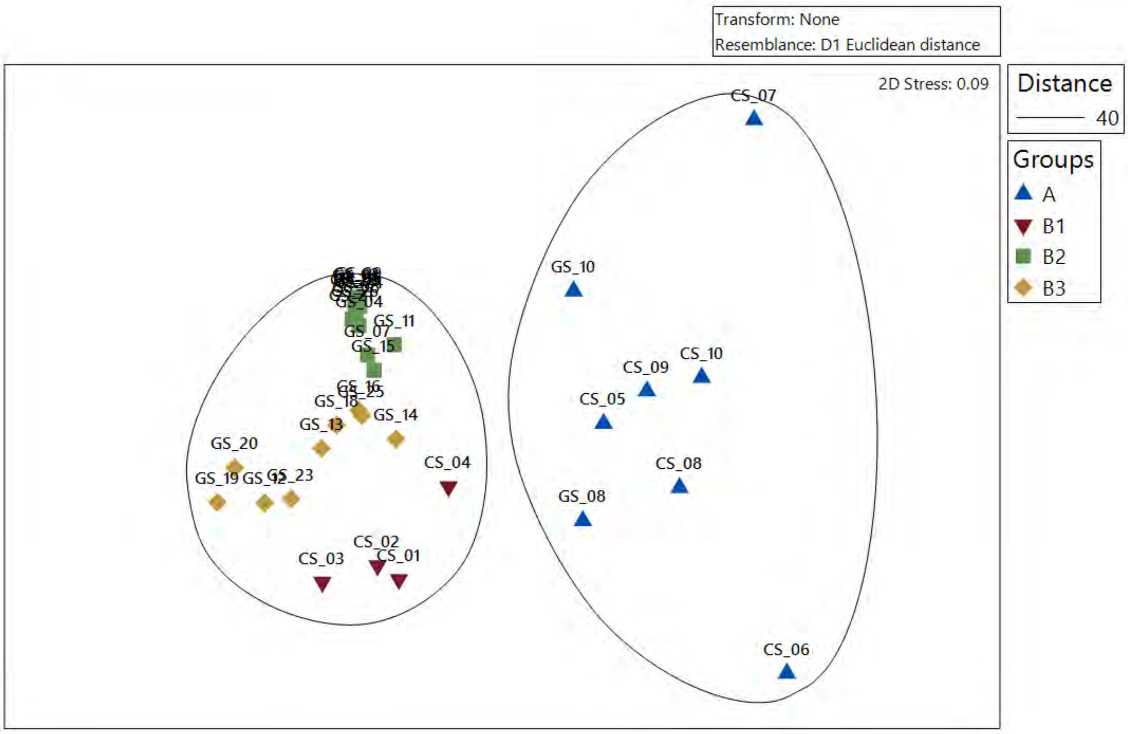
Two groups (A and B) were identified by the cluster analysis, as shown in Figure 4.6a. At the Euclidean distance of 22, group B was split into three further groups. Table 4.10 summarises the characteristics of the multivariate groups detailed as follow:

- Group A comprised six sample and two stations and it was characterised by poorly sorted, very poorly sorted and extremely poorly sorted gravel, muddy gravel and muddy sandy gravel (Folk BGS modified), with a mean median sediment particle size of 10 627 µm (medium pebble). Most samples within this group were collected from the intertidal in the eastern part of the survey area and two (GS_08 and GS_10) were at an average water depth of 6.6 m;
- Group B1 comprised four samples and it was characterised by poorly sorted and very poorly sorted gravelly sand, gravelly muddy sand and muddy sandy gravel (Folk BGS modified), with a mean median sediment particle size of 602 µm (coarse sand) located in the intertidal in the western part of the survey area;
- Group B2 comprised 14 stations and it was characterised by poorly to very poorly sorted sandy mud (Folk BGS modified), with a mean median sediment particle size of 17.5 µm (medium silt), in mean water depth of 7.7 m;
- Group B3 comprised nine stations and it was characterised by poorly to very poorly sorted muddy sand and gravelly muddy sand (Folk BGS modified), with a mean median sediment particle size of 149 µm (fine sand), in mean water depth of 1.7 m.

Figure 4.6b displays the results of the nMDS. The stress coefficient of 0.09 provides a good representation of the data).



A)



B)

Notes
GS = Grab station
CS = core sample

Figure 4.6: Dendrogram (a) and nMDS (b) of hierarchical clustering analysis of particle sizes (μm)

Table 4.10: Summary of physical characteristics of sediment groups identified in multivariate analysis

Multivariate Group	Station/Sample	Average Depth [m BSL]	Median Particle Size [µm]	Fractional Composition [%]			Sorting	
				Gravel	Sand	Fines	[µm]	Description
A ▲ Average squared distance: 641.27	CS_05, CS_06, CS_07, CS_08, CS_09, CS_10, GS_08, GS_10	Intertidal, Intertidal, Intertidal, 6.6	12627	79	13	8	8.00	Very poorly sorted
B1 ▼ Average squared distance: 145.66	CS_01, CS_02, CS_03, CS_04	Intertidal, Intertidal	602	22	69	9	5.24	Very poorly sorted
B2 ■ Average squared distance: 11.03	GS_01, GS_02, GS_03, GS_04, GS_05, GS_06, GS_07, GS_09, GS_11, GS_15, GS_21, GS_22, GS_24, GS_26	7.7	17.5	0.84	18.69	80.47	4.73	Very poorly sorted
B3 ◆ Average squared distance: 123.28	GS_12, GS_13, GS_14, GS_16, GS_18, GS_19, GS_20, GS_23, GS_25	1.7	149	2.68	67.27	30.05	5.62	Very poorly sorted

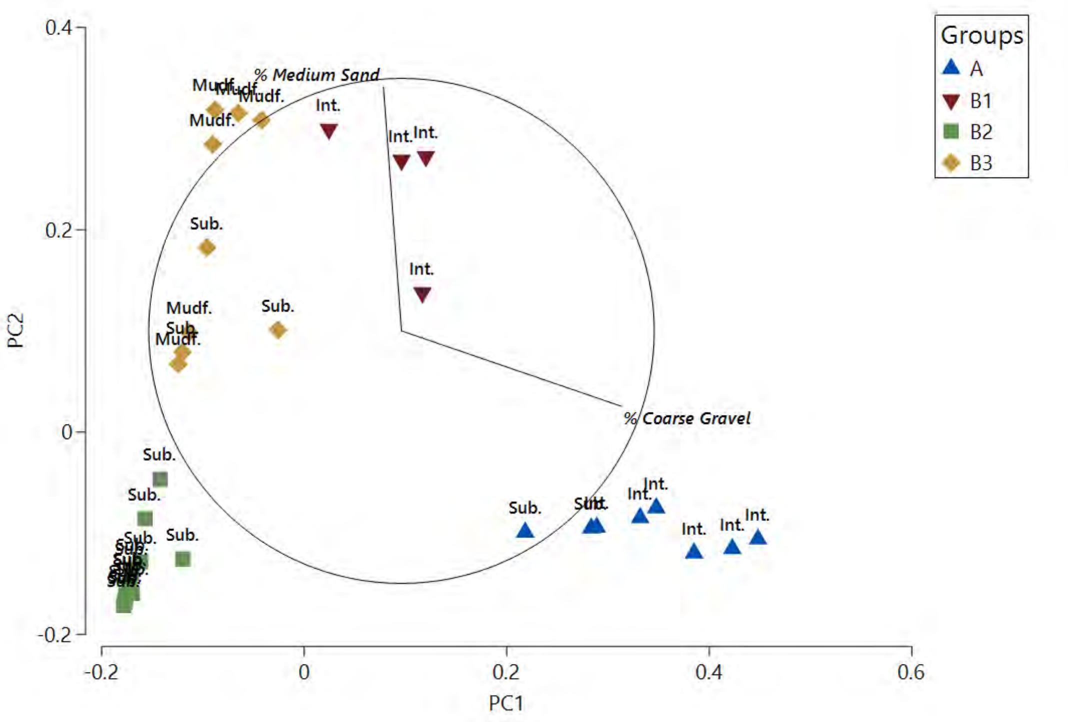
Notes
Data refer to mean values in each multivariate group
BSL = Below sea level
GS = Grab station
CS = Core sample

4.2.2.1.1 Principal Components Analysis (PCA)

Principal component analysis (PCA) was performed on the sediment fractional proportional data. The aim of the analysis was to identify any factor guiding the grouping of the clusters.

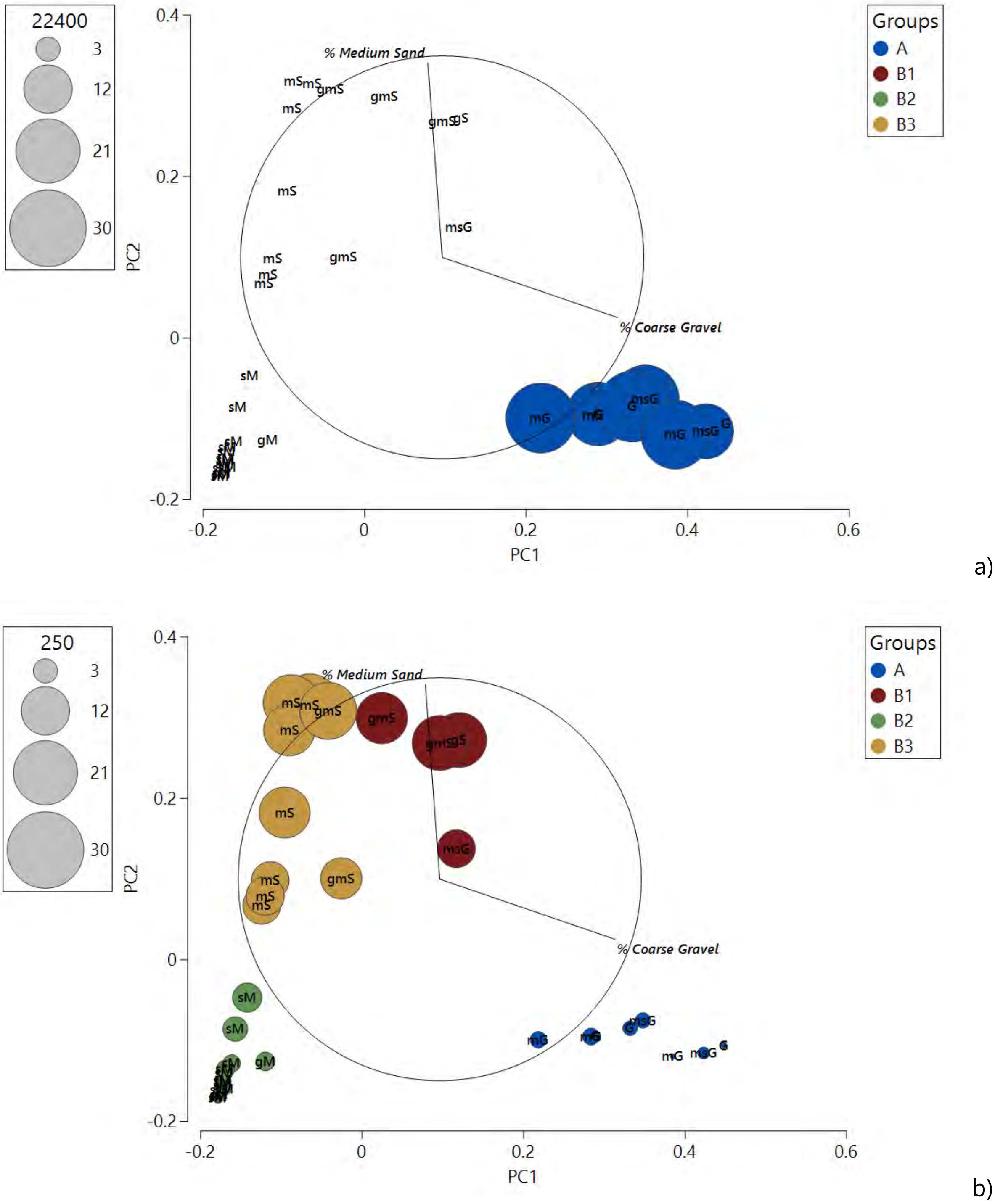
Figure 4.7 presents the results of the PCA applied to the sediment fractions. The first principal components were % coarse gravel (22 400 µm), which explained 44.7 % of variation and % medium sand (250 µm), which explained a further 32.2 % of the variation, for a total of 76.9 % of the variation. This indicates that the ordination driven by these two components gives a good representation of sediment distribution across the survey area.

Figure 4.8 a and b present the relative proportions of the particle size fractions driving the clusters distribution.



Notes
Int. = Intertidal
Sub. = Subtidal
Mudf. = North Tees Mudflat
PC = Principal component

Figure 4.7: Principal components analysis (PCA) ordination of particle sizes (µm)/fractional composition (%)



Notes
mS = Muddy sand
mG =Muddy gravel
gmS = Gravelly muddy sand
sM = Sandy mud
gM = Gravelly mud
PC = Principal component

Figure 4.8: First and second principal components driving the ordination of the groupings based on the sediment fractional proportions

4.3 Sediment Chemistry

The VC and BH sediment chemistry samples were analysed for PSD, pH, hydrocarbons, metals, PCBs and organotins.

4.3.1 Particle Size Distribution (PSD)

The PSD results of the VC and BH sediment samples are presented in Appendix D.1.

4.3.2 Hydrocarbons

Concentrations of THC and a suite of PAHs were analysed in sediments taken from several depth ranges BRL. Concentrations of PAHs were compared with the Cefas action level AL1 value. The reported data are presented in Appendix D.2.

The concentration of acenaphthene exceeded the Cefas AL1 threshold (100 µg/kg) at 34 samples over 19 stations.

The concentration of acenaphthylene exceeded the Cefas AL1 threshold (100 µg/kg) at 34 samples over 20 stations.

The concentration of anthracene exceeded the Cefas AL1 threshold (100 µg/kg) at 33 samples over 19 stations.

The concentration of benzo[a]anthracene exceeded the Cefas AL1 threshold (100 µg/kg) at 37 samples over 20 stations.

The concentration of benzo[a]pyrene exceeded the Cefas AL1 threshold (100 µg/kg) at 37 samples over 20 stations.

The concentration of benzo[b]fluoranthene exceeded the Cefas AL1 threshold (100 µg/kg) at 37 samples over 20 stations.

The concentration of benzo[e]pyrene exceeded the Cefas AL1 threshold (100 µg/kg) at 39 samples over 21 stations.

The concentration of benzo[ghi]pyrene exceeded the Cefas AL1 threshold (100 µg/kg) at 37 samples over 20 stations.

The concentration of benzo[k]fluoranthene exceeded the Cefas AL1 threshold (100 µg/kg) at 32 samples over 18 stations.

The concentration of the C1-naphthalenes exceeded the Cefas AL1 threshold (100 µg/kg) at 64 samples over 24 stations.

The concentration of the C1-phenanthrenes exceeded the Cefas AL1 threshold (100 µg/kg) at 59 samples over 24 stations.

The concentration of the C2-naphthalenes exceeded the Cefas AL1 threshold (100 µg/kg) at 57 samples over 23 stations.

The concentration of the C3-naphthalenes exceeded the Cefas AL1 threshold (100 µg/kg) at 53 samples over 22 stations.

The concentration of chrysene exceeded the Cefas AL1 threshold (100 µg/kg) at 37 samples over 20 stations.

The concentration of dibenzo[ah]anthracene exceeded the Cefas AL1 threshold (100 µg/kg) at 30 samples over 18 stations.

The concentration of fluoranthene exceeded the Cefas AL1 threshold (100 µg/kg) at 37 samples over 20 stations.

The concentration of fluorene exceeded the Cefas AL1 threshold (100 µg/kg) at 36 samples over 20 stations.

The concentration of indeno[1,2,3-cd]pyrene exceeded the Cefas AL1 threshold (100 µg/kg) at 35 samples over 18 stations.

The concentration of naphthalene exceeded the Cefas AL1 threshold (100 µg/kg) at 38 samples over 20 stations.

The concentration of perylene exceeded the Cefas AL1 threshold (100 µg/kg) at 33 samples over 18 stations.

The concentration of phenanthrene exceeded the Cefas AL1 threshold (100 µg/kg) at 56 samples over 23 stations.

The concentration of pyrene exceeded the Cefas AL1 threshold (100 µg/kg) at 37 samples over 20 stations.

4.3.3 Metals

Arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc concentrations were quantified. The concentrations were measured at several depth ranges BRL and were compared with Cefas action levels (AL1 and AL2).

The concentrations of the extractable metals in the sediment samples are summarised in Appendix D.3, following an aqua regia digest as per the methodology in Section 3.2.3. The values highlighted in the table are those which exceeded Cefas thresholds AL1 and AL2.

The concentration of arsenic exceeded the AL1 threshold (20 µg/g) at 29 samples over 18 stations.

The Cefas AL1 threshold for cadmium (0.4 µg/g) was exceeded by 30 samples over 19 stations, of which 4 samples also exceeded the AL2 threshold.

The Cefas AL1 threshold for chromium (40 µg/g) was exceeded by 32 samples over 19 stations, of which 1 sample also exceeded the AL2 threshold.

The Cefas AL1 threshold for copper (40 µg/g) was exceeded by 34 samples over 20 stations, of which 1 sample also exceeded the AL2 threshold.

The Cefas AL1 threshold for mercury (0.3 µg/g) was exceeded by 31 samples over 18 stations, of which 4 samples also exceeded the AL2 threshold.

The concentration of nickel exceeded the AL1 threshold (20 µg/g) at all stations and at all depths except six samples over five stations.

The Cefas AL1 threshold for lead (50 µg/g) was exceeded by 32 samples over 20 stations, of which 3 samples also exceeded the AL2 threshold.

The Cefas AL1 threshold for zinc (130 µg/g) was exceeded by 31 samples over 18 stations, of which 5 samples also exceeded the AL2 threshold.

4.3.4 Polychlorinated Biphenyls (PCBs)

The concentration of individual PCB congeners were measured in each sample (Appendix D.4.1). For comparison with the AL1 and AL2 values, data are presented as the sum of the ICES 7 PCBs and the sum of 25 PCBs in Appendix D.4.2.

Concentrations of individual congeners were added to make the sum of ICES 7 PCBs and of the 25 PCBs as appropriate. If the concentrations were below the minimum reporting value, the absolute number was added to the total and the sum reported as < (less than) the total.

The sum of the ICES 7 PCBs and the sum of 25 PCBs exceeded the AL1 (0.01 mg/kg and 0.02 mg/kg respectively) at 20 samples over 14 stations (shown in Table 4.12). There is no AL2 for the ICES 7 PCBs.

The sum of 25 PCBs did not exceed AL2 at any station at any depth range.

4.3.5 Organotins

The reported concentrations for dibutyltin (DBT) and tributyltin (TBT) are presented in Appendix D.5. Concentrations below the minimum reporting value were reported as < (less than) this value.

The concentration of DBT was below both the Cefas AL1 and AL2 thresholds at all stations, in all samples. The concentration of TBT exceeded the Cefas AL1 threshold (100 ng/g) at station BH-31 (sample 0.00 m-0.80 m) and BH-34 (sample 0.00 m-0.80 m). The Cefas AL2 value was not exceeded at any station.

4.3.6 pH

The sediment pH within the survey area is presented in Appendix D.6.

4.4 Intertidal Sediment Macrofauna

4.4.1 Walkover

The shore area above the supralittoral was excluded from biotope assessment, as it is part of the coastal habitats rather than marine habitats, and therefore outside the remit of this study, albeit incidental observations recorded a range of coastal vegetation including the golden samphire (*Limbarda crithmoides*), the pixie cup lichen (*Cladonia* sp.) and ?stone crop (?*Sedum*) in the old wharf area, adjacent to an inaccessible intertidal area (Figure 4.9). At the access point to the eastern part of the survey area, the purslane (*Atriplex portulacoides*) and the fennel (*Foeniculum vulgare*) were recorded. The remaining shore area above the supralittoral was characterised by anthropogenic structures/slag or grassland/scrub.

Figure 4.9: Terrestrial vegetation above the supralittoral zone

The intertidal walkover was undertaken along the eastern and western section of the survey area. Owing to access restrictions, walkover along the central section of the survey area was not undertaken and the intertidal area in the central section was photographed from the accessible section of the South Bank Wharf.

Figure 4.10 displays photographs representative of the intertidal habitats recorded across the survey area.

The supralittoral zone was characterised by a mixed substrate of pebbles, cobbles and boulders or man-made structures such as seawalls, colonised by filamentous green algae

(Chlorophyta likely to include species of the genera *Blidingia*, *Ulva* and *Prasiola*). Debris of natural (e.g. driftwood) and anthropogenic nature (e.g. plastic, polystyrene, rubber).

The mid eulittoral comprised a substrate characterised by pebbles, cobbles, and small boulders, often in a matrix of muddy sand and/or gravel, likely of anthropogenic origin. In the western part of the survey area freshwater input was visible running down the seawall, reaching the mid-shore through naturally formed channels. Biological communities were represented by fucoid algae, including *Fucus ceranoides*, which was recorded throughout the eulittoral zone in the western section of the survey area, where freshwater input occurred. Green algae (Chlorophyta) and fauna, the latter including gastropods such as *Littorina littorea* and barnacles of the order Sessilia, were associated with *F. ceranoides* habitat.

In the eastern section of the survey area a mix of fucoid algae was recorded with *Fucus spiralis* occurring in the upper eulittoral zone, as a narrow band particularly on seawalls and steeply sloping upper shore areas. The mid eulittoral zone was dominated by *Fucus vesiculosus,* whereas patches of *F. ceranoides* were found associated with areas of freshwater input. Fauna associated with this habitat included amphipods (?*Gammarus*) and barnacles of the order Sessilia.

Fucoid algae (*Fucus* spp.) were observed on pipes and concrete structures in the inaccessible central section of the survey area.

The lower eulittoral zone was characterised by pebbles, cobbles, and small boulders, often in a matrix of muddy sand and/or gravel, likely of anthropogenic origin, such as construction. Epibiotic communities, where present, included a sparse fucoid canopy including juvenile species of *Fucus* and *F. vesiculosus*, and patches of the red alga *Chondrus crispus*. Epifauna associated with this habitat included *Spirobranchus lamarcki*, *L. littorea* and barnacles (Sessilia).

Within each habitat identified, taxa abundance was estimated by means of quadrats (detailed in Section 4.4.2). Core samples were acquired from areas devoid of epibiotic communities, which comprised mixed sediments of muddy sand, sandy gravel and/or gravel, in the mid and lower eulittoral zones (detailed in Section 4.4.3). On-site dig-overs recorded little or no fauna.

The habitats and associated benthic communities formed the basis for biotope classification (detailed in Section 3.3.5), in conjunction with the sediment characteristics (detailed in Section 4.2).

Upper eulittoral eastern section

Upper eulittoral central section

Upper eulittoral western section

Mid eulittoral eastern section

Mid eulittoral central section

Mid eulittoral western section

Lower eulittoral eastern section

Lower eulittoral central section

Lower eulittoral western section

Figure 4.10: Intertidal habitats

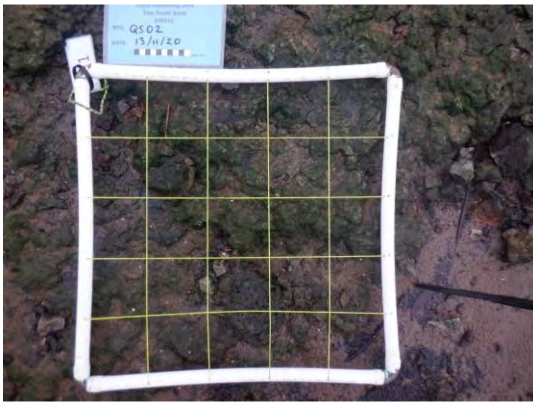
4.4.2 Quadrat Samples

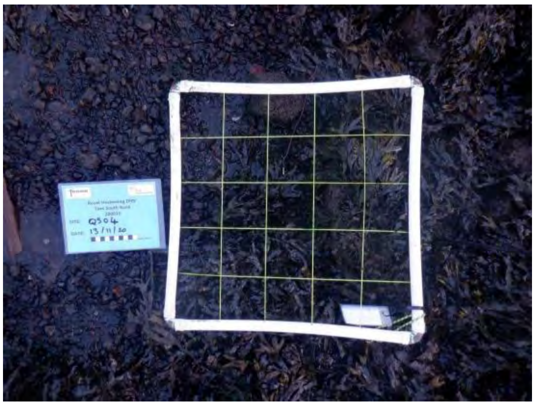
Table 4.11 summarises the results of the quadrat sampling in the intertidal area on the southern bank, with representative photographs of each quadrat presented in Figure 4.11.

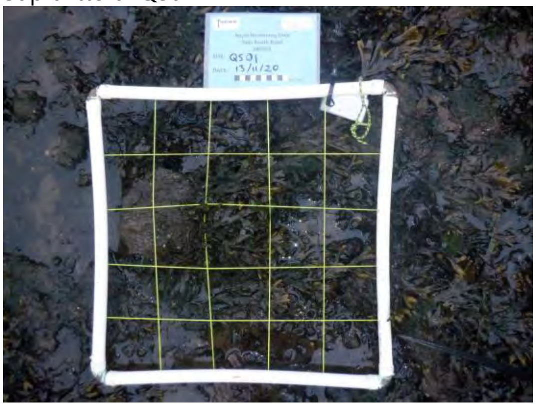
Table 4.11: Abundance of taxa characteristic of intertidal habitats identified

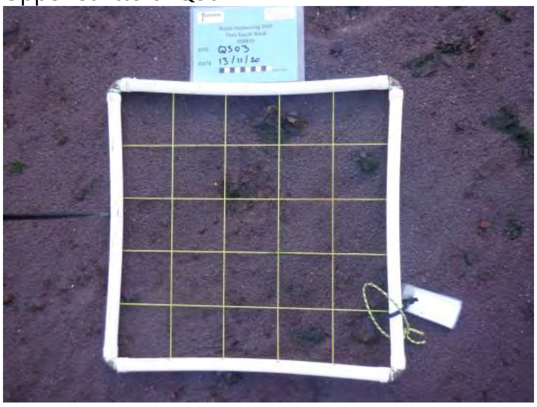
Zone	Quadrat	Substratum	Taxa	Cover/ Abundance*
Supralittoral	QS02	Rock, muddy sand	*Fucus* (juvenile)	< 1 %
			Chlorophyta	60 %
Upper eulittoral	QS04	Cobbles, boulders, gravelly mud with pebbles	*Fucus ceranoides*	20 %
			Fucus vesiculosus	20 %
			Chlorophyta	10 %
			Littorina littorea	2
Mid eulittoral	QS01	Cobbles, boulders, gravelly sand	*Fucus ceranoides*	40 %
			Chlorophyta	10 %
			Sessilia	> 500
			Patella vulgata	1
			Littorina littorea	81
			Mytilus edulis	4
	QS03†	Slightly gravelly muddy sand	*Fucus* (juvenile)	<1 %
			Chlorophyta	2 %
	QS06	Rock, gravel	*Fucus vesiculosus*	70 %
			Chlorophyta	10 %
			Amphipoda	1
	QS08	Muddy gravel with cobbles and pebbles	*Fucus* (juveniles)	50 %
			Amphipoda	~50
Lower eulittoral	QS05	Boulders, pebbles	*Fucus vesiculosus*	10 %
			Chondrus crispus	60 %
			Spirobranchus lamarcki	~50
			Sessilia	> 250
			Littorina littorea	30
	QS07	Muddy, sandy gravel	*Fucus* (juvenile)	< 5 %
			Chondrus crispus	10 %
			Sessilia	~50
			Patella vulgata	3
			Littorina littorea	18
	QS09†	Muddy gravel with pebbles	-	-
	QS10†	Muddy gravel with pebbles	*Chondrus crispus*	< 1 %
			Annelida‡	1
			Sessilia	~70
			Patella vulgata	2
			Littorina littorea	3

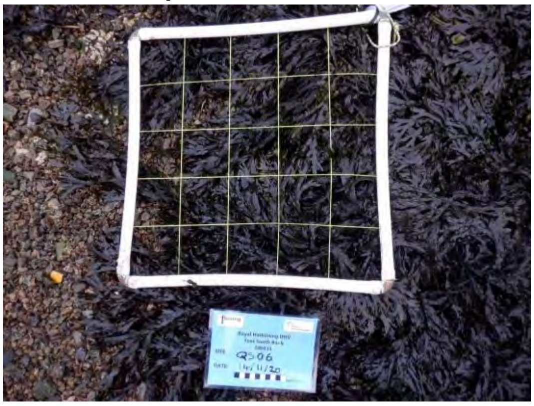
Notes
QS = Quadrat sample
* = Percentage cover and numerical abundance estimated on site
† = On Site dig over also undertaken with no fauna recorded
‡ = Recorded from on-site dig over


Supralittoral QS02


Upper eulittoral QS04

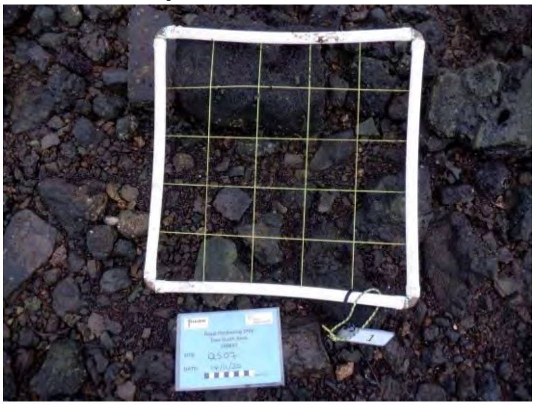

Mid eulittoral QS01


Mid eulittoral QS03


Mid eulittoral QS06


Mid eulittoral QS08


Lower eulittoral QS05


Lower eulittoral QS07

Lower eulittoral QS09

Lower eulittoral QS10

Notes
QS = Quadrat sample

Figure 4.11: Intertidal quadrats

4.4.3 Core Samples

Following rationalisation, the macrofaunal dataset from the core samples comprised 46 taxa and 5510 individuals. The excluded taxa were represented by colonial epifauna and damaged organisms, both recorded as present; juveniles (5 taxa and 32 individuals) and meiofauna (239 Nematoda and 44 Copepoda). In addition, seven individuals of *Jaera albifrons* were aggregated to genus level. Appendix E.2.1 present the species matrix from core samples.

Table 4.12 summarises the phyletic composition of the macrofauna from the core samples and Figure 4.12 presents the phyletic composition of taxa and individuals from each core sample.

Table 4.12: Taxonomic groups of macrofauna from core samples

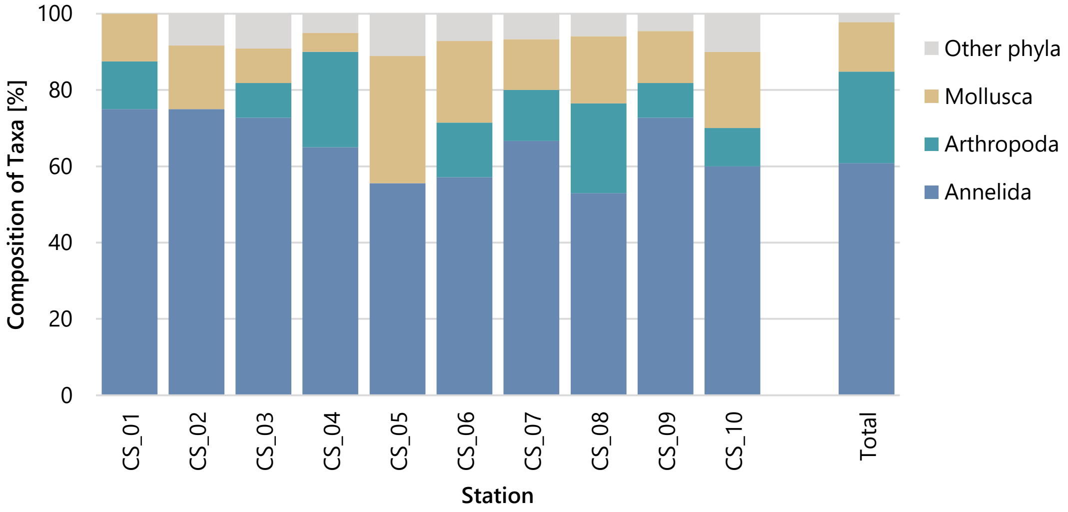
Taxonomic Group	Number of Taxa	Composition of Taxa [%]*	Abundance	Composition of Individuals [%]*
Annelida	28	60.9	4364	79.2
Arthropoda	11	23.9	560	10.2
Mollusca	6	13.0	479	8.7
Other phyla	1	2.2	107	1.9
Total	**46**	**100**	**5510**	**100**

Notes
Other phyla included Nemertea

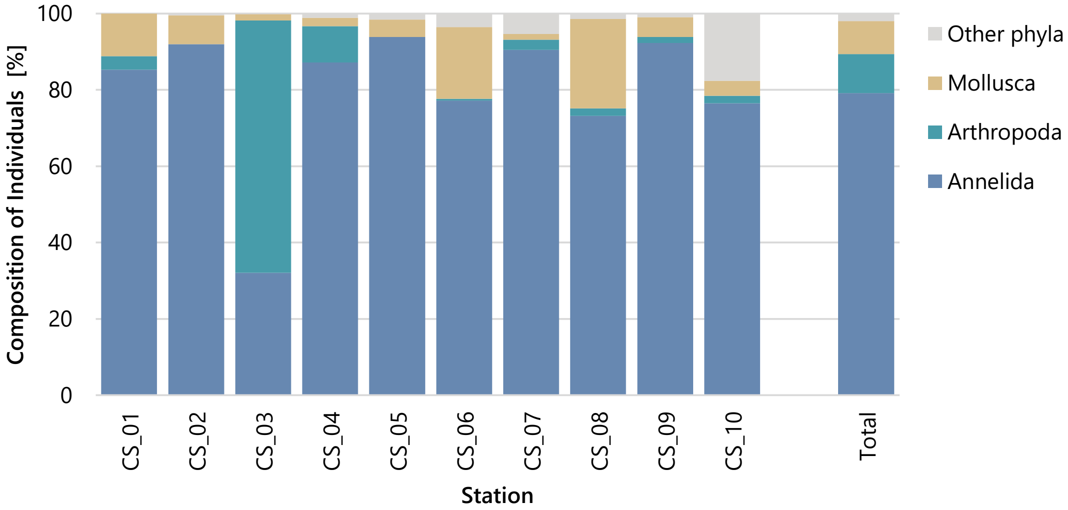
Annelida were dominant in terms of taxa composition, comprising 60.9 % of the taxa recorded, followed by Arthropoda (23.6 %), Mollusca (13.0 %) and other phyla (2.2 %), the latter comprising Nemertea (Table 4.12). The dominance of Annelida in taxa composition was recorded across all core samples (Figure 4.12).

Annelida were also dominant in terms of abundance, comprising 79.3 % of the macrofaunal abundance, followed by Arthropoda (10.2 %), Mollusca (8.7 %) and other phyla (1.9 %)

(Table 4.12). The dominance of Annelida was recorded at all with the exception of core CS_03, which was dominated by Arthropoda (Figure 4.12).



a)



b)

Notes

CS = Core sample

Figure 4.12: Phyletic composition of macrofaunal (A) taxa and (B) individuals

4.4.3.1 Community Statistics

Table 4.13 presents the results of the univariate analysis, which was used to assess the intertidal biodiversity.

The number of taxa from the core samples was between 9 (sample CS_05) and 22 (sample CS_22), with a mean of 15.

The number of individuals was between 51 (sample CS_10) and 1411 (sample CS_04), with a mean of 551. Values of richness reflected the faunal abundance across the taxa recorded and ranged from 1.58 (sample CS_03) to 3.63 (sample CS_09), with a mean of 2.29.

Diversity was between 1.67 (sample CS_03) and 3.13 (sample CS_01), with a mean of 2.43. When diversity was assessed in line with the criteria in Dauvin et al. (2012) (detailed in Section 3.3.2), results indicated that 8 out of 10 core samples had good diversity, with a range of 2.22 (sample CS_04) to 2.67 (sample CS_08). The diversity of sample CS_01 was high and that of sample CS_03 was poor.

Values of evenness and dominance were inversely correlated, with high values of evenness generally corresponding to low values of dominance and vice versa. Thus, sample CS_01 had the highest evenness value (0.782) and the lowest dominance (0.132), whereas sample CS_03 had the lowest evenness (0.483) and the highest dominance (0.471). Analysis of the species list indicated that values of evenness and dominance in sample CS_03 were associated with a numerical dominance of arthropods of the class Collembola, which, with 367 individuals, comprised 66.1 % of the total macrofaunal abundance in sample CS_03.

Table 4.13: Macrofaunal community statistics of intertidal core samples (0.01 m^2)

Station	Numbers		Richness	Diversity	Evenness	Dominance
	Taxa	Individuals	Margalef [d]	Shannon-Wiener [$H'Log_2$]	Pielou [J]	Simpson [λ]
CS_01	16	375	2.53	3.13	0.782	0.132
CS_02	12	450	1.80	2.33	0.649	0.246
CS_03	11	555	1.58	1.67	0.483	0.471
CS_04	20	1411	2.62	2.22	0.514	0.305
CS_05	9	65	1.92	2.44	0.770	0.220
CS_06	14	703	1.98	2.48	0.651	0.233
CS_07	15	733	2.12	2.40	0.613	0.262
CS_08	17	842	2.38	2.67	0.654	0.200
CS_09	22	325	3.63	2.61	0.585	0.303
CS_10	10	51	2.29	2.33	0.703	0.264
Minimum	**9**	**51**	**1.58**	**1.67**	**0.483**	**0.132**
Maximum	**22**	**1411**	**3.63**	**3.13**	**0.782**	**0.471**
Median	**15**	**503**	**2.21**	**2.42**	**0.650**	**0.254**
Mean	**15**	**551**	**2.29**	**2.43**	**0.640**	**0.264**
Standard Deviation	**4**	**403**	**0.57**	**0.37**	**0.097**	**0.089**

Notes
CS = Core sample

4.4.3.2 Characteristic Taxa

Table 4.14 presents the most abundant and frequently occurring taxa recorded in the core samples. Taxa were selected based on the top ten most abundant taxa and taxa with frequency of occurrence higher than the lowest frequency of occurrence > 20.0 %.

Table 4.14: Most abundant and frequently occurring taxa from core samples

Taxon	Abundance [Individuals/0.01 m^2]			Frequency [%]
	Mean	Minimum	Maximum	
Tubificoides pseudogaster	145.7	14	426	90.0
Capitella	95.8	1	630	100
Tubificoides benedii	63.4	1	167	100
Enchytraeidae	62.8	1	237	90.0
Peringia ulvae	45.3	1	188	100
Collembola	37.9	12	367	20.0
Malacoceros tetracerus	18.7	1	166	40.0
Pygospio elegans	12.8	3	45	80.0
Fabricia stellaris	12.5	1	74	70.0
Gammaridae	11.3	1	111	20.0
Nemertea	10.7	1	39	90.0
Tubificoides swirencoides	5.3	1	50	40.0
Manayunkia aestuarina	4.9	5	29	30.0
Dipolydora quadrilobata	3.3	4	15	30.0
Jaera	2.7	1	20	50.0
Eteone longa	2.6	4	9	40.0
Microphthalmus similis	2.0	3	11	40.0
Littorina saxatilis	1.6	1	7	40.0
Onoba aculeus	0.7	1	2	50.0

Notes
Taxa selection based on the top ten most abundant taxa and taxa with frequency of occurrence > 20.0 %
Taxa listed in decreasing order of mean abundance
Frequency refers to percentage of core samples

The oligochaetes *Tubificoides pseudogaster* and *Tubificoides benedii* were amongst the top ten most abundant and frequently occurring taxa across core samples, the former being recorded in all but sample CS_10; the latter being recorded in all core samples. Overall, *T. pseudogaster* was more abundant than *T. benedii*, albeit it had a less even distribution, with an abundance of between 14 individuals (sample CS_09) and 426 individuals (sample CS_04), compared to *T. benedii* which had an abundance of between 1 individual (sample CS_03) and 168 individuals (sample CS_09).

Polychaetes of the genus *Capitella* were the second most abundant invertebrates and was recorded in all core samples, with an abundance of between 1 individual (sample CS_10) and 630 individuals (sample CS_04).

Oligochaetes of the family Enchytraeidae were recorded in all apart from sample CS_10 and had an abundance of between 1 individual (samples CS_02, CS_04 and CS_09) and 237 individuals (sample CS_06).

The gastropod *Peringia* (formerly *Hydrobia*) *ulvae* was recorded in all core samples and had an abundance of between 1 individual (sample CS_10) and 188 individuals (sample CS_08).

Of the remaining taxa, arthropods of the class Collembola were amongst the top ten most abundant taxa, albeit they were recorded only in samples CS_01 and CS_03. Similarly, amphipods of the family Gammaridae featured amongst the top ten most abundant taxa, albeit they were recorded only in samples CS_04 and CS_06.

Nemertea were recorded in all but sample CS_01, though their abundance did not feature within the top ten most abundant taxa, with abundances ranging from 1 individual (samples CS_03 and CS_06) to 39 individuals (sample CS_07).

The spionid *Dipolydora quadrilobata* and *Polydora cornuta* were also recorded, the latter not listed in Table 4.14, as it comprised five individuals across two core samples. These species are considered cryptogenic and have a cosmopolitan distribution.

4.4.3.3 Biomass

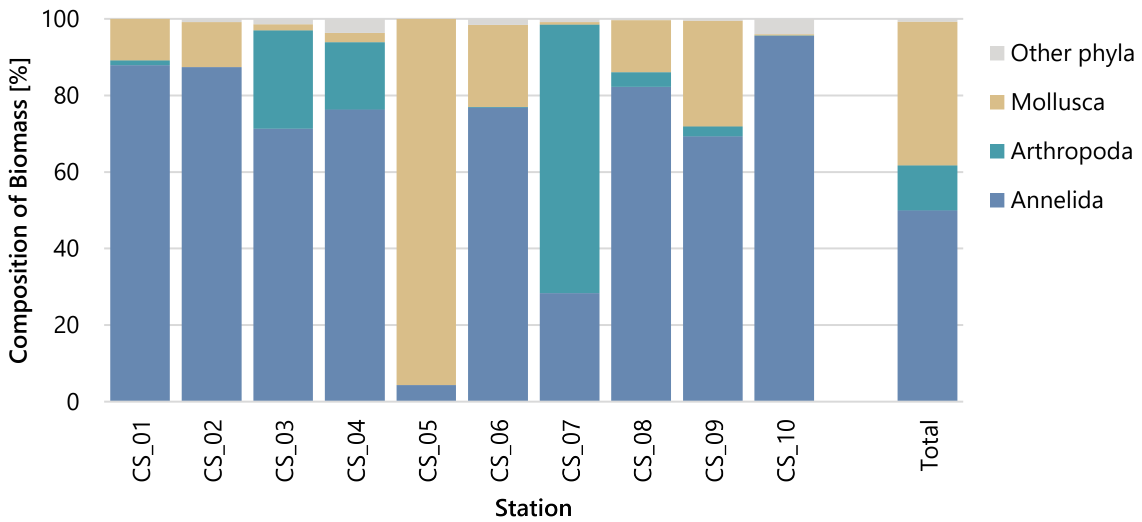
The biomass dataset from the intertidal core samples was rationalised prior to analysis, with removal of colonial and damaged taxa, juveniles and meiofauna, and the aggregation of one individual of *J. albifrons* to genus level.

Table 4.15 summarises the macrofaunal biomass from the core samples following conversion of data to AFDW (details in Section 3.3.3). Figure 4.13 presents the percentage contribution of each phylum to the total biomass. Table 4.16 presents the taxa with a contribution > 1 % to the total biomass from the core samples. Appendix E.2.2 presents the full list of macrofaunal biomass.

Table 4.15: Phyletic composition of macrofaunal biomass from core samples

Core Sample	Biomass				
	Annelida	Arthropoda	Mollusca	Other Phyla	Total
CS_01	0.0215	0.0003	0.0026	0.0000	**0.0245**
CS_02	0.0239	0.0000	0.0032	0.0002	**0.0273**
CS_03	0.0071	0.0026	0.0002	0.0001	**0.0100**
CS_04	0.0641	0.0148	0.0021	0.0030	**0.0839**
CS_05	0.0162	0.0000	0.3605	< 0.0001	**0.3768**
CS_06	0.0871	0.0002	0.0244	0.0018	**0.1134**
CS_07	0.0454	0.1120	0.0010	0.0014	**0.1598**
CS_08	0.2646	0.0125	0.0438	0.0009	**0.3217**
CS_09	0.0520	0.0020	0.0207	0.0004	**0.0750**
CS_10	0.0291	< 0.0001	0.0001	0.0012	**0.0305**
Minimum	**0.0071**	**0.0000**	**0.0001**	**0.0000**	**0.0100**
Maximum	**0.2646**	**0.1120**	**0.3605**	**0.0030**	**0.3768**
Median	**0.0372**	**0.0011**	**0.0029**	**0.0007**	**0.0795**
Mean	**0.0611**	**0.0144**	**0.0459**	**0.0009**	**0.1223**
Standard Deviation	**0.0755**	**0.0347**	**0.1115**	**0.0010**	**0.1288**

Notes
Biomass expressed as ash free dry weight in $g/0.01\ m^2$ core sample
CS = Core sample



Notes
CS = Core sample

Figure 4.13: Percentage contribution of phyla to biomass from core samples

Annelida comprised most of the biomass at all locations with the exception of CS_04 and CS_07, the biomass of which was dominated by the Mollusca and the Arthropoda, respectively. Analysis of the species list indicated that the biomass in sample CS_05 was associated mainly with the gastropod *Littorina littorea* which comprised 96 % of the core sample's total biomass. Indeed, *L. littorea* comprised the largest biomass across the core samples (Table 4.16), albeit it comprised a single individual.

The biomass of sample CS_07 was associated mainly with the barnacle *Austrominius* (formerly *Elminius*) *modestus* which comprised 57 % of the core sample's total biomass and 8.1 % of the total biomass across the samples (Table 4.16).

Of the Annelida, the polychaete *Malacoceros tetracerus* comprised the highest biomass, followed by the oligochaetes *T. pseudogaster* and *T. benedii*, the cirratulid *Cirriformia tentaculata*, oligochaetes of the family Enchytraeidae, polychaetes of the genus *Capitella* and *Eteone longa*.

Other infauna of notable contribution to the biomass included the barnacle *S. balanoides* and amphipods of the family Gammaridae, the gastropod *P. ulvae* and the bivalve *Venerupis corrugata*, the latter comprising a single individual in sample CS_09.

Table 4.16: Percentage contribution of individual taxa to mean biomass from core samples

Taxa	Mean Biomass	Contribution
Littorina littorea	0.0360	29.5
Malacoceros tetracerus	0.0198	16.2
Tubificoides pseudogaster	0.0174	14.3
Austrominius modestus	0.0099	8.1
Peringia ulvae	0.0073	6.0
Tubificoides benedii	0.0066	5.4
Cirriformia tentaculata	0.0051	4.2
Enchytraeidae	0.0043	3.5
Capitella	0.0030	2.5
Eteone longa	0.0023	1.9
Semibalanus balanoides	0.0020	1.7
Venerupis corrugata	0.0019	1.5
Gammaridae	0.0013	1.1

Notes

Biomass expressed as ash free dry weight in g/0.01 m^2 core sample

Contribution expressed as percentage of the total biomass across the core samples

Cut off for percentage contribution: 1 %

4.4.4 North Tees Mudflat

4.4.4.1 Phyletic Composition

A full list of taxa identified and enumerated (individuals per 0.035 m^2) from the survey area are presented in Appendix E.3.1.

A total of 33 taxa and 6030 individuals were identified within grab samples from the survey area. Of these taxa, nine were recorded as juveniles, meiofaunal, colonial or damaged. To represent the permanent macrofaunal community and to avoid spurious enhancement of the species list, the dataset was rationalised and these taxa were removed prior to statistical analysis (Appendix E.3.1).

The rationalised dataset comprised 95 benthic taxa, of which 73 (76.8 %) were annelids, 7 (7.4 %) were arthropods and 15 (15.8 %) were molluscs. A total of 5643 individuals was identified in the rationalised data, of which 2030 (36.0 %) were annelids, 806 (14.3 %) were arthropods and 2804 (49.7 %) were molluscs. Table 4.17 summarises the abundance of taxonomic groups identified within the rationalised dataset across the survey area.

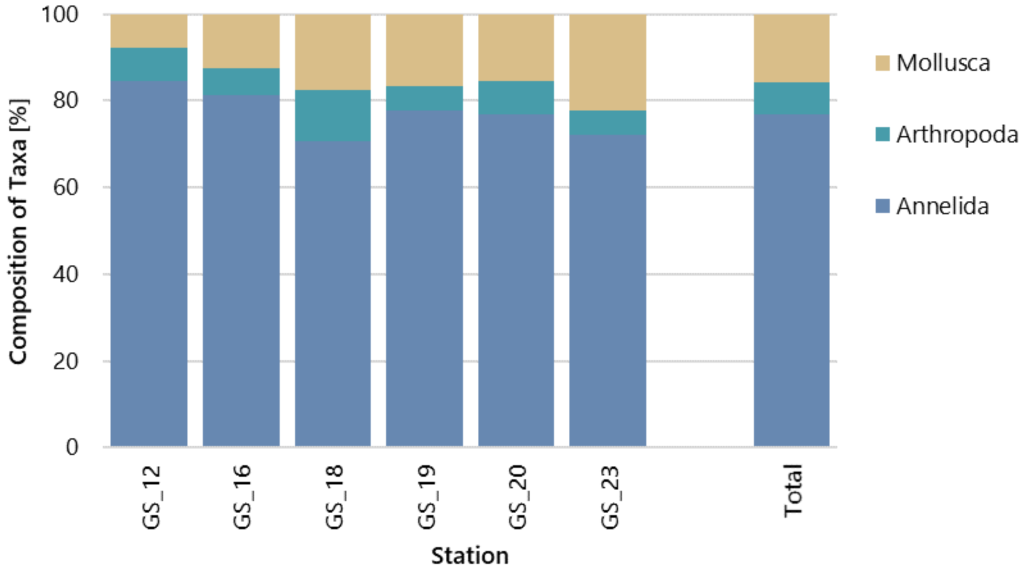
Table 4.17: Taxonomic groups of macrofauna at hand haul Van Veen grab stations, from North Tees Mudflat

Taxonomic Group	Number of Taxa	Composition of Taxa [%]	Abundance	Composition of Individuals [%]
Annelida	73	76.8	2030	36.0
Arthropoda	7	7.4	809	14.3
Mollusca	15	15.8	2804	49.7
Total	**95**	**100**	**5643**	**100.0**
Notes Macrofaunal samples were processed through a 0.5 mm sieve				

Annelida were dominant in terms of taxa composition, comprising 76.8 % of the taxa recorded, followed by Mollusca (15.8 %) and Arthropoda (7.4 %) (Table 4.24).

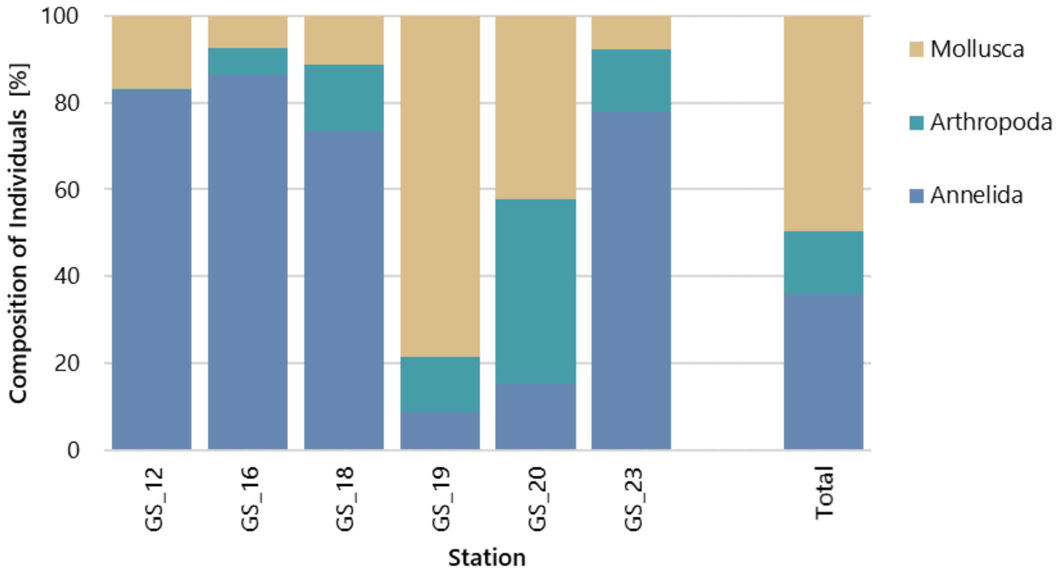
Mollusca were dominant in terms of abundance, comprising 49.7 % of the macrofaunal abundance, followed by Annelida (36.0 %) and Arthropoda (14.3 %) (Table 4.24).

Figures 4.14 and 4.15 illustrate the phyletic composition of taxa and individuals for each station. Annelida were dominant in terms of number of taxa at all stations; in terms of number of individuals, Annelida were dominant at most stations, but they were the least abundant at stations GS_19 where Mollusca were dominant and at station GS_20 where both Mollusca and Arthropoda were more abundant than Annelida, although neither of them was dominating.



Notes
GS = Grab station

Figure 4.14: Phyletic composition of macrofaunal taxa at hand haul van Veen grab stations



Notes
GS = Grab station

Figure 4.15: Phyletic composition of macrofaunal individuals at hand haul Van Veen grab stations

4.4.4.2 Community Statistics

Table 4.18 presents the number of taxa and individuals identified within the rationalised dataset from each station along with several commonly used diversity and evenness statistics.

The number of taxa per station (0.035 m^2) ranged from 13 (station GS_12) to 18 (stations GS_19 and GS_23), with a mean of 16 across the subtidal survey area.

The number of individuals per station (0.035 m^2) ranged from 350 (station GS_16) to 2957 (station GS_19), with a mean of 941 across the subtidal survey area.

Values of richness reflected the faunal abundance across the taxa recorded and ranged from 1.88 (station GS_12) to 2.73 (station GS_23).

Diversity ranged from 1.23 (station GS_19) to 2.95 (station GS_18), with a mean of 2.18. When diversity was assessed against the criteria detailed in Section 3.3.2 (Dauvin et al., 2012), stations GS_12, GS_19 and GS_20 showed poor diversity, while the remaining stations showed moderate diversity.

Evenness was not consistent across the samples and therefore dominance was also not consistent across all samples. Evenness and dominance were complementary, so at stations where evenness was highest with a value of 0.721 (station GS_18), dominance was at its lowest, with a value of 0.182, indicating that at some stations fewer species appeared to dominate the North Tees Mudflat survey area.

Table 4.18: Macrofaunal community statistics at hand haul Van Veen grab stations (0.035 m^2), from North Tees Mudflat

Station	Numbers		Richness	Diversity Indices	Evenness	Dominance
	Taxa	Individuals	Margalef [d]	Shannon-Wiener ($H'Log_2$)	Pielou (J')	Simpson (λ)
GS_12	13	590	1.88	1.68	0.454	0.471
GS_16	16	350	2.56	2.73	0.683	0.236
GS_18	17	677	2.46	2.95	0.721	0.182
GS_19	18	2957	2.13	1.23	0.294	0.634
GS_20	13	565	1.89	1.84	0.498	0.364
GS_23	18	504	2.73	2.65	0.636	0.267
Minimum	**13**	**350**	**1.88**	**1.23**	**0.294**	**0.182**
Maximum	**18**	**2957**	**2.73**	**2.95**	**0.721**	**0.634**
Median	**17**	**578**	**2.29**	**2.25**	**0.567**	**0.316**
Mean	**16**	**941**	**2.28**	**2.18**	**0.548**	**0.359**
Standard Deviation	**2**	**994**	**0.36**	**0.69**	**0.162**	**0.169**

Notes
GS = Grab station

4.4.4.3 Characteristic Taxa

Table 4.19 presents the most abundant and frequently occurring taxa recorded in the core samples. Taxa were selected based on the top ten most abundant taxa and taxa with frequency of occurrence > 50.0 %.

Table 4.19: Most abundant and frequently occurring taxa from van Veen grab stations, from North Tees Mudflat

Taxon	Abundance [Individuals/0.1 m²]			Frequency [%]
	Mean	Minimum	Maximum	
Peringia ulvae	464	25	2323	100
Corophium volutator	135	1	369	100
Tharyx species A	135	7	388	83.3
Tubificoides benedii	83.2	27	233	100
Pygospio elegans	29.0	4	71	100
Tubificoides pseudogaster	26.0	4	90	100
Polydora cornuta	13.7	3	32	100
Streblospio benedicti / gynobranchiata	12.7	8	32	83.3
Capitella	12.0	4	31	66.7
Manayunkia aestuarina	10.5	1	48	100
Eteone longa	6.5	3	12	100
Dipolydora quadrilobata	3.3	1	7	66.7
Hediste diversicolor	2.5	2	8	66.7
Mya arenaria	1.8	1	6	83.3

Notes
Taxa selection based on the top ten most abundant taxa and taxa with frequency of occurrence > 50.0 %
Taxa listed in decreasing order of mean abundance
Frequency refers to percentage of van Veen grab samples

4.4.4.4 Biomass

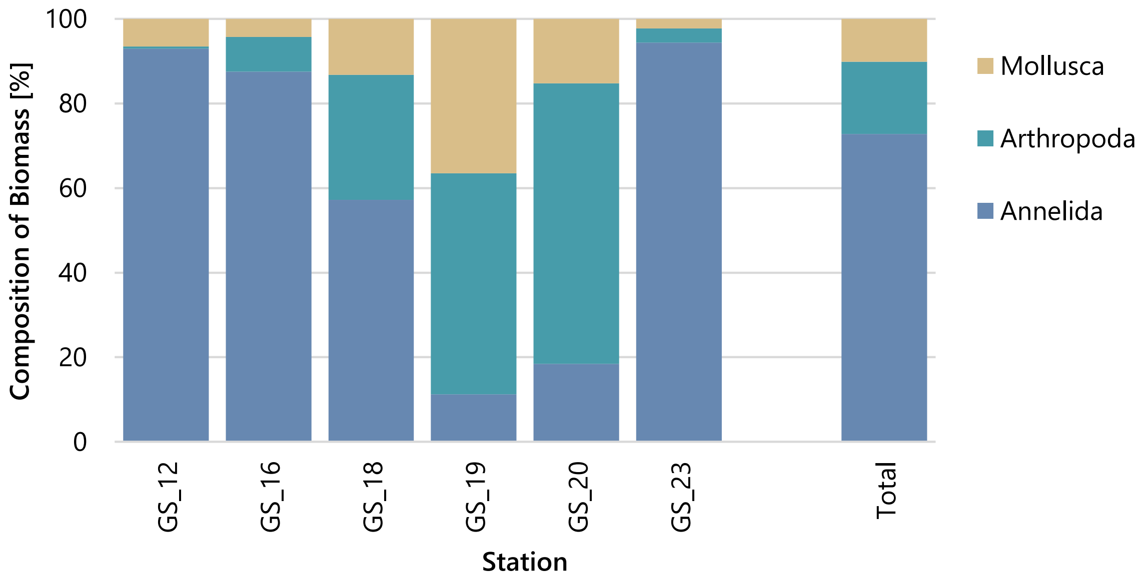
The biomass dataset from the hand haul van Veen grab samples was rationalised prior analysis, with removal of colonial and damaged taxa, juveniles and meiofauna.

Table 4.22 summarises the macrofaunal biomass from the hand haul van Veen grab samples (0.035 m^2) following conversion of data to AFSW (details in Section 3.3.3). Figure 4.16 presents the percentage contribution of each phylum to the total biomass. Table 4.20 presents the taxa with a contribution > 1 % to the total biomass from the hand haul van Veen grab samples. Appendix E.3.2 presents the full list of macrofaunal biomass.

Table 4.20: Phyletic composition of macrofaunal biomass at hand haul Van Veen grab stations, from North Tees Mudflat

Station	Biomass			
	Annelida	Arthropoda	Mollusca	Total
GS_12	0.0604	0.0003	0.0042	0.0649
GS_16	0.0404	0.0038	0.0019	0.0461
GS_18	0.0406	0.0210	0.0094	0.0709
GS_19	0.0174	0.0810	0.0567	0.1551
GS_20	0.0085	0.0305	0.0070	0.0460
GS_23	0.4885	0.0174	0.0117	0.5177
Minimum	**0.0085**	**0.0003**	**0.0019**	**0.0460**
Maximum	**0.4885**	**0.0810**	**0.0567**	**0.5177**
Median	**0.0405**	**0.0192**	**0.0082**	**0.0679**
Mean	**0.1093**	**0.0257**	**0.0152**	**0.1501**
Standard Deviation	**0.1867**	**0.0293**	**0.0206**	**0.1846**

Notes
Biomass expressed as ash free dry weight in g/0.035 m^2 grab sample
GS = Grab station



Notes
Biomass expressed as ash free dry weight in g/0.035 m^2 grab sample
GS = Grab station

Figure 4.16: Phyletic composition of biomass at hand haul Van Veen grab stations

Annelida, Mollusca and Arthropoda were the three major invertebrate phyla recorded in the North Tees Mudflat section of the survey area.

Annelida comprised most of the biomass at all stations with the exception of stations GS_19 and GS_20, the biomass of which was represented mainly by Arthropoda, with Mollusca also having notable contribution at station GS_19. Analysis of the species list indicated that the biomass at stations GS_19 and GS_20 was associated with the numerical dominance of *C. volutator* and *P. ulvae*.

The biomass of Annelida was associated with the polychaete *Tharyx* species A and the oligochaete *T. benedii*.

Table 4.21: Taxa characterising the highest percentage of the biomass at hand haul Van Veen grab stations, from North Tees Mudflat

Taxa	Mean Biomass	Contribution
Tharyx species A	0.5552	61.6
Corophium volutator	0.1532	17.0
Peringia ulvae	0.0771	8.6
Tubificoides benedii	0.0325	3.6
Hediste diversicolor	0.0187	2.1
Pygospio elegans	0.0124	1.4
Polydora cornuta	0.0112	1.2
Littorina saxatilis	0.0089	1.0
Notes Biomass expressed as ash free dry weight in g/0.035 m^2 hand haul Van Veen day grab sample Contribution expressed as percentage of the total biomass across the Van Veen grab samples Cut off for percentage contribution: 1 %		

4.5 Subtidal Sediment Macrofauna

4.5.1 Phyletic Composition

A full list of taxa identified and enumerated (individuals per 0.1 m^2) from the survey area are presented in Appendix E.4.1.

A total of 147 taxa and 9735 individuals was identified within the subtidal grab samples from the survey area. Of these taxa, 44 were recorded as juveniles, colonial and meiofaunal. Several other indeterminable specimens were merged with their respective higher taxon. To represent the permanent macrofaunal community and to avoid spurious enhancement of the species list, the dataset was rationalised, and these taxa were removed prior to statistical analysis (Appendix E.4.1).

Table 4.22 summarises the abundance of taxonomic groups identified within the rationalised dataset across the survey area. Figures 4.17 and 4.18 display the data graphically.

The rationalised dataset comprised 98 benthic taxa, of which 60 (61.2 %) were annelids, 19 (19.4 %) were arthropods, 16 (16.3 %) were molluscs and 3 (3.1 %) were ‘other phyla’. A total of 8705 individuals was identified in the rationalised data, of which 8335 (95.7 %) were annelids, 139 (1.6 %) were arthropods, 223 (2.6 %) were molluscs and 8 (02.1 %) were ‘other phyla’ (Table 4.22).

Table 4.22: Taxonomic groups of macrofauna from day grab samples, recovered from the subtidal

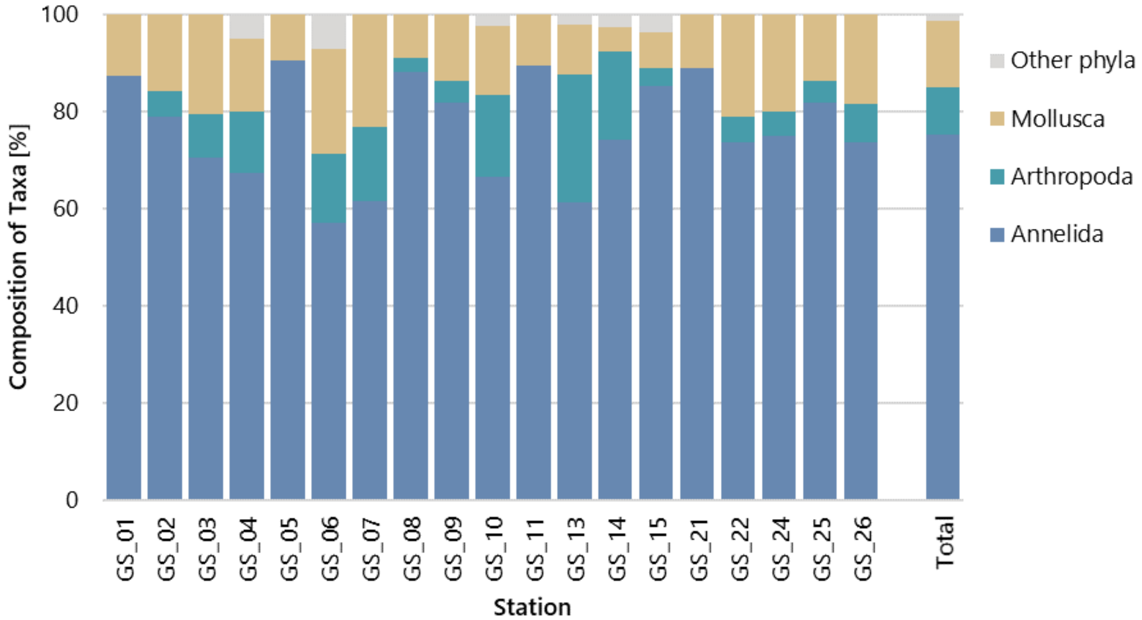
Taxonomic Group	Number of Taxa	Composition of Taxa [%]	Abundance	Composition of Individuals [%]
Annelida	60	61.2	8335	95.7
Arthropoda	19	19.4	139	1.6
Mollusca	16	16.3	223	2.6
Other phyla	3	3.1	8	0.1
Total	98	100	8705	100

Notes
Macrofaunal samples were processed through a 0.5 mm mesh sieve
Other phyla include: Cnidaria and Nemertea

Annelida were dominant in terms of taxa composition, comprising 61.2 % of the taxa recorded, followed by Arthropoda (19.4 %), Mollusca (16.3 %) and other phyla (3.1 %), the latter comprising Cnidaria and Nemertea (Table 4.22).

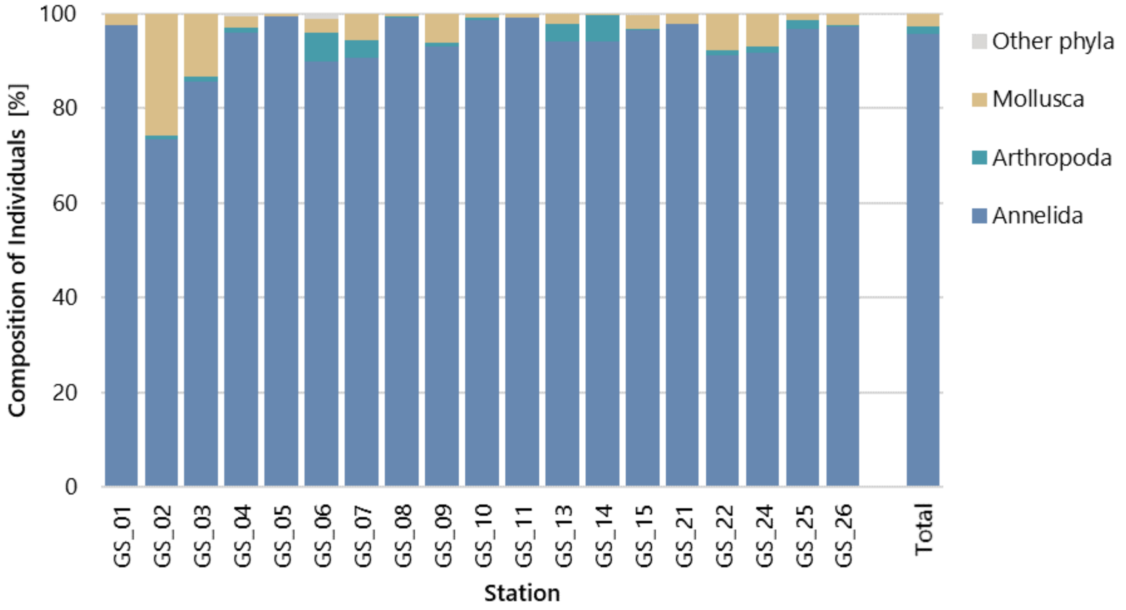
Annelida were also dominant in terms of abundance, comprising 95.7 % of the macrofaunal abundance, followed by Mollusca (2.6 %), Arthropoda (1.6 %), and other phyla (0.1 %) (Table 4.22).

Figures 4.17 and 4.18 illustrate the phyletic composition of taxa and individuals for each station. Annelida were dominant in terms of number of taxa and individuals at all stations. Arthropoda and Other phyla were not recorded at stations GS_01 and GS_21.



Notes
GS = Grab station

Figure 4.17: Phyletic composition of macrofaunal taxa from day grab samples



Notes
GS = Grab station

Figure 4.18: Phyletic composition of macrofaunal individuals from day grab samples

4.5.2 Community Statistics

Table 4.23 presents the number of taxa and individuals identified within the rationalised dataset from each station along with several commonly used diversity and evenness statistics.

The number of taxa per station (0.1 m^2) ranged from 13 (station GS_07) to 49 (station GS_13), with a mean of 27 across the subtidal area.

The number of individuals per station (0.1 m^2) ranged from 16 (station GS_07) to 81 (station GS_13), with a mean of 40 across the subtidal survey area.

Values of richness reflected the faunal abundance across the taxa recorded and ranged from 4.31 (station GS_07) to 10.92 (GS_13).

Diversity ranged from 3.64 (station GS_07) to 5.47 (station GS_13), with a mean of 4.52. When diversity was assessed against the criteria detailed in Section 3.3.2 (Dauvin et al., 2012), stations GS_01, GS_06 and GS_07 showed good diversity, while the remaining stations showed high diversity.

Evenness was very high at all stations and conversely dominance was very low at all stations, indicating that there was no one single species, or just a few species dominating the survey area.

Table 4.23: Macrofaunal community statistics (0.1 m^2), recovered from the subtidal

Station	Numbers		Richness	Diversity Indices	Evenness	Dominance
	Taxa	Individuals	Margalef [d]	Shannon-Wiener ($H'Log_2$)	Pielou (J')	Simpson (λ)
GS_01	16	23	4.76	3.91	0.978	0.071
GS_02	19	27	5.48	4.16	0.978	0.060
GS_03	34	50	8.45	5.00	0.984	0.033
GS_04	40	57	9.66	5.21	0.978	0.030
GS_05	21	31	5.85	4.27	0.972	0.057
GS_06	14	19	4.42	3.72	0.978	0.081
GS_07	13	16	4.31	3.64	0.985	0.084
GS_08	34	50	8.43	4.94	0.971	0.037
GS_09	22	30	6.20	4.39	0.985	0.050
GS_10	41	65	9.58	5.19	0.968	0.031
GS_11	19	31	5.25	4.14	0.975	0.061
GS_13	49	81	10.92	5.47	0.975	0.025
GS_14	39	63	9.16	5.15	0.975	0.031
GS_15	27	43	6.97	4.65	0.979	0.043
GS_21	18	26	5.20	4.08	0.978	0.063
GS_22	19	25	5.58	4.19	0.987	0.057
GS_24	20	25	5.88	4.26	0.987	0.054
GS_25	22	40	5.68	4.33	0.972	0.054
GS_26	38	64	8.90	5.09	0.970	0.033
Minimum	**13**	**16**	**4.31**	**3.64**	**0.968**	**0.025**
Maximum	**49**	**81**	**10.92**	**5.47**	**0.987**	**0.084**
Median	**22**	**31**	**5.88**	**4.33**	**0.978**	**0.054**
Mean	**27**	**40**	**6.88**	**4.52**	**0.976**	**0.050**
Standard Deviation	**11**	**19**	**2.05**	**0.55**	**0.006**	**0.018**

Notes
GS = Grab station

4.5.3 Characteristic Taxa

Table 4.24 presents the most abundant taxa and, their frequency of occurrence, recorded in the Day grab samples. Taxa were selected based on the top ten most abundant taxa.

Table 4.24: Most abundant and frequently occurring taxa from Day grab samples, recovered from the subtidal

Taxon	Abundance [Individuals/0.1 m^2]			Frequency [%]
	Mean	Minimum	Maximum	
Chaetozone gibber	149.7	1	588	100
Euchone limnicola	67.3	3	380	94.7
Melinna palmata	46.8	1	217	94.7
Tharyx species A	24.6	1	405	47.4
Mediomastus fragilis	21.5	1	97	79.0
Tubificoides galiciensis	20.26	1	102	68.4
Chaetozone vivipara	17.89	1	61	79.0
Streblospio benedicti / gynobranchiata	13.26	1	88	94.7
Tubificoides swirencoides	9.79	1	80	73.7
Phyllodoce mucosa	9.11	1	51	68.4

Notes
Taxa selection based on the top ten most abundant taxa (mean abundance) per sample
Frequency refers to percentage of Day grab samples

The polychaete *Chaetozone gibber* was the taxon with the highest mean abundance across the survey area, with abundance ranging from 1 (station GS_24) to 588 (station GS_08) and was recorded at all stations. *Chaetozone vivipara* was also recorded amongst the top ten taxa with the highest mean abundance, this only occurred at 15 out of 19 stations, with abundances ranging from 1 (station GS_04) to 61 (station GS_10).

The polychaete *Euchone limnicola* and *Melinna palmata* were the taxa with the second and third highest mean abundance across the survey area, with their respective abundances ranging, respectively, from 1 (station GS_08) and 3 (station GS_02) to 380 (station GS_13) and 217 (station GS_26). These two taxa were recorded at all stations except for GS_01 (*E. limnicola*) and GS_24 (*M. palmata*).

The spionid *Streblospio benedicti / gynobranchiata* was also recorded at all but one station (GS_14), but it had a mean abundance of 13.

Amongst the top ten taxa with the highest mean abundance there were also the oligochaetes *Tubificoides galiciensis* and *Tubificoides swirencoides* and the polychaetes *Tharyx* species A, *Mediomastus fragilis* and *Phyllodoce mucosa*. Overall, *T. galiciensis* was more abundant than T. *swirencoides*, but while the former showed abundance ranging from 1 (stations GS_06, GS_09 and GS_22) to 102 (station GS_26) and occurred at 13 out of 19 stations, the latter showed abundance ranging from 1 (stations GS_04, GS_21 and GS_22) to 80 (station GS_13) and was recorded at 14 out of 19 stations. *Tharyx* species A ranged from 1 (stations GS_21 and GS_24) to 405 (station GS_25) and was recorded at 9 out of 19 stations. *M. fragilis* ranged from 1 (stations GS_01, GS_02, GS_05 and GS_09) to 97 (station GS_13) and was recorded at

15 out of 19 stations. *P. mucosa* ranged from 1 (stations GS_01, GS_02, GS_05 and GS_09) to 51 (station GS_02, GS_03, GS_11 and GS_24) and was recorded at 13 out of 19 stations.

4.5.4 Biomass

Table 4.25 summarises the macrofaunal biomass and its phyletic composition from the day grab samples and Figure 4.19 presents the percentage contribution of each phylum to the total biomass.

Table 4.26 presents the taxa with a contribution > 1 % to the total biomass. Appendix E.4.2 presents the full list of macrofaunal biomass by identified taxa.

Annelida comprised most of the biomass at all, but day grab samples GS_14 and GS_25, the biomass of which was dominated by the Arthropoda and sample GS_24, the biomass of which was dominated by the Mollusca. Within samples GS_10, the proportion of biomass associated with Polychaeta was less, while the proportion of Mollusca was higher, than the other samples. Analysis of the species list indicated that within samples GS_14 and GS_25 the biomass was mainly associated the barnacle *Balanus crenatus*; within sample GS_24 the biomass was mainly associated with *Yoldia limatula*. Within sample GS_10, the higher proportion of Mollusca biomass was associated with a single individual of *Chamelea striatula* (Appendix E.4.2).

C. striatula, *B. crenatus* and *Y. limatula* contributed, respectively, to the 23.5 %, 14.2 % and 9.4 % of the biomass across the subtidal grab samples (Table 4.26). Amongst the remaining taxa contributing to > 1 % of the biomass, the majority were polychaetes, including *N. hombergii*, *N. incisa*, *M. palmata*, *Alitta virens*, *C. gibber*, *Terebellides*, *Glycera alba*, *Gattyana cirrhosa*, *Ophelina acuminata* and *N. kersivalensis*. One individual of *Crangon crangon* within sample GS_10 contributed 3.1 % of the total biomass (Table 4.26).

Table 4.25: Phyletic composition of macrofaunal biomass from day grab samples, recovered from the subtidal

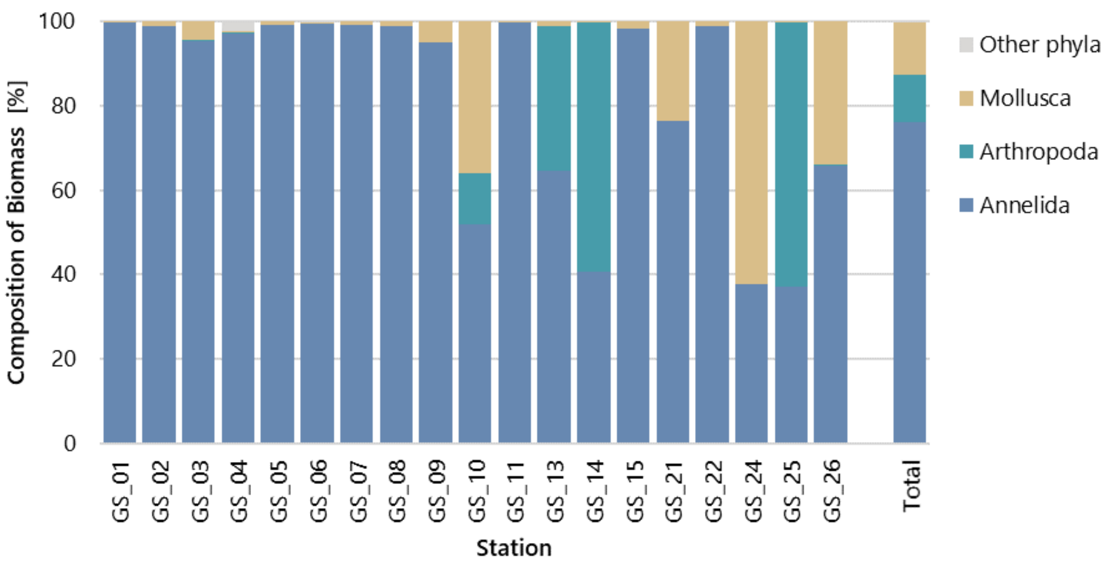
Day Grab Sample	Biomass				
	Annelida	Arthropoda	Mollusca	Other Phyla	Total
GS_01	0.3372	0.0000	0.0013	0.0000	**0.3385**
GS_02	0.2340	0.0000	0.0028	0.0000	**0.2368**
GS_03	0.4466	0.0002	0.0212	0.0000	**0.4680**
GS_04	0.7722	0.0004	0.0038	0.0177	**0.7942**
GS_05	0.2497	0.0000	0.0019	0.0000	**0.2516**
GS_06	0.2643	0.0004	0.0009	0.0005	**0.2661**
GS_07	0.1736	0.0000	0.0016	0.0000	**0.1753**
GS_08	0.2827	0.0004	0.0029	0.0000	**0.2860**
GS_09	0.1711	0.0000	0.0091	0.0000	**0.1801**
GS_10	0.2337	0.0554	0.1619	0.0002	**0.4511**
GS_11	0.1603	0.0000	0.0004	0.0000	**0.1607**

Day Grab Sample	Biomass				
	Annelida	Arthropoda	Mollusca	Other Phyla	Total
GS_13	0.4878	0.2599	0.0088	0.0001	**0.7566**
GS_14	0.1899	0.2758	0.0011	0.0001	**0.4668**
GS_15	0.1292	0.0000	0.0022	0.0000	**0.1314**
GS_21	0.1229	0.0000	0.0378	0.0000	**0.1606**
GS_22	0.1303	0.0000	0.0016	0.0000	**0.1318**
GS_24	0.0922	0.0000	0.1531	0.0000	**0.2453**
GS_25	0.1318	0.2206	0.0009	0.0000	**0.3533**
GS_26	0.9527	0.0018	0.4915	0.0000	**1.4460**
Minimum	**0.0922**	**0.0000**	**0.0004**	**0.0000**	**0.1314**
Maximum	**0.9527**	**0.2758**	**0.4915**	**0.0177**	**1.4460**
Median	**0.2337**	**0.0000**	**0.0028**	**0.0000**	**0.2661**
Mean	**0.2927**	**0.0429**	**0.0476**	**0.0010**	**0.3842**
Standard Deviation	**0.2290**	**0.0944**	**0.1179**	**0.0041**	**0.3206**

Notes

Biomass expressed as ash free dry weight in g/0.1 m^2 day grab sample

GS = Grab station



Notes

GS = Grab station

Figure 4.19: Percentage contribution of phyla to biomass from day grab samples

Table 4.26: Taxa characterising the highest percentage of the biomass of the subtidal survey area, recovered from the subtidal

Taxa	Mean Biomass	Contribution
Chamelea striatula	1.8248	23.5
Balanus crenatus	1.1030	14.2
Yoldia limatula	0.7342	9.4
Nephtys hombergii	0.7271	9.3
Nephtys incisa	0.6048	7.8
Melinna palmata	0.5305	6.8
Alitta virens	0.5117	6.6
Chaetozone gibber	0.2721	3.5
Terebellides	0.2488	3.2
Crangon crangon	0.2438	3.1
Glycera alba	0.1744	2.2
Gattyana cirrhosa	0.1297	1.7
Ophelina acuminata	0.0852	1.1
Nephtys kersivalensis	0.0783	1.0

Notes

Biomass expressed as ash free dry weight in g/0.1 m^2 day grab sample

Contribution expressed as percentage of the total biomass across the day grab samples

4.6 Seabed Habitats and Biotopes

4.6.1 Biotope Classifications

Table 4.27 presents the biotopes hierarchical structure in line with the JNCC (2015) and equivalent EUNIS (2019) classifications. Figure 4.20 presents the spatial distribution of the biotopes identified across the North Tees Mudflat and subtidal sections of survey area. Figures 4.21 and 4.22 present the biotopes recorded in the eastern and western section, respectively, of the intertidal section of the survey area on the southern bank.

Table 4.27: Habitat classifications

JNCC (2015) Marine Habitat Classification						Equivalent EUNIS Classification (EEA, 2019)
Environment Level 1	Broad Habitat Level 2	Habitat Level 3	Biotope Complex Level 4	Biotope Level 5	Biotope Variant Level 6	
Intertidal (South Bank)						
Marine	LR Littoral rock	FLR Features of littoral rock	Lichens or small green algae on supralittoral and littoral fringe rock (LR.FLR.Lic)	-	-	Lichens or small green algae on supralittoral and littoral fringe rock (B3.11)
		LLR Low energy littoral rock	FVS Fucoids in variable salinity	*Fucus spiralis* on sheltered variable salinity upper eulittoral rock (LR.LLR.FVS.FspiVS)	-	*Fucus spiralis* on sheltered variable salinity upper eulittoral rock (A1.322)
				Fucus vesiculosus on mid eulittoral variable salinity boulders and stable mixed substrata (LR.LLR.FVS.FvesVS)	-	*Fucus vesiculosus* on mid eulittoral variable salinity boulders and stable mixed substrata (A1.323)
				Fucus ceranoides on reduced salinity eulittoral rock (LR.LLR.FVS.Fcer)	-	*Fucus ceranoides* on reduced salinity eulittoral rock (A1.327)
		HLR High energy littoral rock	MusB Mussel and/or barnacle communities	*Semibalanus balanoides* on exposed to moderately exposed or vertical sheltered eulittoral rock (LR.HLR.lMusB.Sem)	*Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles' (LR.HLR.lMusB.Sem.LitX)	*Semibalanus balanoides* and *Littorina* spp. on exposed to moderately exposed eulittoral boulders and cobbles' (A1.1133)
	LS Littoral sediment	LSa Littoral Sand	MoSa Mobile sand	Oligochaetes in littoral mobile sand (LS.LSa.MoSa.Ol)	Oligochaetes in variable salinity littoral mobile sand (LS.LSa.MoSa.Ol.VS)	Oligochaetes in variable salinity littoral mobile sand (A2.2222)

<table>
<tr><th colspan="6">JNCC (2015) Marine Habitat Classification</th><th rowspan="2">Equivalent EUNIS Classification (EEA, 2019)</th></tr>
<tr><th>Environment
Level 1</th><th>Broad Habitat
Level 2</th><th>Habitat
Level 3</th><th>Biotope Complex
Level 4</th><th>Biotope
Level 5</th><th>Biotope Variant
Level 6</th></tr>
<tr><td colspan="7">North Tees Mudflat</td></tr>
<tr><td>Marine</td><td>LS
Littoral sediment</td><td>LS.LMx
Littoral mixed sediment</td><td>LS.LMx.GvMu
Hediste-dominated gravelly sandy mud shores</td><td>Hediste diversicolor in littoral gravelly muddy sand and gravelly sandy mud (LS.LMx.GvMu.HedMx)</td><td>Hediste diversicolor and Corophium volutator in littoral gravelly sandy mud (LS.LMx.GvMu.HedMx.Cvol)</td><td>Hediste diversicolor and Corophium volutator in littoral gravelly sandy mud (A2.4115)</td></tr>
<tr><td colspan="7">Subtidal</td></tr>
<tr><td>Marine</td><td>SS
Sublittoral sediment</td><td>SMu
Sublittoral cohesive mud and sandy mud</td><td>ISaMu
Infralittoral sandy mud</td><td>Melinna palmata with Magelona spp. and Thyasira spp. in infralittoral sandy mud (SS.SMu.ISaMu.MelMagThy)</td><td>-</td><td>Melinna palmata with Magelona spp. and Thyasira spp. in infralittoral sandy mud (A5.334)</td></tr>
<tr><td colspan="7">Notes
EUNIS = European Nature Information System
JNCC = Joint Nature Conservation Committee
EEA = European Environment Agency</td></tr>
</table>

4.6.1.1 Intertidal

Results of the intertidal walkover combined with those of the quadrat and core samples (Section 4.4), the latter assessed also in terms of PSD (Section 3.2.1), underpinned the intertidal biotope classification on the southern bank (excluding North Tees Mudflat).

4.6.1.1.1 Lichens or Small Green Algae on Supralittoral and Littoral Fringe Rock (LR.FLR.Lic - B3.11)

The biotope complex 'Lichens or small green algae on supralittoral and littoral fringe rock (LR.FLR.Lic - B3.11)' is described as a band of lichen communities in the 'splash' zone on most rocky shores. This splash zone occurs above the main intertidal zone blending into angiosperm-dominated communities of coastal habitats at its upper limits. The width of the splash zone varies, depending on the degree of exposure of the shore to wave action. Several biotopes have been identified in this biotope complex, based on the species of lichens. The green seaweed *Prasiola stipitata*, can occur in this splash zone in areas of nitrate enrichment from nearby roosting seabirds; on soft rock *Blidingia minima* may occur while steep and vertical rock influenced by freshwater can be dominated by seaweeds of the genera *Ulothrix* and *Urospora*. The winkle *L. saxatilis* is one of the few 'marine' species found in this environment. The EUNIS classification, places this habitat in coastal habitats, whereas the JNCC classification includes it in the marine section, as UK marine surveys have traditionally included the lichen zone within intertidal surveys.

This biotope complex was assigned to the supralittoral splash zone characterised by hard substrate represented by cobbles, pebbles, and boulders or seawalls, colonised by green algae and lichens.

4.6.1.1.2 *Fucus ceranoides* on Reduced Salinity Eulittoral Rock (LR.LLR.FVS.Fcer - A1.327)

The biotope '*Fucus ceranoides* on reduced salinity eulittoral rock (LR.LLR.FVS.Fcer - A1.327)' is described as very to extremely sheltered bedrock and stable boulders in the eulittoral zone subject to reduced salinity and characterised by *F. ceranoides*. Species richness is low and represented by the green seaweeds *Ulva intestinalis* and *Ulva lactuca*, the crab *Carcinus maenas* and occasionally the barnacles *A. modestus* and *S. balanoides*.

This biotope was assigned to the upper/mid eulittoral zone in the western section of the survey area, characterised by muddy sand and/or gravel, with pebbles cobbles and small boulders, dominated by *F. ceranoides* and Chlorophyta; other fucoids included *F. vesiculosus* whereas fauna was represented by *L. littorea* and barnacles, and less frequently *Mytilus edulis* and *P. vulgata*. This biotope may also occur in the inaccessible mid-section of the survey area, as well as the eastern section in combination with biotopes part of the biotope complex 'Fucoids in variable salinity (LR.LLR.FVS - A1.32)'.

4.6.1.1.3 *Fucus spiralis* on Sheltered Variable Salinity Upper Eulittoral Rock (LR.LLR.FVS.FspiVS - A1.322)

The biotope '*Fucus spiralis* on sheltered variable salinity upper eulittoral rock (LR.LLR.FVS.FspiVS - A1.322)' is described as sheltered to extremely sheltered upper eulittoral bedrock or mixed substrata, including boulders and cobbles, in variable salinity conditions, characterised by a band of *F. spiralis* and the ephemeral *U. intestinalis*. The barnacles *S. balanoides* and *A. modestus* occur where suitable substrata are available, while gammarids occur underneath the *F. spiralis* canopy along with *L. saxatilis* and *L. littorea*.

The biotope '*Fucus spiralis* on sheltered variable salinity upper eulittoral rock (LR.LLR.FVS.FspiVS - A1.322)' occurred in combination with the biotope '*Fucus vesiculosus* on mid eulittoral variable salinity boulders and stable mixed substrata (LR.LLR.FVS.FvesVS – A1.323)', the former characterising the upper eulittoral, the latter characterising the mid-eulittoral, with transitional areas having elements of both biotopes.

4.6.1.1.4 *Fucus vesiculosus* on Mid Eulittoral Variable Salinity Boulders and Stable Mixed Substrata (LR.LLR.FVS.FvesVS – A1.323)

The biotope '*Fucus vesiculosus* on mid eulittoral variable salinity boulders and stable mixed substrata (LR.LLR.FVS.FvesVS – A1.323)' is described as sheltered to extremely sheltered mid eulittoral pebbles and cobbles in variable salinity conditions and characterised by *F. vesiculosus*. *Ascophyllum nodosum* may occur on larger boulders, while the barnacles *S. balanoides* and *A. modestus* and the mussel *M. edulis* may occur on cobbles. Gastropods such as *L. littorea*, occur in the algal canopy, which include ephemeral Chlorophyta, while *L. saxatilis* occurs in crevices, and amphipods occur under cobbles.

4.6.1.1.5 *Semibalanus balanoides* and *Littorina* spp. on Exposed to Moderately Exposed Eulittoral Boulders and Cobbles' (LR.HLR.lMusB.Sem.LitX – A1.1133)

The biotope '*Semibalanus balanoides* and *Littorin*a spp. on exposed to moderately exposed eulittoral boulders and cobbles' (LR.HLR.lMusB.Sem.LitX – A1.1133'), is described as large patches of boulders, cobbles and pebbles in the eulittoral zone on exposed to moderately exposed shores colonised by the barnacle *S. balanoides* and, on larger rocks, the limpet *P. vulgata*. The winkles *L. littorea* and *L. saxatilis* are found on and around cobbles and smaller boulders, whereas the foliose red algae *Chondrus crispus*, and *F. vesiculosus* occur in low abundance on cobbles and boulders, along with the barnacle *A. modestus* on some shores. Unstable boulders, cobbles and pebbles are likely to have a sparser coverage of flora and fauna, owing the rocks being regularly turned.

This biotope was assigned to the lower eulittoral zone characterised by muddy sand and/or gravel with pebbles, cobbles, and small boulders, colonised by barnacles and patchily distributed *C. crispus*, *F. vesiculosus* and juvenile *Fucus*, along with *P. vulgata* and *L. littorea*, the latter occurring in the coarse sediment's interstices.

4.6.1.1.6 Oligochaetes in Variable Salinity Littoral Mobile Sand (LS.LSa.MoSa.Ol.VS - A2.222)

The biotope 'Oligochaetes in variable salinity littoral mobile sand (LS.LSa.MoSa.Ol.VS - A2.222)' is described as a species-poor community of oligochaetes occurring in estuarine conditions in channels of very fast flowing river mouths. The sediment is relatively coarse and mobile due to strong river flow and subject to variable salinity. There is usually very little mud in the sediment. Oligochaetes, including enchytraeid oligochaetes, constitute the infaunal assemblage. Nemerteans may be present and nematodes may be frequent.

This biotope was assigned to the mid and lower eulittoral zone devoid of epibiota, the infauna and sediment composition of which were assessed by means of core samples.

4.6.1.2 North Tees Mudflat

Results of the hand haul van Veen grab samples analysis for PSD (Section 4.2) and infaunal identification (Section 4.4.4) underpinned the biotope classification for this section of the survey area.

4.6.1.2.1 *Hediste diversicolor* and *Corophium volutator* in Littoral Gravelly Sandy Mud (LS.LMx.GvMu.HedMx.Cvol - A2.4115

The biotope '*Hediste diversicolor* and *Corophium volutator* in littoral gravelly sandy mud (LS.LMx.GvMu.HedMx.Cvol - A2.4115)' is described as sheltered estuarine shores of sandy mud, with an anoxic layer usually present within the first 5 cm of the sediment, which may be organically enriched. The infauna is represented by the ragworm *H. diversicolor* and the amphipod *C volutator*, oligochaetes and *P. ulvae*.

This biotope was assigned to the North Tees Mudflat section of the survey area.

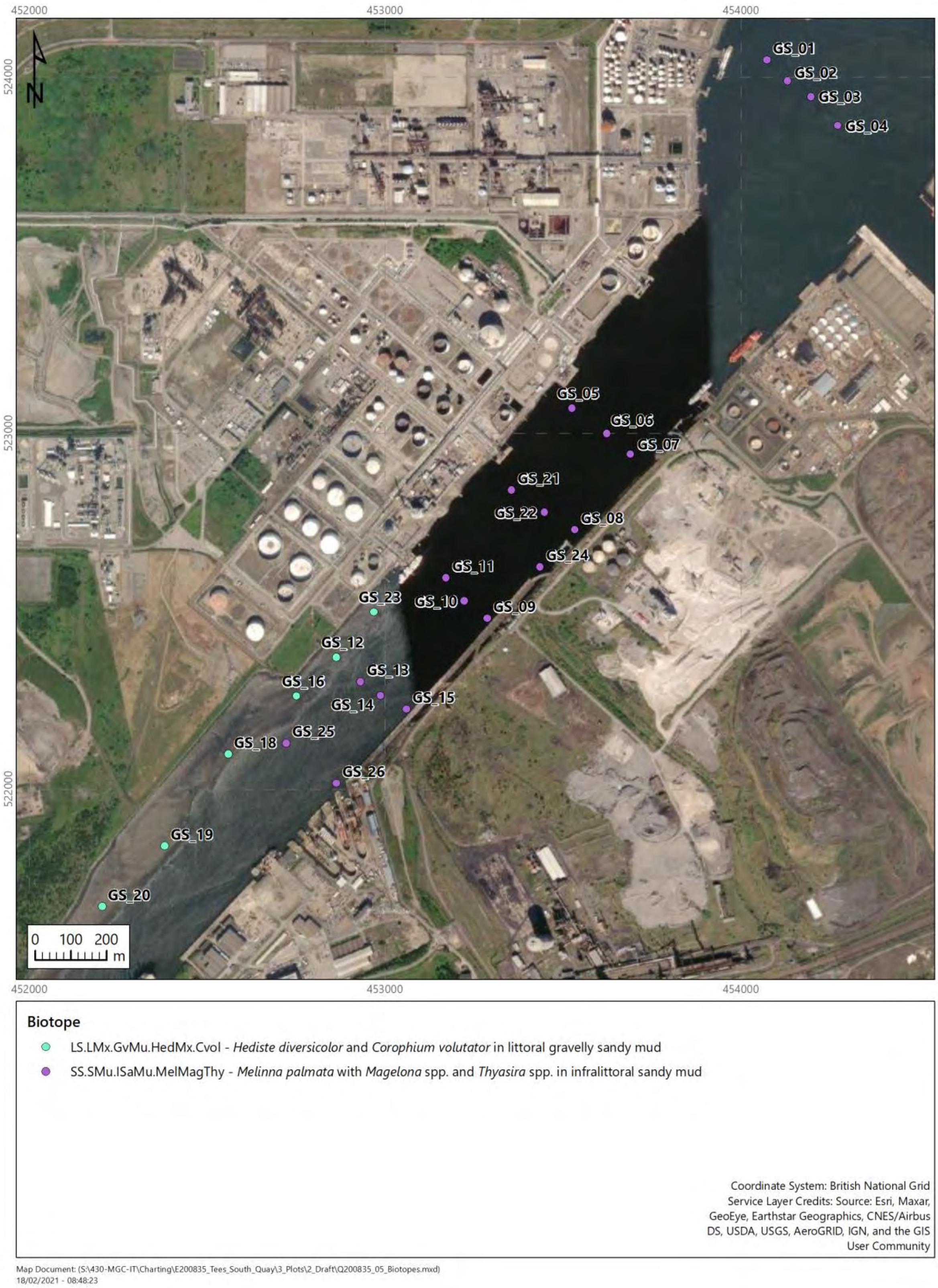
4.6.1.3 Subtidal

Results of the Day grab samples analysis for PSD (Section 4.2) and infaunal identification (Section 4.5) underpinned the biotope classification for this part of the survey area.

4.6.1.3.1 *Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in Infralittoral Sandy Mud (SS.SMu.ISaMu.MelMagThy - A5.334)

The biotope '*Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud (SS.SMu.ISaMu.MelMagThy - A5.334)' is described as infralittoral cohesive sandy mud, in sheltered marine inlets, and occasionally variable salinity environments. It is characterised by populations of the polychaete *Melinna palmata*, often with *Magelona* spp., and the bivalve *Thyasira flexuosa*. Other taxa may include *Chaetozone gibber*, *Nephtys hombergii*, *Galathowenia oculata*, *Ampelisca tenuicornis* and *Abra* alba, all of which were recorded in this study, although polychaetes of the *Magelona* genus were not recorded.

This biotope was assigned to the subtidal survey area.



Notes
GS = Grab station

Figure 4.20: Subtidal and North Tees Mudflat biotopes

Notes

CS = Core sample

Figure 4.21: Intertidal biotopes, eastern section

Notes

CS = Core sample

Figure 4.22: Intertidal biotopes, western section

4.6.2 Potentially Sensitive Habitats

4.6.2.1.1 Estuarine Rocky Habitats

The biotope complexes 'Fucoids in variable salinity (LR.LLR.FVS - A1.32) and 'Lichens or small green algae on supralittoral and littoral fringe rock (LR.FLR.Lic)' are part of the BAP priority habitat 'Estuarine Rocky Habitats'.

4.6.2.1.2 Intertidal North Tees Mudflat

The biotope '*Hediste diversicolor* and *Corophium volutator* in littoral gravelly sandy mud (LS.LMx.GvMu.HedMx.Cvol – A2.3222)' is part of the BAP priority habitat Intertidal mudflats, which is also listed on the OSPAR list of threatened and/or declining habitats and species.

4.7 Fisheries

4.7.1 Beam Trawls

Macrofauna from the beam trawls was assessed in relation to the larger mobile epibenthic taxa, including fish and shellfish, and solitary and colonial epifauna. Prior analysis the dataset from the beam trawls was rationalised, specifically Annelida and Mollusca were removed as they were assessed as part of the macrofauna from the grab samples and are not representative of the macrofauna acquired by trawl sampling. Damaged taxa and juveniles were also removed. Appendix E.5 presents the trawls species list.

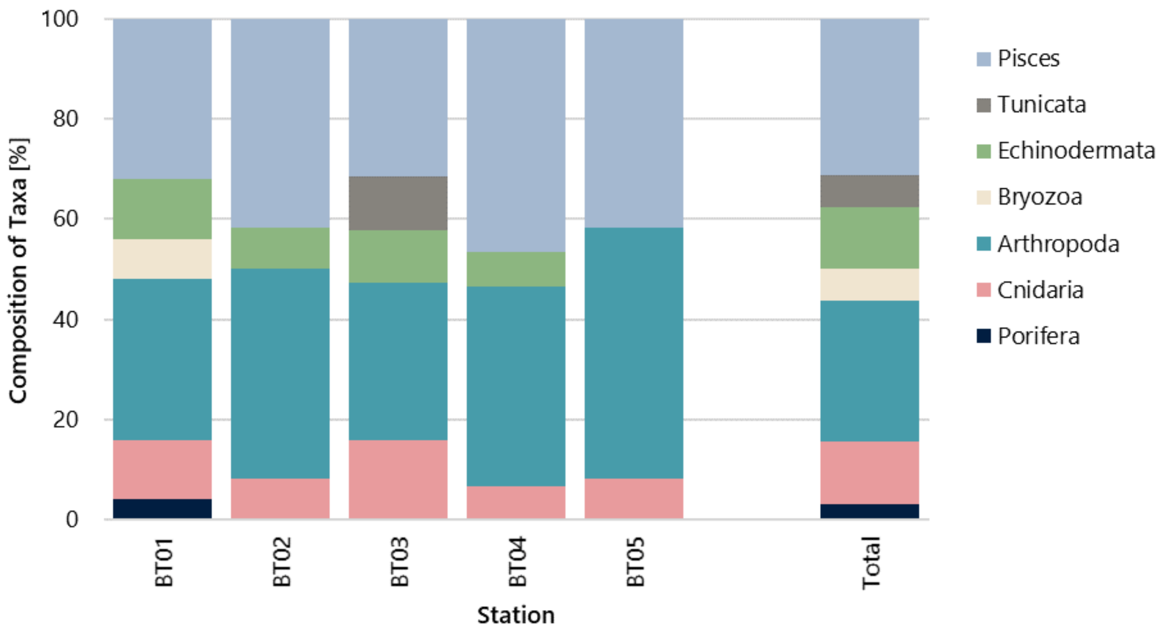
Following rationalisation, the beam trawls dataset comprised 32 taxa and 1515 individuals. The removed taxa included nine annelids, two damaged shellfish and seven juvenile fish of the genus *Pomatoschistus*. Of the 32 taxa recorded, 6 were sessile colonial epifauna recorded as present.

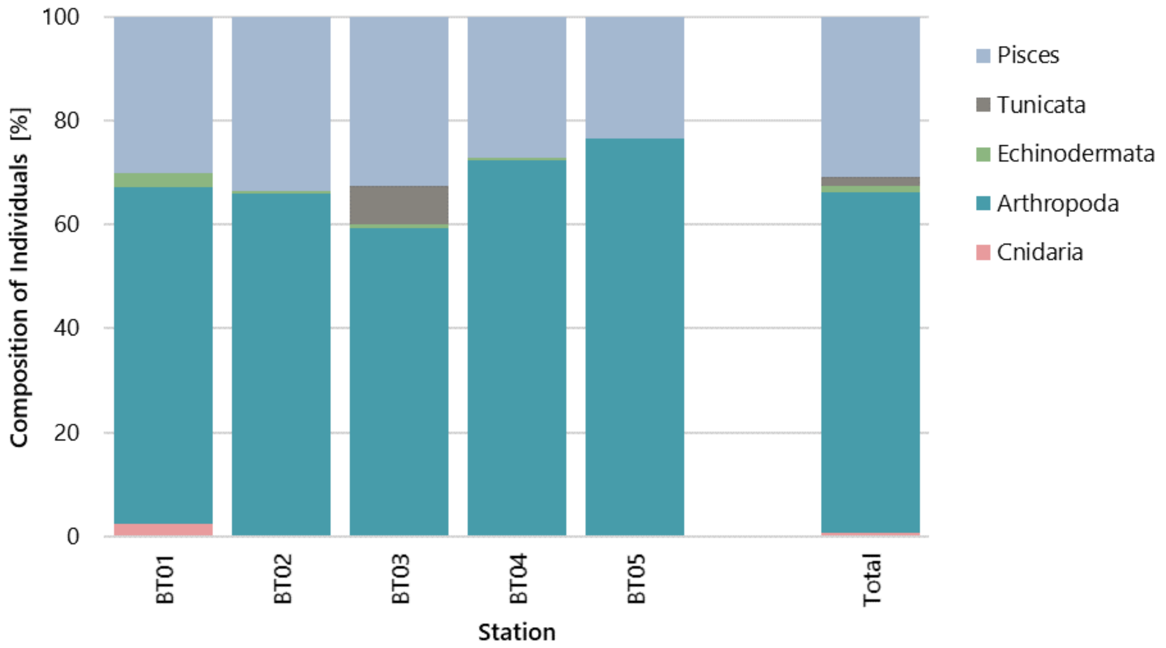
Table 4.28 presents the phyletic composition of the trawl samples.

Table 4.28: Taxonomic groups of macrofauna from trawl samples

Taxonomic Group	Number of Taxa	Composition of Taxa [%]	Abundance	Composition of Individuals [%]
Porifera	1	3.1	-	-
Cnidaria	4	12.5	12*	0.8*
Arthropoda	9	28.1	993	65.5
Bryozoa	2	6.3	-	-
Echinodermata	4	12.5	16	1.1
Tunicata	2	6.3	28*	1.8*
Pisces	10	31.3	466	30.8
Total	**32**	**100**	**1515**	**100**

Notes
* = Includes only solitary enumerated epifauna





Notes
Composition of individuals refers to enumerated macrofauna only; sessile colonial epifauna was recorded as present
BT = Beam trawl

Figure 4.23: Phyletic composition of faunal (A) taxa and (B) individuals from beam trawls

Fish were dominant in terms of taxa composition, comprising 31.3 % of the taxa, followed by Arthropoda (28.1 %), Echinodermata and Cnidaria (each 12.5 %), Bryozoa and Tunicata (each 6.3 %) and Porifera (3.1 %).

In terms of abundance, which was based on the enumerated macrofauna only, Arthropoda were dominant with 65.5 % of total abundance, followed by fish (3.08 %), Echinodermata (1.1 %), Tunicata (1.8 %) and Cnidaria (0.8 %).

Ten fish species were recorded, including the commercial *Gadus morhua*, *Merlangius merlangus*, *Limanda limanda*, *Platichthys flesus* and *Pleuronectes platessa*. The other five species were *Gaidropsarus vulgaris*, *Myoxocephalus scorpius*, *Agonus cataphractus*, *Pomatoschistus lozanoi* and *Pomatoschistus minutus*. Of these, *P. platessa*, with 366 individuals, was the most abundant and frequently occurring, being recorded in all five beam trawls, along with *G. morhua* and *M. merlangius*. Of the other fish recorded, *P. minutus* was recorded in four beam trawls, *A. cataphractus* and *P. lozanoi* in three beam trawls, *M. scorpius* and *L. limanda* in two beam trawls and *P. flesus* in beam trawl BT03.

Nine Arthropoda were recorded, of which *Crangon crangon*, with 371 individuals, was numerically dominant, followed by *Carcinus maenas* (276 individuals), *Pandalus montagui* (209 individuals) and *Liocarcinus depurator* (94 individuals). The remaining Arthropoda had abundances of between 1 individual (*Macropodia rostrata*) and 26 individuals (*Pagurus bernhardus*).

Four Echinodermata were recorded, of which *Ophiura albida*, with seven individuals was the numerically dominant, followed by *Asterias rubens* and *Ophiura ophiura*, each with four individuals and all being recorded in two of the five beam trawls.

Solitary epifauna comprised 28 individuals of *Ascidiella aspersa* recorded in beam trawl BT03; 11 individuals of Actiniaria, recorded in trawl BT01; and 1 individual of *Metridium* recorded in trawl BT03.

Colonial epifauna comprised *Hydractinia echinata*, recorded in all beam trawls, and *Alcyonium digitatum* recorded in beam trawls BT01 and BT03; Porifera, recorded in beam trawl BT01; *Flustra foliacea* and *Securiflustra securifrons*, both recorded in beam trawl BT01; and taxa of the family Didemnidae, recorded in beam trawl BT03.

The commercial fish recorded were measured to gauge information of the age structure of the community, with results of measurement presented in Figure 4.24, for all fish but *P. flesus* which comprised a single individual in the size range of 290 mm to 300 mm.

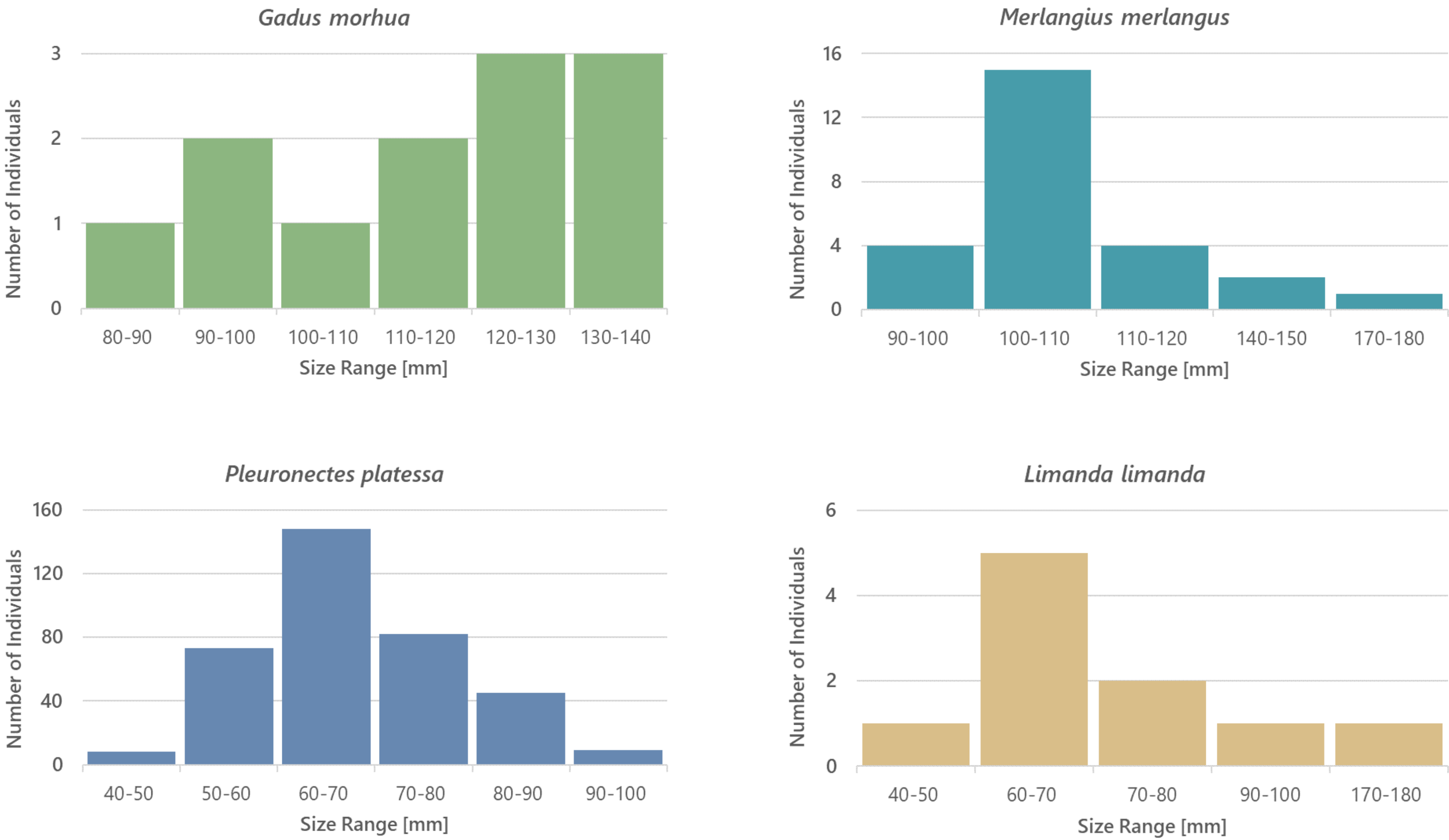


Figure 4.24: Size range of commercial fish from beam trawls

4.7.2 Fyke Nets

Table 4.29 presents the results of the intertidal fyke nets following two flood and two ebb tides, each combined.

Table 4.29: Taxa recorded by Intertidal fyke nets

Taxa	Size Range [mm]	Station and Tide							
		FN_01		FN_02		FN_03		FN_04	
		Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb
Arthropoda									
Carcinus maenas	-	29	14	3	46	36	18	20	15
Chordata									
Myoxocephalus scorpius	Damaged	-	-	-	-	1	-	-	-
Gaidropsarus vulgaris	110 to120	-	-	-	-	-	-	-	1
	130 to 140	-	-	-	-	1	-	-	-
	140 to 150	-	-	-	-	-	-	-	1
	210 to 220	1	-	-	-	1	-	-	-
Gadus morhua	110 to 120	-	-	-	-	-	-	1	-
	130 to 140	-	-	-	-	-	1	-	-
	180 to 190	-	-	-	-	-	-	2	-
Pollachius pollachius	160 to 170	-	-	-	-	-	1	-	-
Pleuronectes platessa	70 to 80	-	-	1	-	-	-	-	-
Platichthys flesus	120 to 130	-	-	-	-	1	-	-	-
	130 to 140	-	-	-	-		1	-	-
	150 to 160	1	-	-	-	-	-	-	-
	160 to 170	-	1	-	-	-	-	-	-
Notes FN = Fyke net									

Six fish species were recorded in the fyke nets, including the commercial *P. flesus*, *P. platessa*, *G. morhua* and *Pollachius pollachius*. Other taxa included *M. scorpius* and *G. vulgaris*, and the crab *Carcinus maenas*, the latter being the most abundant and frequently occurring species, being recorded during flood and ebb tides at all stations.

A single individual of *P. pollachius*, 160 mm to 170 mm long, was recorded in FN_03 during ebb tides; a single individual of *P. platessa*, 70 mm to 80 mm long, was recorded in fyke net FN_02 during flood tides, and a damaged individual of *M. scorpius* was recorded in fyke net FN_03 during flood tides.

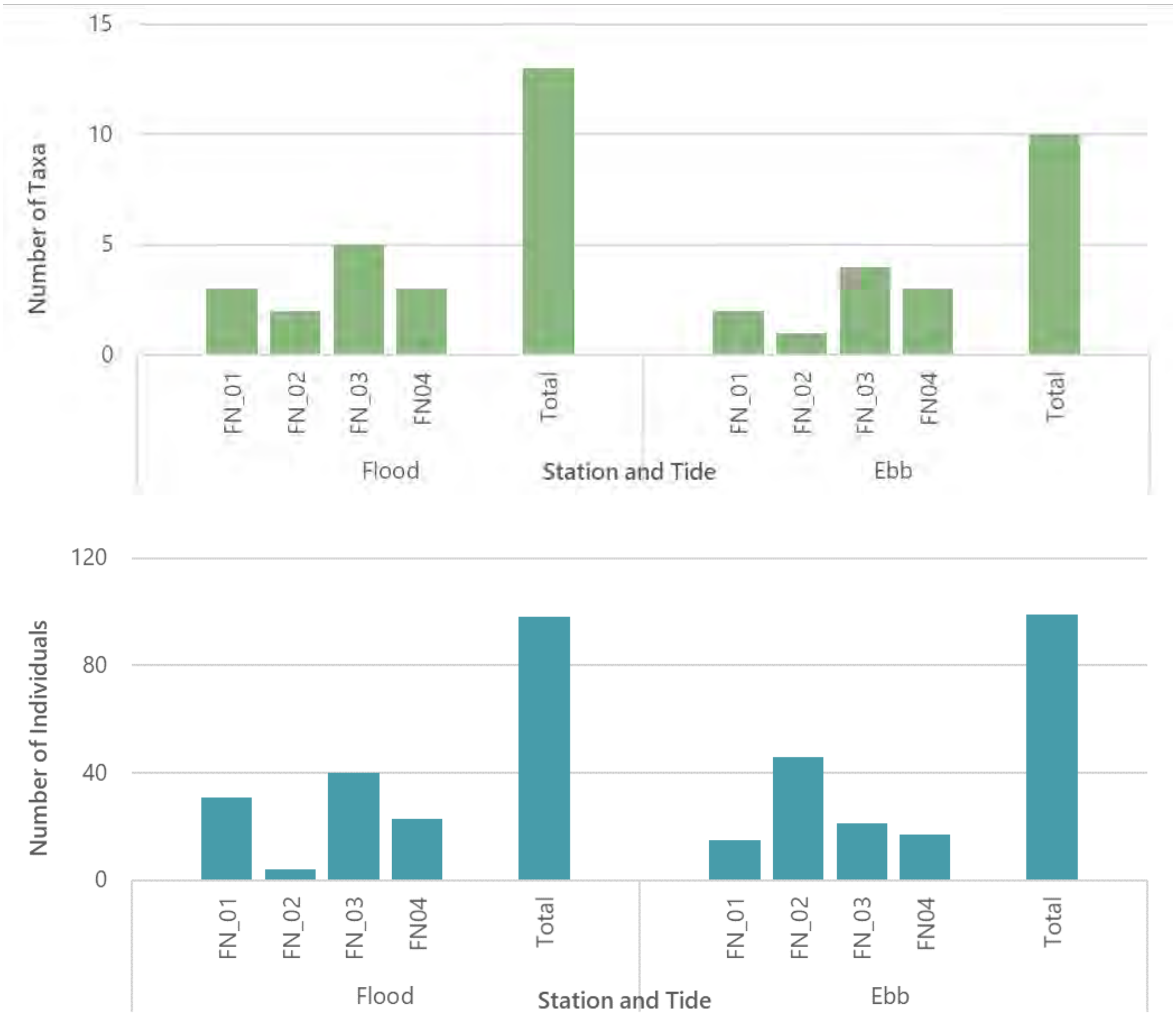
Five individuals of *G. vulgaris* were recorded, of which two in fyke nets FN_01 and FN_03 during flood tide, two in fyke net FN_04 during ebb tides, and one in fyke net FN_03 during flood tides.

Four individuals of *G. morhua* were recorded, of which three in fyke net FN_04 during flood tides, and one in fyke net FN_03 during ebb tides.

Four individuals of *P. flesus* were recorded, of which two in fyke net FN_01 (flood and ebb tides), and two in fyke net FN_03 (flood and ebb tides); all individuals were between 120 mm and 170 mm long.

A total of 181 individuals of *C. maenas* was recorded in the fyke nets, of which 88 during flood tides and 93 during ebb tides; the highest abundance (46 individuals) was recorded in fyke net FN_03 during ebb tides, whereas the lowest (3 individuals) was recorded in fyke net FN_02 during flood tides.

Over a 24 hour period, 13 taxa and 98 individuals, of which 10 fish, were caught across the survey area during flood tides compared to 10 taxa and 99 individuals, of which 6 fish, caught during ebb tides (Figure 4.25).



Notes
FN = Fyke net

Figure 4.25: Number of faunal (A) taxa and (B) individuals in fyke nets

4.8 Scrape Samples from Vertical Artificial Structures

4.8.1 Faunal Communities

Following rationalisation, the faunal dataset from the scrape samples from artificial vertical structures comprised 17 taxa and 17 292 individuals. The excluded taxa included damaged taxa (20 Gastropoda, 4406 Cirripedia, 85 Fabricidae, 37 *Fabricia* and 12 *Littorina*), juveniles (1510 *Littorina* and 1 *Mytilus*) and Nematoda (419 individuals). Eight individuals of *Jaera albifrons* were aggregated to genus level. The rationalised dataset is presented in Appendix E.6.1.

Table 4.30 summarises the phyletic composition of the fauna from the scrape samples; Figure 4.26 present the phyletic composition of faunal taxa and individual, respectively, from each scrape sample. Table 4.31 details the macrofaunal taxa from scrape samples.

Table 4.30: Taxonomic groups of macrofauna from scrape samples

Taxonomic Group	Number of Taxa	Composition of Taxa [%]	Abundance	Composition of Individuals [%]
High Tide				
Annelida	0	0.0	0	0.0
Arthropoda	4	50.0	779	68.8
Mollusca	1	12.5	19	1.7
Other phyla	3	37.5	334	29.5
Total	**8**	**100**	**1132**	**100**
Mid Tide				
Annelida	2	15.4	5	0.1
Arthropoda	5	38.5	8622	92.6
Mollusca	3	23.1	516	5.5
Other phyla	3	23.1	166	1.78
Total	**13**	**100**	**9309**	**100**
Low Tide				
Annelida	2	13.3	632	9.2
Arthropoda	6	40.0	5739	83.8
Mollusca	4	26.7	229	3.3
Other phyla	3	20.0	251	3.7
Total	**15**	**100**	**6851**	**100**
Notes Other phyla included Diptera (pupa) Chironomidae (larvae) and Limoniidae (larvae)				

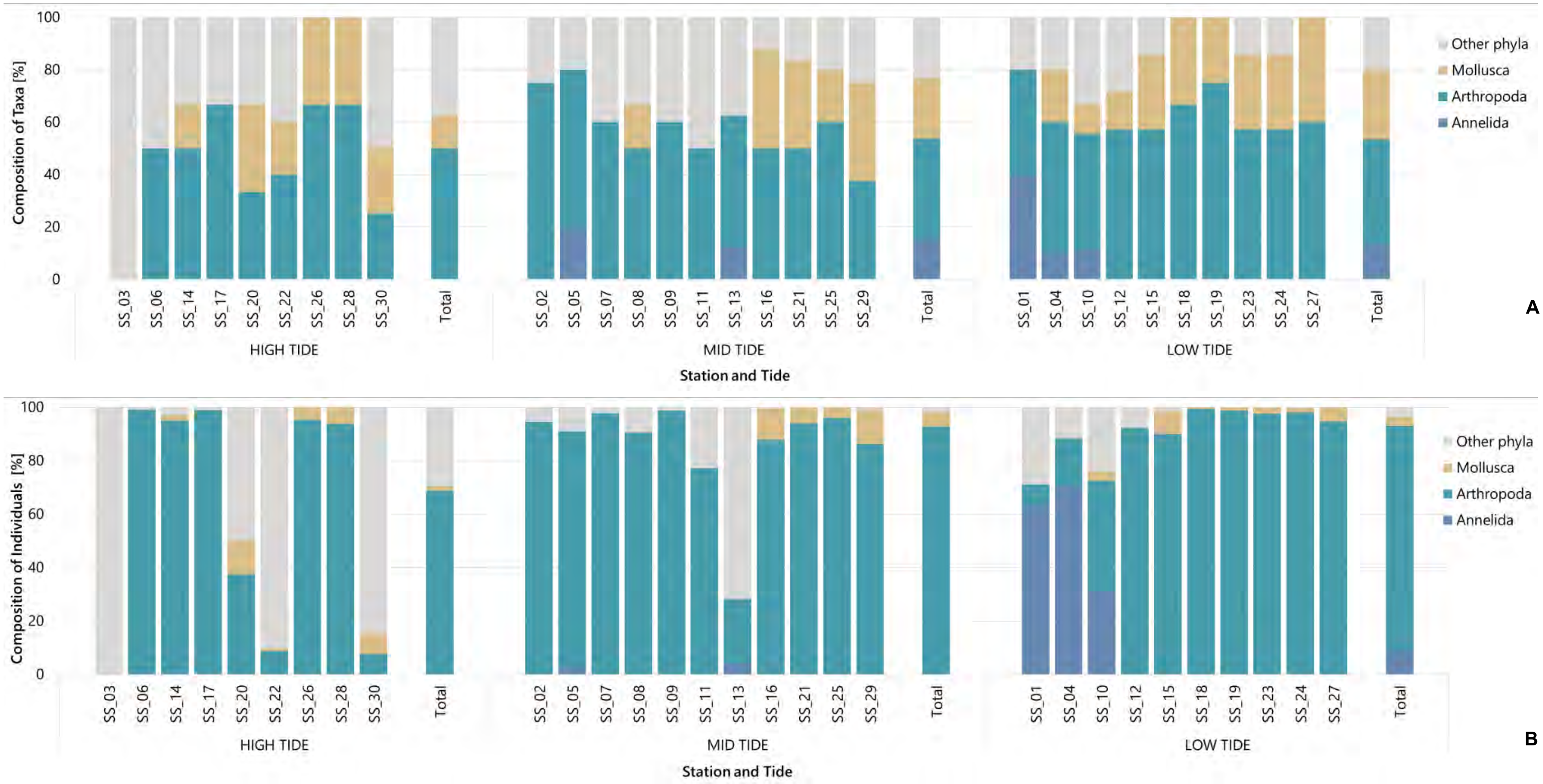
Arthropoda comprised most of the taxa composition and abundance in scrape samples from all tide levels (Table 4.30). Analysis of the species list indicated that Arthropoda comprised seven taxa, of which *A. modestus* was the most abundant, comprising 67.0 % of the total scrape samples' abundance, followed by *S. balanoides* (12.1 % of total abundance) and arachnids of the subclass Acari (8.3 % of total abundance). The remaining four taxa were represented by the amphipods *Echinogammarus marinus*, *Monocorophium insidiosum* and species of the genus *Jaera,* including *J. albifrons*, and the isopod *Ligia oceanica*.

Mollusca comprised five taxa, of which the gastropod *Littorina arcana/saxatilis* was the most abundant, followed by *L. littorea*, *Melarhaphe neritoides*, *Limapontia depressa* and *Mytilus edulis*. The highest abundance of Mollusca was recorded in scrapes from the mid tide level, whereas the lowest abundance was in scrape samples from the high tide level (Table 4.30).

Annelida comprised two taxa, *Fabricia stellaris* and oligochaetes of the family Enchytraeidae. Both taxa were recorded mostly in scrape samples from the low tide level (Table 4.30), where they were numerically dominant in samples SS_01 and SS_04. Annelida were absent in scrape samples from the high tide level (Figure 4.26).

Other phyla comprised larvae of the order Diptera and of the families Chironomidae and Limoniidae. The highest abundance of other phyla was recorded in scrape samples from the high tide level, where they were numerically dominant in samples SS_03, SS_20, SS_22 and SS_30. Albeit overall poorly represented in scrape samples from the mid tide level, other phyla were numerically dominant in sample SS_13.

Scrape samples from high tide level had considerably less faunal taxa and abundance compared to the scrape samples from the mid and low tide levels (Table 4.30), with sample SS_03 comprising only other phyla, represented by four Limoniidae larvae, one Chironomidae larva and one Diptera pupa.



Notes
SS = Scrape sample

Figure 4.26: Phyletic composition of faunal (A) taxa and (B) individual of scrapes samples

Table 4.31: Epifauna from scrape samples

Taxa	Mean Abundance/Tide Level			Frequency/Tidal Level		
	High	Mid	Low	High	Mid	Low
Fabricia stellaris	-	0.3	62.4	-	9.1	30.0
Enchytraeidae	-	0.2	0.8	-	9.1	10.0
Austrominius modestus	37.7	652	408	77.8	100	100.0
Semibalanus balanoides	1	76.5	117.7	11.1	100	90.0
Echinogammarus marinus	-	-	0.2	-	-	20.0
Monocorophium insidiosum	-	-	0.7	-	-	20.0
Jaera	-	0.9	0.3	-	9.1	30.0
Ligia oceanica	0.2	0.2	-	11.1	9.1	-
Littorina littorea	-	0.4	1.2	-	27.3	50.0
Littorina arcana/saxatilis	2.1	45.8	20.6	66.7	36.4	60.0
Melarhaphe neritoides	-	0.7	-	-	27.3	-
Limapontia depressa	-	-	1	-	-	20.0
Mytilus edulis	-	-	0.1	-		10.0
Diptera	0.6	0.5	0.3	22.2	36.4	20.0
Chironomidae	34.3	8.9	22.1	66.7	81.8	60.0
Limoniidae	2.2	5.7	2.3	55.6	54.5	30.0

Notes
Abundance refers to mean number of individuals across scrapes samples
Frequency refers to percentage of scrapes

4.8.1.1 Community Statistics

Table 4.32 presents the results of the univariate analysis of macrofaunal communities from scrape samples.

Macrofauna from the scape samples was characterised by low number of species but high abundances, which resulted in diversity values ranging from 0.25 to 2.24. Of the 30 scrape samples analysed, 10 had values of macrofaunal diversity of 0.25 to 0.94; 18 scrape samples had values of macrofaunal diversity of 1.02 to 1.88; and 2 scrape samples had values of macrofaunal diversity of 2.01 and 2.24.

Values of evenness were generally low, with 18 scrape samples having evenness < 0.500. There was an inverse relationship between evenness and dominance, so values of low evenness corresponded to high dominance and vice versa.

Table 4.32: Macrofaunal community statistics of samples form artificial structures (0.25 m^2)

Scrape Sample (SS)	Numbers		Richness	Diversity	Evenness	Dominance
	Taxa	Individuals	Margalef [d]	Shannon-Wiener [H'Log$_2$]	Pielou [J]	Simpson [λ]
High Tide						
SS_03	3	6	1.12	1.25	0.790	0.500
SS_06	4	205	0.56	0.25	0.127	0.934
SS_14	6	390	0.84	1.08	0.418	0.611
SS_17	3	89	0.45	0.48	0.306	0.835
SS_20	3	8	0.96	1.41	0.887	0.406
SS_22	5	331	0.69	0.58	0.251	0.816
SS_26	3	42	0.54	0.64	0.405	0.783
SS_28	3	48	0.52	1.25	0.787	0.461
SS_30	4	13	1.17	1.61	0.807	0.373
Mid Tide						
SS_02	4	18	1.04	1.28	0.638	0.549
SS_05	5	66	0.95	1.58	0.682	0.460
SS_07	5	522	0.64	0.90	0.389	0.664
SS_08	6	381	0.84	1.02	0.395	0.641
SS_09	5	819	0.60	0.85	0.365	0.684
SS_11	6	136	1.02	1.24	0.481	0.577
SS_13	8	71	1.64	2.01	0.669	0.363
SS_16	8	950	1.02	1.05	0.348	0.635
SS_21	6	3208	0.62	0.94	0.362	0.655
SS_25	5	2094	0.52	0.83	0.356	0.724
SS_29	8	1044	1.01	1.76	0.586	0.373
Low Tide						
SS_01	5	38	1.10	1.88	0.809	0.309
SS_04	10	745	1.36	1.44	0.432	0.526
SS_10	9	258	1.44	2.24	0.707	0.246
SS_12	7	911	0.88	1.41	0.502	0.473
SS_15	7	1469	0.82	1.23	0.437	0.566
SS_18	3	171	0.39	0.27	0.171	0.921
SS_19	4	544	0.48	0.80	0.401	0.676
SS_23	7	1322	0.83	1.66	0.592	0.348
SS_24	7	657	0.92	1.03	0.367	0.618
SS_27	5	736	0.61	1.12	0.484	0.605

4.8.2 Algal Communities

Following rationalisation, the macroalgal dataset from scrape samples from artificial vertical structures comprised 27 taxa, of which 14 Chlorophyta, 9 Rhodophyta and 4 Phaeophyceae. The excluded taxa included *Ulva* sp. recorded in 28 scrape samples and *Fucus* sp. recorded in 17 scrape samples.

Table 4.33 summarises the phyletic composition of the macroalgae from the scrape samples, and Figure 4.27 presents the phyletic composition of macroalgae from each scrape sample.

Table 4.34 details the macroalgae from the scrape samples and Figure 4.28 displays photographs of scrape samples representative of each tidal level.

Table 4.33: Taxonomic groups of macroalgae from scrape samples

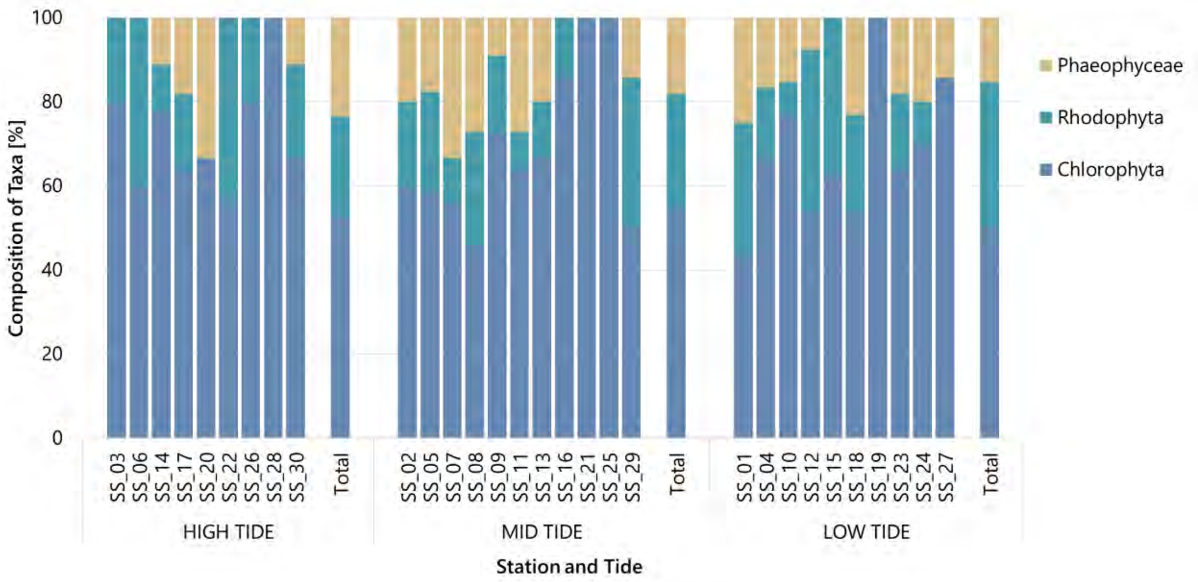
Taxonomic Group	Number of Taxa	Composition of Taxa [%]	Frequency [%]
High Tide			
Chlorophyta	9	52.9	100
Rhodophyta	4	23.5	77.8
Phaeophyceae	4	23.3	44.4
Total	**17**	**100**	-
Mid Tide			
Chlorophyta	12	54.5	100
Rhodophyta	6	27.3	81.8
Phaeophyceae	4	18.2	72.2
Total	**22**	**100**	-
Low Tide			
Chlorophyta	13	50.0	100
Rhodophyta	9	34.6	80.0
Phaeophyceae	4	15.4	80.0
Total	**26**	**100**	-

Chlorophyta were the most frequently occurring taxa at all tidal levels, followed by the Rhodophyta at high and mid tide levels, whereas at the low tide level Rhodophyta and Phaeophyta had the same frequency of occurrence.

Of the Chlorophyta, *U. intestinalis* was the most frequently occurring being recorded in 90.0 % of scrape samples. It was followed by *Prasiola stipitata*, *Ulva prolifera*, *Rhizoclonium riparium*, *Gayralia oxysperma*, species of the genera *Blidingia* and *Ulothrix*, and of the family Gomontiaceae, with frequency of occurrence of between 36.7 % and 83.3 % of samples. The remaining Chlorophyta were represented by *Chaetomorpha linum*, *Ulva lactuca*, *Ulva linza*, *Cladophora*, *Rosenvingiella radicans*, species of the genus *Cladophora* and *Percursaria percursa*, the latter recorded only from sample SS_10 at low tide level.

Of the Rhodophyta, *Rhodochorton purpureum* and *Erythrotrichia carnea* were the most frequently occurring, being recorded in 60.0 % and 43.3 % of samples; the remaining Rhodophyta had frequency of occurrence of between 3.3 % (*Osmundea* and *Polysiphonia stricta*) and 30.0 % (*Porphyra umbilicalis*).

Of the Phaeophyceae, *Elachista fucicola* was the most frequently occurring being recorded in 43.3 % of samples, followed by *Fucus spiralis* and *Pylaiella littoralis*, both recorded in 40.0% of samples and ?*Sphacelorbus nanus*, recorded in 16.7 % of samples.



Notes
SS = Scrape sample

Figure 4.27: Macroalgae phyletic composition of scrape samples from artificial structures

Table 4.34: Macroalgae from scrape samples

Taxa	Frequency / Tide Level		
	High	Mid	Low
Chlorophyta			
Prasiola stipitata	100.0	63.6	90.0
Rosenvingiella radicans	11.1		10.0
Rhizoclonium riparium	44.4	81.8	90.0
Gayralia oxysperma	22.2	45.5	40.0
Ulothrix	44.4	81.8	30.0
Ulva intestinalis	88.9	90.9	90.0
Ulva prolifera	66.7	81.8	90.0
Ulva lactuca	-	18.2	20.0
Ulva linza	-	18.2	-
Blidingia	77.8	72.7	90.0
Cladophora	-	27.3	30.0
Percursaria percursa	-	-	10.0
Chaetomorpha linum	-	36.4	20.0
?Gomontiaceae	33.3	45.5	50.0
Rhodophyta			
Porphyra umbilicalis	44.4	27.3	20.0
Porphyra ?purpurea	-	9.1	20.0
Erythrotrichia carnea	22.2	54.5	40.0
Bangia atropurpurea	44.4	9.1	10.0
Gaillona hookeri	-	18.2	20.0
Rhodochorton purpureum	33.3	72.7	70.0
Rhodothamniella floridula	-	-	20.0
Osmundea	-	-	10.0
Polysiphonia stricta	44.4	27.3	10.0
Phaeophyta			
?Sphacelorbus nanus	11.1	9.1	30.0
Pylaiella littoralis	22.2	45.5	50.0
Elachista fucicola	11.1	63.6	50.0
Fucus spiralis	11.1	63.6	40.0

SS_03 High Tide

SS_14 High Tide

SS_28 High Tide

S_05 Mid Tide

SS_11 Mid Tide

SS_25 Mid Tide

SS_10 Low Tide

SS_15 Low Tide

SS_24 Low Tide

Notes

SS = Scrape sample

Figure 4.28: Representative photographs of scrape samples

4.9 Potentially Sensitive Species

Of the species recorded in this study, *G. morua* is listed on the IUCN Red list of threatened species as vulnerable; this species is also listed on the OSPAR list of threatened and/or declining habitats and species for regions II and III, the Tees estuary being part of OSPAR region II.

4.10 Non-native Species (NNS) and Cryptogenic Species

Table 4.35 presents NNS and cryptogenic species recorded in this study.

Table 4.35: Non-native and cryptogenic taxa

Phylum	Taxa	Status	Origin	Occurrence in this Study		
				Scrape	Cores	Grab
Annelida	*Alitta virens*	Non-native	Western Atlantic	-	-	✓
	Euchone limnicola	Non-native	California	-	-	✓
	Dipolydora quadrilobata	Cryptogenic	Cosmopolitan	-	✓	✓
	Polydora cornuta	Cryptogenic	Cosmopolitan	-	✓	✓
	Streblospio benedicti	Non-native	Western Atlantic	-	✓	✓
	Streblospio gynobranchiata	Non-native	Gulf of Mexico	-	✓	✓
Arthropoda	*Austrominius modestus*	Non-native	Australasia	✓	✓	-
	Monocorophium insidiosum	Cryptogenic	Cosmopolitan	-	✓	-
Mollusca	*Yoldia limatula*	Non-native	Western Atlantic	-	-	✓

Notes
Alitta virens has been recorded from the UK waters since the 19th century but is considered non-native
Streblospio could not be identified as *S. benedicti* nor *S. gynobranchiata*, owing to the absence of mature female individuals

The mollusc *Yoldia limatula* represents a new record for the UK and comprised 32 individuals across 10 grab stations, with the highest abundance recorded at station GS_26. In addition, 225 juveniles of the family Yoldiidae (likely to be *Y. limatula*) were recorded, with the highest abundance recorded at station GS_24.

Table 4.36 presents details of *Y. limatula* occurrence across the survey area and Figure 4.29 presents specimen of *Y. limatula* adults and Yoldiidae juveniles. Figure 4.30 presents the abundance of *Y. limatula* and Figure 4.31 presents the abundance of Yoldiidae juveniles recorded across the survey area.

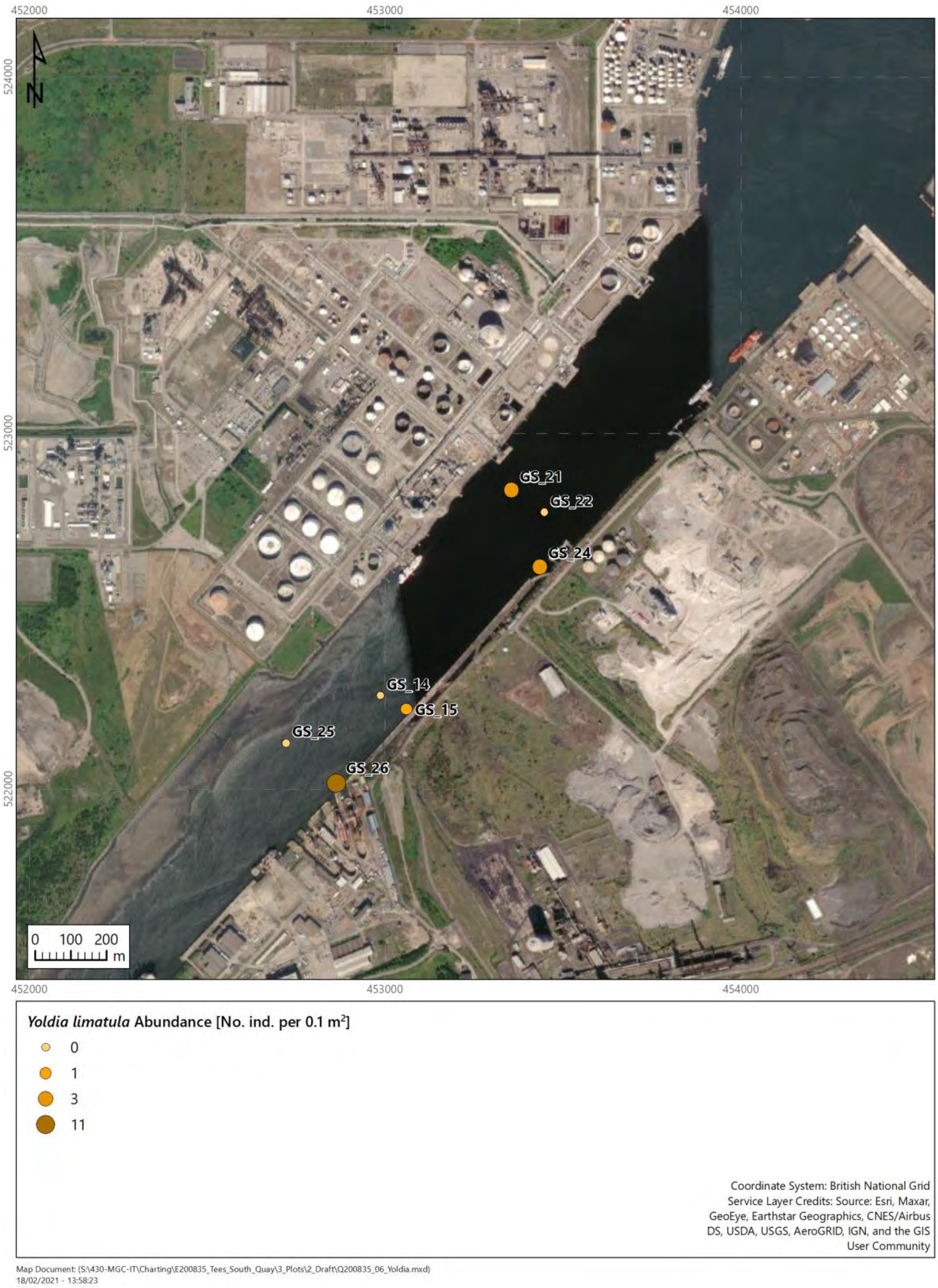
Table 4.36: Records of *Yoldia limatula*

Station	*Yoldia limatula*		Yoldiidae juveniles	
	Abundance	Biomass	Abundance	Biomass
GS_01	-	-	2	0.0001
GS_02	-	-	4	0.0001
GS_03	4	0.0055	4	0.0002
GS_04	-	-	1	0.0000
GS_06	-	-	2	0.0001
GS_07	1	0.0015	6	0.0005
GS_08	-	-	4	0.0001
GS_09	2	0.0056	4	0.0002
GS_10	1	0.0023	19	0.0007
GS_11	2	0.0004	6	0.0003

Station	*Yoldia limatula*		Yoldiidae juveniles	
	Abundance	Biomass	Abundance	Biomass
GS_13	4	0.0015	-	-
GS_14	-	-	1	0.0000
GS_15	1	0.0009	12	0.0006
GS_21	3	0.0375	7	0.0002
GS_22	-	-	7	0.0002
GS_24	3	0.1528	83	0.0035
GS_25	-	-	7	0.0004
GS_26	11	0.4784	56	0.0026
Total	**32**	**0.6864**	**225**	**0.0097**

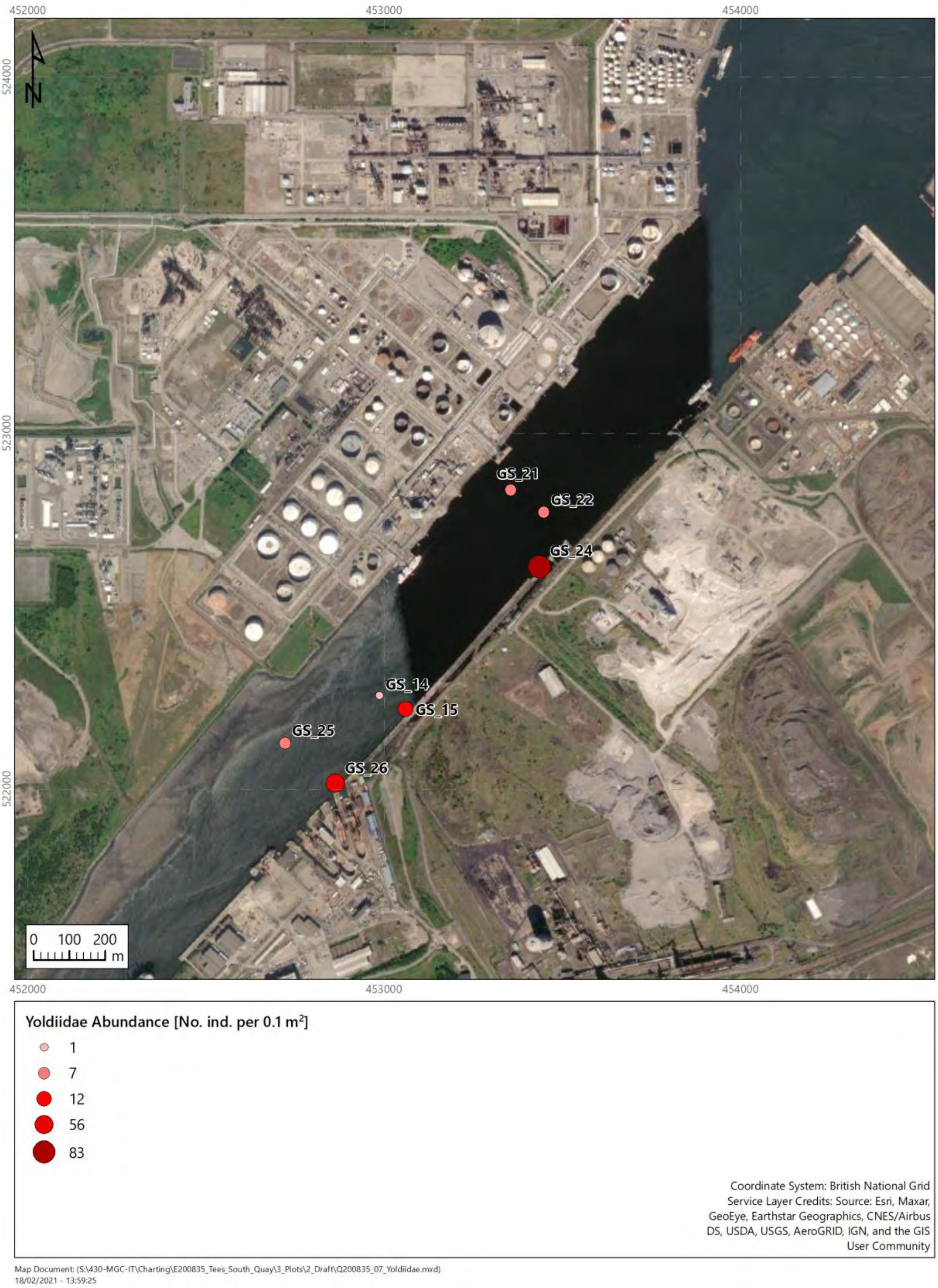
Notes
Abundance refers to number of individuals per 0.1 m^2
Biomass refers to ash free dry weight g/0.1 m^2
GS = Grab station

Figure 4.29: *Yoldia limatula*



Notes
No. ind. = number of individuals
GS = Grab station

Figure 4.30: Spatial distribution of *Yoldia limatula* abundance



Notes
No. ind. = number of individuals
GS = Grab station

Figure 4.31: Spatial distribution of Yoldiidae juveniles abundance

5. Discussion

5.1 Sediment Characterisation

The intertidal section of the survey area (excluding North Tees Mudflat) featured heterogeneous sediment comprising pebbles, cobbles, and boulders in a matrix of muddy sand and gravel. The PSD analysis of the core samples indicated coarse sediment comprising mainly gravel and sand, the former with a content of up to 96.29 %, the latter with a content of up to 82.73 %. Fines were less represented with a content of up to 11.78 %. The Folk (BGS modified) classification reflected the coarseness of the sediment with most core samples being classified as gravel or muddy sandy gravel and described as medium and fine pebbles on the Wentworth (1922) scale. Three core samples were classified as gravelly sand or gravelly muddy sand and described as medium to very coarse sand.

Debris of anthropogenic nature, including plastic, polystyrene, and rubber tyres were recorded across the intertidal section of the survey area, but also debris likely associated with historic construction activities, which may have enhanced the coarseness of the sediment. No evidence of mudflat was identified on the intertidal in the southern section of the survey area.

The North Tees Mudflat section of the survey area also featured heterogeneous sediment, albeit finer than that of the intertidal section on the southern bank, and comprised mostly sand, which had a content of up to 87.18 %, and fines which had a content of up to 48.34 %. Gravel was poorly represented with a content of up to 5.23 %. Five of the six stations in the North Tees Mudflats section of the survey area were classified as muddy sand (Folk (BGS modified)); station GS_23 was classified as gravelly muddy sand owing to its gravel content. All stations were described as fine sand, very fine sand, and coarse silt (Wentworth, 1922).

The subtidal section of the survey area featured the finest sediment, albeit with a degree of heterogeneity, with 15 of the 19 stations sampled comprising mainly sand, which had a content of up to 62.17 % and fines, which had a content of up to 86.18 %. These stations were classified as sandy mud and muddy sand and described as coarse, medium, and fine silt. Four subtidal stations had conspicuous amount of gravel with percentages of up to 66.74 %, and were classified as muddy gravel, gravelly mud and gravelly muddy sand and described as very coarse sand, fine sand, and medium silt.

The heterogeneity of the sediment, across the entire survey area, was reflected in the sorting coefficient, with most samples having poorly or very poorly sorted sediment. Two subtidal stations had extremely poorly sorted sediment, whereas one intertidal core had moderately sorted sediment.

Most samples had bimodal or polymodal distributions, suggesting different sources of sediment influx (Hein, 2007). These are likely to be associated with fluvial sediment input and physical disturbance from anthropogenic activities such as canalisation and dredging, which have resulted in the Tees estuary been significantly modified over the last century (Shillabeer & Tapp, 1989).

5.2 Sediment Chemistry

The vibrocore and borehole sediment chemistry samples were collected from a total of 31 sites and 84 samples and analysed for PSD, hydrocarbons, metals, PCBs, organotins and pH. The Tees estuary, where the survey area is located, is a well-characterised site with high anthropogenic impact and the findings of this analysis are in line with previous observations of the area (e.g. Deere-Jones, 2007).

5.2.1 Sediment Hydrocarbons

Marine sediments contain hydrocarbons derived from many sources that enter the marine environment via three general processes: biosynthesis (marine and land organisms biosynthesise hydrocarbons), geochemical processes (submarine and coastal/terrestrial oil-seeps) and anthropogenic sources (Farrington & Meyer, 1975; Myers & Gunnerson, 1976) The latter include marine transportation, coastal oil refineries, accidental shipping losses, industrial and municipal waste (e.g. sewage and dredged spoils), as well as urban and river run-off, atmospheric deposition (from combustion sources including PAHs) and natural seepages (Johnston, 1980; Dicks et al., 1987; North Sea Task Force [NSTF], 1993; OSPAR, 2000; 2010).

Hydrocarbon values were high at most stations throughout many depth ranges, with many PAHs exceeding their respective Cefas AL1 threshold values.

5.2.2 Sediment Metals

Metals and metalloids occur naturally in the marine environment and are widely distributed in both dissolved and sedimentary forms. Some are essential to marine life while others have no biological function and therefore are toxic to numerous organisms at certain levels (Paez-Osuna & Ruiz-Fernandez, 1995; Boening, 1999). Metals can enter the environment via natural methods such as riverine transport, coastal discharges, geological weathering and atmospheric fallout (Brady et al., 2015). Other routes into marine sediments are from anthropogenic activities such as direct discharges from industrial activities.

Concentrations of metals were high for many stations and samples. Arsenic exceeded the AL1 threshold at 29 samples over 18 stations, cadmium exceeded the AL1 threshold at 30 samples over 19 stations, chromium exceeded the AL1 threshold at 32 samples over 19 stations, copper exceeded the AL1 threshold at 34 samples over 20 stations, mercury exceeded the AL1 threshold at 31 samples over 18 stations, nickel exceeded the AL1 threshold at nearly all samples and over all stations, with just a few exceptions, lead exceeded the AL1 threshold at 32 samples over 20 stations and zinc exceeded the AL1 threshold at 31 samples over 18 stations. At station BH-34 the concentration of cadmium, chromium, copper, mercury, lead and zinc also exceeded their respective AL2 threshold at one or more depths.

5.2.3 Sediment Polychlorinated Biphenyls

PCBs are a group of industrial chemicals used in electrical equipment. They are manufactured by reacting chlorine with biphenyl resulting in the formation of a complex mixture of compounds (known as congeners). The properties of the final product are modified by varying the proportion of chlorine to biphenyl present. Chemicals such as PCBs in environmental samples are therefore present as technical mixtures not as individual compounds. PCBs are contaminants which are ubiquitous within the marine environment, with a background concentration of zero, excluding any anthropogenic input (OSPAR, 2009b).

The sum of the ICES 7 PCBs and the sum of 25 PCBs exceeded their respective Cefas AL1 threshold at 20 samples over 14 stations and did not exceed the AL2 threshold at any sample at any station.

5.2.4 Sediment Organotins

Organotin compounds have historically been used in marine antifouling products; however, their use is now prohibited. Since 2003, monitoring of imposex and related effects of TBT in marine snails in OSPAR Regions I, II, III and IV has been undertaken regularly. Although the overall status is improving, marine snails still show pollution effects from TBT over the large parts of the OSPAR area, especially Regions II, III and IV (OSPAR, 2014).

The Cefas AL1 threshold was exceeded in the surface sediment at stations BH-31 and BH-34, whilst the Cefas AL2 threshold was not exceeded at any station.

5.3 Biological Communities

Intertidal epibiota was represented by fucoid algae, including *Fucus spiralis*, *Fucus ceranoides* and *Fucus vesiculosus*, the former occurring on the upper eulittoral, the latter occurring in the mid and lower eulittoral. *F. ceranoides* dominated in areas with freshwater input as this fucoid is a brackish water species, abundant on shore areas with freshwater input (White, 2007) and in the inner reaches of estuaries (Wilkinson et al., 2007). Of the other fucoid recorded, *F. spiralis* has been reported at the lowermost end of the Tees estuary (Wilkinson et al., 2007). Green algae were recorded throughout the upper and mid eulittoral, whereas dense patches of the red alga *C. crispus* were recorded in the lower eulittoral. Epifauna was mainly represented by barnacles (Sessilia), the gastropods *P. vulgata* and *L. littorea* and less frequently the mussel *M. edulis* and the polychaete *S. lamarcki*.

Intertidal infauna was dominated by oligochaetes, such as *T. pseudogaster*, *T. benedii* and species of the family Enchytraeidae, and polychaetes of the genus *Capitella*. These taxa are typical of organically enriched estuaries, and so are *Pygospio elegans* and species of *Polydora* (Tillin, 2016), which were also recorded. Oligochaetes, specifically *T. benedii* is reported to be predominant in eutrophic and polluted coastal sites often characterised by high levels of hydrogen sulphide, which this species is capable of withstanding owing to its adaptive respiratory strategies (Giere et al., 1999). Other polychaetes included *Manayunkia aestuarina*, which is characteristic of brackish water and found sublittorally in sandy and muddy sediments of estuaries to depths of 30 m (Ballerstedt, 2005), although a population of this species has been reported from the Isles of Scilly in fully saline environment (Tegwyn, 1970).

The gastropod *Peringia ulvae* was within the top five most abundant taxa and was recorded in all core samples. This species is typically found on muddy sand in estuaries and areas of variable salinity, frequently associated with seagrass and green algae canopy (Jackson, 2000).

Arthropoda of the class Collembola were amongst the numerically dominant infaunal invertebrates, albeit restricted in distribution. Collembola are semiaquatic invertebrates commonly found in the air-water interface (Los Huertos, 2020), where they tend to clump, even in homogeneous sediments, owing to pheromones or local food abundance or as a result of limited dispersion after founding events and subsequent population growth (Christiansen et al., 2009).

The mean invertebrates' biomass from the intertidal section of the survey area (excluding North Tees Mudflat) was 12.2 AFDW g/m^2 of which *L. littorina* was the highest contributor. Other invertebrates contributing to the intertidal invertebrate biomass included polychaetes (M. *tetracerus*, *C. tentaculata, Capitella and Eteone longa*), oligochaetes (*Tubificoides pseudogaster*, *Tubificoides benedii,* Enchytraeidae), crustaceans (*A. modestus, S. balanoides,* Gammaridae*)* and the gastropod *P. ulvae*. The high biomass of *L. littorea* was associated with the size of this gastropod rather than the abundance, as this is largest British periwinkle with the shell reaching a maximum height of 52 mm (Jackson, 2008).

The infauna of the North Tees Mudflat section of the survey area was characterised by *P. ulvae* which was the most abundant invertebrate recorded from all six stations sampled on the North Tees Mudflat. The amphipod *C. volutator*, the polychaetes *P. cornuta*, *P. elegans* and *M. aestuarina* and the oligochaetes *T. benedii* and *T. pseudogaster* were also recorded at all stations and featured within the top ten most abundant taxa recorded. By comparison, the polychaete *H. diversicolor* and the bivalve *M. arenaria* had lower abundance and frequency of occurrence.

Corophium volutator is one of the most abundant organisms in estuarine mudflats, with seasonal changes in density due to predation and subsequent recovery. This amphipod is food source for crustaceans such as *C. crangon* and *C. maenas* and fish such as *P. flesus* (Neal & Avant, 2006), which were also recorded in this study.

The mean invertebrates' biomass of the North Tees Mudflat section of the survey area was 4.29 AFDW g/m^2, of which the polychaete *T. species A* was the highest contributor. Other invertebrates contributing to the North Tees Mudflat invertebrates' biomass included mollusc (*P. ulvae*, *L. saxatilis*) crustaceans (*C. volutator*), polychaetes (*H. diversicolor, P. elegans, P. cornuta*) and the oligochaete *T. benedii.*

The subtidal section of the survey area was characterised mainly by polychaetes and oligochaetes, with *C. gibber* being the most abundant and frequently occurring invertebrate recorded at all 19 subtidal stations. Other polychaete featuring within the top ten most abundant taxa included (but were not limited to) *E. limnicola*, *M. palmata* and *Tharix* species A, and the oligochaetes *T. galiciensis and T. swirencoides*.

The mean invertebrates' biomass of the subtidal section of the survey area was 3.82 AFDW g/m^2 of which the bivalve *Chamelea striatula* was the highest contributor, albeit it only comprised one individual. Other invertebrates contributing to the subtidal invertebrates' biomass included the crustaceans *B. crenatus* and *C. crangon*, the bivalve *Y. limatula*, and polychaetes of the genera *Nephtys* and *Terebellides*, along with M. *palmata*, *A. virens*, *C. gibber*, *G. alba, G. cirrhosa* and *O. acuminata*. The biomass of C. *striatula* was associated with the size of this bivalve rather than its abundance, as it can reach 45 mm (de Kluijver et al., n.c.).

Faunal diversity, in line with the criteria in Dauvin et al. (2012), was generally moderate in the intertidal on the south bank and North Tees Mudflat sections of the survey area and high in the subtidal section. The high diversity of the subtidal section was associated with the low abundance relative to the taxa recorded, as reflected in the high value of evenness at the subtidal stations. The intertidal on the south bank and North Tees Mudflat sections of the survey area had comparatively lower values of evenness associated with the numerical dominance of selected taxa.

Overall, the biological communities recorded in this study are typical of the Tees estuary, the seaward end of which is reported to comprise typical estuarine fauna, compared to the middle reaches which are reported to be dominated by an abundant fauna tolerant of organic pollution (Shillabeer & Tapp, 1989). Polychaetes of the genera *Capitella*, *Polydora*, *Streblospio* are reported to occur in physically stable areas along with *M. aestuarina* and the oligochaetes *T. benedii* and *T. pseudogaster* (Gray, 1976).

5.4 Seabed Habitats and Biotopes

The biotopes identified in this study are representative of estuarine environments of the UK east coast subject to a degree of anthropogenic impact, reflected both in the rocky and sedimentary habitats recorded, and with transitional areas owing to indistinct biotope boundaries.

The biotope complexes 'Fucoids in variable salinity (LR.LLR.FVS - A1.32) and 'Lichens or small green algae on supralittoral and littoral fringe rock (LR.FLR.Lic)' are part of the BAP priority habitat 'Estuarine Rocky Habitats'.

Estuarine rocky habitats extend from the supralittoral lichens down to the subtidal circalittoral, including substrata such as bedrock and stable boulders. Estuarine rocky habitats are an important component of fish nursery grounds, thus contributing to the overall biodiversity of estuaries. The extent and heterogeneity of the substrate influence the biological communities associated with estuarine rocky habitats (BRIG, 2011). In this study, the rocky habitats encompassed a narrow strip on the top of the shore and mixed substrates of pebbles, cobbles, and boulders, with evident anthropogenic input.

Of the sedimentary biotopes, '*Hediste diversicolor* and *Corophium volutator* in littoral gravelly sandy mud (LS.LMx.GvMu.HedMx.Cvol -A2.3222)' is part of the BAP priority habitats 'Intertidal mudflats', which is also listed on the OSPAR list of threatened and/or declining habitats and species. This biotope was identified on the North Tees Mudflat section of the survey area only. No mudflat habitats were identified in the South Bank survey area.

Intertidal mudflats were selected for inclusion on the OSPAR list based on their ecological significance and decline (OSPAR, 2009c). Mudflats are highly productive areas which, together with other intertidal habitats, support large numbers of predatory birds and fish. They provide feeding and resting areas for internationally important populations of migrant and wintering waterfowl and are also important nursery areas for flatfish (BRIG, 2011). The mud surface plays an important role in nutrient chemistry in areas subject to anthropogenic discharge, by sequestering and storing contaminants (OSPAR, 2009c).

Reduction in the extension of intertidal mudflats is particularly alarming in an estuarine environment where these areas are favoured for land claim (OSPAR, 2009c), with over 80 % of the Tees estuary's intertidal sedimentary habitats been reclaimed for infrastructure development (Royal HaskoningDHV, 2015).

The sedimentary biotope '*Melinna palmata* with *Magelona* spp. and *Thyasira* spp. in infralittoral sandy mud (SS.SMu.ISaMu.MelMagThy - A5.334)' was assigned to the subtidal section of the survey area albeit no *Magelona* species were recorded in the grab samples. Sediment parameters, specifically grain size median and mud content, are the most important factors influencing the occurrence of species of *Magelona* (Meißne & Darr, 2009) For example, *M. johnstoni* is reported to prefer fine sand with mud content < 10 %, and in some parts of the North Sea, this species is reported to be absent in coarse grained sediment with a median grain size > 500 µm (Meißner & Darr, 2009). In this study, the mean median sediment particle size from the subtidal stations was 3036 µm and the mean mud content was 46.55 %. Similarly, *M. filiformis* is reported to occur in well sorted fine sands with a median grain size of between 100 and 250 and mud content < 5 % (Meißner & Darr, 2009).

5.5 Fisheries

The commercial fish *Gadus morhua*, *Merlangius merlangus*, *Limanda limanda*, *Platichthys flesus* and *Pleuronectes platessa* were recorded from the beam trawls, along with the non-commercial species *Gaidropsarus vulgaris*, *Myoxocephalus scorpius*, *Agonus cataphractus*, *Pomatoschistus lozanoi* and *Pomatoschistus minutus*. Of these, *G. morhua*, *P. flesus*, *P. platessa*, *G. vulgaris* and *M. scorpius* were also recorded from the fyke nets along with *Pollachius pollachius*.

The measurement of the commercial fish was compared to the average size attained by each species as detailed in Maitland & Herdson, (2010), to gauge information on the age. The conservation status of each species, as detailed in the IUCN red list of threatened species (IUCN, 2021) was also assessed. Of the fish recorded, *Gadus morhua* is a UK BAP priority species, and is listed on the OSPAR list of threatened and/or declining habitats and species for regions II and III, the Tees estuary being part of OSPAR region II. This species is also listed as vulnerable on the IUCN red list of threatened species, whereas the remaining fish are listed as of least concern. Size ranges indicate that all fish measured are likely to be young.

G. morhua has an average length of 1200 mm, compared to a maximum length of 140 mm in this study; it occurs from the shoreline to the continental shelf in depths of 600 m; young, smaller fish live close inshore (Maitland & Herdson, 2010).

M. merlangus can reach 700 mm in length, but it is usually between 300 mm and 400 mm, compared to a maximum length of 180 mm in this study; it occurs in shallow waters and small specimens occur inshore (Maitland & Herdson, 2010).

L. limanda can reach 420 mm, but it is usually 250 mm, compared to a maximum length of 180 mm; it lives at depths of 20 m to 40 m, and small specimens are found as shallow as 2 m (Maitland & Herdson, 2010).

P. platessa can reach 910 mm, though it is usually 500 mm, compared to a maximum length of 100 mm in this study; it occurs at depths of 10 m to 50 m, and young occur in the shoreline to 10 m depth (Maitland & Herdson, 2010).

P. pollachius can reach 1300 m, though it is usually 500 mm, compared to a maximum length of 300 mm in this study; it lives in inshore waters near rocks or on rough grounds and small specimens occur over sandy shores and in estuaries (Maitland & Herdson, 2010).

Additional macrofauna recorded from the trawl samples included crustaceans, (*C. crangon*, *C. meanas*, *P. montagui*, *L. depurator*, *M. rostrata* and *P. bernhardus)* and echinoderms (*A. rubens*, *O. albida* and *O. ophiura*). Epifauna included solitary (*A. aspersa* Actiniaria, Metridium) and colonial (*Hydractinia echinata*, *Alcyonium digitatum Flustra foliacea*, *Securiflustra securifrons* and Didemnidae) invertebrates. The faunal assemblages from the beam trawls are comparable to those reported to be typical of the shallow areas of the southern North Sea (Callaway et al., 2002; Jennings et al., 1999) and specifically the Tees estuary (Smurthwaite, 2006, Royal HaskoningDHV, 2015).

5.6 Biological Communities on Vertical Artificial Structures

Artificial structures such as those associated with wharfs provide suitable hard substrate for a variety of epifaunal organisms that may not otherwise occur. These infrastructures generally provide vertical habitat, whereas many natural habitats slope more gently or have heterogeneous topography (Bulleri & Chapman, 2010). Results of the scrape samples analysis indicated low macrofaunal diversity. Evenness was generally low and dominance high, owing to the numerical dominance of taxa such as *A. modestus*, *S. balanoides*, *L. arcana/saxatils* and *F. stellaris*. These results are in line with evidence identified in literature which reports lower diversity of assemblages on artificial structures compared to natural habitats (Bulleri & Champman, 2010).

The community structure and composition of epibiotic communities on vertical artificial structure is influenced by factors such as composition and surface topography, shading and proximity to the seabed, lack of refuges against predator and stressful conditions such as sand scouring, wave action and desiccation (Mineur et al., 2012).

The slope of natural shores is a limiting factor to the distribution of many intertidal organisms, with the potential for selected organisms to overcrowd artificial vertical structures, and consequently increase the strength of interspecific interactions (Bulleri & Chapman, 2010). Increased competition, coupled with the potential for artificial structures to act as a point of entry for NNS through ballast water or ship hulls (Maraffini et al., 2017), may enhance the establishment of non-native and/or invasive species (Bulleri & Champman, 2010).

The algal community was characterised by taxa typical of estuaries along the UK east coast (Edwards, 1972). Green algae were the richest in number of taxa with *P. stipitata* being the second most frequently occurring species after *U. intestinalis*. *P. stipitata* occurs on natural and artificial structures in the upper intertidal zones including those in estuaries and is particularly abundant in areas organically enriched from seabird guano (Brodie et al. 2007). *U. intestinalis* occurs on all shore levels in a wide range of habitats, including artificial structures and estuarine conditions (Brodie et al., 2007) and is considered an opportunistic species with short reproductive cycle and high dispersal rate (Budd & Pizzola, 2008).

Of the brown algae, *F. spiralis* was the only fucoid recorded on artificial structures. This alga occurs on the upper eulittoral where it can withstand long period of emersion and salinity fluctuations, making it able to extend into estuaries (White, 2008).

Other macroalgae typical of UK estuaries included (but were not limited to) red algae of the genus *Porphyra, Rhodochorton purpureum*, *Rhodothamniella floridula* and *Polysiphonia stricta* (Edwards, 1972).

5.7 Non-native Species (NNS) and Cryptogenic Species

Non-native species (NNS) are those that have reached the UK by accidental human transport, deliberate human introduction, or which have arrived by natural dispersion from a non-native population in Europe (Government Digital Service [GDS], 2020). Once introduced, some NNS can become established (grow and reproduce successfully) and their subsequent dispersal from the point of introduction can result in environmental and economic impact (Cottier-Cook et al., 2017). The NNS that have a negative impact on biodiversity, through the spread of disease, competition for resources, or by direct consumption, parasitism, or hybridisation, are termed invasive (GDS, 2020).

Cryptogenic species are those of unknown origin, as such they are not demonstrably native nor introduced (Eno et al., 1997).

Eight NNS and/or cryptogenic species were recorded across the survey area, including the mollusc *Yoldia limatula* and the barnacle *Austrominius modestus*.

The bivalve *Y. limatula* occurs in shallow soft bottoms of boreal arctic seas of North America and Europe (Bender & Davis, 2012) and has not been previously reported in the UK. This bivalve is a subsurface and surface deposit-feeder, whose feeding activities result in sediment resuspension through expulsion of loose pseudofaeces directly into the water column (Bender and Davis, 2012).

The barnacle *A. modestus*, first found in Hampshire, in 1945, naturally occurs in Australasia and was introduced from Australia or New Zealand, through ships' hulls or ballast water. This barnacle withstands reduced salinity, turbid waters, and lower temperatures than the native barnacles of the genus *Chthamalus*, and higher temperatures than the native barnacles of the genus *Balanus*. Other competitive advantages include a broad tidal range, as it occurs in the upper eulittoral and sublittoral, a rapid initial growth rate, reaching sexual maturity in its first season and multiple reproductive seasons per year, compared to *Semibalanus balanoides* which only produces one brood per year and earlier in the season (Eno et al., 1997).This species is also reported to colonise concrete breakwaters rapidly (Mineur et al., 2012).

The remaining six NNS and/or cryptogenic species were annelids, including *Euchone limnicola*, which was first reported from California in fine mud sediments where the species constructed a mucoid tube with fine particles adhering to it (Reish, 1959). *E. limnicola* has been reported as a NNS in different localities of southern Australia, New Zealand, UK, and France, always in sandy and muddy sediments of harbours with a high degree of contamination and degradation, up to 24 m depth. Specifically, *E. limnicola* tolerates copper pollution and may be an indicator of high copper conditions. In newly colonised areas it forms dense and stable populations, competing with native species for natural resources, albeit its grade as a potential hazard is low due to its small impact and invasive processes (Cepeda & Lattig, 2017, Guyonnet & Borg, 2015).

Streblospio benedicti is a small tube-dwelling, highly productive, opportunistic polychaete commonly known as the bar-gilled mud worm. It is native to the Western Atlantic, from the Gulf of St. Lawrence to Venezuela. It is found in mudflats and soft sediments of estuaries and coastal waters and can tolerate a wide range of temperatures and salinities. It can attain very high abundances in introduced locations where it is probably a significant grazer of phytoplankton (Fofonoff et al., 2021).

Streblospio gynobranchiata is a recently described species, native to the Gulf of Mexico, which breeds planktotrophic larvae in its gills. It has been introduced to the Turkish Mediterranean Sea, the Black Sea, and the Caspian Sea. It is almost identical to *Streblospio benedicti* and morphological differences between them remain uncertain (Fofonoff et al., 2021).

Alitta virens is an invasive alien species, which has become established in many areas worldwide since 1915 (van der Have et al., 2015).

Three cryptogenic species were recorded: *Dipolydora* (formerly *Polydora*) *quadrilobata Polydora cornuta* and *Monocorophium insidiosum*.

The polychaete *D. quadrilobata* is reported from New England in intertidal sandy muds and in muddy substrates of dredged rivers (Blake, 1971), from Japan in mud deposits with other polychaetes of the family Spionidae (Sato-Okoshi, 2000) and from the Romanian coast of the Black Sea, most common and abundant in mud between 40 m and 60 m (Surugiu, 2012).

The polychaete *Polydora cornuta* is widely distributed from the Atlantic to the Pacific and has been reported for the first time in the Mediterranean in 2008 (Simboura et al., 2008). Along the Romanian coast of the Black Sea, *P. cornuta* is reported to occur on various types of substrata (rocks, stems of reeds, water-soaked branches of bushes, seagrasses, clay-rock, soft mud, sandy mud or sand) on which it builds fragile tubes of silt particles and fine sand grains (Surugiu, 2012). This polychaete is known to be an opportunistic species and has been widely found in organically enriched and polluted environments (Simboura et al., 2008).

The amphipod *M. insidiosum* has a wide global distribution and its native range is currently unknown. Populations are established in temperate and sub-tropical regions on both coasts of North America, both coasts of South America, Europe, Australia, and Asia. Likely vectors for its spread include hitchhiking on the hulls of commercial ships and oyster transplants. It is found in shallow marine and estuarine waters where it builds tubes attached to hard surfaces, including rocks, bivalve shells, pilings, docks, buoys, and ships' hulls. It can form U-shaped burrows in mud and silt. In some areas it is an abundant pest species known for fouling maritime structures, but its impacts have not been quantified on a large scale (Fofonoff et al., 2021).

6. Conclusions

The survey area was characterised by heterogeneous sediment, the coarseness of which decreased from the intertidal to the subtidal section of the survey area, with core samples being classified as gravel, muddy sandy gravel, gravelly sand and gravelly muddy sand (Folk (BGS)) and described as medium and fine pebbles, and medium to very coarse sand (Wentworth (1922).

The North Tees Mudflat section of the survey comprised mostly sand and fines, with most stations being classified as muddy sand (Folk (BGS)) and described as fine sand, very fine sand, and coarse silt (Wentworth (1922)).

The subtidal section of the survey area had the finest sediment, with most stations being classified as sandy mud and muddy sand (Folk (BGS)) and described as coarse, medium, and fine silt (Wentworth (1922)). Four subtidal stations with conspicuous proportion of gravel were classified as muddy gravel, gravelly mud, and gravelly muddy sand (Folk (BGS)) and described as very coarse sand, fine sand, and medium silt (Wentworth (1922)).

A total of 31 sites and 84 samples was collected for sediment chemistry investigation. Hydrocarbon values were high at most stations throughout many depth ranges, with many PAHs exceeding their Cefas AL1 threshold value.

The concentration of sediment metals exceeded their respective Cefas AL1 threshold at most stations and at station BH-34 the concentration of cadmium, chromium, copper, mercury, lead and zinc exceeded their respective Cefas AL2 threshold at one or more of the six depth ranges analysed for this core.

The sum of the ICES 7 PCBs and the sum of 25 PCBs exceeded their respective AL1 threshold at 20 samples over 14 stations and did not exceed the Cefas AL2 threshold at any depth range at any station.

The concentration of DBT was below the Cefas AL1 threshold at all stations, in all samples. The concentration of tributyltin (TBT) exceeded the Cefas AL1 threshold at the surface layers of stations BH-31 and BH-34 and did not exceed the Cefas AL2 threshold at any station.

Epibiota in the intertidal section of the survey area comprised fucoid algae (Fucus spp.), green algae (Chlorophyta) and patches of the red alga *C. crispus* in the lower eulittoral. Epifauna comprised barnacles (Sessilia), gastropods and less frequently the mussels and encrusting polychaetes.

The infauna of the intertidal section of the survey area was dominated by oligochaetes and polychaetes typical of organically enriched estuaries.

The highest invertebrate biomass was recorded in the intertidal section of the survey area, albeit this section had the lowest infaunal diversity, compared to that of the North Tees Mudflat and subtidal sections, which had similar values of invertebrate biomass.

Eight biotopes and/or biotope complexes were identified across the survey area, of which the intertidal section included rocky and sedimentary habitats, whereas the North Tees Mudflats and subtidal sections features sedimentary habitats. No mudflat habitats were identified in the South Bank survey area.

Some of the habitats identified are part of the UK BAP priority habitats for their ecological importance, which needs to be assessed in conjunction with the human impact to which the area has been subjected, with evident debris of anthropogenic nature being recorded across the intertidal section of the survey area.

The faunal communities recorded in the beam trawls comprised fish, crustaceans, echinoderms and epifauna comprised solitary and colonial organisms. Eleven species of fish were recorded in the beam trawls and fyke nets, of which six commercial the size range of which indicates they are juveniles.

Of the fish species recorded, *Gadus morhua* is a UK BAP priority species, and is listed on the OSPAR list of threatened and/or declining habitats and species for regions II and III, the Tees estuary being part of OSPAR region II. This species is also listed on the IUCN red list of threatened species as vulnerable.

Macrofaunal diversity of the scrape samples from artificial vertical structures was low owing to the numerical dominance of few taxa. The macroalgae assemblage was represented by green algae (Chlorophyta) which comprised the highest number of taxa, followed by red algae (Rhodophyta) and brown algae (Phaeophyceae) which comprised four taxa.

Six NNS and three cryptogenic species were recorded across the survey area, including the bivalve *Yoldia limatula* which is believed to represent the first record in UK waters.

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Appendices

Appendix 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") under terms of the relevant contract between the two parties (the "Contract"). The Services were performed by Fugro based on requirements of the Client set out in the Contract or otherwise made known by the Client to Fugro at the time.

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Appendix B

Logs

B.1 Survey Log

Geodetic Parameters: British National Grid OSGB 1936 [m]												
Date	Time [UTC]	Transect/ Station	Type	Sample Rep	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Locations		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
13/11/2020	08:17	QS_02	QS	-	H3	-	-	-	453 053.1	522 159.6	-	-
13/11/2020	08:24	QS_01	QS	-	H2	-	-	-	453 006.5	522 116.3	-	-
13/11/2020	08:43	CS_01	CS	-	H4	-	-	-	453 009.4	522 111.2	-	-
13/11/2020	08:52	CS_02	CS	-	H5	-	-	-	453 039.0	522 151.8	-	-
13/11/2020	09:00	CS_03	CS	-	H7	-	-	-	453 094.9	522 211.0	-	-
13/11/2020	09:00	QS_03	QS	-	H7	-	-	-	453 094.9	522 211.0	-	-
13/11/2020	09:20	QS_04	QS	-	H8	-	-	-	453 117.2	522 235.7	-	-
13/11/2020	09:28	CS_04	CS	-	H9	-	-	-	453 108.1	522 227.8	-	-
13/11/2020	10:05	FN_03	FN	-	H10	-	-	-	453 099.8	522 208.9	-	-
13/11/2020	10:14	FN_04	FN	-	H11	-	-	-	453 113.2	522 234.8	-	-
13/11/2020	10:23	FN_02	FN	-	H12	-	-	-	453 032.9	522 141.9	-	-
13/11/2020	10:31	FN_01	FN	-	H13	-	-	-	453 004.4	522 108.3	-	-
14/11/2020	09:10	CS_05	CS	-	H14	-	-	-	453 765.6	522 963.5	-	-
14/11/2020	09:10	QS_05	QS	-	H14	-	-	-	453 765.6	522 963.5	-	-
14/11/2020	09:32	CS_06	CS	-	H15	-	-	-	453 791.5	522 960.1	-	-
14/11/2020	09:32	QS_06	QS	-	H15	-	-	-	453 791.5	522 960.1	-	-
14/11/2020	09:52	CS_09	CS	-	H16	-	-	-	453 631.7	522 829.4	-	-
14/11/2020	09:52	QS_09	QS	-	H16	-	-	-	453 631.7	522 829.4	-	-
14/11/2020	10:01	CS_10	CS	-	H17	-	-	-	453 634.5	522 816.3	-	-

Geodetic Parameters: British National Grid OSGB 1936 [m]												
Date	Time [UTC]	Transect/ Station	Type	Sample Rep	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Locations		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
14/11/2020	10:01	QS_10	QS	-	H17	-	-	-	453 634.5	522 816.3	-	-
14/11/2020	10:26	CS_07	CS	-	H18	-	-	-	453 746.0	522 925.7	-	-
14/11/2020	10:26	QS_07	QS	-	H18	-	-	-	453 746.0	522 925.7	-	-
14/11/2020	10:28	CS_08	CS	-	H19	-	-	-	453 750.0	522 925.7	-	-
14/11/2020	10:28	QS_08	QS	-	H19	-	-	-	453 750.0	522 925.7	-	-
17/11/2020	07:48	GS_26	DG	FA	6	9.2	452 869.0	522 014.0	452 856.1	522 024.7	16.8	-
17/11/2020	07:59	GS_26	DG	PC	7	9.2	452 869.0	522 014.0	452 862.9	522 017.1	6.8	-
17/11/2020	08:28	GS_15	DG	FA	8	2.6	453 065.0	522 217.0	453 062.9	522 230.8	13.9	-
17/11/2020	08:34	GS_15	DG	PC	9	2.6	453 065.0	522 217.0	453 059.4	522 225.0	9.8	-
17/11/2020	08:48	GS_09	DG	FA	10	5.8	453 293.0	522 472.0	453 291.0	522 485.1	13.3	-
17/11/2020	08:54	GS_09	DG	PC	11	5.8	453 293.0	522 472.0	453 287.0	522 479.9	9.9	-
17/11/2020	09:13	GS_24	DG	FA	12	7.3	453 447.0	522 617.0	453 436.1	522 626.8	14.6	-
17/11/2020	09:18	GS_24	DG	PC	13	7.3	453 447.0	522 617.0	453 435.5	522 625.0	13.9	-
17/11/2020	09:34	GS_08	DG	FA	14	6.0	453 535.0	522 710.0	453 531.6	522 725.1	15.4	-
17/11/2020	09:44	GS_08	DG	NS	15	6.0	453 535.0	522 710.0	453 535.6	522 728.2	18.3	Stone in jaws
17/11/2020	09:49	GS_08	DG	PC	16	6.0	453 535.0	522 710.0	453 533.1	522 728.7	18.8	-
17/11/2020	10:19	GS_07	DG	FA	17	3.4	453 700.0	522 932.0	453 690.0	522 943.4	15.2	-
17/11/2020	10:33	GS_07	DG	PC	18	3.4	453 700.0	522 932.0	453 689.8	522 941.3	13.8	-
17/11/2020	10:58	BT_01	BT	SOL	19	7.5	454 237.0	524 032.0	454 217.5	524 047.3	24.8	-
17/11/2020	11:04	BT_01	BT	EOL	20	7.5	454 115.0	523 897.0	454 043.8	523 797.6	122.3	-
17/11/2020	13:41	BT_04	BT	SOL	21	9.3	453 212.0	522 586.0	453 263.4	522 664.5	93.9	-

Geodetic Parameters: British National Grid OSGB 1936 [m]												
Date	Time [UTC]	Transect/ Station	Type	Sample Rep	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Locations		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
17/11/2020	13:46	BT_04	BT	EOL	22	9.3	453 090.0	522 454.0	453 086.9	522 436.8	17.4	-
17/11/2020	14:47	BT_02	BT	SOL	23	17.0	453 494.0	522 954.0	453 435.6	522 869.1	103.1	-
17/11/2020	14:52	BT_02	BT	EOL	24	17.0	453 617.0	523 089.0	453 601.6	523 066.2	27.5	Insufficient warp-rerun
17/11/2020	15:00	BT_02	BT	SOL	25	17.0	453 617.0	523 089.0	453 652.9	523 141.2	63.3	-
17/11/2020	15:05	BT_02	BT	EOL	26	17.0	453 494.0	522 954.0	453 469.1	522 917.1	44.6	-
17/11/2020	16:09	GS_25	DG	FA	27	-	452 729.0	522 134.0	452 722.3	522 131.6	7.1	-
17/11/2020	16:19	GS_25	DG	PC	28	-	452 729.0	522 134.0	452 722.1	522 130.2	7.9	-
17/11/2020	16:39	GS_13	DG	FA	29	-	452 926.0	522 307.0	452 925.8	522 311.5	4.5	-
17/11/2020	16:46	GS_13	DG	PC	30	-	452 926.0	522 307.0	452 931.2	522 302.2	7.1	-
17/11/2020	16:57	GS_14	DG	FA	31	-	452 982.0	522 254.0	452 979.2	522 255.9	3.4	-
17/11/2020	17:04	GS_14	DG	PC	32	-	452 982.0	522 254.0	452 987.4	522 262.5	10.1	-
18/11/2020	07:43	BT_03	BT	SOL	33	12.8	453 505.0	522 733.0	453 544.1	522 789.0	68.3	-
18/11/2020	07:48	BT_03	BT	EOL	34	11.9	453 383.0	522 600.0	453 377.0	522 597.3	6.7	-
18/11/2020	09:03	BT_05	BT	SOL	35	8.0	453 124.0	522 338.0	453 221.1	522 458.9	155.1	-
18/11/2020	09:08	BT_05	BT	EOL	36	8.0	452 997.0	522 201.0	453 028.8	522 230.3	43.2	-
18/11/2020	09:44	GS_17	DG	NS	37	7.0	452 804.0	522 069.0	452 808.4	522 078.0	10.0	Stone in jaws
18/11/2020	09:46	GS_17	DG	NS	38	7.0	452 804.0	522 069.0	452 797.7	522 074.3	8.3	Stone in jaws
18/11/2020	09:49	GS_17	DG	NS	39	7.0	452 804.0	522 069.0	452 808.3	522 072.3	5.4	Stone in jaws
18/11/2020	09:50	GS_17	DG	NS	40	7.0	452 804.0	522 069.0	452 807.8	522 072.4	5.1	Stone in jaws. Station abandoned
18/11/2020	09:59	GS_10	DG	FA	41	7.2	453 230.0	522 525.0	453 233.8	522 521.9	4.8	-
18/11/2020	10:04	GS_10	DG	PC	42	7.2	453 230.0	522 525.0	453 222.2	522 529.7	9.2	-

Geodetic Parameters: British National Grid OSGB 1936 [m]												
Date	Time [UTC]	Transect/ Station	Type	Sample Rep	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Locations		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
18/11/2020	10:16	GS_11	DG	FA	43	6.5	453 164.0	522 585.0	453 166.4	522 590.8	6.2	-
18/11/2020	10:22	GS_11	DG	PC	44	6.5	453 164.0	522 585.0	453 170.8	522 594.9	12.0	-
18/11/2020	10:38	GS_21	DG	FA	45	7.6	453 357.0	522 837.0	453 354.2	522 842.0	5.7	-
18/11/2020	10:44	GS_21	DG	PC	46	7.6	453 357.0	522 837.0	453 355.6	522 840.4	3.7	-
18/11/2020	11:46	GS_04	DG	FA	47	10.1	454 275.0	523 874.0	454 280.3	523 873.5	5.3	-
18/11/2020	11:53	GS_04	DG	PC	48	10.1	454 275.0	523 874.0	454 272.7	523 864.3	9.9	-
18/11/2020	12:10	GS_03	DG	FA	49	7.8	454 203.0	523 935.0	454 214.1	523 938.1	11.5	-
18/11/2020	12:16	GS_03	DG	PC	50	7.8	454 203.0	523 935.0	454 197.8	523 946.3	12.5	-
18/11/2020	12:33	GS_02	DG	FA	51	7.7	454 131.0	523 990.0	454 125.1	523 979.0	12.4	-
18/11/2020	12:37	GS_02	DG	PC	52	7.7	454 131.0	523 990.0	454 131.4	523 989.9	0.4	-
18/11/2020	12:51	GS_01	DG	FA	53	6.9	454 070.0	524 047.0	454 064.9	524 047.1	5.2	-
18/11/2020	12:56	GS_01	DG	PC	54	6.9	454 070.0	524 047.0	454 072.3	524 049.0	3.0	-
18/11/2020	13:21	GS_06	DG	FA	55	10.3	453 618.0	522 997.0	453 612.7	523 006.8	11.2	-
18/11/2020	13:27	GS_06	DG	PC	56	10.3	453 618.0	522 997.0	453 623.7	522 999.8	6.3	-
18/11/2020	13:42	GS_05	DG	FA	57	12.5	453 535.0	523 062.0	453 532.9	523 065.9	4.4	-
18/11/2020	13:49	GS_05	DG	PC	58	12.5	453 535.0	523 062.0	453 525.5	523 070.9	13.0	-
18/11/2020	14:03	GS_22	DG	FA	59	9.4	453 444.0	522 772.0	453 446.1	522 769.8	3.0	-
18/11/2020	14:11	GS_22	DG	PC	60	9.4	453 444.0	522 772.0	453 447.6	522 778.5	7.5	-
19/11/2020	08:26:38	GS_20	HHG	FA	H21	3.0	452 169.0	521 622.0	452 201.1	521 660.3	50.0	Moved - shallow water. Small, combined

Geodetic Parameters: British National Grid OSGB 1936 [m]												
Date	Time [UTC]	Transect/ Station	Type	Sample Rep	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Locations		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
19/11/2020	08:27:57	GS_20	HHG	FA	H22	3.0	452 169.0	521 622.0	452 201.0	521 669.4	57.2	Moved - shallow water. Small, combined
19/11/2020	08:31:58	GS_20	HHG	PC	H23	2.0	452 169.0	521 622.0	452 205.0	521 671.1	60.9	Moved – shallow water
19/11/2020	08:38:27	GS_19	HHG	FA	H24	2.0	452 374.0	521 840.0	452 383.7	521 842.0	10.0	Small, combined
19/11/2020	08:41:01	GS_19	HHG	FA	H25	1.0	452 374.0	521 840.0	452 377.8	521 841.7	4.2	Small, combined
19/11/2020	08:42:56	GS_19	HHG	PC	H26	1.0	452 374.0	521 840.0	452 380.6	521 841.8	6.8	-
19/11/2020	08:51:05	GS_18	HHG	FA	H27	2.0	452 546.0	522 108.0	452 546.2	522 107.6	0.4	-
19/11/2020	08:57:05	GS_18	HHG	PC	H28	2.0	452 546.0	522 108.0	452 559.2	522 099.2	15.8	-
19/11/2020	09:05:37	GS_16	HHG	FA	H29	1.0	452 741.0	522 264.0	452 751.4	522 256.6	12.8	-
19/11/2020	09:08:07	GS_16	HHG	PC	H30	1.0	452 741.0	522 264.0	452 751.3	522 261.7	10.5	-
19/11/2020	09:16:23	GS_12	HHG	PC	H31	1.0	452 853.0	522 379.0	452 862.1	522 370.7	12.3	-
19/11/2020	09:22:07	GS_12	HHG	FA	H32	1.0	452 853.0	522 379.0	452 860.5	522 375.4	8.3	Small, combined
19/11/2020	09:23:25	GS_12	HHG	FA	H33	1.0	452 853.0	522 379.0	452 857.5	522 371.0	9.2	Small, combined
19/11/2020	09:27:24	GS_23	HHG	NS	H34	1.0	452 968.0	522 506.0	452 971.6	522 502.1	5.3	-
19/11/2020	09:28:19	GS_23	HHG	FA	H35	1.0	452 968.0	522 506.0	452 972.5	522 505.6	4.6	Small, combined
19/11/2020	09:30:18	GS_23	HHG	FA	H36	1.0	452 968.0	522 506.0	452 968.5	522 504.8	1.3	Small, combined
19/11/2020	09:32:08	GS_23	HHG	NS	H37	1.0	452 968.0	522 506.0	452 968.5	522 497.8	8.2	-
19/11/2020	09:33:37	GS_23	HHG	PC	H38	1.0	452 968.0	522 506.0	452 967.6	522 497.8	8.2	-
19/11/2020	09:42:44	SS_29	SS	-	H39	-	-	-	453 509.2	522 699.5	-	Mid - fender
19/11/2020	09:42:44	SS_30	SS	-	H39	-	-	-	453 509.2	522 699.5	-	Upper - fender
19/11/2020	09:48:04	SS_27	SS	-	H40	-	-	-	453 514.1	522 701.8	-	Low – metal ladder

Geodetic Parameters: British National Grid OSGB 1936 [m]												
Date	Time [UTC]	Transect/ Station	Type	Sample Rep	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Locations		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
19/11/2020	09:48:04	SS_28	SS	-	H40	-	-	-	453 514.1	522 701.8	-	Upper – metal ladder
19/11/2020	09:54:52	SS_25	SS	-	H41	-	-	-	453 490.1	522 676.9	-	Mid – steel pile
19/11/2020	09:54:52	SS_26	SS	-	H41	-	-	-	453 490.1	522 676.9	-	Upper – steel pile
19/11/2020	10:01:22	SS_23	SS	-	H42	-	-	-	453 471.7	522 661.7	-	Low – *Fucus* – steel support
19/11/2020	10:01:22	SS_24	SS	-	H42	-	-	-	453 471.7	522 661.7	-	Low – *Fucus* – steel support
19/11/2020	10:04:08	SS_21	SS	-	H43	-	-	-	453 468.2	522 657.5	-	Mid - fender
19/11/2020	10:04:08	SS_22	SS	-	H43	-	-	-	453 468.2	522 657.5	-	Upper - fender
19/11/2020	10:07:23	SS_19	SS	-	H44	-	-	-	453 466.6	522 642.4	-	Lower – steel beam
19/11/2020	10:07:23	SS_20	SS	-	H44	-	-	-	453 466.6	522 642.4	-	Upper – steel beam
19/11/2020	10:13:18	SS_17	SS	-	H45	-	-	-	453 417.9	522 595.2	-	Upper - *Fucus*, Chlorophyta - steel-beam
19/11/2020	10:13:18	SS_18	SS	-	H45	-	-	-	453 417.9	522 595.2	-	Low - *Fucus* - steel-support
19/11/2020	10:18:01	SS_15	SS	-	H47	-	-	-	453 398.6	522 585.4	-	Lower - wood
19/11/2020	10:18:01	SS_16	SS	-	H47	-	-	-	453 398.6	522 585.4	-	Mid - wood
19/11/2020	10:18:31	SS_13	SS	-	H48	-	-	-	453 373.0	522 559.7	-	Mid – barnacles - wood
19/11/2020	10:18:31	SS_14	SS	-	H48	-	-	-	453 373.0	522 559.7	-	Upper - *Fucus*, Chlorophyta - wood
19/11/2020	10:23:00	SS_11	SS	-	H49	-	-	-	453 339.0	522 519.1	-	Mid – mixed seaweed - wood
19/11/2020	10:23:00	SS_12	SS	-	H49	-	-	-	453 339.0	522 519.1	-	Lower – barnacles - steel
19/11/2020	10:27:08	SS_09	SS	-	H50	-	-	-	453 271.5	522 445.0	-	Mid - seaweed, barnacles
19/11/2020	10:27:08	SS_10	SS	-	H50	-	-	-	453 271.5	522 445.0	-	Lower – mixed seaweed - wood

Geodetic Parameters: British National Grid OSGB 1936 [m]												
Date	Time [UTC]	Transect/ Station	Type	Sample Rep	Fix No.	Water Depth [m BSL]	Proposed Location		Actual Locations		Offset [m]	Notes
							Easting [m]	Northing [m]	Easting [m]	Northing [m]		
19/11/2020	10:32:55	SS_07	SS	-	H51	-	-	-	453 233.1	522 399.9	-	Mid - *Fucus,* barnacles - metal-
19/11/2020	10:32:55	SS_08	SS	-	H51	-	-	-	453 233.1	522 399.9	-	Mid – barnacles - concrete
19/11/2020	10:37:23	SS_05	SS	-	H52	-	-	-	453 158.3	522 317.7	-	Mid – *Fucus* - wood
19/11/2020	10:37:23	SS_06	SS	-	H52	-	-	-	453 158.3	522 317.7	-	Upper – Chlorophyta - wood
19/11/2020	10:45:05	SS_03	SS	-	H53	-	-	-	453 086.1	522 240.1	-	Upper – mixed seaweed - wood
19/11/2020	10:45:05	SS_04	SS	-	H53	-	-	-	453 086.1	522 240.1	-	Lower – Chlorophyta - wood
19/11/2020	10:49:10	SS_01	SS	-	H54	-	-	-	452 939.6	522 079.2	-	Lower - *Fucus,* mixed seaweed - wood
19/11/2020	10:49:10	SS_02	SS	-	H54	-	-	-	452 939.6	522 079.2	-	Mid – *Fucus* - wood

Notes
UTC = Coordinated Universal Time
BSL = Below sea level
QS = Quadrat sample
CS = Core sample
DG = Day grab
BT = Beam trawl
HHG = Hand haul grab
SS = Scrape sample
FA = Faunal sample
PC = Physicochemical samples
NS = No sample

B.2 Grab Log

Date	Time [UTC]	Station	Sample Rep	Fix No.	Sample Depth [cm]	Sediment Description (including stratigraphy)				Comments (fauna, smell, bioturbation, debris)
						Depth [cm]	Sediment Type	Sediment Description	Munsell Colour	
13/11/2020	08:43	CS01	1	H3	13	0-2	mS	Muddy sand	2.5Y/3/2	Upper mid shore. ASB
						2-13	mS	Muddy sand	GLEY1/2.5/10Y	-
						> 13	mG	Muddy gravel	GLEY1/2.5/10Y	-
13/11/2020	08:52	CS02	1	H4	9	0-3	mS	Muddy sand	2.5Y/3/2	Lower mid shore. Oxic
						3-9	mS	Muddy sand	GLEY1/2.5/10Y	Anoxic
						< 9	mG	Muddy gravel	GLEY1/2.5/10Y	-
13/11/2020	09:00	CS03	1	H7	17	0-3	mS	Muddy sand	2.5Y/3/2	Middle mid shore. Oxic. ASB
						3-17	mS	Muddy sand	2.5Y/4/4	Anoxic, metal debris
						> 17	M	Mud	GLEY1/2.5/10Y	Hard mud
13/11/2020	09:28	CS04	1	H9	8	0-8	sG	Sandy gravel	2.5Y/3/2	Lower mid shore. Oxic
						> 8	sG	Sandy gravel	GLEY1/2.5/10Y	Lower mid shore. Hard substrate
14/11/2020	09:10	CS05	1	H14	13	0-4	mG	Muddy gravel with pebbles	2.5Y/4/2	Lower shore. Oxic. ASB
						4-13	mG	Muddy gravel with pebbles	GLEY1/2.5/N	Lower shore. Anoxic
14/11/2020	09:32	CS06	1	H15	13	0-6	G	Gravel	Mixed	Mid shore.
						6-13	mG	Muddy gravel	Mixed	Debris - glass
14/11/2020	09:52	CS09	1	H16	12	0-2	mG	Muddy gravel	2.5Y/4/3	Lower shore. Oxic. ASB
						2-12	mG	Muddy gravel	GLEY1/2.5/N	Anoxic
14/11/2020	10:01	CS10	1	H17	15	0-6	mG	Muddy gravel	2.5Y/4/3	Oxic
						6-15	mG	Muddy gravel	GLEY1/2.5/N	Anoxic

Date	Time [UTC]	Station	Sample Rep	Fix No.	Sample Depth [cm]	Sediment Description (including stratigraphy)				Comments (fauna, smell, bioturbation, debris)
						Depth [cm]	Sediment Type	Sediment Description	Munsell Colour	
14/11/2020	10:26	CS07	1	H18	18	0-4	msG	Muddy sandy gravel with pebbles	2.5Y/3/2	Lower shore. with pebbles. Oxic
						4-18	msG	Muddy sandy gravel with pebbles	2.5Y/3/1	-
14/11/2020	10:28	CS08	1	H19	13	0-5	mG	Muddy gravel	2.5Y/3/2	Mid shore. Oxic. ASB
						5-13	mG	Muddy gravel	GLEY1/2.5/N	Anoxic
17/11/2020	07:48	GS-26	FA	6	16	0-2	M	Mud	2.5Y/3/3	Worms. Oil smell
						2-16	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	07:59	GS-26	PC	7	14	0-2	M	Mud	2.5Y/3/3	Oil smell
						2-14	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	08:28	GS-15	FA	8	13	0-2	M	Mud and shell	2.5Y/3/3	Oil smell
						2-13	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	08:34	GS-15	PC	9	14	0-2	M	Mud	2.5Y/4/3	Oil smell. ASB
						2-14	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	08:48	GS-09	FA	10	14	0-2	M	Mud	2.5Y/4/3	-
						2-14	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	08:54	GS-09	PC	11	14	0-2	M	Mud	2.5Y/4/3	-
						2-14	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	09:13	GS-24	FA	12	12	0-2	M	Mud	2.5Y/4/3	-
						2-12	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	09:18	GS-24	PC	13	15	0-0.5	M	Mud and shell	2.5Y/4/3	ASB
						0.5-15	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	09:34	GS-08	FA	14	13	NL	mG	Muddy gravel	2.5Y/3/2	-
17/11/2020	09:44	GS-08	NS	15	-	-	-	-	-	Stone in jaws

Date	Time [UTC]	Station	Sample Rep	Fix No.	Sample Depth [cm]	Sediment Description (including stratigraphy)				Comments (fauna, smell, bioturbation, debris)
						Depth [cm]	Sediment Type	Sediment Description	Munsell Colour	
17/11/2020	09:49	GS-08	PC	16	17	NL	mG	Muddy gravel	2.5Y/3/2	-
17/11/2020	10:19	GS-07	FA	17	17	0-2	M	Mud	2.5Y/3/2	-
						2-17	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	10:33	GS-07	PC	18	13	0-2	M	Mud	2.5Y/3/2	-
						2-13	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	16:09	GS-25	FA	27	14	0-0.5	M	Mud	2.5Y/3/2	-
						0.5-14	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	16:19	GS-25	PC	28	12	0-0.5	M	Mud	2.5Y/3/2	ASB
						0.5-14	M	Mud	GLEY1/2.5/N	Anoxic
17/11/2020	16:39	GS-13	FA	29	10	0-2	sM	Sandy mud	2.5Y/3/2	-
						2-10	sM	Sandy mud	GLEY1/2.5/N	Anoxic
17/11/2020	16:46	GS-13	PC	30	12	0-2	sM	Sandy mud	2.5Y/3/2	-
						2-12	sM	Sandy mud	GLEY1/2.5/N	Anoxic
17/11/2020	16:57	GS-14	FA	31	6	NL	gsM	Gravelly, sandy mud	2.5Y/3/2	-
17/11/2020	17:04	GS-14	PC	32	10	NL	gsM	Gravelly, sandy mud	2.5Y/3/2	ASB
18/11/2020	09:44	GS-17	NS	37	-	-	-	Muddy gravel and pebbles	-	Stone in jaws
18/11/2020	09:46	GS-17	NS	38	-	-	-	Pebbles	-	Stone in jaws
18/11/2020	09:49	GS-17	NS	39	-	-	-	Pebbles	-	Stone in jaws
18/11/2020	09:50	GS-17	NS	40	-	-	-	Pebbles	-	Stone in jaws. Station abandoned
18/11/2020	09:59	GS-10	FA	41	12	0-2	gM	Gravelly mud with pebbles	2.5Y/3/2	-
						2-12	gM	Gravelly mud with pebbles	GLEY1/2.5/N	Anoxic

Date	Time [UTC]	Station	Sample Rep	Fix No.	Sample Depth [cm]	Sediment Description (including stratigraphy)				Comments (fauna, smell, bioturbation, debris)
						Depth [cm]	Sediment Type	Sediment Description	Munsell Colour	
18/11/2020	10:04	GS-10	PC	42	10	0-2	gM	Gravelly mud with pebbles	2.5Y/3/2	ASB
						2-12	gM	Gravelly mud with pebbles	GLEY1/2.5/N	Anoxic
18/11/2020	10:16	GS-11	FA	43	16	0-0.5	M	Mud	2.5Y/3/2	-
						0.5-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	10:22	GS-11	PC	44	16	0-0.5	M	Mud	2.5Y/3/2	-
						0.5-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	10:38	GS-21	FA	45	16	0-0.5	M	Mud	2.5Y/3/2	-
						0.5-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	10:44	GS-21	PC	46	16	0-0.5	M	Mud	2.5Y/3/2	ASB
						0.5-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	11:46	GS-04	FA	47	14	0-2	sM	Sandy mud	2.5Y/3/2	-
						2-14	sM	Sandy mud	GLEY1/2.5/N	Anoxic
18/11/2020	11:53	GS-04	PC	48	14	0-2	sM	Sandy mud	2.5Y/3/2	-
						2-14	sM	Sandy mud	GLEY1/2.5/N	Anoxic
18/11/2020	12:10	GS-03	FA	49	15	0-0.5	M	Mud	2.5Y/3/2	-
						0.5-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	12:16	GS-03	PC	50	16	0-0.5	M	Mud	2.5Y/3/2	ASB
						0.5-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	12:33	GS-02	FA	51	15	0-0.5	M	Mud	2.5Y/3/2	-
						0.5-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	12:37	GS-02	PC	52	16	0-0.5	M	Mud	2.5Y/3/2	-
						0.5-16	M	Mud	GLEY1/2.5/N	Anoxic

Date	Time [UTC]	Station	Sample Rep	Fix No.	Sample Depth [cm]	Sediment Description (including stratigraphy)				Comments (fauna, smell, bioturbation, debris)
						Depth [cm]	Sediment Type	Sediment Description	Munsell Colour	
18/11/2020	12:51	GS-01	FA	53	15	0-2	M	Mud	2.5Y/3/2	-
						2-15	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	12:56	GS-01	PC	54	15	0-2	M	Mud	2.5Y/3/2	ASB
						2-15	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	13:21	GS-06	FA	55	14	0-2	M	Mud	2.5Y/3/2	-
						2-14	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	13:27	GS-06	PC	56	16	0-2	M	Mud	2.5Y/3/2	-
						2-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	13:42	GS-05	FA	57	16	0-2	M	Mud	2.5Y/3/2	-
						2-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	13:49	GS-05	PC	58	16	0-2	M	Mud	2.5Y/3/2	ASB
						2-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	14:03	GS-22	FA	59	16	0-2	M	Mud	2.5Y/3/2	-
						2-16	M	Mud	GLEY1/2.5/N	Anoxic
18/11/2020	14:11	GS-22	PC	60	16	0-2	M	Mud	2.5Y/3/2	-
						2-16	M	Mud	GLEY1/2.5/N	Anoxic
19/11/2020	08:26:38	GS_20	FA	INT21	3	NL	sM	Sandy mud	2.5Y/3/2	Small, combined
19/11/2020	08:27:57	GS_20	FA	INT22	4	NL	sM	Sandy mud	2.5Y/3/2	Small, combined
19/11/2020	08:31:58	GS_20	PC	INT23	4	NL	sM	Sandy mud	2.5Y/3/2	ASB
19/11/2020	08:38:27	GS_19	FA	INT24	3	NL	sM	Sandy mud	2.5Y/3/2	Small, combined
19/11/2020	08:41:01	GS_19	FA	INT25	3	NL	sM	Sandy mud	2.5Y/3/2	Small, combined

Date	Time [UTC]	Station	Sample Rep	Fix No.	Sample Depth [cm]	Sediment Description (including stratigraphy)				Comments (fauna, smell, bioturbation, debris)
						Depth [cm]	Sediment Type	Sediment Description	Munsell Colour	
19/11/2020	08:42:56	GS_19	PC	INT26	4	NL	sM	Sandy mud	2.5Y/3/2	ASB
19/11/2020	08:51:05	GS_18	FA	INT27	6	NL	M	Mud	2.5Y/3/2	-
19/11/2020	08:57:05	GS_18	PC	INT28	8	NL	M	Mud	2.5Y/3/2	ASB
19/11/2020	09:05:37	GS_16	FA	INT29	6	NL	M	Mud	2.5Y/3/2	-
19/11/2020	09:08:07	GS_16	PC	INT30	8	NL	M	Mud	2.5Y/3/2	ASB
19/11/2020	09:16:23	GS_12	PC	INT31	3	NL	M	Mud	2.5Y/3/2	-
19/11/2020	09:22:07	GS_12	FA	INT32	3	NL	M	Mud	2.5Y/3/2	Small, combined
19/11/2020	09:23:25	GS_12	FA	INT33	3	NL	M	Mud	2.5Y/3/2	Small, combined
19/11/2020	09:27:24	GS_23	NS	INT34	-	-	-	No sample - too small	-	-
19/11/2020	09:28:19	GS_23	FA	INT35	3	NL	M	Mud	2.5Y/3/2	Small, combined
19/11/2020	09:30:18	GS_23	FA	INT36	3	NL	M	Mud	2.5Y/3/2	Small, combined
19/11/2020	09:32:08	GS_23	NS	INT37	-	-	-	No sample - too small	-	-
19/11/2020	09:33:37	GS_23	PC	INT38	3	NL	M	Mud	2.5Y/3/2	-

Notes
UTC = Coordinated Universal Time
FA = Faunal sample
PC = Physicochemical samples
NS = No sample
ASB = Asbestos screening sample
NL = No layering
mS = Muddy sand
mG = Muddy gravel
M = Mud
msG = Muddy, sandy gravel
sM = Sandy mud
gsM = Gravelly sandy mud

Appendix C

Sediment Particle Size and Grab Sample Photographs

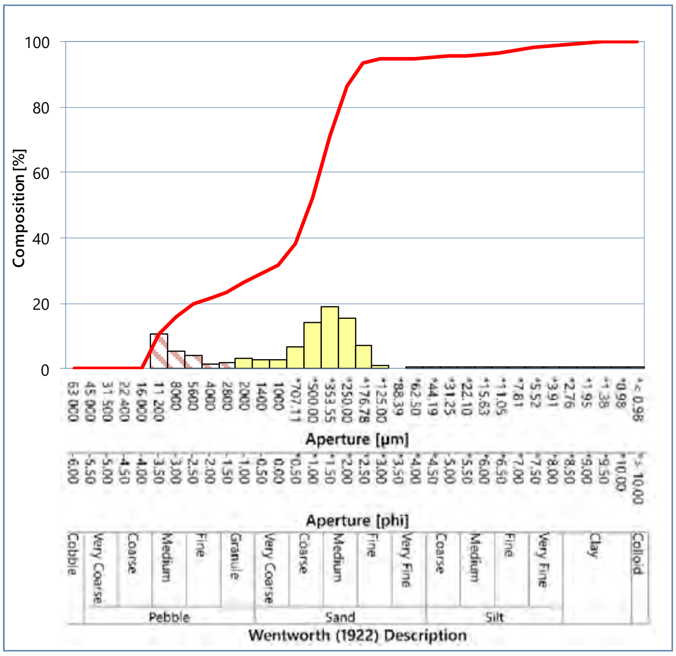
C.1 Intertidal Core Samples

STATION: CS_01

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	10.49	10.49
8000	-3.00	5.25	15.74
5600	-2.50	4.02	19.76
4000	-2.00	1.62	21.38
2800	-1.50	1.76	23.14
2000	-1.00	3.05	26.19
1400	-0.50	2.82	29.02
1000	0.00	2.83	31.85
*707.11	*0.50	6.50	38.35
*500.00	*1.00	13.94	52.30
*353.55	*1.50	18.82	71.12
*250.00	*2.00	15.47	86.59
*176.78	*2.50	6.94	93.53
*125.00	*3.00	0.97	94.50
*88.39	*3.50	0.00	94.50
*62.50	*4.00	0.02	94.52
*44.19	*4.50	0.43	94.95
*31.25	*5.00	0.49	95.45
*22.10	*5.50	0.32	95.77
*15.63	*6.00	0.32	96.08
*11.05	*6.50	0.50	96.59
*7.81	*7.00	0.70	97.29
*5.52	*7.50	0.76	98.05
*3.91	*8.00	0.68	98.73
*2.76	*8.50	0.52	99.25
*1.95	*9.00	0.35	99.60
*1.38	*9.50	0.22	99.82
*0.98	*10.00	0.15	99.97
*< 0.98	*> 10.00	0.03	100.00
Total		**100.00**	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm][†]	427	Medium sand
Mode 2 [µm][†]	13600	Medium pebble
Mode 3 [µm][†]	2400	Granule
Median [µm][†]	529	Coarse sand
Median [phi][†]	0.92	
Mean [µm][‡]	1031	Very coarse sand
Mean [phi][‡]	-0.04	
Sorting [µm][‡]	5.57	Very poorly sorted
Sorting [phi][‡]	2.48	
Skewness [µm][‡]	0.36	Very coarse skewed
Skewness [phi][‡]	-0.36	
Gravel [%][#]	26.19	Gravelly sand
Sand [%][#]	68.33	
Fines [%][#]	5.48	

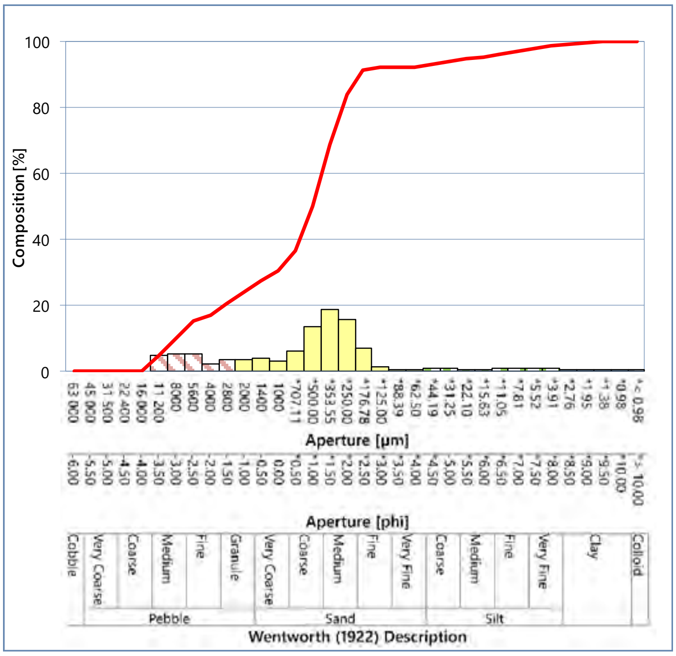
Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: CS_02

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	4.80	4.80
8000	-3.00	5.09	9.88
5600	-2.50	5.16	15.04
4000	-2.00	2.01	17.05
2800	-1.50	3.32	20.38
2000	-1.00	3.36	23.73
1400	-0.50	3.76	27.49
1000	0.00	3.01	30.50
*707.11	*0.50	5.91	36.41
*500.00	*1.00	13.45	49.86
*353.55	*1.50	18.63	68.48
*250.00	*2.00	15.51	83.99
*176.78	*2.50	7.08	91.07
*125.00	*3.00	1.14	92.21
*88.39	*3.50	0.00	92.21
*62.50	*4.00	0.11	92.32
*44.19	*4.50	0.72	93.04
*31.25	*5.00	0.84	93.88
*22.10	*5.50	0.69	94.56
*15.63	*6.00	0.68	95.25
*11.05	*6.50	0.82	96.07
*7.81	*7.00	0.93	97.00
*5.52	*7.50	0.90	97.90
*3.91	*8.00	0.74	98.64
*2.76	*8.50	0.54	99.18
*1.95	*9.00	0.36	99.55
*1.38	*9.50	0.23	99.78
*0.98	*10.00	0.15	99.93
*< 0.98	*> 10.00	0.07	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	427	Medium sand
Mode 2 [µm]†	9600	Medium pebble
Mode 3 [µm]†	1700	Very coarse sand
Median [µm]†	499	Medium sand
Median [phi]†	1.00	
Mean [µm]‡	841	Coarse sand
Mean [phi]‡	0.25	
Sorting [µm]‡	5.54	Very poorly sorted
Sorting [phi]‡	2.47	
Skewness [µm]‡	0.25	Coarse skewed
Skewness [phi]‡	-0.25	
Gravel [%]#	23.73	Gravelly muddy sand
Sand [%]#	68.59	
Fines [%]#	7.68	

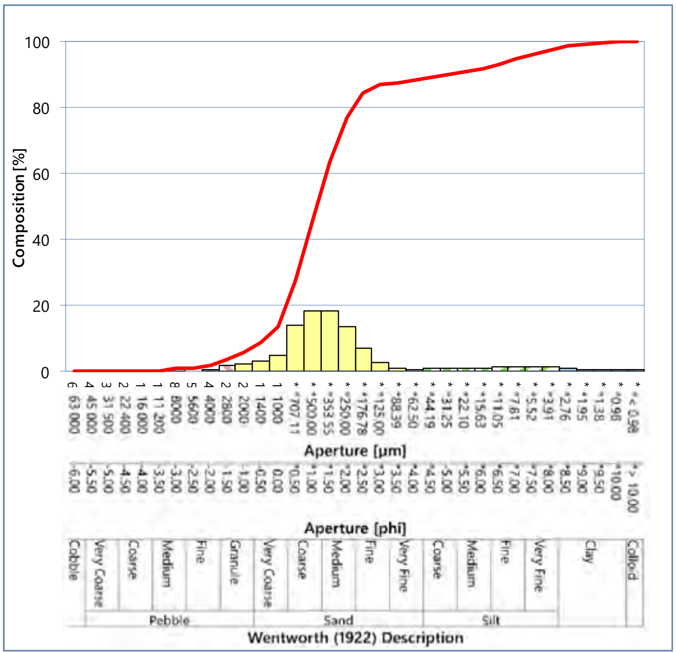
Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: CS_03

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	1.11	1.11
5600	-2.50	0.00	1.11
4000	-2.00	0.67	1.78
2800	-1.50	1.62	3.40
2000	-1.00	2.09	5.49
1400	-0.50	3.22	8.70
1000	0.00	4.82	13.52
*707.11	*0.50	13.81	27.33
*500.00	*1.00	18.12	45.45
*353.55	*1.50	18.20	63.65
*250.00	*2.00	13.49	77.14
*176.78	*2.50	7.07	84.21
*125.00	*3.00	2.52	86.73
*88.39	*3.50	0.80	87.53
*62.50	*4.00	0.68	88.22
*44.19	*4.50	0.84	89.05
*31.25	*5.00	0.83	89.88
*22.10	*5.50	0.84	90.73
*15.63	*6.00	1.03	91.76
*11.05	*6.50	1.32	93.08
*7.81	*7.00	1.53	94.61
*5.52	*7.50	1.54	96.15
*3.91	*8.00	1.35	97.50
*2.76	*8.50	1.01	98.51
*1.95	*9.00	0.66	99.17
*1.38	*9.50	0.38	99.55
*0.98	*10.00	0.23	99.78
*< 0.98	*> 10.00	0.22	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	427	Medium sand
Mode 2 [µm]†	-	-
Mode 3 [µm]†	-	-
Median [µm]†	459	Medium sand
Median [phi]†	1.12	
Mean [µm]†‡	425	Medium sand
Mean [phi]†‡	1.23	
Sorting [µm]‡	3.60	Poorly sorted
Sorting [phi]‡	1.85	
Skewness [µm]‡	-0.30	Fine skewed
Skewness [phi]‡	0.30	
Gravel [%]#	5.49	Gravelly muddy sand
Sand [%]#	82.73	
Fines [%]#	11.78	

Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

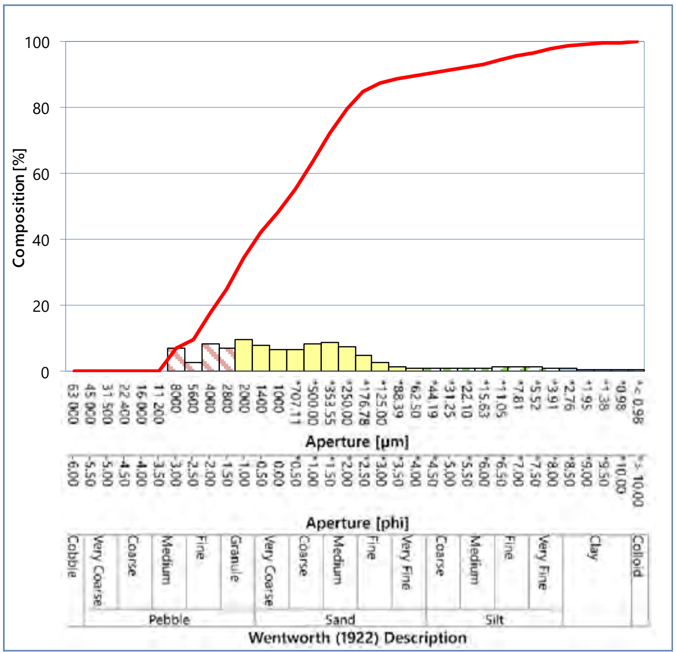
STATION: CS_04

No available photograph

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	7.15	7.15
5600	-2.50	2.48	9.63
4000	-2.00	8.14	17.77
2800	-1.50	6.92	24.69
2000	-1.00	9.46	34.15
1400	-0.50	7.89	42.04
1000	0.00	6.41	48.45
*707.11	*0.50	6.66	55.11
*500.00	*1.00	8.34	63.45
*353.55	*1.50	8.76	72.21
*250.00	*2.00	7.41	79.62
*176.78	*2.50	4.95	84.57
*125.00	*3.00	2.69	87.26
*88.39	*3.50	1.39	88.66
*62.50	*4.00	0.91	89.57
*44.19	*4.50	0.81	90.38
*31.25	*5.00	0.82	91.21
*22.10	*5.50	0.89	92.09
*15.63	*6.00	1.00	93.10
*11.05	*6.50	1.13	94.23
*7.81	*7.00	1.21	95.44
*5.52	*7.50	1.18	96.62
*3.91	*8.00	1.04	97.66
*2.76	*8.50	0.82	98.48
*1.95	*9.00	0.57	99.04
*1.38	*9.50	0.36	99.40
*0.98	*10.00	0.24	99.64
*< 0.98	*> 10.00	0.36	100.00
Total		**100.00**	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	2400	Granule
Mode 2 [µm]†	427	Medium sand
Mode 3 [µm]†	4800	Fine pebble
Median [µm]†	923	Coarse sand
Median [phi]†	0.12	
Mean [µm]†‡	901	Coarse sand
Mean [phi]†‡	0.15	
Sorting [µm]‡	6.26	Very poorly sorted
Sorting [phi]‡	2.65	
Skewness [µm]‡	-0.18	Fine skewed
Skewness [phi]‡	0.18	
Gravel [%]#	34.15	Muddy, sandy gravel
Sand [%]#	55.42	
Fines [%]#	10.43	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

\# = Description based on BGS modified Folk classification (Long, 2006)

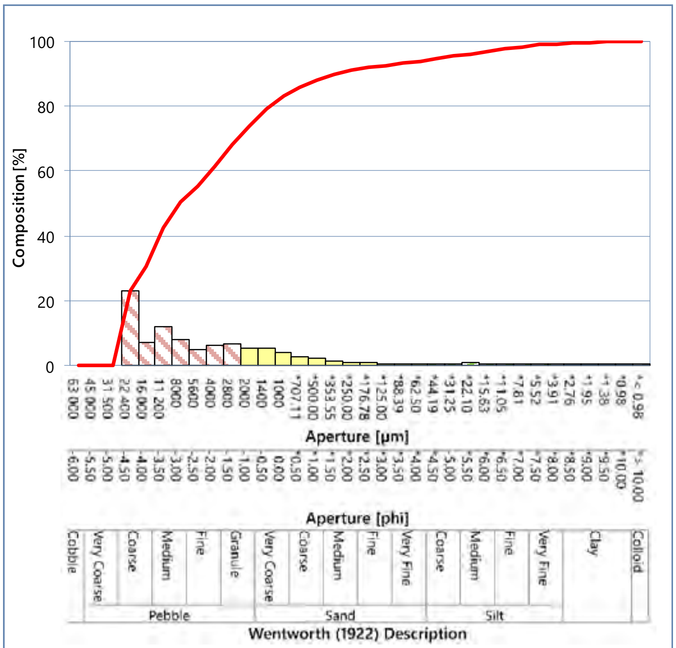
STATION: CS_05

No available photograph

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	23.06	23.06
16 000	-4.00	7.40	30.47
11 200	-3.50	11.89	42.35
8000	-3.00	8.11	50.47
5600	-2.50	4.95	55.41
4000	-2.00	6.22	61.63
2800	-1.50	6.66	68.29
2000	-1.00	5.42	73.71
1400	-0.50	5.31	79.03
1000	0.00	4.10	83.13
*707.11	*0.50	2.83	85.96
*500.00	*1.00	2.24	88.20
*353.55	*1.50	1.64	89.84
*250.00	*2.00	1.21	91.05
*176.78	*2.50	0.91	91.96
*125.00	*3.00	0.69	92.65
*88.39	*3.50	0.58	93.23
*62.50	*4.00	0.61	93.84
*44.19	*4.50	0.71	94.56
*31.25	*5.00	0.80	95.36
*22.10	*5.50	0.84	96.20
*15.63	*6.00	0.81	97.01
*11.05	*6.50	0.73	97.74
*7.81	*7.00	0.63	98.37
*5.52	*7.50	0.51	98.87
*3.91	*8.00	0.39	99.26
*2.76	*8.50	0.27	99.53
*1.95	*9.00	0.18	99.71
*1.38	*9.50	0.11	99.82
*0.98	*10.00	0.07	99.89
*< 0.98	*> 10.00	0.11	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	26950	Coarse pebble
Mode 2 [µm]†	13600	Medium pebble
Mode 3 [µm]†	3400	Granule
Median [µm]†	8156	Medium pebble
Median [phi]†	-3.03	
Mean [µm]‡	5670	Fine pebble
Mean [phi]‡	-2.50	
Sorting [µm]‡	6.32	Very poorly sorted
Sorting [phi]‡	2.66	
Skewness [µm]‡	-0.47	Very fine skewed
Skewness [phi]‡	0.47	
Gravel [%]#	73.71	Muddy, sandy gravel
Sand [%]#	20.13	
Fines [%]#	6.16	

Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

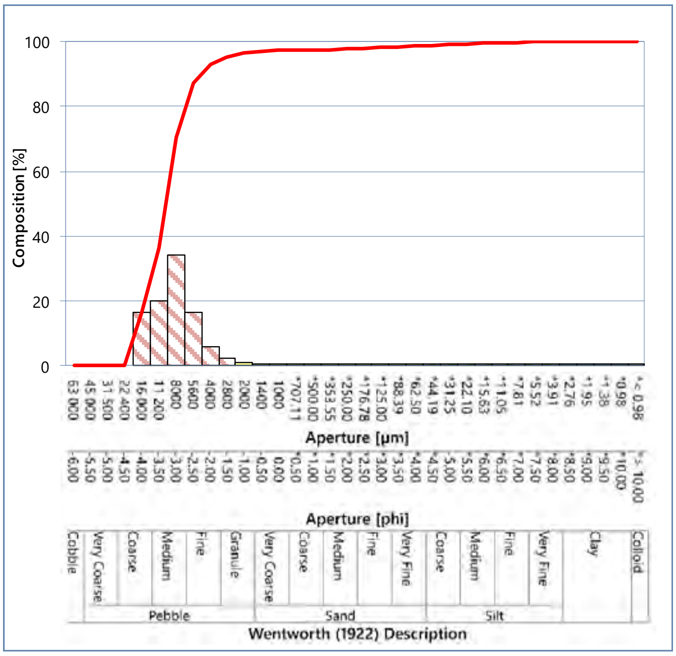
STATION: CS_06

No available photograph

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	16.37	16.37
11 200	-3.50	19.87	36.24
8000	-3.00	34.04	70.28
5600	-2.50	16.67	86.95
4000	-2.00	5.90	92.85
2800	-1.50	2.25	95.10
2000	-1.00	1.19	96.29
1400	-0.50	0.53	96.82
1000	0.00	0.27	97.09
*707.11	*0.50	0.14	97.23
*500.00	*1.00	0.14	97.37
*353.55	*1.50	0.15	97.52
*250.00	*2.00	0.16	97.67
*176.78	*2.50	0.18	97.85
*125.00	*3.00	0.21	98.06
*88.39	*3.50	0.23	98.30
*62.50	*4.00	0.24	98.54
*44.19	*4.50	0.24	98.78
*31.25	*5.00	0.23	99.01
*22.10	*5.50	0.21	99.22
*15.63	*6.00	0.19	99.41
*11.05	*6.50	0.16	99.57
*7.81	*7.00	0.13	99.70
*5.52	*7.50	0.10	99.79
*3.91	*8.00	0.07	99.86
*2.76	*8.50	0.05	99.91
*1.95	*9.00	0.03	99.94
*1.38	*9.50	0.02	99.96
*0.98	*10.00	0.01	99.97
*< 0.98	*> 10.00	0.03	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	9600	Medium pebble
Mode 2 [µm]†	-	-
Mode 3 [µm]†	-	-
Median [µm]†	9776	Medium pebble
Median [phi]†	-3.29	
Mean [µm]‡	9797	Medium pebble
Mean [phi]‡	-3.29	
Sorting [µm]‡	1.73	Moderately sorted
Sorting [phi]‡	0.79	
Skewness [µm]‡	-0.13	Fine skewed
Skewness [phi]‡	0.13	
Gravel [%]#	96.29	Gravel
Sand [%]#	2.25	
Fines [%]#	1.46	

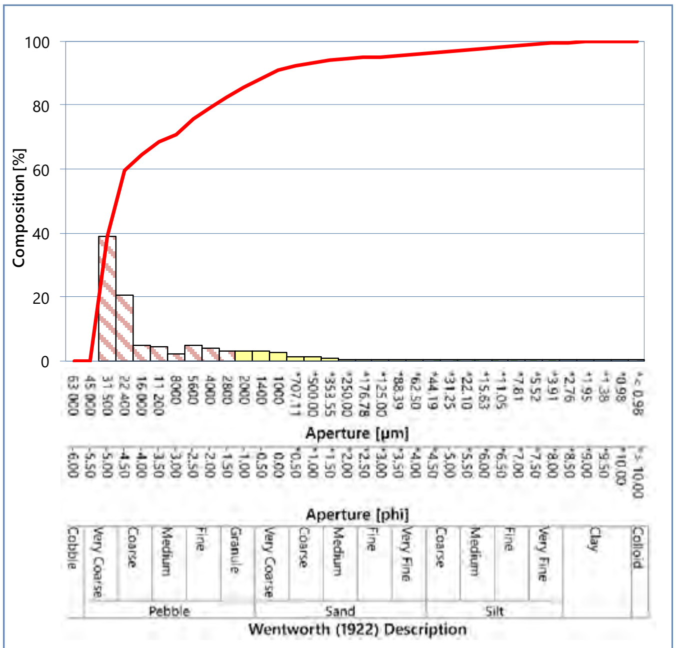
Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: CS_07

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	39.06	39.06
22 400	-4.50	20.62	59.69
16 000	-4.00	4.79	64.48
11 200	-3.50	4.18	68.65
8000	-3.00	2.21	70.86
5600	-2.50	4.88	75.74
4000	-2.00	3.70	79.44
2800	-1.50	3.19	82.62
2000	-1.00	2.90	85.52
1400	-0.50	2.87	88.39
1000	0.00	2.43	90.82
*707.11	*0.50	1.37	92.19
*500.00	*1.00	1.05	93.24
*353.55	*1.50	0.71	93.95
*250.00	*2.00	0.48	94.43
*176.78	*2.50	0.38	94.82
*125.00	*3.00	0.36	95.18
*88.39	*3.50	0.37	95.54
*62.50	*4.00	0.39	95.94
*44.19	*4.50	0.43	96.37
*31.25	*5.00	0.48	96.84
*22.10	*5.50	0.51	97.35
*15.63	*6.00	0.52	97.88
*11.05	*6.50	0.50	98.38
*7.81	*7.00	0.45	98.83
*5.52	*7.50	0.37	99.20
*3.91	*8.00	0.28	99.48
*2.76	*8.50	0.19	99.67
*1.95	*9.00	0.12	99.80
*1.38	*9.50	0.07	99.87
*0.98	*10.00	0.05	99.92
*< 0.98	*> 10.00	0.08	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	38250	Very coarse pebble
Mode 2 [µm]†	-	-
Mode 3 [µm]†	-	-
Median [µm]†	26290	Coarse pebble
Median [phi]†	-4.72	
Mean [µm]†‡	13462	Medium pebble
Mean [phi]†‡	-3.75	
Sorting [µm]‡	4.74	Very poorly sorted
Sorting [phi]‡	2.25	
Skewness [µm]‡	-0.77	Very fine skewed
Skewness [phi]‡	0.77	
Gravel [%]#	85.52	Gravel
Sand [%]#	10.41	
Fines [%]#	4.06	

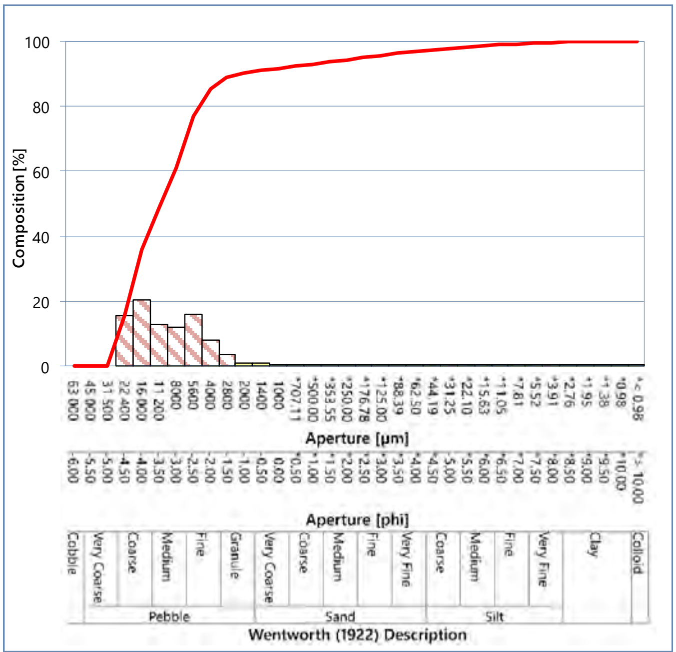
Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: CS_08

FRACTIONAL DATA

Aperture [μm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	15.51	15.51
16 000	-4.00	20.29	35.81
11 200	-3.50	12.98	48.78
8000	-3.00	12.18	60.96
5600	-2.50	16.19	77.15
4000	-2.00	8.18	85.34
2800	-1.50	3.55	88.89
2000	-1.00	1.21	90.10
1400	-0.50	0.94	91.03
1000	0.00	0.68	91.72
*707.11	*0.50	0.58	92.30
*500.00	*1.00	0.68	92.97
*353.55	*1.50	0.72	93.70
*250.00	*2.00	0.73	94.43
*176.78	*2.50	0.70	95.12
*125.00	*3.00	0.63	95.75
*88.39	*3.50	0.55	96.31
*62.50	*4.00	0.49	96.80
*44.19	*4.50	0.47	97.27
*31.25	*5.00	0.46	97.73
*22.10	*5.50	0.44	98.17
*15.63	*6.00	0.41	98.59
*11.05	*6.50	0.37	98.95
*7.81	*7.00	0.31	99.26
*5.52	*7.50	0.24	99.50
*3.91	*8.00	0.18	99.68
*2.76	*8.50	0.12	99.80
*1.95	*9.00	0.08	99.87
*1.38	*9.50	0.04	99.92
*0.98	*10.00	0.03	99.95
*< 0.98	*> 10.00	0.05	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [μm]†	19200	Coarse pebble
Mode 2 [μm]†	6800	Fine pebble
Mode 3 [μm]†	-	-
Median [μm]†	10830	Medium pebble
Median [phi]†	-3.44	
Mean [μm]‡	10056	Medium pebble
Mean [phi]‡	-3.33	
Sorting [μm]‡	3.24	Poorly sorted
Sorting [phi]‡	1.69	
Skewness [μm]‡	-0.38	Very fine skewed
Skewness [phi]‡	0.38	
Gravel [%]#	90.10	Gravel
Sand [%]#	6.71	
Fines [%]#	3.20	

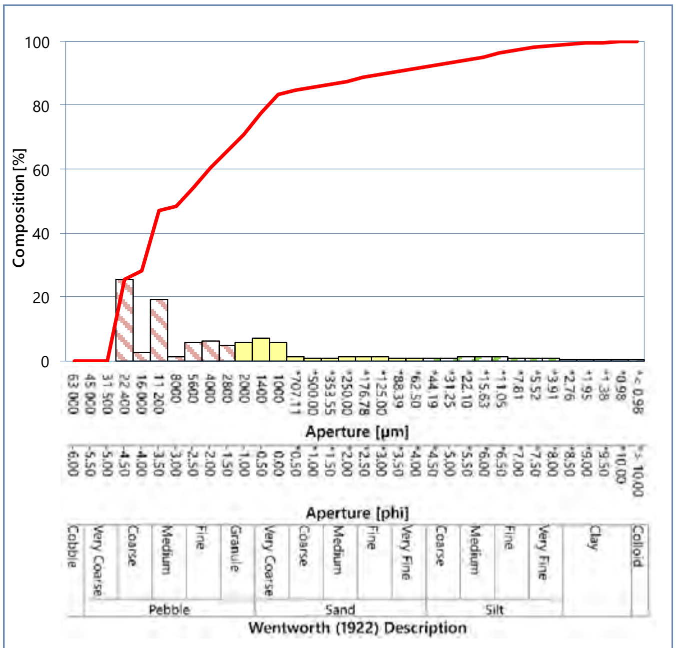
Notes
Particle Size Distribution by Dry Sieving (63 000 μm - 1000 μm) and Laser Diffraction* (< 1000 μm - < 0.98 μm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: CS_09

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
> 63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	25.57	25.57
16 000	-4.00	2.42	27.99
11 200	-3.50	19.11	47.10
8000	-3.00	1.40	48.50
5600	-2.50	5.77	54.28
4000	-2.00	6.09	60.37
2800	-1.50	4.99	65.35
2000	-1.00	5.50	70.85
1400	-0.50	6.82	77.67
1000	0.00	5.71	83.39
*707.11	*0.50	1.10	84.49
*500.00	*1.00	0.94	85.44
*353.55	*1.50	0.94	86.38
*250.00	*2.00	1.09	87.46
*176.78	*2.50	1.18	88.65
*125.00	*3.00	1.11	89.75
*88.39	*3.50	0.92	90.68
*62.50	*4.00	0.79	91.47
*44.19	*4.50	0.79	92.25
*31.25	*5.00	0.88	93.13
*22.10	*5.50	0.98	94.11
*15.63	*6.00	1.04	95.14
*11.05	*6.50	1.03	96.17
*7.81	*7.00	0.96	97.14
*5.52	*7.50	0.84	97.98
*3.91	*8.00	0.67	98.65
*2.76	*8.50	0.49	99.14
*1.95	*9.00	0.32	99.47
*1.38	*9.50	0.20	99.67
*0.98	*10.00	0.13	99.80
*< 0.98	*> 10.00	0.20	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	26950	Coarse pebble
Mode 2 [µm]†	13600	Medium pebble
Mode 3 [µm]†	1700	Very coarse sand
Median [µm]†	7293	Fine pebble
Median [phi]†	-2.87	
Mean [µm]†‡	5350	Fine pebble
Mean [phi]†‡	-2.42	
Sorting [µm]‡	7.34	Very poorly sorted
Sorting [phi]‡	2.87	
Skewness [µm]‡	-0.45	Very fine skewed
Skewness [phi]‡	0.45	
Gravel [%]#	70.85	Muddy, sandy gravel
Sand [%]#	20.61	
Fines [%]#	8.53	

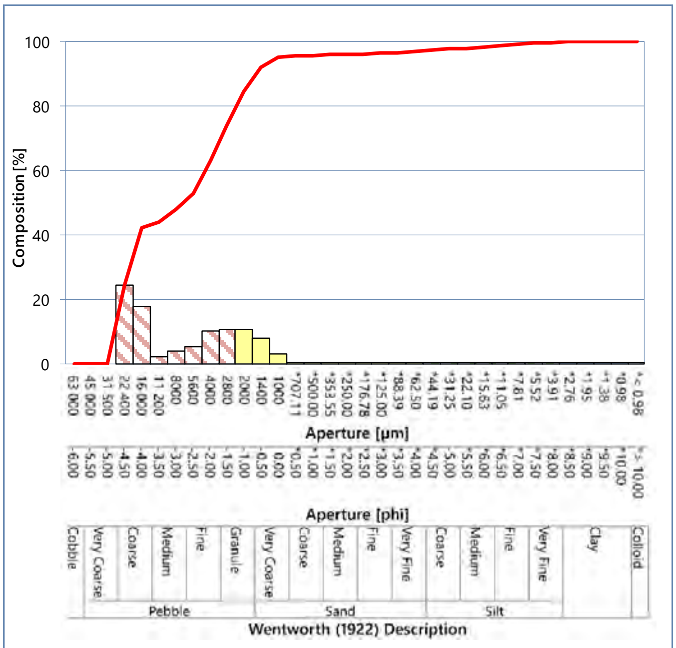
Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: CS_10

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	24.22	24.22
16 000	-4.00	17.69	41.92
11 200	-3.50	2.07	43.99
8000	-3.00	3.96	47.95
5600	-2.50	4.95	52.90
4000	-2.00	10.23	63.13
2800	-1.50	10.43	73.56
2000	-1.00	10.70	84.26
1400	-0.50	7.76	92.01
1000	0.00	3.10	95.12
*707.11	*0.50	0.26	95.38
*500.00	*1.00	0.20	95.58
*353.55	*1.50	0.15	95.74
*250.00	*2.00	0.15	95.88
*176.78	*2.50	0.17	96.05
*125.00	*3.00	0.21	96.26
*88.39	*3.50	0.25	96.51
*62.50	*4.00	0.29	96.80
*44.19	*4.50	0.34	97.14
*31.25	*5.00	0.39	97.53
*22.10	*5.50	0.42	97.95
*15.63	*6.00	0.42	98.38
*11.05	*6.50	0.40	98.77
*7.81	*7.00	0.34	99.11
*5.52	*7.50	0.28	99.39
*3.91	*8.00	0.21	99.60
*2.76	*8.50	0.14	99.74
*1.95	*9.00	0.09	99.83
*1.38	*9.50	0.06	99.88
*0.98	*10.00	0.04	99.92
*< 0.98	*> 10.00	0.08	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



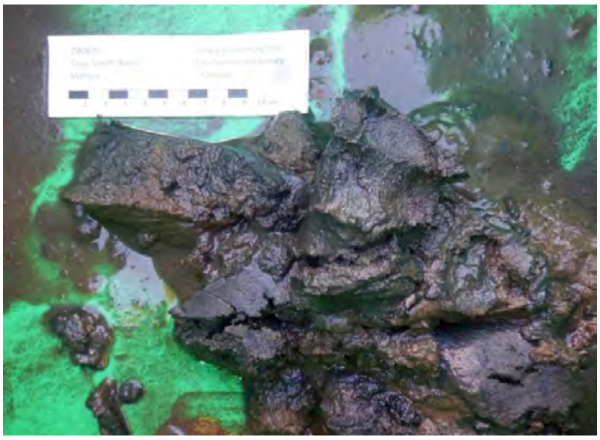
SUMMARY STATISTICS

Mode 1 [µm]†	26950	Coarse pebble
Mode 2 [µm]†	2400	Granule
Mode 3 [µm]†	4800	Fine pebble
Median [µm]†	6901	Fine pebble
Median [phi]†	-2.79	
Mean [µm]†‡	7047	Fine pebble
Mean [phi]†‡	-2.82	
Sorting [µm]‡	3.13	Poorly sorted
Sorting [phi]‡	1.65	
Skewness [µm]‡	-0.06	Symmetrical
Skewness [phi]‡	0.06	
Gravel [%]#	84.26	Gravel
Sand [%]#	12.54	
Fines [%]#	3.20	

Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

C.2 Mudflat Grab Samples

STATION: GS_12

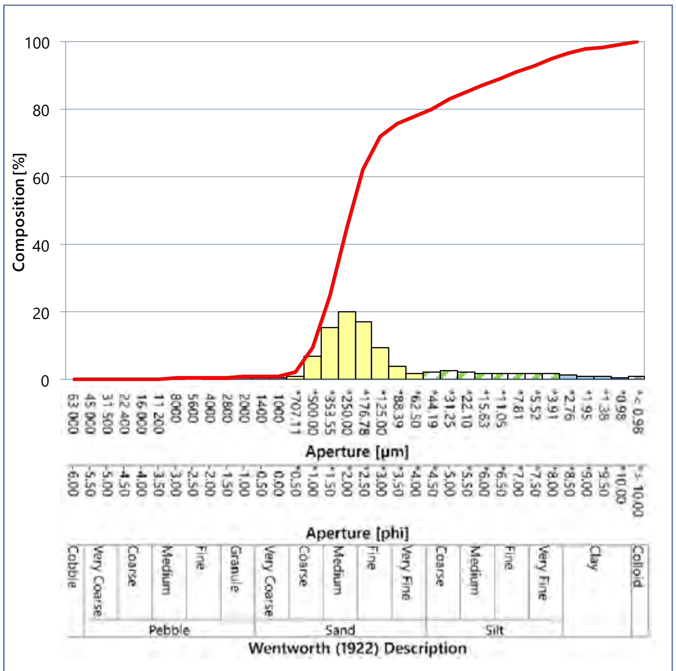


No available photograph

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.40	0.40
5600	-2.50	0.00	0.40
4000	-2.00	0.12	0.52
2800	-1.50	0.12	0.64
2000	-1.00	0.20	0.84
1400	-0.50	0.19	1.03
1000	0.00	0.18	1.21
*707.11	*0.50	1.20	2.42
*500.00	*1.00	7.00	9.42
*353.55	*1.50	15.42	24.83
*250.00	*2.00	20.22	45.05
*176.78	*2.50	17.21	62.27
*125.00	*3.00	9.68	71.95
*88.39	*3.50	3.89	75.84
*62.50	*4.00	2.07	77.91
*44.19	*4.50	2.37	80.29
*31.25	*5.00	2.63	82.92
*22.10	*5.50	2.34	85.26
*15.63	*6.00	1.98	87.24
*11.05	*6.50	1.87	89.11
*7.81	*7.00	1.96	91.07
*5.52	*7.50	2.02	93.09
*3.91	*8.00	1.91	95.00
*2.76	*8.50	1.61	96.61
*1.95	*9.00	1.20	97.81
*1.38	*9.50	0.81	98.62
*0.98	*10.00	0.56	99.18
*< 0.98	*> 10.00	0.82	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	302	Medium sand
Mode 2 [µm]†	-	-
Mode 3 [µm]†	-	-
Median [µm]†	226	Fine sand
Median [phi]†	2.14	
Mean [µm]‡	137	Fine sand
Mean [phi]‡	2.86	
Sorting [µm]‡	4.32	Very poorly sorted
Sorting [phi]‡	2.11	
Skewness [µm]‡	-0.57	Very fine skewed
Skewness [phi]‡	0.57	
Gravel [%]#	0.84	Muddy sand
Sand [%]#	77.08	
Fines [%]#	22.09	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

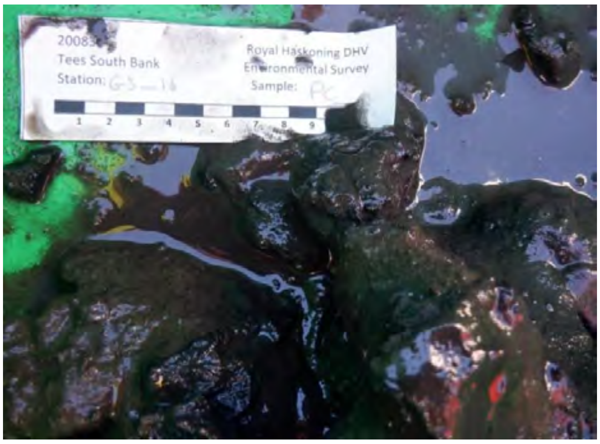
* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

= Description based on BGS modified Folk classification (Long, 2006)

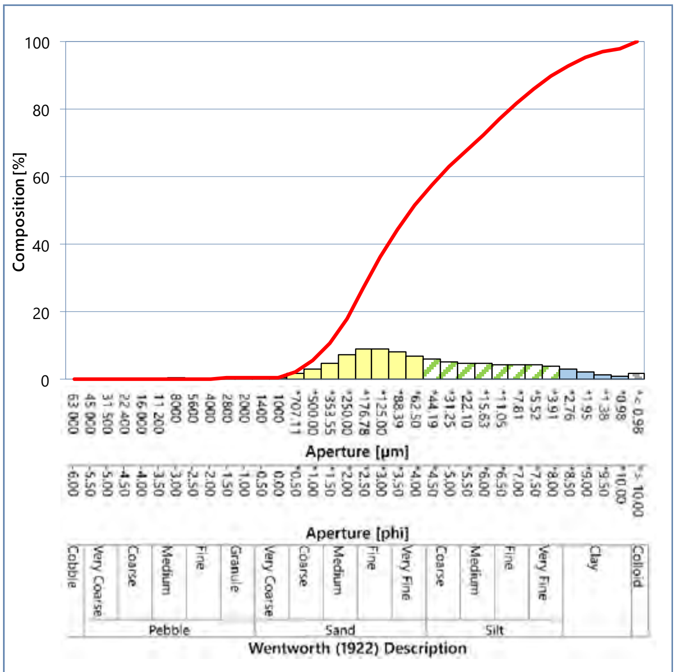
STATION: GS_16



FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.34	0.34
5600	-2.50	0.00	0.34
4000	-2.00	0.00	0.34
2800	-1.50	0.11	0.45
2000	-1.00	0.13	0.59
1400	-0.50	0.08	0.67
1000	0.00	0.09	0.76
*707.11	*0.50	1.74	2.50
*500.00	*1.00	3.06	5.56
*353.55	*1.50	5.04	10.59
*250.00	*2.00	7.31	17.90
*176.78	*2.50	8.96	26.87
*125.00	*3.00	9.29	36.16
*88.39	*3.50	8.42	44.58
*62.50	*4.00	7.08	51.66
*44.19	*4.50	5.98	57.64
*31.25	*5.00	5.32	62.96
*22.10	*5.50	4.96	67.92
*15.63	*6.00	4.73	72.65
*11.05	*6.50	4.55	77.20
*7.81	*7.00	4.42	81.62
*5.52	*7.50	4.25	85.87
*3.91	*8.00	3.88	89.75
*2.76	*8.50	3.22	92.98
*1.95	*9.00	2.39	95.37
*1.38	*9.50	1.62	96.98
*0.98	*10.00	1.13	98.11
*< 0.98	*> 10.00	1.89	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	151	Fine sand
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	68	Very fine sand
Median [phi]†	3.88	
Mean [µm]‡	49	Coarse silt
Mean [phi]‡	4.34	
Sorting [µm]‡	5.93	Very poorly sorted
Sorting [phi]‡	2.57	
Skewness [µm]‡	-0.26	Fine skewed
Skewness [phi]‡	0.26	
Gravel [%]#	0.59	Muddy sand
Sand [%]#	51.07	
Fines [%]#	48.34	

Notes

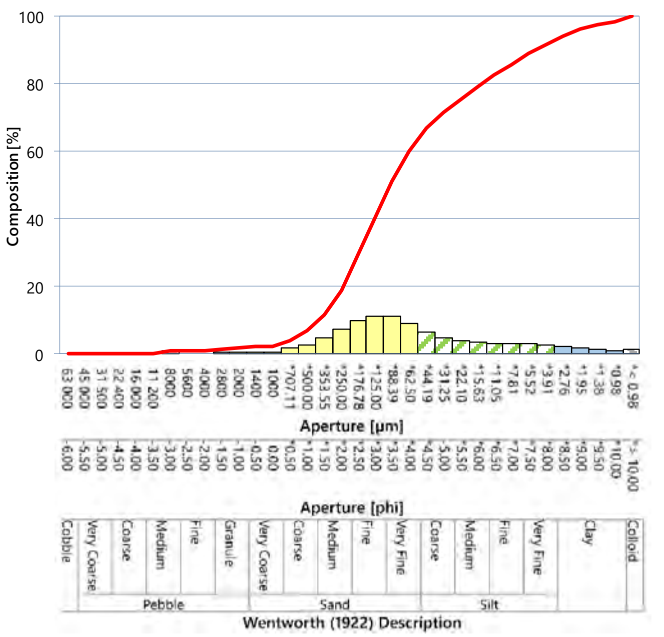
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_18

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	1.02	1.02
5600	-2.50	0.00	1.02
4000	-2.00	0.00	1.02
2800	-1.50	0.40	1.42
2000	-1.00	0.39	1.81
1400	-0.50	0.29	2.11
1000	0.00	0.24	2.34
*707.11	*0.50	1.79	4.14
*500.00	*1.00	2.91	7.05
*353.55	*1.50	4.70	11.75
*250.00	*2.00	7.25	18.99
*176.78	*2.50	9.90	28.89
*125.00	*3.00	11.43	40.32
*88.39	*3.50	11.02	51.34
*62.50	*4.00	9.00	60.34
*44.19	*4.50	6.60	66.94
*31.25	*5.00	4.82	71.76
*22.10	*5.50	3.89	75.65
*15.63	*6.00	3.52	79.16
*11.05	*6.50	3.35	82.51
*7.81	*7.00	3.24	85.76
*5.52	*7.50	3.13	88.89
*3.91	*8.00	2.91	91.80
*2.76	*8.50	2.49	94.29
*1.95	*9.00	1.89	96.19
*1.38	*9.50	1.31	97.50
*0.98	*10.00	0.93	98.42
*< 0.98	*> 10.00	1.58	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	151	Fine sand
Mode 2 [µm]†	-	-
Mode 3 [µm]†	-	-
Median [µm]†	92	Very fine sand
Median [phi]†	3.44	
Mean [µm]‡	63	Very fine sand
Mean [phi]‡	3.99	
Sorting [µm]‡	5.47	Very poorly sorted
Sorting [phi]‡	2.45	
Skewness [µm]‡	-0.32	Very fine skewed
Skewness [phi]‡	0.32	
Gravel [%]#	1.81	Muddy sand
Sand [%]#	58.53	
Fines [%]#	39.66	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

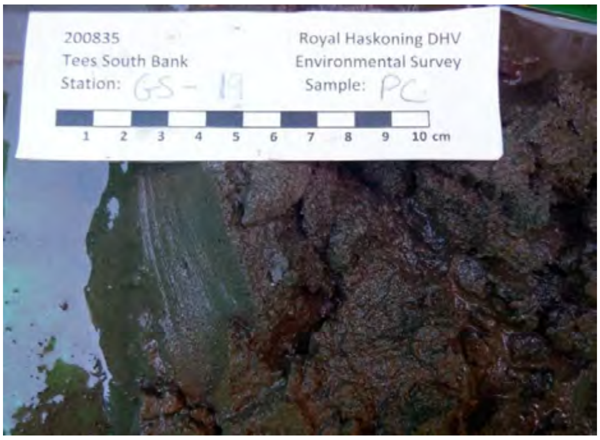
* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

\# = Description based on BGS modified Folk classification (Long, 2006)

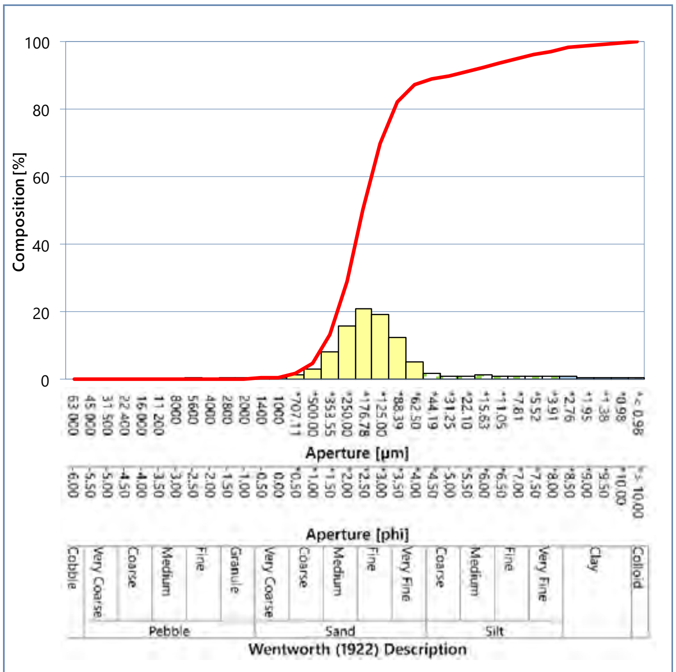
STATION: GS_19



FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.15	0.15
4000	-2.00	0.00	0.15
2800	-1.50	0.16	0.31
2000	-1.00	0.03	0.34
1400	-0.50	0.13	0.47
1000	0.00	0.08	0.54
*707.11	*0.50	1.30	1.84
*500.00	*1.00	3.13	4.97
*353.55	*1.50	8.30	13.27
*250.00	*2.00	15.96	29.23
*176.78	*2.50	21.11	50.34
*125.00	*3.00	19.41	69.75
*88.39	*3.50	12.40	82.15
*62.50	*4.00	5.37	87.52
*44.19	*4.50	1.68	89.20
*31.25	*5.00	0.91	90.11
*22.10	*5.50	1.15	91.26
*15.63	*6.00	1.27	92.53
*11.05	*6.50	1.21	93.74
*7.81	*7.00	1.18	94.92
*5.52	*7.50	1.21	96.13
*3.91	*8.00	1.17	97.30
*2.76	*8.50	0.97	98.27
*1.95	*9.00	0.69	98.96
*1.38	*9.50	0.43	99.39
*0.98	*10.00	0.28	99.66
*< 0.98	*> 10.00	0.34	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	213	Fine sand
Mode 2 [µm]†	-	-
Mode 3 [µm]†	-	-
Median [µm]†	178	Fine sand
Median [phi]†	2.49	
Mean [µm]‡	167	Fine sand
Mean [phi]‡	2.58	
Sorting [µm]‡	2.71	Poorly sorted
Sorting [phi]‡	1.44	
Skewness [µm]‡	-0.32	Very fine skewed
Skewness [phi]‡	0.32	
Gravel [%]#	0.34	Muddy sand
Sand [%]#	87.18	
Fines [%]#	12.48	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

= Description based on BGS modified Folk classification (Long, 2006)

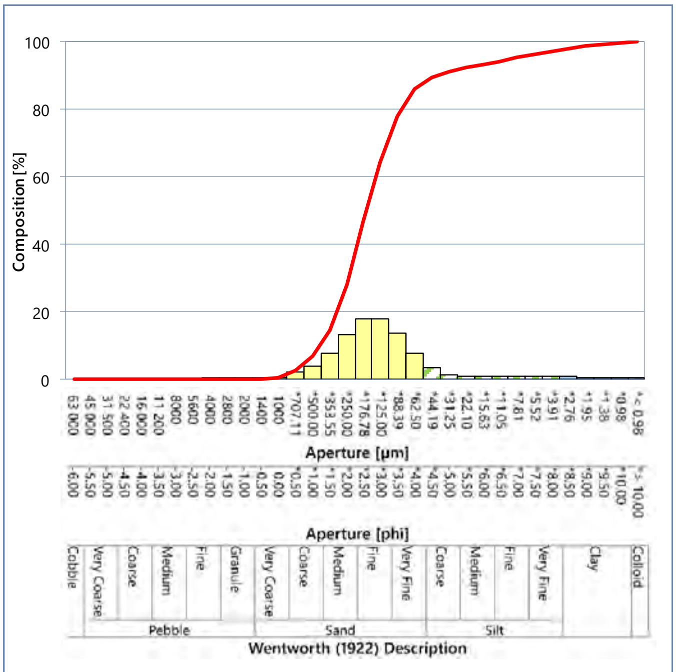
STATION: GS_20

No available photograph

FRACTIONAL DATA

Aperture [μm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.16	0.16
2800	-1.50	0.08	0.24
2000	-1.00	0.03	0.27
1400	-0.50	0.10	0.37
1000	0.00	0.15	0.52
*707.11	*0.50	2.40	2.91
*500.00	*1.00	4.07	6.99
*353.55	*1.50	7.82	14.80
*250.00	*2.00	13.48	28.28
*176.78	*2.50	18.04	46.32
*125.00	*3.00	18.11	64.43
*88.39	*3.50	13.69	78.12
*62.50	*4.00	7.87	85.99
*44.19	*4.50	3.60	89.60
*31.25	*5.00	1.63	91.22
*22.10	*5.50	1.10	92.32
*15.63	*6.00	1.02	93.35
*11.05	*6.50	0.98	94.33
*7.81	*7.00	0.95	95.28
*5.52	*7.50	0.97	96.25
*3.91	*8.00	0.97	97.22
*2.76	*8.50	0.88	98.10
*1.95	*9.00	0.68	98.78
*1.38	*9.50	0.46	99.24
*0.98	*10.00	0.32	99.56
*< 0.98	*> 10.00	0.44	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [μm]†	151	Fine sand
Mode 2 [μm]†	-	-
Mode 3 [μm]†	-	-
Median [μm]†	165	Fine sand
Median [phi]†	2.60	
Mean [μm]‡	157	Fine sand
Mean [phi]‡	2.67	
Sorting [μm]‡	2.84	Poorly sorted
Sorting [phi]‡	1.51	
Skewness [μm]‡	-0.24	Fine skewed
Skewness [phi]‡	0.24	
Gravel [%]#	0.27	Muddy sand
Sand [%]#	85.72	
Fines [%]#	14.01	

Notes

Particle Size Distribution by Dry Sieving (63 000 μm - 1000 μm) and Laser Diffraction* (< 1000 μm - < 0.98 μm) at 0.5 phi Intervals

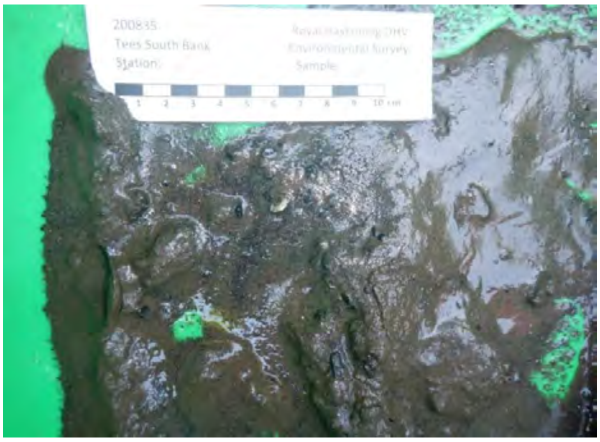
* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

= Description based on BGS modified Folk classification (Long, 2006)

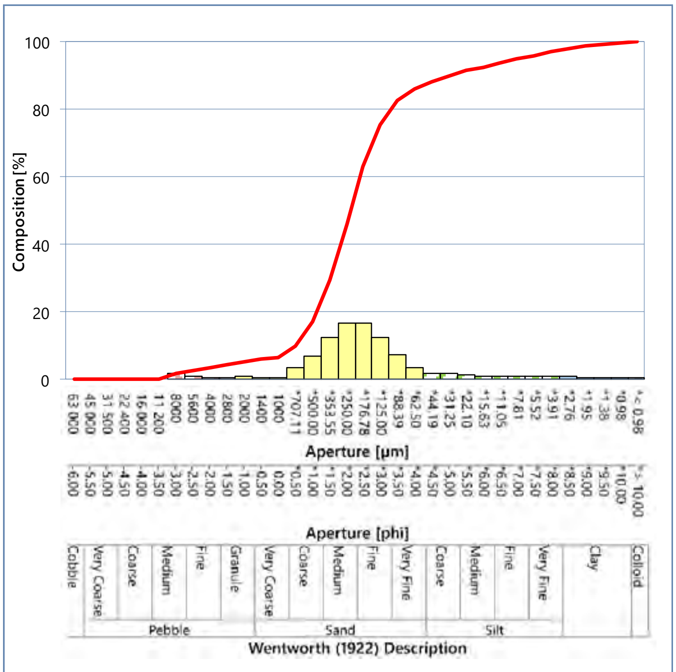
STATION: GS_23



FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	1.72	1.72
5600	-2.50	1.21	2.93
4000	-2.00	0.55	3.48
2800	-1.50	0.75	4.23
2000	-1.00	1.00	5.23
1400	-0.50	0.68	5.91
1000	0.00	0.69	6.61
*707.11	*0.50	3.36	9.97
*500.00	*1.00	7.08	17.05
*353.55	*1.50	12.41	29.46
*250.00	*2.00	16.68	46.13
*176.78	*2.50	16.77	62.91
*125.00	*3.00	12.58	75.49
*88.39	*3.50	7.21	82.70
*62.50	*4.00	3.56	86.26
*44.19	*4.50	2.07	88.32
*31.25	*5.00	1.66	89.99
*22.10	*5.50	1.44	91.43
*15.63	*6.00	1.21	92.63
*11.05	*6.50	1.08	93.71
*7.81	*7.00	1.09	94.80
*5.52	*7.50	1.14	95.94
*3.91	*8.00	1.12	97.06
*2.76	*8.50	0.96	98.03
*1.95	*9.00	0.72	98.74
*1.38	*9.50	0.48	99.23
*0.98	*10.00	0.33	99.55
*< 0.98	*> 10.00	0.45	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	213	Fine sand
Mode 2 [µm]†	-	-
Mode 3 [µm]†	-	-
Median [µm]†	231	Fine sand
Median [phi]†	2.12	
Mean [µm]†‡	212	Fine sand
Mean [phi]†‡	2.24	
Sorting [µm]‡	3.82	Poorly sorted
Sorting [phi]‡	1.93	
Skewness [µm]‡	-0.18	Fine skewed
Skewness [phi]‡	0.18	
Gravel [%]#	5.23	Gravelly muddy sand
Sand [%]#	81.03	
Fines [%]#	13.74	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

= Description based on BGS modified Folk classification (Long, 2006)

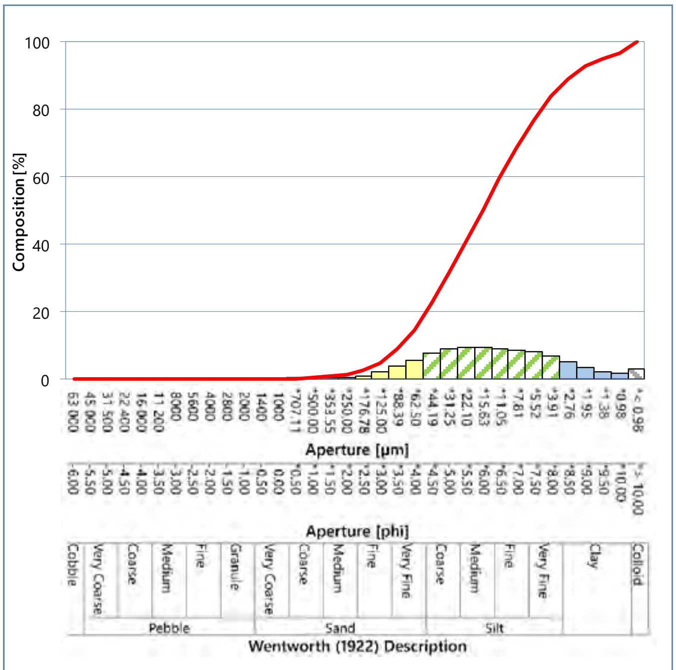
C.3 Subtidal Grab Samples

STATION: GS_01

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.00	0.00
2800	-1.50	0.00	0.00
2000	-1.00	0.00	0.00
1400	-0.50	0.00	0.00
1000	0.00	0.00	0.00
*707.11	*0.50	0.25	0.25
*500.00	*1.00	0.35	0.60
*353.55	*1.50	0.43	1.03
*250.00	*2.00	0.59	1.62
*176.78	*2.50	1.13	2.76
*125.00	*3.00	2.25	5.01
*88.39	*3.50	3.93	8.94
*62.50	*4.00	5.89	14.83
*44.19	*4.50	7.70	22.53
*31.25	*5.00	8.95	31.49
*22.10	*5.50	9.49	40.97
*15.63	*6.00	9.50	50.47
*11.05	*6.50	9.26	59.73
*7.81	*7.00	8.88	68.62
*5.52	*7.50	8.19	76.80
*3.91	*8.00	6.99	83.79
*2.76	*8.50	5.37	89.17
*1.95	*9.00	3.68	92.85
*1.38	*9.50	2.36	95.21
*0.98	*10.00	1.69	96.90
*< 0.98	*> 10.00	3.10	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	19	Medium silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	16	Medium silt
Median [phi]†	5.97	
Mean [µm]‡	15	Fine silt
Mean [phi]‡	6.02	
Sorting [µm]‡	3.90	Poorly sorted
Sorting [phi]‡	1.96	
Skewness [µm]‡	-0.06	Symmetrical
Skewness [phi]‡	0.06	
Gravel [%]#	0.00	Sandy mud
Sand [%]#	14.83	
Fines [%]#	85.17	

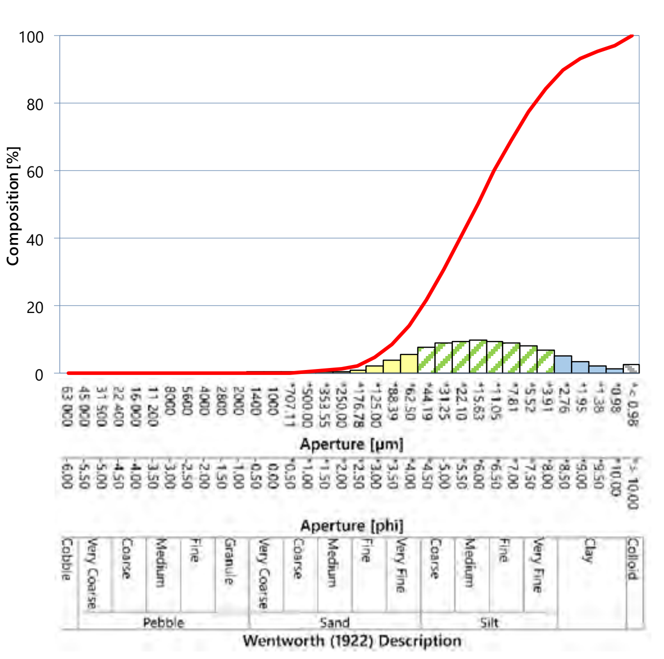
Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_02

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.00	0.00
2800	-1.50	0.00	0.00
2000	-1.00	0.00	0.00
1400	-0.50	0.10	0.10
1000	0.00	0.01	0.11
*707.11	*0.50	0.18	0.29
*500.00	*1.00	0.31	0.60
*353.55	*1.50	0.34	0.94
*250.00	*2.00	0.51	1.45
*176.78	*2.50	1.05	2.50
*125.00	*3.00	2.17	4.66
*88.39	*3.50	3.83	8.49
*62.50	*4.00	5.79	14.28
*44.19	*4.50	7.64	21.92
*31.25	*5.00	8.96	30.89
*22.10	*5.50	9.62	40.51
*15.63	*6.00	9.78	50.29
*11.05	*6.50	9.66	59.95
*7.81	*7.00	9.24	69.19
*5.52	*7.50	8.37	77.56
*3.91	*8.00	6.97	84.53
*2.76	*8.50	5.22	89.74
*1.95	*9.00	3.51	93.25
*1.38	*9.50	2.24	95.50
*0.98	*10.00	1.60	97.10
*< 0.98	*> 10.00	2.90	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	19	Medium silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	16	Medium silt
Median [phi]†	5.98	
Mean [µm]‡	15	Fine silt
Mean [phi]‡	6.02	
Sorting [µm]‡	3.79	Poorly sorted
Sorting [phi]‡	1.92	
Skewness [µm]‡	-0.05	Symmetrical
Skewness [phi]‡	0.05	
Gravel [%]#	0.00	Sandy mud
Sand [%]#	14.28	
Fines [%]#	85.72	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

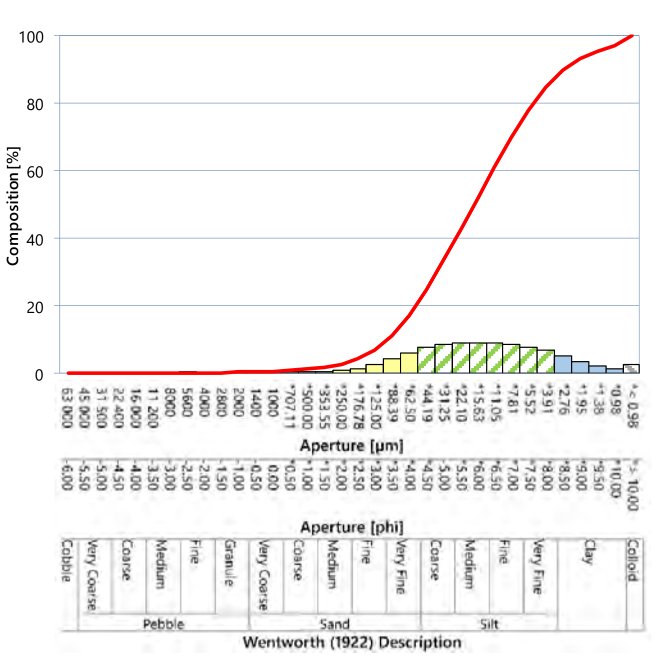
= Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_03

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.03	0.03
4000	-2.00	0.00	0.03
2800	-1.50	0.00	0.03
2000	-1.00	0.44	0.47
1400	-0.50	0.11	0.57
1000	0.00	0.02	0.59
*707.11	*0.50	0.25	0.84
*500.00	*1.00	0.48	1.32
*353.55	*1.50	0.60	1.92
*250.00	*2.00	0.83	2.75
*176.78	*2.50	1.47	4.22
*125.00	*3.00	2.63	6.85
*88.39	*3.50	4.25	11.10
*62.50	*4.00	6.07	17.17
*44.19	*4.50	7.70	24.87
*31.25	*5.00	8.78	33.65
*22.10	*5.50	9.22	42.87
*15.63	*6.00	9.23	52.09
*11.05	*6.50	9.05	61.14
*7.81	*7.00	8.70	69.85
*5.52	*7.50	8.00	77.85
*3.91	*8.00	6.79	84.64
*2.76	*8.50	5.16	89.79
*1.95	*9.00	3.49	93.29
*1.38	*9.50	2.22	95.51
*0.98	*10.00	1.59	97.10
*< 0.98	*> 10.00	2.90	100.00
Total		**100.00**	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	19	Medium silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	17	Medium silt
Median [phi]†	5.89	
Mean [µm]‡	17	Medium silt
Mean [phi]‡	5.91	
Sorting [µm]‡	4.09	Very poorly sorted
Sorting [phi]‡	2.03	
Skewness [µm]‡	-0.03	Symmetrical
Skewness [phi]‡	0.03	
Gravel [%]#	0.47	Sandy mud
Sand [%]#	16.70	
Fines [%]#	82.83	

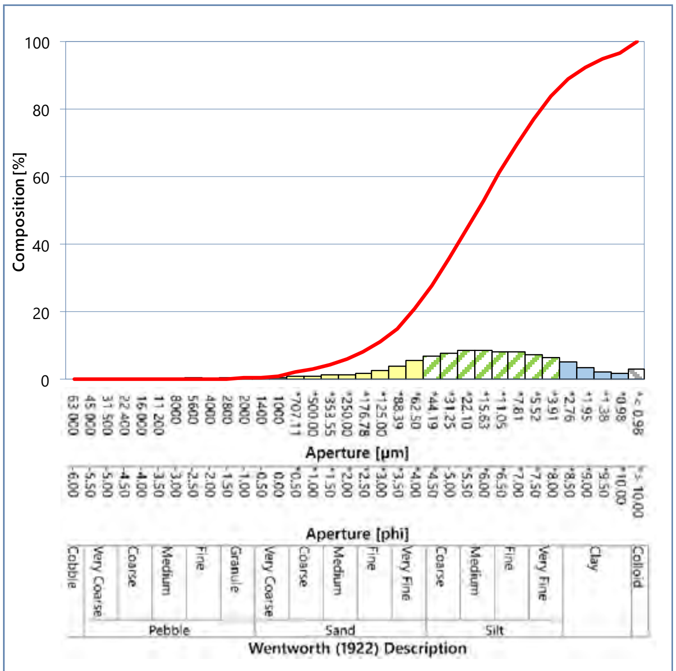
Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_04

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.11	0.11
4000	-2.00	0.00	0.11
2800	-1.50	0.11	0.22
2000	-1.00	0.22	0.43
1400	-0.50	0.31	0.74
1000	0.00	0.38	1.12
*707.11	*0.50	0.98	2.10
*500.00	*1.00	1.15	3.25
*353.55	*1.50	1.32	4.56
*250.00	*2.00	1.59	6.16
*176.78	*2.50	2.08	8.24
*125.00	*3.00	2.91	11.15
*88.39	*3.50	4.12	15.27
*62.50	*4.00	5.58	20.85
*44.19	*4.50	7.00	27.86
*31.25	*5.00	8.03	35.88
*22.10	*5.50	8.51	44.39
*15.63	*6.00	8.57	52.97
*11.05	*6.50	8.43	61.40
*7.81	*7.00	8.15	69.55
*5.52	*7.50	7.61	77.15
*3.91	*8.00	6.61	83.76
*2.76	*8.50	5.19	88.95
*1.95	*9.00	3.65	92.60
*1.38	*9.50	2.41	95.01
*0.98	*10.00	1.75	96.76
*< 0.98	*> 10.00	3.24	100.00
Total		**100.00**	-

PARTICLE SIZE DISTRIBUTION

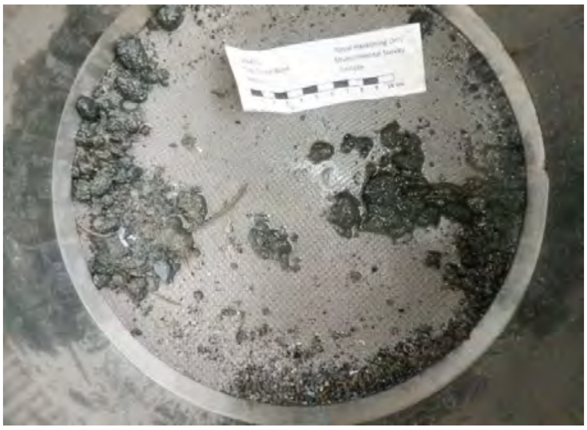


SUMMARY STATISTICS

Mode 1 [µm]†	19	Medium silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	18	Medium silt
Median [phi]†	5.83	
Mean [µm]‡	18	Medium silt
Mean [phi]‡	5.80	
Sorting [µm]‡	4.94	Very poorly sorted
Sorting [phi]‡	2.31	
Skewness [µm]‡	0.04	Symmetrical
Skewness [phi]‡	-0.04	
Gravel [%]#	0.43	Sandy mud
Sand [%]#	20.42	
Fines [%]#	79.15	

Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

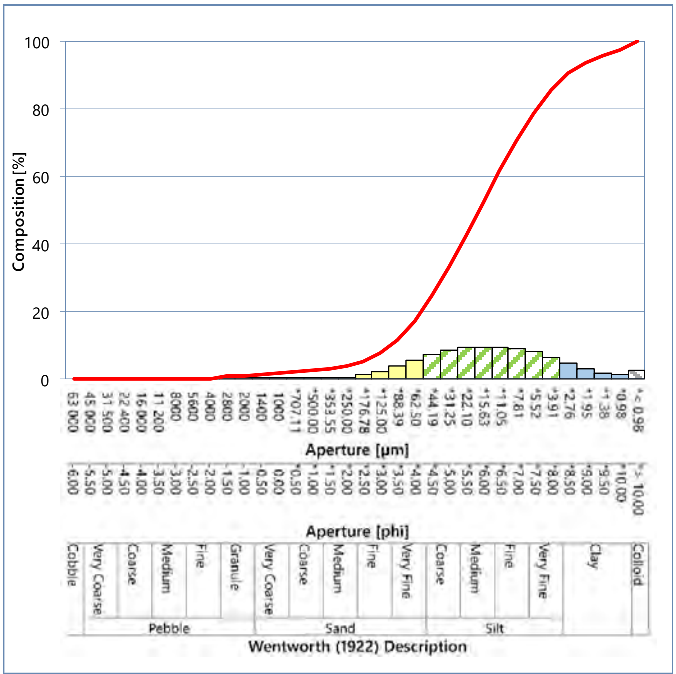
STATION: GS_05



FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.30	0.30
2800	-1.50	0.62	0.92
2000	-1.00	0.27	1.19
1400	-0.50	0.40	1.59
1000	0.00	0.28	1.86
*707.11	*0.50	0.39	2.25
*500.00	*1.00	0.47	2.72
*353.55	*1.50	0.55	3.28
*250.00	*2.00	0.78	4.06
*176.78	*2.50	1.33	5.39
*125.00	*3.00	2.36	7.75
*88.39	*3.50	3.88	11.63
*62.50	*4.00	5.70	17.32
*44.19	*4.50	7.43	24.75
*31.25	*5.00	8.70	33.46
*22.10	*5.50	9.39	42.85
*15.63	*6.00	9.60	52.45
*11.05	*6.50	9.49	61.94
*7.81	*7.00	9.02	70.97
*5.52	*7.50	8.09	79.06
*3.91	*8.00	6.66	85.72
*2.76	*8.50	4.92	90.65
*1.95	*9.00	3.26	93.91
*1.38	*9.50	2.04	95.94
*0.98	*10.00	1.44	97.39
*< 0.98	*> 10.00	2.61	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	19	Medium silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	17	Medium silt
Median [phi]†	5.87	
Mean [µm]‡†	17	Medium silt
Mean [phi]‡†	5.88	
Sorting [µm]‡	4.13	Very poorly sorted
Sorting [phi]‡	2.04	
Skewness [µm]‡	0.01	Symmetrical
Skewness [phi]‡	-0.01	
Gravel [%]#	1.19	Sandy mud
Sand [%]#	16.14	
Fines [%]#	82.68	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

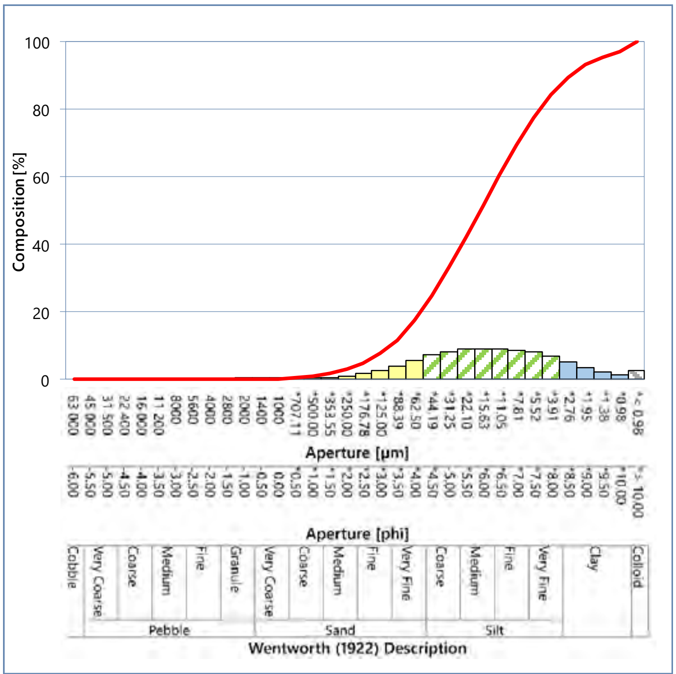
= Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_06

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.00	0.00
2800	-1.50	0.00	0.00
2000	-1.00	0.13	0.13
1400	-0.50	0.10	0.23
1000	0.00	0.08	0.31
*707.11	*0.50	0.35	0.67
*500.00	*1.00	0.46	1.13
*353.55	*1.50	0.71	1.84
*250.00	*2.00	1.14	2.98
*176.78	*2.50	1.82	4.80
*125.00	*3.00	2.83	7.63
*88.39	*3.50	4.20	11.83
*62.50	*4.00	5.81	17.64
*44.19	*4.50	7.32	24.96
*31.25	*5.00	8.42	33.38
*22.10	*5.50	9.00	42.38
*15.63	*6.00	9.19	51.58
*11.05	*6.50	9.14	60.72
*7.81	*7.00	8.83	69.55
*5.52	*7.50	8.09	77.65
*3.91	*8.00	6.84	84.49
*2.76	*8.50	5.20	89.69
*1.95	*9.00	3.55	93.24
*1.38	*9.50	2.28	95.52
*0.98	*10.00	1.62	97.14
*< 0.98	*> 10.00	2.86	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	19	Medium silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	17	Medium silt
Median [phi]†	5.91	
Mean [µm]†‡	17	Medium silt
Mean [phi]†‡	5.91	
Sorting [µm]‡	4.18	Very poorly sorted
Sorting [phi]‡	2.06	
Skewness [µm]‡	-0.01	Symmetrical
Skewness [phi]‡	0.01	
Gravel [%]#	0.13	Sandy mud
Sand [%]#	17.51	
Fines [%]#	82.36	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

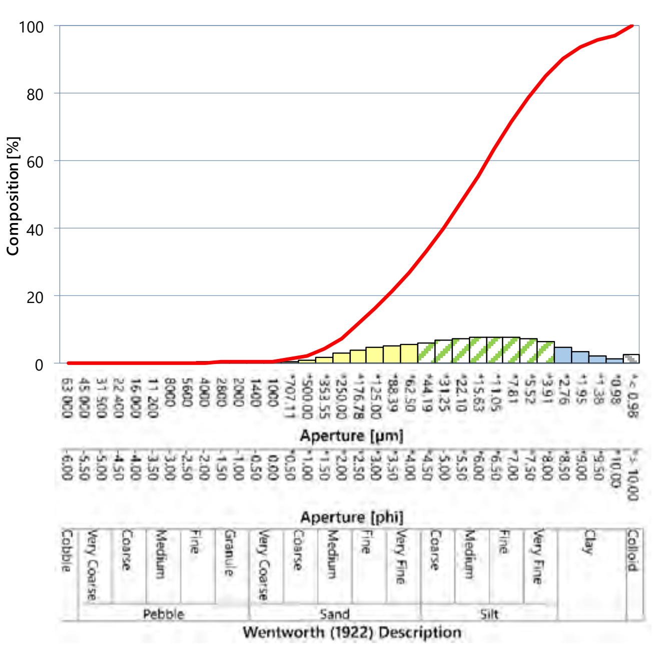
= Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_07

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.21	0.21
2800	-1.50	0.18	0.39
2000	-1.00	0.06	0.45
1400	-0.50	0.15	0.60
1000	0.00	0.10	0.70
*707.11	*0.50	0.57	1.27
*500.00	*1.00	1.10	2.37
*353.55	*1.50	2.03	4.41
*250.00	*2.00	3.14	7.55
*176.78	*2.50	4.07	11.62
*125.00	*3.00	4.66	16.27
*88.39	*3.50	5.09	21.37
*62.50	*4.00	5.64	27.01
*44.19	*4.50	6.33	33.34
*31.25	*5.00	6.99	40.32
*22.10	*5.50	7.49	47.81
*15.63	*6.00	7.82	55.63
*11.05	*6.50	8.00	63.63
*7.81	*7.00	7.91	71.55
*5.52	*7.50	7.40	78.95
*3.91	*8.00	6.36	85.30
*2.76	*8.50	4.91	90.21
*1.95	*9.00	3.39	93.60
*1.38	*9.50	2.19	95.79
*0.98	*10.00	1.53	97.32
*< 0.98	*> 10.00	2.68	100.00
Total		**100.00**	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	13	Fine silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	20	Medium silt
Median [phi]†	5.64	
Mean [µm]†‡	22	Medium silt
Mean [phi]†‡	5.50	
Sorting [µm]‡	5.29	Very poorly sorted
Sorting [phi]‡	2.40	
Skewness [µm]‡	0.07	Symmetrical
Skewness [phi]‡	-0.07	
Gravel [%]#	0.45	Sandy mud
Sand [%]#	26.56	
Fines [%]#	72.99	

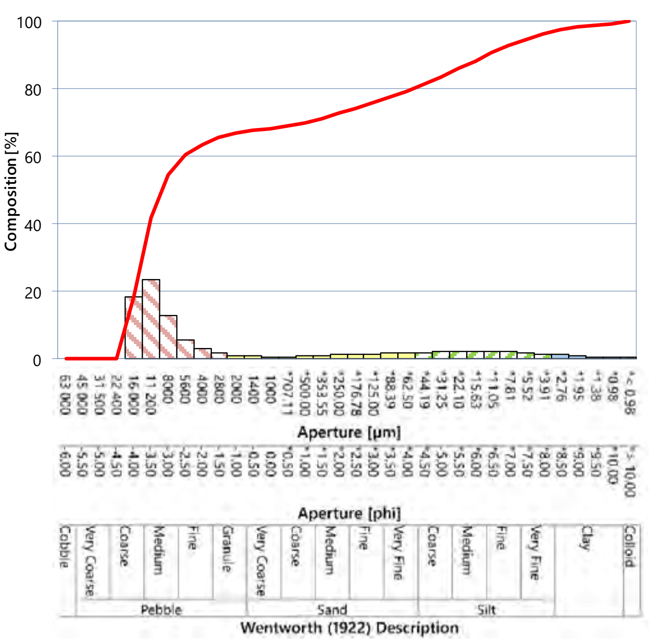
Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_08

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	18.42	18.42
11 200	-3.50	23.56	41.98
8000	-3.00	12.75	54.74
5600	-2.50	5.62	60.35
4000	-2.00	3.19	63.54
2800	-1.50	2.02	65.56
2000	-1.00	1.17	66.74
1400	-0.50	0.94	67.68
1000	0.00	0.70	68.38
*707.11	*0.50	0.78	69.16
*500.00	*1.00	0.95	70.10
*353.55	*1.50	1.19	71.29
*250.00	*2.00	1.47	72.76
*176.78	*2.50	1.62	74.38
*125.00	*3.00	1.64	76.02
*88.39	*3.50	1.66	77.68
*62.50	*4.00	1.79	79.48
*44.19	*4.50	2.01	81.49
*31.25	*5.00	2.20	83.69
*22.10	*5.50	2.30	85.99
*15.63	*6.00	2.31	88.30
*11.05	*6.50	2.27	90.57
*7.81	*7.00	2.18	92.75
*5.52	*7.50	1.98	94.73
*3.91	*8.00	1.66	96.38
*2.76	*8.50	1.25	97.63
*1.95	*9.00	0.84	98.46
*1.38	*9.50	0.53	98.99
*0.98	*10.00	0.37	99.36
*< 0.98	*> 10.00	0.64	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION

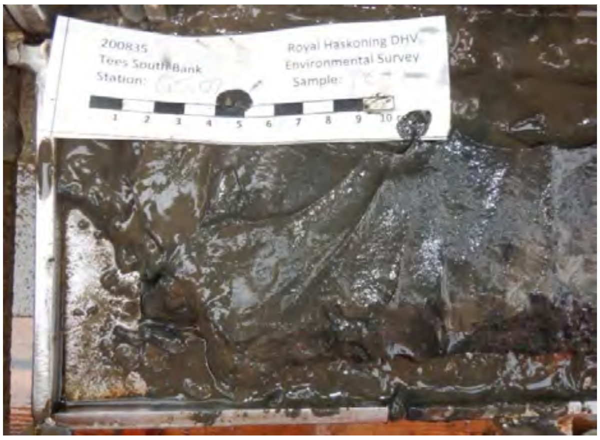


SUMMARY STATISTICS

Mode 1 [µm]†	13600	Medium pebble
Mode 2 [µm]†	-	-
Mode 3 [µm]†	-	-
Median [µm]†	9065	Medium pebble
Median [phi]†	-3.18	
Mean [µm]‡	1653	Very coarse sand
Mean [phi]‡	-0.73	
Sorting [µm]‡	17.05	Extremely poorly sorted
Sorting [phi]‡	4.09	
Skewness [µm]‡	-0.80	Very fine skewed
Skewness [phi]‡	0.80	
Gravel [%]#	66.74	Muddy gravel
Sand [%]#	12.74	
Fines [%]#	20.52	

Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

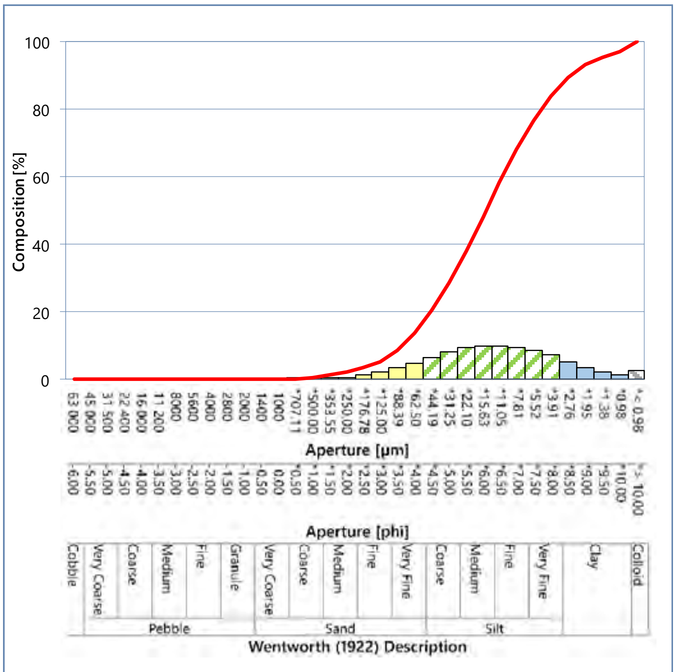
STATION: GS_09



FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.00	0.00
2800	-1.50	0.00	0.00
2000	-1.00	0.00	0.00
1400	-0.50	0.00	0.00
1000	0.00	0.00	0.00
*707.11	*0.50	0.28	0.28
*500.00	*1.00	0.46	0.74
*353.55	*1.50	0.58	1.33
*250.00	*2.00	0.79	2.12
*176.78	*2.50	1.25	3.37
*125.00	*3.00	2.09	5.46
*88.39	*3.50	3.36	8.82
*62.50	*4.00	5.00	13.82
*44.19	*4.50	6.75	20.57
*31.25	*5.00	8.28	28.85
*22.10	*5.50	9.38	38.23
*15.63	*6.00	10.00	48.23
*11.05	*6.50	10.13	58.36
*7.81	*7.00	9.74	68.09
*5.52	*7.50	8.77	76.87
*3.91	*8.00	7.26	84.13
*2.76	*8.50	5.43	89.56
*1.95	*9.00	3.66	93.22
*1.38	*9.50	2.33	95.56
*0.98	*10.00	1.64	97.19
*< 0.98	*> 10.00	2.81	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	13	Fine silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	15	Fine silt
Median [phi]†	6.09	
Mean [µm]‡	15	Fine silt
Mean [phi]‡	6.08	
Sorting [µm]‡	3.84	Poorly sorted
Sorting [phi]‡	1.94	
Skewness [µm]‡	0.00	Symmetrical
Skewness [phi]‡	0.00	
Gravel [%]#	0.00	Sandy mud
Sand [%]#	13.82	
Fines [%]#	86.18	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

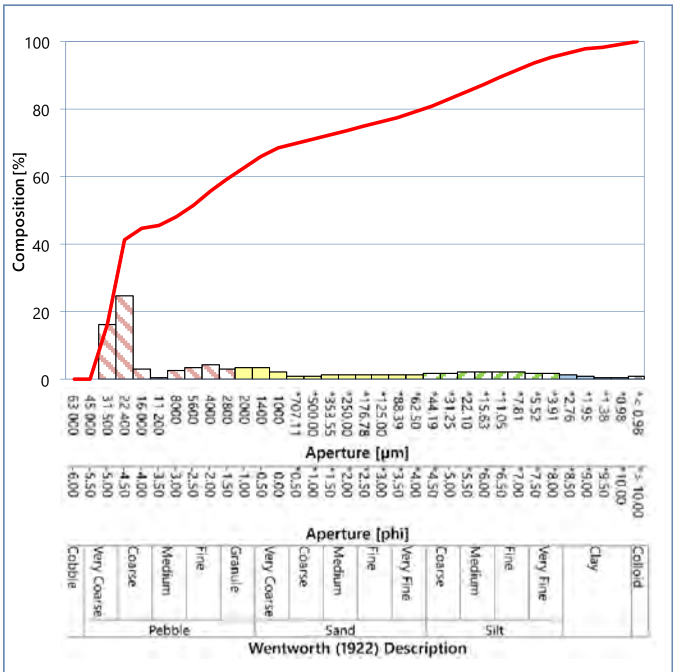
= Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_10

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	16.50	16.50
22 400	-4.50	25.02	41.52
16 000	-4.00	3.29	44.81
11 200	-3.50	0.76	45.57
8000	-3.00	2.68	48.25
5600	-2.50	3.54	51.79
4000	-2.00	4.30	56.09
2800	-1.50	3.34	59.43
2000	-1.00	3.40	62.83
1400	-0.50	3.39	66.22
1000	0.00	2.45	68.67
*707.11	*0.50	1.14	69.80
*500.00	*1.00	1.23	71.04
*353.55	*1.50	1.33	72.37
*250.00	*2.00	1.39	73.76
*176.78	*2.50	1.34	75.10
*125.00	*3.00	1.27	76.36
*88.39	*3.50	1.30	77.66
*62.50	*4.00	1.49	79.15
*44.19	*4.50	1.77	80.92
*31.25	*5.00	2.01	82.93
*22.10	*5.50	2.16	85.09
*15.63	*6.00	2.23	87.32
*11.05	*6.50	2.24	89.56
*7.81	*7.00	2.18	91.74
*5.52	*7.50	2.03	93.76
*3.91	*8.00	1.76	95.53
*2.76	*8.50	1.39	96.92
*1.95	*9.00	1.00	97.92
*1.38	*9.50	0.67	98.59
*0.98	*10.00	0.50	99.09
*< 0.98	*> 10.00	0.91	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	26950	Coarse pebble
Mode 2 [µm]†	4800	Fine pebble
Mode 3 [µm]†	-	-
Median [µm]†	6707	Fine pebble
Median [phi]†	-2.75	
Mean [µm]‡	1778	Very coarse sand
Mean [phi]‡	-0.83	
Sorting [µm]‡	23.56	Extremely poorly sorted
Sorting [phi]‡	4.56	
Skewness [µm]‡	-0.58	Very fine skewed
Skewness [phi]‡	0.58	
Gravel [%]#	62.83	Muddy gravel
Sand [%]#	16.33	
Fines [%]#	20.85	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

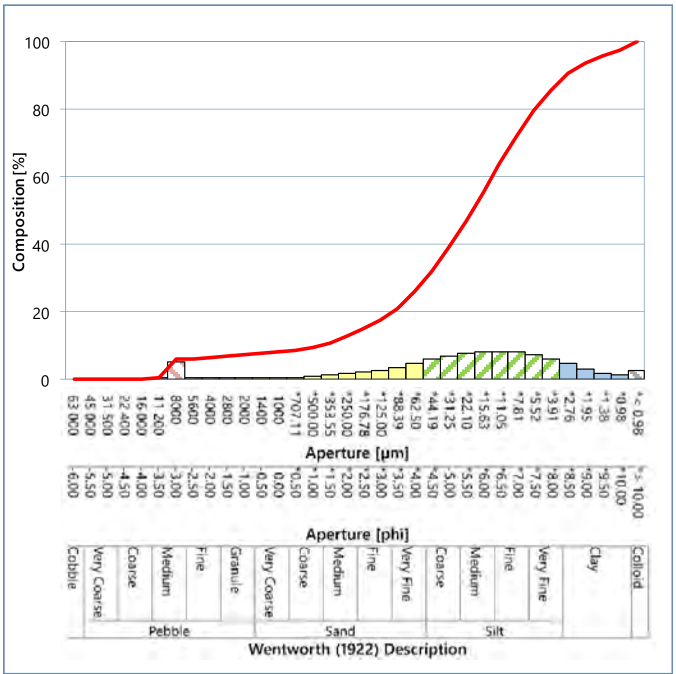
\# = Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_11

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.59	0.59
8000	-3.00	5.33	5.92
5600	-2.50	0.15	6.07
4000	-2.00	0.33	6.39
2800	-1.50	0.45	6.84
2000	-1.00	0.47	7.31
1400	-0.50	0.38	7.69
1000	0.00	0.36	8.05
*707.11	*0.50	0.49	8.54
*500.00	*1.00	0.96	9.50
*353.55	*1.50	1.41	10.91
*250.00	*2.00	1.80	12.72
*176.78	*2.50	2.16	14.88
*125.00	*3.00	2.69	17.57
*88.39	*3.50	3.59	21.16
*62.50	*4.00	4.81	25.97
*44.19	*4.50	6.09	32.06
*31.25	*5.00	7.15	39.21
*22.10	*5.50	7.87	47.08
*15.63	*6.00	8.29	55.36
*11.05	*6.50	8.42	63.79
*7.81	*7.00	8.21	71.99
*5.52	*7.50	7.52	79.52
*3.91	*8.00	6.33	85.84
*2.76	*8.50	4.79	90.63
*1.95	*9.00	3.25	93.88
*1.38	*9.50	2.07	95.95
*0.98	*10.00	1.46	97.41
*< 0.98	*> 10.00	2.59	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	13	Fine silt
Mode 2 [µm]†	9600	Medium pebble
Mode 3 [µm]†	1	Colloid
Median [µm]†	20	Medium silt
Median [phi]†	5.68	
Mean [µm]‡	23	Medium silt
Mean [phi]‡	5.41	
Sorting [µm]‡	8.93	Very poorly sorted
Sorting [phi]‡	3.16	
Skewness [µm]‡	0.29	Coarse skewed
Skewness [phi]‡	-0.29	
Gravel [%]#	7.31	Gravelly mud
Sand [%]#	18.66	
Fines [%]#	74.03	

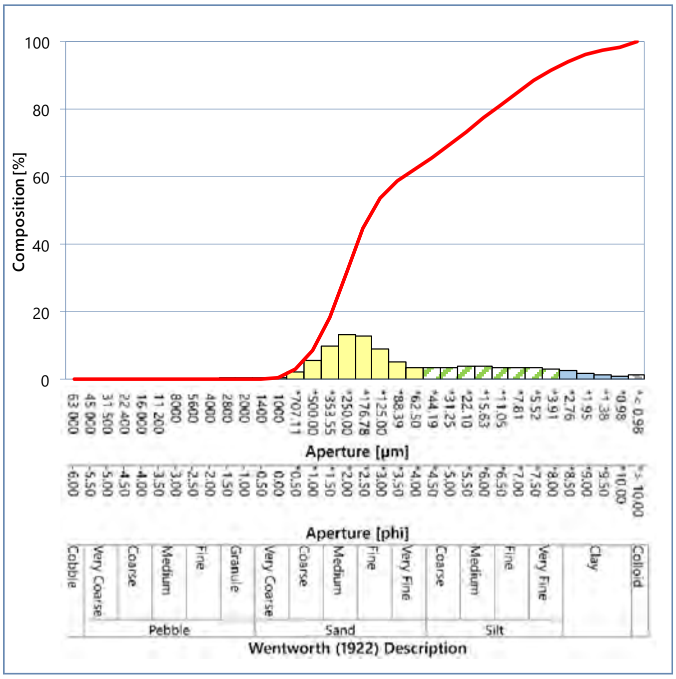
Notes
Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals
* = Determinand not included in UKAS Accreditation
† = Particle size expressed in accordance with Wentworth (1922) scale
‡ = Statistics calculated using Folk and Ward (1957) method
# = Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_13

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.00	0.00
2800	-1.50	0.09	0.09
2000	-1.00	0.16	0.25
1400	-0.50	0.13	0.38
1000	0.00	0.26	0.64
*707.11	*0.50	2.33	2.97
*500.00	*1.00	5.51	8.48
*353.55	*1.50	10.11	18.59
*250.00	*2.00	13.34	31.93
*176.78	*2.50	12.74	44.67
*125.00	*3.00	9.04	53.71
*88.39	*3.50	5.26	58.98
*62.50	*4.00	3.45	62.43
*44.19	*4.50	3.36	65.79
*31.25	*5.00	3.78	69.57
*22.10	*5.50	3.94	73.51
*15.63	*6.00	3.85	77.36
*11.05	*6.50	3.76	81.12
*7.81	*7.00	3.72	84.84
*5.52	*7.50	3.61	88.44
*3.91	*8.00	3.26	91.71
*2.76	*8.50	2.66	94.37
*1.95	*9.00	1.93	96.29
*1.38	*9.50	1.29	97.58
*0.98	*10.00	0.92	98.50
*< 0.98	*> 10.00	1.50	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	302	Medium sand
Mode 2 [µm]†	27	Medium silt
Mode 3 [µm]†	-	-
Median [µm]†	144	Fine sand
Median [phi]†	2.79	
Mean [µm]‡	78	Very fine sand
Mean [phi]‡	3.68	
Sorting [µm]‡	6.01	Very poorly sorted
Sorting [phi]‡	2.59	
Skewness [µm]‡	-0.48	Very fine skewed
Skewness [phi]‡	0.48	
Gravel [%]#	0.25	Muddy sand
Sand [%]#	62.17	
Fines [%]#	37.57	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

= Description based on BGS modified Folk classification (Long, 2006)

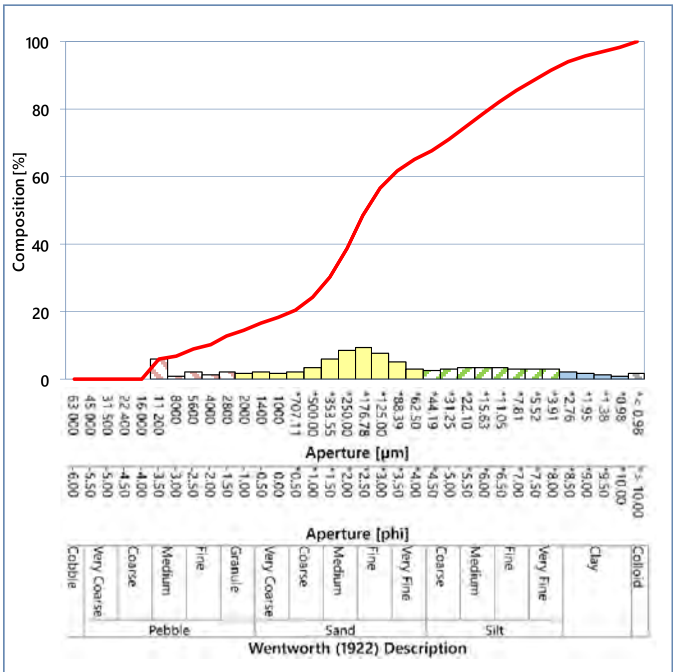
STATION: GS_14

No available photograph

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	6.26	6.26
8000	-3.00	0.84	7.10
5600	-2.50	2.16	9.26
4000	-2.00	1.32	10.58
2800	-1.50	2.26	12.85
2000	-1.00	1.85	14.69
1400	-0.50	2.10	16.79
1000	0.00	1.72	18.51
*707.11	*0.50	2.19	20.70
*500.00	*1.00	3.52	24.22
*353.55	*1.50	6.03	30.25
*250.00	*2.00	8.71	38.96
*176.78	*2.50	9.61	48.57
*125.00	*3.00	7.96	56.54
*88.39	*3.50	5.19	61.73
*62.50	*4.00	3.30	65.03
*44.19	*4.50	2.93	67.96
*31.25	*5.00	3.34	71.30
*22.10	*5.50	3.68	74.98
*15.63	*6.00	3.68	78.66
*11.05	*6.50	3.51	82.17
*7.81	*7.00	3.35	85.52
*5.52	*7.50	3.21	88.73
*3.91	*8.00	2.95	91.68
*2.76	*8.50	2.48	94.17
*1.95	*9.00	1.87	96.04
*1.38	*9.50	1.30	97.34
*0.98	*10.00	0.95	98.29
*< 0.98	*> 10.00	1.71	100.00
Total		**100.00**	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	213	Fine sand
Mode 2 [µm]†	19	Medium silt
Mode 3 [µm]†	3400	Granule
Median [µm]†	166	Fine sand
Median [phi]†	2.59	
Mean [µm]†‡	134	Fine sand
Mean [phi]†‡	2.89	
Sorting [µm]‡	13.26	Very poorly sorted
Sorting [phi]‡	3.73	
Skewness [µm]‡	-0.06	Symmetrical
Skewness [phi]‡	0.06	
Gravel [%]#	14.69	Gravelly muddy sand
Sand [%]#	50.34	
Fines [%]#	34.97	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

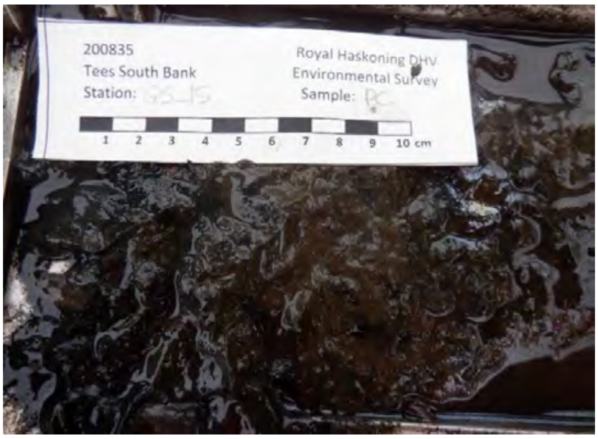
* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

\# = Description based on BGS modified Folk classification (Long, 2006)

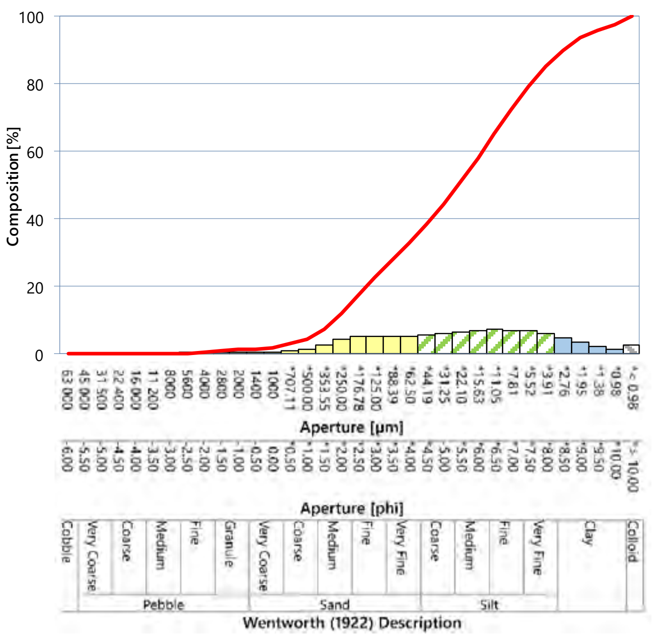
STATION: GS_15



FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.33	0.33
4000	-2.00	0.28	0.62
2800	-1.50	0.27	0.89
2000	-1.00	0.43	1.31
1400	-0.50	0.31	1.62
1000	0.00	0.21	1.83
*707.11	*0.50	1.10	2.94
*500.00	*1.00	1.66	4.60
*353.55	*1.50	2.90	7.50
*250.00	*2.00	4.37	11.87
*176.78	*2.50	5.29	17.16
*125.00	*3.00	5.41	22.57
*88.39	*3.50	5.14	27.71
*62.50	*4.00	5.11	32.82
*44.19	*4.50	5.51	38.33
*31.25	*5.00	6.11	44.44
*22.10	*5.50	6.64	51.09
*15.63	*6.00	7.01	58.09
*11.05	*6.50	7.21	65.30
*7.81	*7.00	7.18	72.49
*5.52	*7.50	6.82	79.31
*3.91	*8.00	6.01	85.31
*2.76	*8.50	4.80	90.11
*1.95	*9.00	3.44	93.55
*1.38	*9.50	2.29	95.84
*0.98	*10.00	1.59	97.43
*< 0.98	*> 10.00	2.57	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	13	Fine silt
Mode 2 [µm]†	151	Fine sand
Mode 3 [µm]†	1	Colloid
Median [µm]†	23	Medium silt
Median [phi]†	5.42	
Mean [µm]†‡	27	Medium silt
Mean [phi]†‡	5.23	
Sorting [µm]‡	6.17	Very poorly sorted
Sorting [phi]‡	2.62	
Skewness [µm]‡	0.08	Symmetrical
Skewness [phi]‡	-0.08	
Gravel [%]#	1.31	Sandy mud
Sand [%]#	31.51	
Fines [%]#	67.18	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

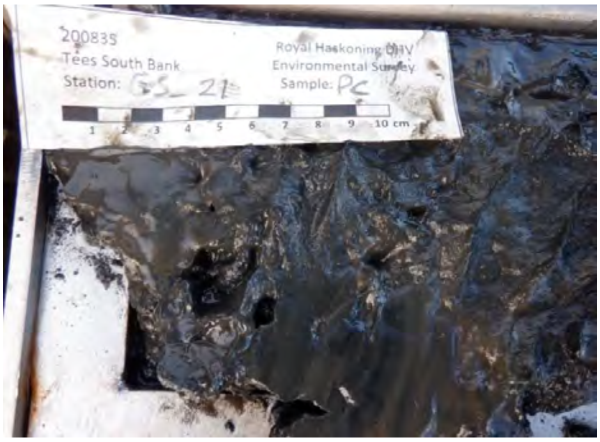
* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

= Description based on BGS modified Folk classification (Long, 2006)

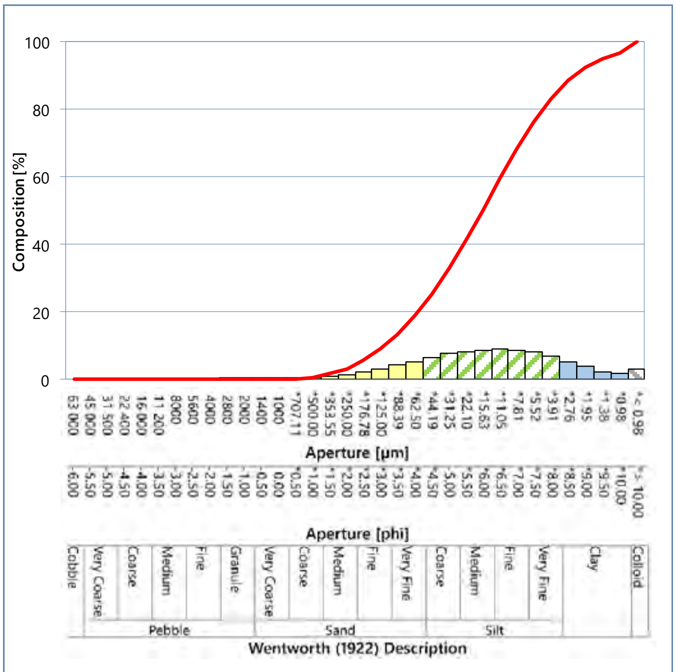
STATION: GS_21



FRACTIONAL DATA

Aperture [μm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.00	0.00
2800	-1.50	0.05	0.05
2000	-1.00	0.00	0.05
1400	-0.50	0.05	0.10
1000	0.00	0.02	0.12
*707.11	*0.50	0.20	0.32
*500.00	*1.00	0.46	0.78
*353.55	*1.50	0.93	1.71
*250.00	*2.00	1.64	3.35
*176.78	*2.50	2.49	5.84
*125.00	*3.00	3.35	9.19
*88.39	*3.50	4.26	13.45
*62.50	*4.00	5.34	18.79
*44.19	*4.50	6.57	25.36
*31.25	*5.00	7.69	33.05
*22.10	*5.50	8.46	41.51
*15.63	*6.00	8.84	50.35
*11.05	*6.50	8.94	59.29
*7.81	*7.00	8.75	68.04
*5.52	*7.50	8.15	76.19
*3.91	*8.00	7.03	83.22
*2.76	*8.50	5.48	88.70
*1.95	*9.00	3.83	92.53
*1.38	*9.50	2.51	95.03
*0.98	*10.00	1.79	96.82
*< 0.98	*> 10.00	3.18	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [μm]†	13	Fine silt
Mode 2 [μm]†	1	Colloid
Mode 3 [μm]†	-	-
Median [μm]†	16	Medium silt
Median [phi]†	5.98	
Mean [μm]‡	16	Medium silt
Mean [phi]‡	5.93	
Sorting [μm]‡	4.49	Very poorly sorted
Sorting [phi]‡	2.17	
Skewness [μm]‡	0.03	Symmetrical
Skewness [phi]‡	-0.03	
Gravel [%]#	0.05	Sandy mud
Sand [%]#	18.74	
Fines [%]#	81.21	

Notes

Particle Size Distribution by Dry Sieving (63 000 μm - 1000 μm) and Laser Diffraction* (< 1000 μm - < 0.98 μm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

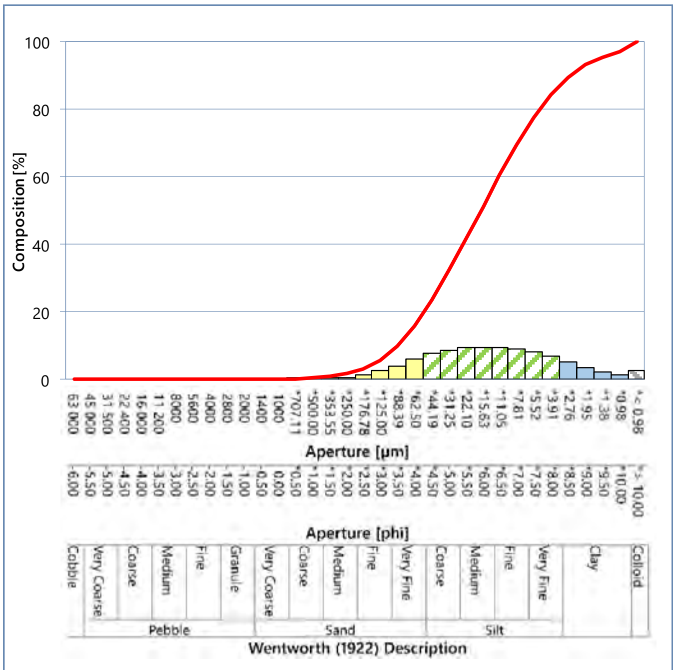
= Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_22

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.00	0.00
2800	-1.50	0.00	0.00
2000	-1.00	0.00	0.00
1400	-0.50	0.00	0.00
1000	0.00	0.00	0.00
*707.11	*0.50	0.29	0.29
*500.00	*1.00	0.37	0.67
*353.55	*1.50	0.48	1.14
*250.00	*2.00	0.74	1.88
*176.78	*2.50	1.37	3.25
*125.00	*3.00	2.52	5.77
*88.39	*3.50	4.14	9.91
*62.50	*4.00	5.97	15.88
*44.19	*4.50	7.64	23.53
*31.25	*5.00	8.81	32.33
*22.10	*5.50	9.36	41.69
*15.63	*6.00	9.46	51.15
*11.05	*6.50	9.32	60.47
*7.81	*7.00	8.93	69.40
*5.52	*7.50	8.16	77.56
*3.91	*8.00	6.88	84.43
*2.76	*8.50	5.22	89.65
*1.95	*9.00	3.54	93.19
*1.38	*9.50	2.27	95.46
*0.98	*10.00	1.61	97.07
*< 0.98	*> 10.00	2.93	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	19	Medium silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	16	Medium silt
Median [phi]†	5.94	
Mean [µm]‡	16	Medium silt
Mean [phi]‡	5.97	
Sorting [µm]‡	3.95	Poorly sorted
Sorting [phi]‡	1.98	
Skewness [µm]‡	-0.04	Symmetrical
Skewness [phi]‡	0.04	
Gravel [%]#	0.00	Sandy mud
Sand [%]#	15.88	
Fines [%]#	84.12	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

= Description based on BGS modified Folk classification (Long, 2006)

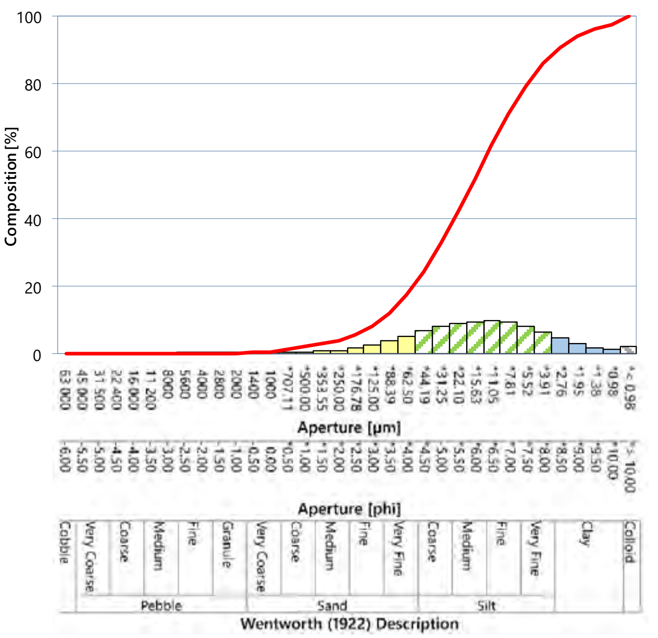
STATION: GS_24

No available photograph

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.07	0.07
4000	-2.00	0.10	0.16
2800	-1.50	0.06	0.22
2000	-1.00	0.14	0.36
1400	-0.50	0.12	0.48
1000	0.00	0.10	0.58
*707.11	*0.50	0.72	1.30
*500.00	*1.00	0.80	2.10
*353.55	*1.50	0.92	3.02
*250.00	*2.00	1.16	4.19
*176.78	*2.50	1.67	5.86
*125.00	*3.00	2.56	8.42
*88.39	*3.50	3.83	12.25
*62.50	*4.00	5.38	17.64
*44.19	*4.50	6.97	24.61
*31.25	*5.00	8.32	32.92
*22.10	*5.50	9.25	42.17
*15.63	*6.00	9.74	51.91
*11.05	*6.50	9.79	61.70
*7.81	*7.00	9.33	71.03
*5.52	*7.50	8.28	79.31
*3.91	*8.00	6.71	86.02
*2.76	*8.50	4.90	90.92
*1.95	*9.00	3.22	94.14
*1.38	*9.50	2.01	96.16
*0.98	*10.00	1.41	97.57
*< 0.98	*> 10.00	2.43	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	13	Fine silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	17	Medium silt
Median [phi]†	5.90	
Mean [µm]‡	17	Medium silt
Mean [phi]‡	5.87	
Sorting [µm]‡	4.16	Very poorly sorted
Sorting [phi]‡	2.06	
Skewness [µm]‡	0.04	Symmetrical
Skewness [phi]‡	-0.04	
Gravel [%]#	0.36	Sandy mud
Sand [%]#	17.28	
Fines [%]#	82.36	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

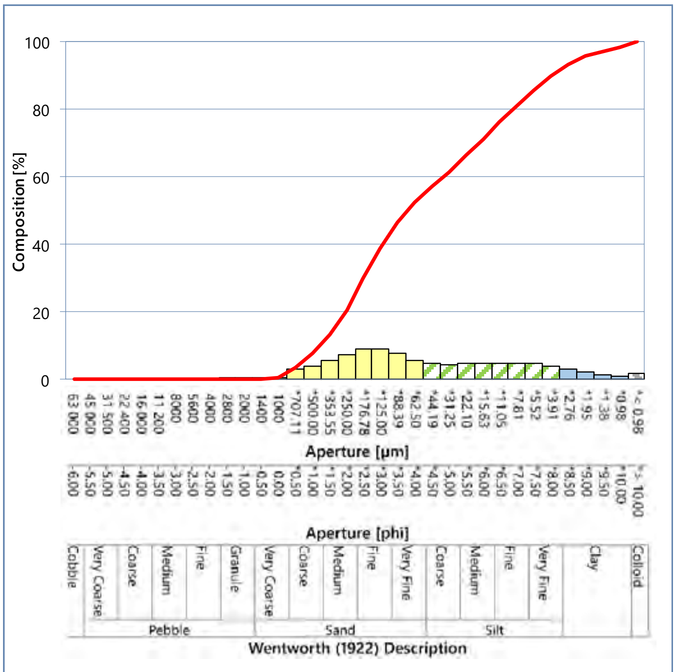
= Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_25

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.00	0.00
2800	-1.50	0.00	0.00
2000	-1.00	0.09	0.09
1400	-0.50	0.17	0.26
1000	0.00	0.17	0.43
*707.11	*0.50	3.07	3.50
*500.00	*1.00	4.13	7.63
*353.55	*1.50	5.58	13.21
*250.00	*2.00	7.51	20.72
*176.78	*2.50	9.08	29.80
*125.00	*3.00	9.15	38.95
*88.39	*3.50	7.65	46.60
*62.50	*4.00	5.79	52.39
*44.19	*4.50	4.69	57.08
*31.25	*5.00	4.51	61.59
*22.10	*5.50	4.71	66.31
*15.63	*6.00	4.90	71.20
*11.05	*6.50	4.96	76.17
*7.81	*7.00	4.93	81.10
*5.52	*7.50	4.72	85.82
*3.91	*8.00	4.19	90.01
*2.76	*8.50	3.33	93.34
*1.95	*9.00	2.34	95.68
*1.38	*9.50	1.51	97.19
*0.98	*10.00	1.04	98.23
*< 0.98	*> 10.00	1.77	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	151	Fine sand
Mode 2 [µm]†	13	Fine silt
Mode 3 [µm]†	1	Colloid
Median [µm]†	72	Very fine sand
Median [phi]†	3.79	
Mean [µm]‡	52	Coarse silt
Mean [phi]‡	4.26	
Sorting [µm]‡	6.25	Very poorly sorted
Sorting [phi]‡	2.64	
Skewness [µm]‡	-0.24	Fine skewed
Skewness [phi]‡	0.24	
Gravel [%]#	0.09	Muddy sand
Sand [%]#	52.30	
Fines [%]#	47.61	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

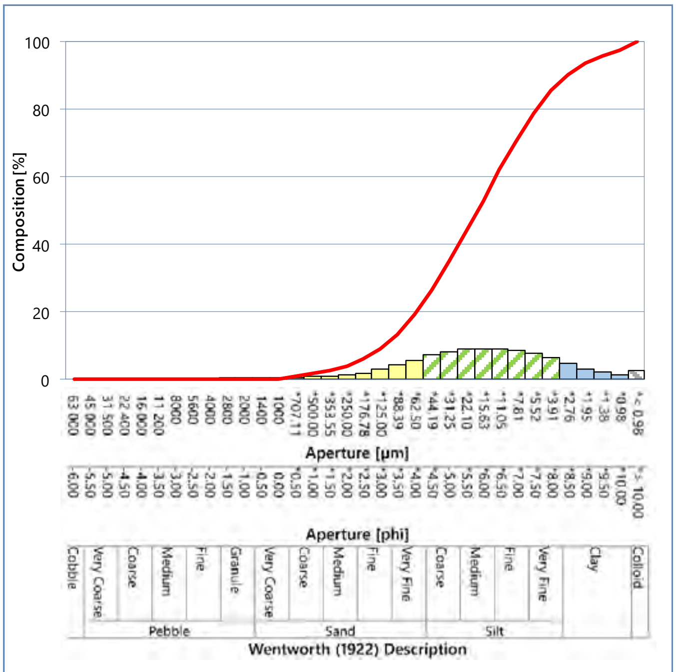
= Description based on BGS modified Folk classification (Long, 2006)

STATION: GS_26

FRACTIONAL DATA

Aperture [µm]	Aperture [phi]	Fractional [%]	Cumulative [%]
63 000	-6.00	0.00	0.00
45 000	-5.50	0.00	0.00
31 500	-5.00	0.00	0.00
22 400	-4.50	0.00	0.00
16 000	-4.00	0.00	0.00
11 200	-3.50	0.00	0.00
8000	-3.00	0.00	0.00
5600	-2.50	0.00	0.00
4000	-2.00	0.00	0.00
2800	-1.50	0.05	0.05
2000	-1.00	0.00	0.06
1400	-0.50	0.03	0.09
1000	0.00	0.06	0.15
*707.11	*0.50	0.77	0.91
*500.00	*1.00	0.90	1.82
*353.55	*1.50	0.98	2.79
*250.00	*2.00	1.27	4.06
*176.78	*2.50	1.97	6.03
*125.00	*3.00	3.08	9.11
*88.39	*3.50	4.43	13.54
*62.50	*4.00	5.87	19.41
*44.19	*4.50	7.21	26.62
*31.25	*5.00	8.25	34.87
*22.10	*5.50	8.90	43.77
*15.63	*6.00	9.19	52.95
*11.05	*6.50	9.16	62.12
*7.81	*7.00	8.79	70.91
*5.52	*7.50	7.96	78.86
*3.91	*8.00	6.62	85.49
*2.76	*8.50	4.96	90.45
*1.95	*9.00	3.33	93.78
*1.38	*9.50	2.10	95.88
*0.98	*10.00	1.48	97.37
*< 0.98	*> 10.00	2.63	100.00
Total		100.00	-

PARTICLE SIZE DISTRIBUTION



SUMMARY STATISTICS

Mode 1 [µm]†	19	Medium silt
Mode 2 [µm]†	1	Colloid
Mode 3 [µm]†	-	-
Median [µm]†	17	Medium silt
Median [phi]†	5.84	
Mean [µm]‡†	18	Medium silt
Mean [phi]‡†	5.81	
Sorting [µm]‡	4.33	Very poorly sorted
Sorting [phi]‡	2.11	
Skewness [µm]‡	0.02	Symmetrical
Skewness [phi]‡	-0.02	
Gravel [%]#	0.06	Sandy mud
Sand [%]#	19.35	
Fines [%]#	80.59	

Notes

Particle Size Distribution by Dry Sieving (63 000 µm - 1000 µm) and Laser Diffraction* (< 1000 µm - < 0.98 µm) at 0.5 phi Intervals

* = Determinand not included in UKAS Accreditation

† = Particle size expressed in accordance with Wentworth (1922) scale

‡ = Statistics calculated using Folk and Ward (1957) method

\# = Description based on BGS modified Folk classification (Long, 2006)

Appendix D

Sediment Chemistry

D.1 Particle Size Distribution

Station	Depth [m BRL]	Aperture [phi]																							
		-5.5	-5.0	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
		Aperture [µm]																							
		45000	31500	22400	16000	11200	8000	5600	4000	2800	2000	1400	1000	707	500	353.6	250	176.8	125	88.39	63	44.2	31.3	22.1	15.6
VC-01	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	1.74	6.48	2.33	1.67	8.05	9.06	10.11	9.28
	1.00-1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	3.65	5.38	2.17	0.19	3.08	7.05	8.73	8.46
	2.00-2.30	0.00	0.00	0.00	0.00	2.52	2.37	3.77	4.74	5.61	6.30	7.12	6.66	12.79	11.31	7.89	5.36	2.76	2.81	0.85	0.72	1.80	1.67	1.88	1.62
VC-02	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	4.06	0.93	1.47	7.47	8.89	10.22	10.40
	1.00-1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	2.64	6.51	5.13	2.30	0.21	3.21	6.70	7.72	7.84
VC-03	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	3.43	0.65	1.43	7.27	8.56	10.40	10.00
	1.00-1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	3.91	0.70	0.45	5.89	8.48	10.28	9.53
	2.00-2.30	0.00	5.26	0.00	2.10	4.90	6.05	5.02	5.54	6.43	6.06	6.33	4.97	4.72	7.60	4.07	2.80	2.61	2.21	1.48	0.41	1.19	1.69	2.03	2.04
	2.30-2.60	0.00	0.00	0.00	4.18	11.06	5.66	4.68	5.43	6.27	6.00	5.96	4.61	5.56	6.67	2.77	2.44	1.49	1.97	0.92	0.23	1.62	1.78	2.18	2.33
VC-04	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	4.17	1.54	0.89	7.13	9.42	10.75	10.39
	1.00-1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	3.19	3.81	0.62	3.23	7.87	9.56	9.12
	2.00-2.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	3.47	1.07	2.99	17.78	21.83	9.83	2.23	0.42	0.91	2.36	3.06	2.96
	2.50-3.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92	1.05	1.48	0.86	0.83	0.62	0.00	0.00	0.00	0.31	3.80	3.55	3.52	1.84	3.22	5.45	7.08	6.25
VC-05	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	4.35	1.36	0.67	6.49	8.61	10.36	9.43
	1.00-1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	3.27	2.31	0.45	4.47	7.67	10.33	8.90
	2.00-2.30	0.00	0.00	0.00	0.00	0.00	0.00	1.93	0.72	0.63	0.88	0.75	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1.70	5.88	5.76
	2.30-2.60	0.00	0.00	0.00	0.00	0.00	0.00	1.71	1.60	1.45	1.73	1.58	1.37	0.00	0.00	0.78	3.95	4.32	5.50	4.38	1.20	3.83	5.35	6.14	5.89
VC-06	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	6.00	1.92	0.94	6.83	8.57	9.78	9.37
	1.00-1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	3.29	0.91	0.30	5.08	8.15	9.35	9.65
	2.00-2.30	0.00	0.00	0.00	0.94	4.83	2.32	2.56	2.63	2.04	1.63	1.52	1.26	1.65	9.37	20.86	19.31	12.54	5.80	1.88	0.61	1.01	0.58	0.91	0.55
	2.50-2.80	0.00	0.00	0.00	3.28	2.98	1.44	2.38	1.82	1.79	1.54	1.69	1.52	3.54	3.57	6.92	8.70	7.19	7.80	4.11	2.10	3.71	3.21	3.56	3.21
VC-07	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	2.05	5.46	1.46	0.64	6.23	8.05	9.53	9.44
	1.00-1.30	0.00	0.00	8.72	0.00	5.68	1.25	2.24	2.11	2.59	2.01	1.93	1.67	0.00	0.00	0.04	0.86	2.38	3.36	2.70	0.48	1.38	3.65	5.09	5.37
	1.50-1.80	0.00	0.00	0.00	0.00	3.49	1.13	0.99	1.97	2.38	1.79	1.64	1.11	0.00	0.00	0.00	0.77	4.54	3.86	3.69	1.36	1.90	4.68	6.22	6.16
VC-08B	0.00-0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	4.46	2.89	0.23	3.83	7.96	9.44	9.03
	1.00-1.20	0.00	0.00	9.07	0.00	0.00	4.53	1.52	0.98	1.28	1.19	1.26	1.01	0.09	3.12	3.46	3.72	6.04	5.91	4.62	1.37	2.96	3.97	4.38	4.18
	2.00-2.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.44	2.10	1.02	5.97	28.48	35.18	13.11	4.14	1.05	0.43	0.72	0.49	0.65	0.50
	2.20-2.50	0.00	0.00	0.00	5.09	0.00	0.69	1.02	1.36	0.97	0.99	0.94	0.87	0.20	2.74	2.08	4.55	2.63	7.07	5.45	3.67	7.20	6.17	6.44	4.78
VC-09	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	2.85	1.82	0.65	6.00	9.20	10.99	9.73
	1.00-1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.98	4.46	1.93	0.44	5.16	8.09	9.15	9.11
	2.05-2.35	0.00	4.55	0.00	0.00	3.25	2.88	2.80	3.19	3.12	3.11	3.18	2.63	0.00	0.00	0.32	1.55	1.60	2.70	2.41	0.87	1.67	3.92	5.65	5.59
VC-10	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.95	3.83	1.22	1.06	6.70	8.41	9.96	9.78

Station	Depth [m BRL]	Aperture [phi]																							
		-5.5	-5.0	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
		Aperture [µm]																							
		45000	31500	22400	16000	11200	8000	5600	4000	2800	2000	1400	1000	707	500	353.6	250	176.8	125	88.39	63	44.2	31.3	22.1	15.6
	1.30-1.60	0.00	0.00	0.00	7.30	1.51	5.82	5.28	4.96	3.75	3.28	3.18	2.23	0.00	0.00	0.91	3.38	1.94	2.47	2.19	0.36	0.93	2.75	4.25	4.20
VC-11	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1.19	4.71	1.04	0.44	5.48	7.97	9.26	9.49
	0.70-1.00	0.00	0.00	0.00	1.35	0.61	1.16	2.16	2.95	3.25	3.96	4.89	3.99	14.34	12.91	5.88	3.00	2.17	2.27	0.71	0.22	1.92	2.51	3.37	3.63
VC-12	0.00-0.30	0.00	0.00	0.00	7.01	6.52	2.94	1.65	1.84	2.11	1.69	1.53	1.24	0.00	0.00	0.55	2.33	3.64	3.96	3.22	0.61	2.37	3.74	5.26	5.18
	0.80-1.10	0.00	11.60	0.00	0.00	6.74	4.60	3.12	2.75	2.48	2.04	1.76	1.01	0.02	1.19	1.06	1.14	2.27	2.10	0.48	0.11	2.04	4.03	5.47	5.76
VC-13	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	4.70	6.28	1.45	0.77	6.22	7.76	9.38	8.46
	0.50-0.80	0.00	0.00	0.00	0.00	2.70	3.25	4.93	5.45	5.00	4.62	4.01	2.85	0.77	3.64	3.75	2.28	2.59	2.47	1.09	0.18	1.90	3.22	4.43	4.75
VC-14	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	2.17	5.51	2.40	0.81	6.21	7.99	9.88	8.92
VC-15A	0.00-0.30	0.00	0.00	0.00	1.87	0.43	2.57	0.85	0.69	1.53	1.56	1.86	1.44	0.10	2.60	3.27	1.72	4.67	6.19	3.93	0.57	3.92	5.10	6.06	6.02
	0.80-1.10	0.00	0.00	0.00	0.00	3.79	2.62	3.58	5.02	6.13	7.45	7.17	5.56	6.79	6.16	5.55	3.21	2.26	2.35	1.03	0.12	0.32	1.40	2.48	2.70
VC-16	0.00-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.70	2.29	4.65	7.71	7.51	6.64	5.09	4.56	6.05	6.76	7.49	2.39	1.72	3.33	2.81	3.55	3.34
VC-17	0.00-0.30	0.00	0.00	0.00	6.59	3.09	1.30	2.07	2.83	2.62	2.49	2.27	1.78	0.94	3.80	3.84	2.25	6.30	4.79	3.78	1.84	1.98	3.71	4.26	4.19
VC-18	0.00-0.30	0.00	12.19	1.50	1.01	5.08	4.46	5.13	4.06	3.53	3.25	3.64	2.87	4.79	4.09	4.50	6.56	6.25	4.53	1.02	0.55	1.70	1.66	2.12	2.06
	0.30-0.85	0.00	0.00	0.00	0.00	4.62	4.97	6.64	5.72	5.98	5.37	4.67	3.25	4.92	7.66	5.45	2.32	2.63	2.19	0.85	0.08	1.13	1.83	2.48	3.03
VC-19	0.00-0.30	0.00	0.00	0.00	0.00	1.70	0.33	1.24	0.99	1.07	1.37	1.76	1.73	0.01	0.75	1.03	2.12	2.30	6.14	2.77	1.49	5.74	6.11	7.71	7.07
VC-20	0.00-0.30	0.00	0.00	7.77	0.00	0.00	1.82	1.63	1.92	2.76	2.28	2.30	1.94	0.07	2.70	3.41	0.68	3.13	5.14	2.81	0.50	3.36	3.73	5.23	5.13
	0.80-1.10	0.00	0.00	0.00	0.00	0.00	2.56	2.08	1.88	1.70	1.71	1.50	1.19	0.00	0.00	0.00	0.44	5.44	5.65	4.15	2.91	3.24	4.94	6.53	5.71
BH-08	1.60-1.80	13.63	9.42	2.80	0.78	7.72	4.45	7.46	6.54	4.49	3.59	3.08	2.08	3.96	4.85	2.71	1.63	1.34	1.33	0.91	0.10	0.98	1.48	1.70	1.73
BH-09	2.30-3.00	0.00	0.00	15.95	6.96	10.65	9.46	8.03	7.29	6.39	4.78	3.97	3.02	2.86	2.99	1.96	1.01	1.01	0.89	0.88	0.18	0.40	0.86	1.04	1.08
BH-10	2.30-2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	5.94	18.77	15.97	11.73	8.98
BH-11	2.40-2.60	0.00	0.00	0.00	0.00	0.00	1.57	0.33	0.89	0.58	0.86	0.93	0.63	0.00	0.00	0.00	0.00	0.53	3.52	3.49	0.65	1.10	5.87	8.16	7.07
BH-12	2.25-2.50	0.00	0.00	0.00	0.00	0.00	5.04	2.55	1.78	1.78	1.41	1.46	1.24	0.00	0.00	0.14	2.62	3.65	4.63	4.44	2.52	2.39	4.78	5.60	5.47
BH-13	3.90-4.10	0.00	0.00	0.00	0.00	2.06	2.93	3.93	3.24	2.45	1.71	1.54	1.09	0.00	0.00	0.00	0.00	0.17	1.71	2.14	0.13	0.06	2.36	5.35	6.54
BH-30	0.00-0.50	0.00	0.00	0.00	0.00	1.51	0.00	1.51	1.15	1.10	1.12	0.98	1.01	0.00	0.00	0.01	0.86	2.60	3.98	4.36	0.65	2.43	5.42	6.61	6.67
	0.95-1.25	0.00	0.00	0.00	0.00	2.44	0.65	0.47	0.96	1.70	0.92	0.88	0.71	0.11	3.17	5.13	3.09	3.41	3.75	4.10	1.01	4.46	5.42	5.61	5.46
	2.00-2.20	0.00	0.00	0.00	0.00	0.00	0.84	2.14	1.71	1.96	1.76	1.49	0.99	0.00	0.00	0.00	0.00	0.56	3.90	3.22	0.45	0.86	4.42	6.60	7.25
	3.00-3.20	0.00	0.00	0.00	0.00	2.71	3.55	2.65	2.28	2.61	2.33	1.82	1.21	0.00	0.00	0.00	0.00	0.57	3.08	2.72	0.37	1.05	4.35	5.93	6.33
	4.00-4.20	0.00	0.00	0.00	3.52	3.93	2.78	4.60	2.62	2.64	2.19	2.02	1.41	0.00	0.00	0.01	0.56	2.06	4.43	4.00	2.04	2.10	4.67	5.49	5.19
	5.00-5.20	0.00	0.00	0.00	0.00	2.73	2.44	3.44	2.11	2.39	1.85	1.68	1.26	0.00	0.00	0.04	1.85	3.53	4.08	4.95	1.27	2.75	4.87	5.71	5.51
	6.00-6.20	0.00	0.00	0.00	0.00	1.28	5.69	1.50	1.71	1.88	1.76	1.50	1.05	0.00	0.00	0.08	1.81	3.12	4.97	4.87	1.22	2.83	4.78	5.89	5.63
	6.80-7.00	0.00	0.00	17.94	5.51	9.91	9.38	8.57	7.83	5.33	3.84	3.57	2.75	1.37	2.80	2.17	1.50	1.25	1.13	0.78	0.07	0.64	1.01	1.24	1.31

Station	Depth [m BRL]	Aperture [phi]																							
		-5.5	-5.0	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
		Aperture [µm]																							
		45000	31500	22400	16000	11200	8000	5600	4000	2800	2000	1400	1000	707	500	353.6	250	176.8	125	88.39	63	44.2	31.3	22.1	15.6
BH-31	0.00-0.80	0.00	0.00	0.00	0.01	0.00	0.00	0.12	0.20	0.17	0.15	0.20	0.19	0.00	0.00	0.00	0.53	2.28	3.61	4.73	0.47	4.03	7.20	8.17	8.47
	1.00-1.60	0.00	0.00	0.00	0.00	0.00	1.22	1.51	1.23	1.20	1.75	1.97	1.58	0.00	0.00	0.77	4.91	3.84	4.50	5.51	1.68	2.99	5.18	5.88	5.53
	2.00-2.30	0.00	0.00	0.00	0.00	2.15	0.00	0.88	2.50	1.88	1.79	1.65	1.21	0.00	0.00	0.02	1.39	3.66	3.92	5.12	1.52	3.01	5.47	6.45	6.26
	3.30-3.70	0.00	0.00	0.00	0.00	0.00	2.47	1.62	1.85	3.39	3.45	3.60	3.10	0.00	0.00	0.01	0.70	2.36	4.47	3.67	1.65	1.82	4.19	5.53	5.61
	4.00-4.30	0.00	28.34	0.00	0.00	0.00	2.26	1.95	1.50	1.75	1.39	1.39	0.88	0.00	0.00	0.01	0.49	1.48	3.03	2.89	0.44	1.72	3.44	4.22	4.40
	5.00-5.30	0.00	33.25	0.00	0.00	0.00	0.76	1.99	2.29	1.63	1.23	1.01	0.70	0.00	0.00	0.02	0.65	1.63	2.40	2.85	0.54	1.36	2.92	3.68	4.18
	6.10-6.40	0.00	0.00	0.00	5.77	2.23	2.04	3.53	3.40	3.36	3.44	2.80	1.86	0.00	0.00	0.01	1.35	2.65	1.70	2.64	0.34	0.22	2.24	3.90	5.19
BH-32	0.00-0.50	0.00	0.00	0.00	0.00	0.00	0.60	0.86	0.65	0.77	0.84	0.63	0.39	0.00	0.00	0.00	0.09	0.65	4.11	1.65	0.53	5.40	7.95	8.96	9.65
	1.00-1.50	0.00	11.71	0.00	1.92	2.58	2.16	1.91	2.52	3.22	2.87	2.57	2.07	0.00	0.00	0.00	0.00	0.78	3.70	3.52	0.94	0.76	3.46	4.44	4.76
	2.00-2.50	0.00	0.00	0.00	0.00	3.38	3.25	3.52	1.04	3.00	1.77	1.85	1.41	0.00	0.00	0.16	1.74	4.17	5.52	5.13	2.29	1.88	4.54	5.30	5.27
	3.00-3.50	0.00	0.00	0.00	0.00	0.00	0.00	2.27	2.66	3.29	1.97	1.32	0.67	0.00	0.00	0.00	0.00	0.00	0.58	1.18	0.09	0.08	2.59	5.95	8.11
BH-33	0.00-1.00	0.00	0.00	0.00	6.11	0.00	0.85	0.10	0.04	0.21	0.12	0.20	0.13	0.00	0.00	0.00	0.00	0.19	3.15	1.44	0.54	5.50	8.08	9.02	9.70
	1.00-1.70	0.00	0.00	0.00	3.27	0.00	1.68	1.88	3.38	3.03	2.68	2.35	1.95	0.00	0.54	1.61	2.63	4.29	5.25	4.71	1.86	2.84	4.81	5.23	5.16
	2.00-2.50	0.00	0.00	0.00	3.41	1.25	3.94	1.51	4.30	3.14	3.14	3.19	2.69	0.00	0.00	0.02	1.44	2.52	3.82	3.72	1.36	1.01	3.87	4.72	4.73
	3.00-3.30	0.00	0.00	0.00	0.00	1.74	2.33	3.25	3.04	2.37	1.87	1.62	1.12	0.00	0.00	0.01	1.16	3.88	5.80	4.58	1.99	1.76	4.45	5.50	5.59
BH-34	0.00-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	4.37	5.81	1.20	3.98	8.12	9.07	8.52
	1.00-1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.79	1.86	5.07	5.32	0.80	3.15	6.66	7.96	7.66
	2.00-2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	3.85	5.39	0.79	3.66	7.78	9.05	8.75
	3.00-3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	4.04	4.91	2.11	2.77	7.17	8.82	8.32
	4.00-4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	3.56	5.15	0.62	2.92	7.77	8.83	8.62
	5.00-5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	3.98	5.02	1.64	2.00	7.44	8.36	8.53

Notes
Units are % for fractional data at 0.5 phi intervals.
VC = Vibrocore
BH = Borehole
BRL = Below riverbed level

Station	Depth [m BRL]	Aperture [phi]																	
		6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	> 14.5
		Aperture [µm]																	
		11	7.8	5.5	3.9	2.75	1.95	1.38	0.98	0.69	0.49	0.34	0.24	0.17	0.12	0.09	0.06	0.04	< 0.04
VC-01	0.00-0.30	9.49	9.28	8.30	6.52	4.55	2.94	2.06	1.65	1.44	1.28	1.11	0.92	0.68	0.49	0.30	0.12	0.01	0.00
	1.00-1.30	9.13	9.22	8.73	7.44	5.70	4.27	3.54	3.04	2.55	2.15	1.79	1.41	0.98	0.65	0.37	0.14	0.02	0.00
	2.00-2.30	1.56	1.47	1.32	1.07	0.80	0.61	0.55	0.51	0.43	0.35	0.27	0.20	0.14	0.10	0.06	0.02	0.00	0.00
VC-02	0.00-0.30	10.01	10.00	9.41	7.49	5.08	3.09	2.08	1.70	1.54	1.42	1.25	1.03	0.76	0.54	0.33	0.13	0.02	0.00
	1.00-1.30	8.28	8.99	8.94	7.61	5.62	3.91	3.01	2.53	2.17	1.88	1.59	1.26	0.87	0.58	0.33	0.12	0.01	0.00
VC-03	0.00-0.30	9.45	9.69	9.40	7.71	5.40	3.42	2.40	2.00	1.81	1.65	1.46	1.20	0.89	0.64	0.39	0.15	0.02	0.00
	1.00-1.30	9.41	10.10	9.70	7.94	5.69	3.86	2.87	2.35	1.99	1.73	1.48	1.19	0.83	0.56	0.32	0.12	0.01	0.00
	2.00-2.30	2.36	2.12	1.82	1.53	1.23	1.00	0.91	0.83	0.70	0.56	0.45	0.35	0.26	0.19	0.12	0.05	0.01	0.00
	2.30-2.60	2.15	2.21	2.23	1.92	1.44	1.12	1.05	1.00	0.85	0.68	0.52	0.39	0.27	0.19	0.11	0.04	0.01	0.00
VC-04	0.00-0.30	10.23	10.16	9.19	7.16	4.91	3.12	2.17	1.73	1.50	1.33	1.15	0.94	0.69	0.49	0.30	0.12	0.01	0.00
	1.00-1.30	10.41	9.76	8.80	7.57	5.93	4.31	3.31	2.72	2.30	2.01	1.73	1.39	0.98	0.65	0.37	0.14	0.02	0.00
	2.00-2.30	3.80	4.12	4.12	3.68	2.81	2.12	1.90	1.72	1.46	1.23	1.05	0.84	0.60	0.40	0.23	0.08	0.01	0.00
	2.50-3.00	7.42	7.66	7.28	6.25	4.82	3.80	3.46	3.25	2.97	2.73	2.50	2.16	1.66	1.21	0.74	0.29	0.03	0.00
VC-05	0.00-0.30	9.32	9.75	9.15	7.40	5.31	3.57	2.61	2.14	1.90	1.76	1.61	1.36	1.00	0.70	0.42	0.16	0.02	0.00
	1.00-1.30	10.03	10.54	9.75	7.99	5.86	4.04	3.01	2.42	2.04	1.81	1.59	1.29	0.89	0.59	0.33	0.12	0.01	0.00
	2.00-2.30	8.60	8.50	8.64	8.56	7.09	5.75	5.44	5.16	4.82	4.76	4.64	3.95	2.66	1.60	0.78	0.25	0.03	0.00
	2.30-2.60	6.88	6.36	5.78	5.13	4.15	3.31	3.00	2.77	2.50	2.28	2.07	1.78	1.36	0.98	0.60	0.23	0.03	0.00
VC-06	0.00-0.30	9.78	9.66	8.77	7.04	5.04	3.36	2.41	1.94	1.68	1.50	1.33	1.11	0.84	0.61	0.37	0.15	0.02	0.00
	1.00-1.30	9.84	10.66	10.43	8.56	6.02	3.92	2.84	2.32	2.00	1.76	1.52	1.22	0.85	0.57	0.32	0.12	0.01	0.00
	2.00-2.30	0.85	0.71	0.63	0.62	0.45	0.34	0.40	0.39	0.29	0.18	0.11	0.08	0.06	0.05	0.04	0.02	0.00	0.00
	2.50-2.80	3.41	3.34	3.06	2.53	1.86	1.47	1.45	1.45	1.31	1.12	0.93	0.74	0.54	0.39	0.23	0.09	0.01	0.00
VC-07	0.00-0.30	9.38	9.78	9.28	7.46	5.20	3.42	2.52	2.07	1.78	1.58	1.39	1.14	0.83	0.57	0.34	0.13	0.02	0.00
	1.00-1.30	6.48	6.60	6.04	4.94	3.65	2.83	2.66	2.60	2.40	2.14	1.86	1.54	1.16	0.84	0.52	0.20	0.02	0.00
	1.50-1.80	7.89	7.52	6.59	5.42	4.19	3.35	3.08	2.90	2.59	2.27	1.95	1.62	1.23	0.91	0.57	0.23	0.03	0.00
VC-08B	0.00-0.20	10.04	10.44	9.79	8.10	5.96	4.05	2.92	2.30	1.93	1.67	1.44	1.16	0.84	0.58	0.34	0.13	0.02	0.00
	1.00-1.20	5.00	4.70	4.21	3.60	2.79	2.23	2.10	2.02	1.84	1.67	1.52	1.31	1.00	0.72	0.44	0.17	0.02	0.00
	2.00-2.20	0.62	0.65	0.64	0.58	0.42	0.33	0.35	0.36	0.29	0.20	0.12	0.07	0.03	0.02	0.01	0.00	0.00	0.00
	2.20-2.50	5.46	4.92	4.15	3.49	2.75	2.20	2.04	1.96	1.78	1.59	1.41	1.19	0.91	0.67	0.41	0.16	0.02	0.00
VC-09	0.00-0.30	10.23	9.78	8.76	7.14	5.30	3.70	2.77	2.26	1.94	1.70	1.48	1.21	0.88	0.62	0.37	0.15	0.02	0.00
	1.00-1.30	9.34	10.04	9.76	8.09	5.81	3.93	2.94	2.37	2.00	1.77	1.56	1.25	0.84	0.52	0.28	0.10	0.01	0.00
	2.05-2.35	7.16	6.63	5.83	4.93	3.78	2.93	2.70	2.54	2.22	1.85	1.50	1.15	0.80	0.54	0.31	0.12	0.01	0.00
VC-10	0.00-0.30	9.70	9.97	9.46	7.63	5.34	3.48	2.51	2.05	1.79	1.61	1.41	1.16	0.85	0.60	0.36	0.14	0.02	0.00

Station	Depth [m BRL]	Aperture [phi]																	
		6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	> 14.5
		Aperture [µm]																	
		11	7.8	5.5	3.9	2.75	1.95	1.38	0.98	0.69	0.49	0.34	0.24	0.17	0.12	0.09	0.06	0.04	< 0.04
	1.30-1.60	4.95	5.39	5.28	4.55	3.47	2.64	2.31	2.10	1.85	1.65	1.48	1.27	0.98	0.72	0.45	0.18	0.02	0.00
VC-11	0.00-0.30	9.57	10.10	9.74	7.96	5.61	3.69	2.70	2.24	1.96	1.77	1.57	1.30	0.95	0.67	0.40	0.15	0.02	0.00
	0.70-1.00	3.71	3.72	3.37	2.60	1.78	1.32	1.24	1.20	1.04	0.84	0.65	0.49	0.34	0.24	0.14	0.06	0.01	0.00
VC-12	0.00-0.30	6.13	6.14	5.54	4.49	3.30	2.54	2.37	2.30	2.12	1.91	1.69	1.43	1.10	0.82	0.51	0.20	0.02	0.00
	0.80-1.10	6.44	6.14	5.30	4.19	3.08	2.29	1.96	1.76	1.55	1.37	1.21	1.03	0.81	0.61	0.38	0.15	0.02	0.00
VC-13	0.00-0.30	9.02	9.24	8.55	6.99	5.11	3.47	2.50	1.97	1.66	1.48	1.31	1.09	0.81	0.58	0.35	0.14	0.02	0.00
	0.50-0.80	5.75	5.82	5.10	3.90	2.68	1.92	1.74	1.72	1.62	1.47	1.29	1.08	0.83	0.62	0.39	0.16	0.02	0.00
VC-14	0.00-0.30	9.80	10.06	9.13	7.25	5.13	3.38	2.41	1.92	1.63	1.43	1.23	1.00	0.73	0.51	0.30	0.12	0.01	0.00
VC-15A	0.00-0.30	6.87	7.01	6.35	5.14	3.78	2.70	2.17	1.87	1.62	1.41	1.22	1.02	0.78	0.58	0.36	0.15	0.02	0.00
	0.80-1.10	3.62	3.58	3.21	2.72	2.11	1.63	1.42	1.26	1.08	0.93	0.81	0.68	0.52	0.39	0.24	0.10	0.01	0.00
VC-16	0.00-0.30	3.17	3.40	3.53	3.10	2.28	1.55	1.20	1.05	0.92	0.79	0.67	0.54	0.39	0.28	0.17	0.06	0.01	0.00
VC-17	0.00-0.30	4.98	4.57	4.06	3.49	2.74	2.19	2.01	1.85	1.62	1.43	1.27	1.09	0.83	0.61	0.38	0.15	0.02	0.00
VC-18	0.00-0.30	2.08	2.22	2.15	1.75	1.23	0.83	0.64	0.56	0.49	0.42	0.34	0.27	0.20	0.14	0.09	0.04	0.00	0.00
	0.30-0.85	3.27	3.42	3.31	2.73	1.92	1.41	1.32	1.33	1.24	1.11	0.96	0.79	0.59	0.44	0.27	0.10	0.01	0.00
VC-19	0.00-0.30	7.06	7.99	7.97	6.55	4.56	2.96	2.17	1.76	1.44	1.19	0.97	0.75	0.53	0.36	0.21	0.08	0.01	0.00
VC-20	0.00-0.30	5.47	5.84	5.57	4.54	3.24	2.51	2.44	2.39	2.16	1.90	1.66	1.40	1.07	0.79	0.49	0.19	0.02	0.00
	0.80-1.10	6.97	6.64	5.91	5.01	3.99	3.25	2.97	2.75	2.43	2.13	1.86	1.56	1.20	0.88	0.55	0.22	0.03	0.00
BH-08	1.60-1.80	1.71	1.71	1.63	1.37	1.03	0.77	0.66	0.59	0.49	0.39	0.30	0.23	0.16	0.11	0.07	0.03	0.00	0.00
BH-09	2.30-3.00	1.31	1.30	1.15	0.94	0.71	0.55	0.50	0.46	0.40	0.32	0.25	0.18	0.13	0.09	0.05	0.02	0.00	0.00
BH-10	2.30-2.50	7.23	5.94	4.92	3.81	2.86	2.21	1.93	1.82	1.70	1.54	1.34	1.12	0.87	0.66	0.42	0.18	0.02	0.00
BH-11	2.40-2.60	8.44	9.29	9.27	8.08	6.17	4.57	3.86	3.43	2.88	2.32	1.81	1.38	0.99	0.70	0.43	0.17	0.02	0.00
BH-12	2.25-2.50	6.81	6.35	5.79	5.02	3.89	3.04	2.81	2.72	2.53	2.33	2.12	1.82	1.38	1.01	0.62	0.24	0.03	0.00
BH-13	3.90-4.10	9.50	9.82	8.62	6.64	4.58	3.29	3.06	3.17	3.09	2.82	2.43	1.99	1.49	1.10	0.68	0.27	0.03	0.00
BH-30	0.00-0.50	7.00	7.52	7.50	6.51	4.87	3.73	3.49	3.37	3.09	2.80	2.50	2.10	1.54	1.08	0.64	0.24	0.03	0.00
	0.95-1.25	5.10	5.54	5.97	5.53	4.26	3.30	3.04	2.79	2.41	2.13	1.92	1.65	1.24	0.89	0.54	0.20	0.02	0.00
	2.00-2.20	9.27	9.20	8.06	6.42	4.69	3.57	3.32	3.27	3.04	2.75	2.42	2.04	1.57	1.17	0.73	0.29	0.03	0.00
	3.00-3.20	7.98	8.15	7.45	6.03	4.43	3.38	3.10	3.03	2.83	2.55	2.23	1.86	1.42	1.05	0.66	0.26	0.03	0.00
	4.00-4.20	6.40	5.95	5.19	4.34	3.42	2.80	2.64	2.51	2.27	2.04	1.81	1.54	1.18	0.87	0.54	0.21	0.03	0.00
	5.00-5.20	6.40	6.47	6.02	5.05	3.81	3.04	2.91	2.81	2.52	2.20	1.90	1.58	1.19	0.87	0.53	0.21	0.02	0.00
	6.00-6.20	6.48	6.52	6.08	5.14	3.90	3.10	2.95	2.86	2.58	2.28	1.98	1.65	1.24	0.90	0.55	0.21	0.03	0.00
	6.80-7.00	1.36	1.41	1.37	1.17	0.87	0.68	0.62	0.56	0.48	0.41	0.36	0.30	0.22	0.16	0.09	0.04	0.00	0.00
BH-31	0.00-0.80	8.95	9.82	9.83	8.31	5.97	3.92	2.82	2.28	1.92	1.65	1.37	1.06	0.72	0.47	0.26	0.09	0.01	0.00

Station	Depth [m BRL]	Aperture [phi]																	
		6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	> 14.5
		Aperture [µm]																	
		11	7.8	5.5	3.9	2.75	1.95	1.38	0.98	0.69	0.49	0.34	0.24	0.17	0.12	0.09	0.06	0.04	< 0.04
	1.00-1.60	6.21	6.32	6.10	5.35	4.18	3.33	3.08	2.88	2.55	2.25	1.97	1.65	1.23	0.88	0.53	0.20	0.02	0.00
	2.00-2.30	7.08	6.99	6.42	5.39	4.04	3.17	3.02	2.92	2.65	2.37	2.11	1.78	1.35	0.98	0.60	0.23	0.03	0.00
	3.30-3.70	6.86	6.93	6.35	5.26	3.91	3.04	2.86	2.80	2.61	2.40	2.18	1.87	1.44	1.06	0.65	0.26	0.03	0.00
	4.00-4.30	5.02	5.21	4.94	4.11	3.01	2.34	2.24	2.20	2.02	1.81	1.61	1.37	1.05	0.78	0.48	0.19	0.02	0.00
	5.00-5.30	4.65	4.89	4.80	4.08	2.97	2.26	2.18	2.17	2.00	1.78	1.55	1.29	0.97	0.70	0.43	0.16	0.02	0.00
	6.10-6.40	7.59	8.35	7.53	5.68	3.79	2.76	2.64	2.69	2.50	2.16	1.78	1.40	1.02	0.74	0.45	0.18	0.02	0.00
BH-32	0.00-0.50	9.77	10.06	9.63	7.77	5.29	3.20	2.12	1.70	1.52	1.37	1.20	0.98	0.71	0.50	0.30	0.12	0.01	0.00
	1.00-1.50	6.49	6.21	5.45	4.50	3.49	2.82	2.64	2.51	2.26	1.98	1.72	1.43	1.08	0.80	0.49	0.20	0.02	0.00
	2.00-2.50	6.59	6.08	5.35	4.51	3.53	2.88	2.73	2.63	2.37	2.09	1.82	1.51	1.14	0.82	0.50	0.20	0.02	0.00
	3.00-3.50	12.02	11.95	9.98	7.38	5.07	3.71	3.36	3.27	3.00	2.60	2.16	1.72	1.27	0.93	0.58	0.23	0.03	0.00
BH-33	0.00-1.00	10.02	10.44	9.85	7.69	5.02	2.89	1.83	1.42	1.25	1.12	0.98	0.79	0.57	0.40	0.24	0.09	0.01	0.00
	1.00-1.70	6.12	5.49	4.90	4.27	3.35	2.63	2.42	2.29	2.07	1.85	1.64	1.38	1.04	0.75	0.46	0.18	0.02	0.00
	2.00-2.50	6.81	6.43	5.64	4.74	3.73	2.99	2.75	2.58	2.32	2.06	1.82	1.54	1.17	0.86	0.53	0.21	0.02	0.00
	3.00-3.30	7.30	6.85	5.92	4.86	3.76	3.03	2.81	2.66	2.39	2.11	1.84	1.54	1.18	0.87	0.54	0.22	0.03	0.00
BH-34	0.00-0.50	9.82	9.55	8.84	7.57	5.67	3.87	2.85	2.31	1.97	1.74	1.50	1.17	0.76	0.46	0.24	0.08	0.01	0.00
	1.00-1.50	9.03	9.33	8.79	7.60	5.88	4.29	3.39	2.82	2.38	2.04	1.73	1.37	0.94	0.62	0.34	0.13	0.01	0.00
	2.00-2.50	10.17	10.26	9.44	7.79	5.72	3.90	2.87	2.33	1.98	1.72	1.47	1.16	0.79	0.52	0.29	0.11	0.01	0.00
	3.00-3.50	10.35	9.86	8.87	7.59	5.84	4.12	3.15	2.64	2.28	1.98	1.68	1.31	0.90	0.59	0.33	0.12	0.01	0.00
	4.00-4.50	10.15	10.35	9.64	7.98	5.86	4.02	3.03	2.55	2.22	1.91	1.59	1.23	0.85	0.57	0.33	0.12	0.01	0.00
	5.00-5.50	10.54	9.82	9.03	7.85	6.06	4.21	3.13	2.60	2.28	2.01	1.70	1.34	0.92	0.61	0.35	0.13	0.02	0.00

Notes
Units are % for fractional data at 0.5 phi intervals
VC = Vibrocore
BH = Borehole
BRL = Below riverbed level

D.2 Sediment Hydrocarbons

Station	Depth [m BRL]	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[e]pyrene	Benzo[ghi]perylene	Benzo[k]fluoranthene	C1-naphthalenes	C1-phenanthrenes
VC-01	0.00-0.30	217	155	293	665	680	685	673	588	326	3300	1570
	1.00-1.30	1060	1240	1170	1380	1090	996	1090	801	568	12000	4940
	2.00-2.30	3.28	7.46	3.97	4.87	4.62	3.06	4.79	3.86	2.40	47.0	22.7
VC-02	0.00-0.30	274	227	373	823	835	800	780	655	381	3480	1630
	1.00-1.30	230	161	306	583	633	623	601	489	243	2740	1310
VC-03	0.00-0.30	213	175	288	635	648	615	627	552	307	2980	1460
	1.00-1.30	320	196	330	629	623	650	566	449	271	2680	1270
	2.00-2.30	9.40	3.90	14.9	16.7	19.3	20.3	22.4	19.8	8.85	103	52.2
	2.30-2.60	1.25	< 1	1.61	2.39	2.60	6.47	5.98	4.01	1.43	19.1	10.2
VC-04	0.00-0.30	219	194	320	806	798	798	782	666	365	3670	1720
	1.00-1.30	796	806	882	1630	1440	1420	1420	1150	528	7780	3300
	2.00-2.30	117	83.8	326	676	653	558	514	476	242	1150	908
	2.50-3.00	11.9	2.45	11.9	34.1	43.1	47.9	64.2	82.6	12.2	146	184
VC-05	0.00-0.30	218	189	264	562	557	540	576	509	251	3340	1550
	1.00-1.30	608	491	674	1180	1130	1220	1130	952	418	6580	2790
	2.00-2.30	43.1	12.4	32.4	135	211	287	514	450	47.8	2100	1050
	2.30-2.60	40.9	11.6	30.1	131	195	266	487	437	47.7	2010	1040
VC-06	0.00-0.30	331	219	350	767	805	818	778	669	332	3270	1540
	1.00-1.30	554	353	524	1000	1060	1110	979	803	512	3830	1880
	2.00-2.30	6.34	14.1	7.96	16.1	17.4	21.6	33.6	31.4	5.64	97.1	91.0
	2.50-2.80	6.42	2.51	6.93	19.8	23.2	35.2	56.6	45.8	4.69	191	171
VC-07	0.00-0.30	499	300	396	759	808	818	769	649	452	3400	1540
	1.00-1.30	54.6	10.4	17.9	33.3	41.9	58.4	80.5	66.0	14.6	229	129
	1.50-1.80	3.96	1.75	3.36	13.7	18.3	36.6	55.6	46.6	6.65	112	85.6
VC-08B	0.00-0.20	748	578	834	1320	1450	1330	1260	1040	622	4700	2090
	1.00-1.20	11.4	5.75	11.1	34.4	43.0	55.5	91.5	84.1	12.1	288	208
	2.00-2.20	2.12	2.24	1.87	4.46	5.32	6.14	11.1	9.51	1.93	36.3	32.9
	2.20-2.50	8.89	2.88	9.15	35.4	42.3	57.7	96.4	88.6	11.3	246	241
VC-09	0.00-0.30	399	320	489	1030	1080	1070	971	830	472	3490	1690
	1.00-1.30	765	348	667	1390	1480	1340	1360	1110	611	4130	2090
	2.05-2.35	646	474	547	615	647	590	564	435	263	2470	1080
VC-10	0.00-0.30	406	292	402	881	975	965	896	759	482	3080	1490
	1.30-1.60	< 1	< 1	< 1	< 1	< 1	3.82	3.56	1.89	< 1	4.54	3.81

Station	Depth [m BRL]	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[e]pyrene	Benzo[ghi]perylene	Benzo[k]fluoranthene	C1-naphthalenes	C1-phenanthrenes
VC-11	0.00-0.30	389	281	471	1000	1030	1140	950	792	423	3430	1640
	0.70-1.00	56.2	65.1	78.6	143	165	163	145	121	69.7	428	199
VC-12	0.00-0.30	4.12	1.83	3.30	13.1	18.9	37.6	60.2	46.4	6.10	157	102
	0.80-1.10	< 1	1.38	< 1	< 1	< 1	< 1	1	< 1	< 1	5.42	3.72
VC-13	0.00-0.30	1300	1930	2020	4490	4530	4190	3680	2840	1800	9790	4610
	0.50-0.80	14.9	14.2	15.9	26.5	22.9	42.8	46.2	27.7	10.9	404	109
VC-14	0.00-0.30	503	281	644	1110	1250	1270	1070	895	503	3630	1920
VC-15A	0.00-0.30	67.6	193	77.3	123	131	139	135	114	58.3	607	330
	0.80-1.10	1.96	2.36	1.21	1.45	1.34	1.70	1.78	< 1	< 1	6.79	4.09
VC-16	0.00-0.30	3.19	3.15	1.03	1.30	1.04	2.50	2.36	1.41	1.01	11.0	4.78
VC-17	0.00-0.30	10.0	4.06	6.89	24.5	35.7	59.3	101	81.7	10.1	257	153
VC-18	0.00-0.30	< 1	3.53	< 1	1.03	1.02	1.34	1.69	1.01	< 1	8.50	3.68
	0.30-0.85	< 1	1.88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	3.69	2.19
VC-19	0.00-0.30	427	415	424	684	817	739	628	535	425	1550	695
VC-20	0.00-0.30	9.46	6.07	7.03	20.3	24.3	46.4	69.1	47.7	10.4	200	124
	0.80-1.10	5.67	3.16	4.98	17.6	23.0	51.0	77.0	53.5	8.28	208	134
BH-08	1.60-1.80	< 1	1.08	< 1	2.20	1.54	8.83	11.1	4.43	< 1	4.02	4.30
BH-09	2.30-3.00	< 1	< 1	< 1	< 1	< 1	3.79	2.51	1.18	< 1	2.14	1.48
BH-10	2.30-2.50	< 1	< 1	< 1	< 1	< 1	3.25	3.88	1.83	< 1	< 1	< 1
BH-11	2.40-2.60	< 1	< 1	< 1	< 1	< 1	1.32	1.30	< 1	< 1	< 1	< 1
BH-12	2.25-2.50	6.60	2.52	8.61	22.1	28.1	41.0	70.2	62.8	10.0	247	203
BH-13	3.90-4.10	< 1	< 1	< 1	< 1	< 1	1.81	2.83	1.83	1.28	4.05	3.34
BH-30	0.00-0.50	6390	219	466	176	161	151	158	161	80.8	2480	559
	0.95-1.25	6.10	1.27	2.63	2.35	3.77	4.65	8.83	35.4	1.95	38.7	14.7
	2.00-2.20	7.16	1.29	3.87	9.82	15.1	29.4	48.6	35.4	5.38	120	77.7
	3.00-3.20	2.85	< 1	2.27	5.18	7.99	15.6	25.6	18.4	3.16	73.8	44.6
	4.00-4.20	3.23	< 1	3.52	8.41	12.9	27.4	43.1	32.2	5.20	102	72.3
	5.00-5.20	5.26	1.75	5.17	15.5	23.2	44.2	73.4	53.7	7.51	219	147
	6.00-6.20	7.68	1.96	6.30	18.7	29.3	49.1	85.2	66.9	9.65	244	155
	6.80-7.00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BH-31	0.00-0.80	13800	1350	1640	2930	3310	2740	2420	1890	1790	6190	2690
	1.00-1.60	18.8	3.95	9.82	21.7	26.7	30.3	45.3	59.0	10.4	167	149
	2.00-2.30	14.3	3.84	17.0	34.2	43.1	46.8	69.5	78.5	13.5	290	246
	3.30-3.70	27.6	6.68	11.1	20.3	26.8	30.7	46.3	50.4	8.78	198	121

Station	Depth [m BRL]	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[e]pyrene	Benzo[ghi]perylene	Benzo[k]fluoranthene	C1-naphthalenes	C1-phenanthrenes
	4.00-4.30	3.56	1.24	4.05	16.0	20.0	34.3	55.3	41.4	7.00	137	118
	5.00-5.30	2.33	< 1	2.70	7.68	11.5	22.6	37.4	27.9	4.74	103	64.2
	6.10-6.40	1.35	< 1	1.31	3.48	5.25	14.9	21.3	14.0	2.75	38.5	28.7
BH-32	0.00-0.50	35800	1920	2180	1540	1260	917	1080	876	903	6380	2740
	1.00-1.50	234	12.7	15.7	22.7	31.2	50.8	77.1	60.6	11.7	221	129
	2.00-2.50	12.3	2.70	6.80	22.0	36.4	76.3	126	88.9	7.66	367	232
	3.00-3.50	< 1	< 1	< 1	< 1	< 1	2.32	2.59	1.46	< 1	2.21	1.08
BH-33	0.00-1.00	2850	346	550	938	1110	1120	943	873	400	3960	1700
	1.00-1.70	15.2	10.5	7.92	23.2	35.0	56.7	86.2	74.4	6.75	272	154
	2.00-2.50	15.6	8.96	8.00	22.2	33.9	59.6	94.5	75.9	8.88	294	174
	3.00-3.30	2.49	6.16	5.71	18.4	27.1	54.1	86.7	69.9	7.03	261	158
BH-34	0.00-0.50	3190	1310	1590	2410	2730	2460	2140	1880	849	7540	3400
	1.00-1.50	58200	4590	7910	4760	3580	3160	2770	2230	1200	47600	10900
	2.00-2.50	6210	1550	1710	2130	2500	2560	1960	1750	987	9310	3490
	3.00-3.50	13900	2670	3030	3100	3160	2940	2390	2050	928	13000	4960
	4.00-4.50	14900	2370	3210	3840	3700	3340	2750	2400	1550	14400	5420
	5.00-5.50	10200	1970	2410	2620	2450	2390	1890	1630	815	10500	3940
CEFAS Guideline Action Level												
AL1		100	100	100	100	100	100	100	100	100	100	100

Notes
Concentrations expressed as µg/kg dry sediment
* = Total hydrocarbon content expressed in mg/kg
BH = Borehole
VC = Vibrocore
BRL = Below riverbed level
AL1 = Action level 1
Cefas = Centre for Environment, Fisheries and Aquaculture Science
Cefas action levels available at https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans

Key:	Below AL1	Above AL1

Station	Depth [m BRL]	C2-naphthalenes	C3-naphthalenes	Chrysene	Dibenzo[ah]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene	Perylene	Phenanthrene	Pyrene	Total Hydrocarbon Content*
VC-01	0.00-0.30	2610	2290	713	121	1160	358	478	1140	184	1340	1170	85.7
	1.00-1.30	8610	6150	1510	118	2840	1730	544	4820	271	4570	2830	89.8
	2.00-2.30	35.8	26.5	5.53	< 1	9.64	8.14	2.20	13.9	1.13	20.8	14.8	5.00
VC-02	0.00-0.30	2760	2250	753	132	1350	429	559	1220	240	1440	1450	214
	1.00-1.30	2150	1750	563	103	948	351	413	1040	182	1210	1230	174
VC-03	0.00-0.30	2300	2090	706	112	1140	344	435	1020	177	1380	1150	219
	1.00-1.30	2050	1690	709	97.7	1250	468	400	1020	196	1290	1270	290
	2.00-2.30	76.8	55.2	22.1	3.66	34.4	16.3	12.9	46.5	4.91	53.3	62.2	38.8
	2.30-2.60	13.4	9.6	4.68	< 1	4.73	2.69	1.64	7.40	< 1	10.0	6.94	3.87
VC-04	0.00-0.30	2840	2280	865	133	1330	388	541	1260	223	1510	1300	182
	1.00-1.30	6050	4530	1320	247	2190	1220	964	3010	420	2980	2680	124
	2.00-2.30	938	807	674	100	1170	205	371	514	180	1020	1470	118
	2.50-3.00	146	180	49.4	6.67	52.1	27.1	26.0	24.9	14.1	138	67.2	8.47
VC-05	0.00-0.30	2640	2320	639	102	995	349	389	1130	146	1310	999	231
	1.00-1.30	4780	3840	1160	192	1730	862	751	2710	391	2490	2010	71.8
	2.00-2.30	1110	684	342	62.5	200	323	123	665	29.6	995	285	21.6
	2.30-2.60	1050	675	334	49.4	187	305	112	771	27.5	940	279	9.88
VC-06	0.00-0.30	2630	2210	738	141	1280	453	569	1160	234	1430	1400	217
	1.00-1.30	2960	2520	989	178	1610	692	729	1500	338	1780	1880	106
	2.00-2.30	85.6	85.1	28.6	4.51	21.6	15.2	9.7	22.4	3.93	64.1	33.0	33.6
	2.50-2.80	156	151	42.5	10.4	32.5	21.5	11.4	56.7	8.48	137	41.9	30.4
VC-07	0.00-0.30	2600	2200	731	138	1340	569	525	1250	236	1470	1490	48.9
	1.00-1.30	157	111	56.7	10.7	56.3	48.0	25.4	63.4	10.5	134	76.6	10.2
	1.50-1.80	74.5	52.7	34.7	7.03	22.7	20.7	13.5	25.5	3.98	82.6	28.4	98.5
VC-08B	0.00-0.20	3550	2570	1300	227	2060	905	963	2060	454	2230	2730	498
	1.00-1.20	204	181	65.2	12.0	59.6	34.4	22.9	77.8	13.7	170	70.3	21.9
	2.00-2.20	32.2	32.9	8.97	1.41	6.65	5.12	2.69	8.15	1.23	26.1	10.3	50.0
	2.20-2.50	213	202	70.1	12.4	53.5	30.0	25.2	52.8	15.0	195	63.9	49.6
VC-09	0.00-0.30	2700	2380	984	174	1760	541	740	1340	292	1660	1970	312
	1.00-1.30	3300	2710	1320	240	2290	842	1020	1880	531	2190	2690	224
	2.05-2.35	1770	1430	621	95.5	1070	837	404	1070	195	1240	1470	36.1
VC-10	0.00-0.30	2430	2080	851	162	1460	510	681	1190	284	1400	1650	237
	1.30-1.60	3.48	2.57	2.90	< 1	1.42	1.12	< 1	1.70	< 1	2.89	2.04	< 1
VC-11	0.00-0.30	2650	2140	979	172	1690	528	716	1320	293	1630	1920	150
	0.70-1.00	310	244	143	26.3	207	75.1	112	181	47.3	207	268	42.0
VC-12	0.00-0.30	89.5	56.4	43.9	5.85	23.5	21.5	12.7	45.7	3.48	94.9	30.2	5.94

Station	Depth [m BRL]	C2-naphthalenes	C3-naphthalenes	Chrysene	Dibenzo[ah]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene	Perylene	Phenanthrene	Pyrene	Total Hydrocarbon Content*
	0.80-1.10	5.37	3.80	< 1	< 1	1.22	1.28	< 1	3.13	< 1	3.21	1.61	< 1
VC-13	0.00-0.30	6910	6120	3790	638	8190	1830	2870	3850	1270	5550	9040	1280
	0.50-0.80	271	208	57.5	5.16	39.7	21.4	15.1	184	7.00	90.4	52.3	16.8
VC-14	0.00-0.30	2940	2510	1150	191	1980	611	829	1410	358	2100	2200	408
VC-15A	0.00-0.30	441	336	138	23.0	205	126	86.7	236	38.1	288	245	127
	0.80-1.10	8.59	4.56	1.87	< 1	2.21	2.59	< 1	3.23	< 1	4.38	3.27	2.21
VC-16	0.00-0.30	10.6	8.27	3.21	< 1	2.87	2.71	< 1	5.43	< 1	6.53	3.73	1.14
VC-17	0.00-0.30	152	101	65.1	11.8	41.9	34.1	20.0	66.7	7.78	150	50.5	15.0
VC-18	0.00-0.30	6.78	5.49	1.69	< 1	2.92	1.37	< 1	3.25	< 1	3.84	2.64	< 1
	0.30-0.85	3.73	2.88	1.19	< 1	< 1	1.06	< 1	1.31	< 1	2.12	< 1	< 1
VC-19	0.00-0.30	1100	778	664	123	1250	447	516	767	230	1030	1550	372
VC-20	0.00-0.30	128	89.9	53.2	6.42	37.3	28.4	13.3	61.4	6.81	114	42.0	6.09
	0.80-1.10	122	82.8	52.8	6.29	33.4	25.9	12.2	62.1	5.80	123	37.0	11.2
BH-08	1.60-1.80	4.42	4.01	10.5	< 1	13.2	1.89	< 1	2.65	< 1	35.8	9.94	< 1
BH-09	2.30-3.00	1.98	1.64	1.75	< 1	2.09	< 1	< 1	1.40	< 1	6.70	1.84	< 1
BH-10	2.30-2.50	< 1	< 1	3.56	< 1	2.19	< 1	< 1	< 1	< 1	7.86	1.96	< 1
BH-11	2.40-2.60	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BH-12	2.25-2.50	183	149	50.2	5.83	43.0	23.1	16.0	68.8	10.2	166	51.3	34.4
BH-13	3.90-4.10	3.89	3.80	1.91	< 1	1.29	< 1	< 1	1.73	< 1	2.83	1.39	< 1
BH-30	0.00-0.50	1610	813	202	< 1	575	2880	82.3	3970	60	2380	489	42.7
	0.95-1.25	26.2	32.8	2.97	< 1	7.82	9.90	4.62	27.1	2.04	14.6	9.26	9.12
	2.00-2.20	74.5	47.5	31.7	4.55	18.6	19.1	9.39	27.3	2.33	74.7	23.2	10.3
	3.00-3.20	42.1	25.9	16.3	2.41	10.0	8.87	4.54	20.0	1.59	40.1	12.4	12.99
	4.00-4.20	63.2	38.0	28.5	4.57	17.1	15.8	8.24	20.5	1.99	65.1	21.2	16.6
	5.00-5.20	125	78.3	46.5	7.11	33.5	26.9	11.3	58.6	3.85	138	40.0	9.90
	6.00-6.20	135	88.0	53.9	8.71	36.6	29.6	16.9	68.2	6.20	150	44.9	15.8
	6.80-7.00	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2.08	< 1	< 1
BH-31	0.00-0.80	5260	4200	2800	364	5680	3550	1870	3630	1060	3340	6050	511
	1.00-1.60	149	162	32.8	5.33	35.5	23.1	14.2	47.4	7.76	105	47.2	25.2
	2.00-2.30	244	246	51.8	8.89	50.1	39.3	23.0	67.0	11.7	212	65.9	11.0
	3.30-3.70	148	130	35.7	5.94	38.6	32.6	15.4	60.4	8.99	106	47.0	12.1
	4.00-4.30	80.7	60.5	38.3	6.11	37.0	17.5	11.6	37.5	3.54	104	34.9	3.77
	5.00-5.30	59.3	38.8	24.1	4.10	14.7	12.5	7.21	30.1	2.37	59.0	17.9	4.90
	6.10-6.40	24.5	16.2	13.3	2.37	7.89	5.88	3.41	8.21	1.03	25.5	10.2	1.37
BH-32	0.00-0.50	7160	5720	1410	177	4930	10800	611	5290	489	7130	4130	232
	1.00-1.50	151	105	53.4	8.99	51.3	93.0	19.6	83.4	6.81	140	53.8	3.42

Station	Depth [m BRL]	C2-naphthalenes	C3-naphthalenes	Chrysene	Dibenzo[ah]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene	Perylene	Phenanthrene	Pyrene	Total Hydrocarbon Content*
	2.00-2.50	203	126	85.0	13.7	48.1	49.8	21.0	105	4.93	214	59.3	11.7
	3.00-3.50	1.76	1.06	1.97	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BH-33	0.00-1.00	3380	2800	906	200	1920	1520	722	1680	355	1730	1830	111
	1.00-1.70	176	122	46.4	11.4	43.4	42.7	21.3	82.0	5.47	144	50.1	4
	2.00-2.50	189	131	59.5	11.4	43.4	46.6	19.7	86.6	6.49	162	52.5	1.80
	3.00-3.30	170	107	54.8	11.0	35.5	36.6	16.6	75.4	5.79	144	43.6	36.2
BH-34	0.00-0.50	6110	4910	2060	437	3730	2510	1820	3840	815	3700	4580	787
	1.00-1.50	30500	16300	4420	513	12300	39400	2020	28400	943	24900	10900	499
	2.00-2.50	6890	5030	2070	411	3770	4130	1670	6340	717	4500	4850	384
	3.00-3.50	9650	6920	2830	499	6600	9160	2040	8280	880	7520	6680	720
	4.00-4.50	10800	7620	3480	582	7900	9730	2120	8810	985	8150	6930	344
	5.00-5.50	7990	5410	2360	385	5890	7070	1520	6600	635	6050	5150	382
CEFAS AL1 (GOV.UK, 2020)													
AL1		100	100	100	100	100	100	100	100	100	100	100	-

Notes
Concentrations expressed as µg/kg dry sediment
* = Total hydrocarbon content expressed in mg/kg
BH = Borehole
VC = Vibrocore
BRL = Below riverbed level
AL1 = Action level 1
Cefas = Centre for Environment, Fisheries and Aquaculture Science
Cefas action levels available at https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans

Key:	Below AL1	Above AL1

D.3 Sediment Metals

Station	Depth [m BRL]	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
VC-01	0.00-0.30	25.0	0.63	50.0	62.5	0.45	30.7	143	222
	1.00-1.30	23.6	0.81	76.5	99.9	0.63	31.2	129	204
	2.00-2.30	4.9	0.08	35.5	13.9	0.07	41.9	13.1	60.1
VC-02	0.00-0.30	23.0	0.72	57.5	63.8	0.58	32.7	142	238
	1.00-1.30	13.8	0.37	45.8	40.9	0.37	41.9	74.7	131
VC-03	0.00-0.30	27.1	0.36	50.6	51.7	0.45	33.2	124	184
	1.00-1.30	26.6	0.84	71.4	89.8	0.94	26.9	141	236
	2.00-2.30	8.3	0.24	31.2	18.9	0.08	39.1	21.8	77.5
	2.30-2.60	4.8	0.20	22.7	17.1	< 0.01	29.1	8.7	52.4
VC-04	0.00-0.30	25.2	0.43	52.6	51.6	0.47	33.4	129	185
	1.00-1.30	23.4	2.31	165	180	1.58	32.0	177	381
	2.00-2.30	9.4	0.20	15.8	23.1	0.17	13.8	42.2	63.4
	2.50-3.00	5.7	0.24	25.2	21.4	< 0.01	33.9	14.1	51.9
VC-05	0.00-0.30	26.7	0.42	46.2	46.1	0.38	30.8	153	192
	1.00-1.30	26.2	1.00	77.9	113	0.86	33.4	169	311
	2.00-2.30	8.3	0.32	35.0	30.2	0.02	47.3	29.2	81.8
	2.30-2.60	6.9	0.23	29.4	23.5	< 0.01	40.8	21.9	64.7
VC-06	0.00-0.30	23.0	0.51	52.4	55.3	0.51	29.5	153	208
	1.00-1.30	25.1	0.91	74.8	93.7	0.92	33.2	168	281
	2.00-2.30	4.2	0.21	9.5	13.7	0.04	11.4	13.1	47.1
	2.50-2.80	5.1	0.19	15.1	15.5	0.02	20.0	10.3	53.2
VC-07	0.00-0.30	23.9	0.67	59.2	67.7	0.60	31.2	150	244
	1.00-1.30	7.4	0.30	27.5	35.9	0.09	28.3	19.6	68.1
	1.50-1.80	5.8	0.20	23.5	27.6	< 0.01	28.4	11.2	52.7
VC-08B	0.00-0.20	21.0	0.98	78.7	100	0.88	30.6	177	312
	1.00-1.20	5.6	0.21	20.3	18.8	0.02	24.1	14.5	59.8
	2.00-2.20	3.2	0.13	9.0	10.6	< 0.01	10.0	8.2	46.7
	2.20-2.50	5.7	0.24	22.6	24.1	< 0.01	27.3	14.0	57.4
VC-09	0.00-0.30	23.5	0.79	74.0	79.7	0.76	34.1	162	264
	1.00-1.30	23.6	0.81	73.3	78.4	0.91	30.8	171	282
	2.05-2.35	8.6	0.70	72.4	174	0.61	29.3	45.4	147
VC-10	0.00-0.30	23.0	0.79	65.0	68.7	0.67	31.0	160	262
	1.30-1.60	4.6	0.11	25.2	20.6	< 0.01	32.8	6.7	60.1
VC-11	0.00-0.30	23.9	0.85	71.1	77.8	0.77	33.5	184	292
	0.70-1.00	3.9	0.10	18.8	9.3	0.02	21.5	8.9	39.3
VC-12	0.00-0.30	5.9	0.15	20.3	24.3	< 0.01	24.5	10.9	49.7
	0.80-1.10	5.4	0.12	20.6	22.0	< 0.01	23.1	4.7	38.9
VC-13	0.00-0.30	21.3	1.31	113	120	1.06	30.6	200	340
	0.50-0.80	4.2	0.10	21.6	107	< 0.01	26.6	8.5	47.7
VC-14	0.00-0.30	22.3	0.87	72.3	78.5	0.84	31.2	171	274
VC-15A	0.00-0.30	11.0	0.26	32.8	36.3	0.20	25.4	65.1	110
	0.80-1.10	5.0	0.10	21.4	13.9	< 0.01	24.2	7.7	44.8
VC-16	0.00-0.30	2.2	0.09	16.9	9.4	< 0.01	18.9	3.7	28.0
VC-17	0.00-0.30	7.3	0.18	24.3	24.4	< 0.01	29.0	15.1	63.0
VC-18	0.00-0.30	5.5	0.12	20.4	71.8	< 0.01	22.9	6.3	40.9
	0.30-0.85	7.7	0.07	26.6	11.6	< 0.01	29.8	9.3	45.5
VC-19	0.00-0.30	20.1	1.05	91.4	98.1	1.02	29.0	175	304

Station	Depth [m BRL]	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
VC-20	0.00-0.30	6.2	0.22	21.3	33.2	< 0.01	25.7	13.9	53.8
	0.80-1.10	6.2	0.30	23.2	34.9	< 0.01	28.7	14.6	59.3
BH-08	1.60-1.80	1.6	0.09	28.0	126	0.02	28.8	3.4	48.2
BH-09	2.30-3.00	3.7	0.06	38.6	9.6	0.02	33.4	5.8	42.7
BH-10	2.30-2.50	3.4	0.09	28.0	8.4	0.02	32.4	6.1	49.9
BH-11	2.40-2.60	1.5	0.10	23.2	29.8	< 0.01	24.7	2.5	38.9
BH-12	2.25-2.50	6.2	0.21	18.8	16.5	0.01	22.3	12.6	46.7
BH-13	3.90-4.10	2.9	0.12	19.0	26.9	< 0.01	20.4	3.2	33.4
BH-30	0.00-0.50	8.5	0.45	47.1	36.0	0.25	34.4	25	89.0
	0.95-1.25	10.1	0.31	29.8	24.2	0.03	31.9	17.5	79.2
	2.00-2.20	5.4	0.16	26.7	28.7	0.03	28.0	9.9	49.9
	3.00-3.20	5.3	0.12	24.3	21.5	0.02	27.5	9.1	48.7
	4.00-4.20	4.9	0.15	20.4	22.3	0.02	22.1	296	39.3
	5.00-5.20	5.2	0.18	23.1	18.2	0.01	27.5	15.2	51.5
	6.00-6.20	6.5	0.29	25.3	26.4	0.02	28.4	15.4	59.0
	6.80-7.00	7.9	0.13	28.6	7.9	0.02	27.5	6.9	42.6
BH-31	0.00-0.80	23.2	1.74	123	139	1.24	34.5	239	461
	1.00-1.60	6.3	0.23	26.0	20.9	0.04	30.2	13.9	49.5
	2.00-2.30	5.4	0.21	23.1	18.4	0.02	27.7	13.5	48.5
	3.30-3.70	7.7	0.24	27.9	20.0	0.02	34.0	14.7	55.8
	4.00-4.30	5.1	0.16	22.6	22.3	0.01	25.4	9.1	45.6
	5.00-5.30	4.3	0.13	24.3	19.1	0.02	24.6	8.1	45.4
	6.10-6.40	2.9	0.08	20.4	6.1	0.03	19.4	3.5	30.2
BH-32	0.00-0.50	24.1	0.80	67.4	77.3	0.71	32.9	166	264
	1.00-1.50	7.4	0.19	29.8	29.1	0.05	28.8	19.7	65.4
	2.00-2.50	4.8	0.23	21.3	19.6	0.02	24.8	12.2	48.0
	3.00-3.50	2.6	0.06	21.3	5.4	0.03	20.4	4.1	29.8
BH-33	0.00-1.00	26.9	1.38	85.5	88.3	0.87	37.9	198	426
	1.00-1.70	5.4	0.20	26.2	24.0	0.04	27.9	12.8	59.1
	2.00-2.50	5.0	0.17	24.2	25.6	0.02	24.7	10.4	50.5
	3.00-3.30	5.5	0.24	24.4	23.7	0.03	27.1	12.8	55.8
BH-34	0.00-0.50	27.9	2.68	144	188	1.56	36.8	311	767
	1.00-1.50	60.4	14.9	492	429	12.8	41.1	828	2835
	2.00-2.50	31.2	3.68	187	218	2.54	38.1	354	972
	3.00-3.50	38.2	6.59	288	284	4.73	39.5	488	1502
	4.00-4.50	35.5	6.58	280	290	4.36	37.9	503	1488
	5.00-5.50	38.5	8.00	302	311	5.15	39.0	562	1695
Cefas Guideline Action Levels									
AL1		**20**	**0.4**	**40**	**40**	**0.3**	**20**	**50**	**130**
AL2		**100**	**5**	**400**	**400**	**3**	**200**	**500**	**800**

Notes

Concentrations expressed in µg/g dry sediment

As = Arsenic | Cd = Cadmium | Cr = Chromium | Cu = Copper

Hg = Mercury | Ni = Nickel | Pb = Lead | Zn = Zinc

BH = Borehole | VC = Vibrocore | BRL = Below riverbed level

AL1 = Action level 1

AL2 = Action level 2

Cefas = Centre for Environment, Fisheries and Aquaculture Science

Cefas action levels available at https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans

Key:	Below AL1	Above AL1	Above AL2

D.4 Sediment Polychlorinated Biphenyls (PCBs)

D.4.1 Individual Polychlorinated Biphenyls (PCBs)

Station	Depth [m BRL]	PCB 18	PCB 28	PCB 31	PCB 44	PCB 47	PCB 49	PCB 52	PCB 66	PCB 101	PCB 105	PCB 110
VC-01	0.00-0.30	0.40	0.50	1.43	0.37	0.12	0.52	0.91	0.70	0.93	0.38	0.91
	1.00-1.30	0.95	1.13	2.82	0.95	0.29	1.29	2.00	1.53	2.03	0.71	2.00
	2.00-2.30	0.11	< 0.08	0.17	< 0.08	< 0.08	< 0.08	0.11	< 0.08	< 0.08	< 0.08	< 0.08
VC-02	0.00-0.30	0.78	0.76	1.99	0.60	0.13	0.84	1.42	1.11	1.16	0.41	1.17
	1.00-1.30	0.57	0.45	1.23	0.52	0.15	0.56	1.08	0.64	1.00	0.34	0.87
VC-03	0.00-0.30	0.34	0.43	1.08	0.32	0.12	0.44	0.79	0.56	0.81	0.24	0.86
	1.00-1.30	1.04	0.98	2.64	0.86	0.35	1.31	1.99	1.36	2.08	0.60	1.72
	2.00-2.30	0.19	0.11	0.28	< 0.08	< 0.08	0.16	0.31	0.09	0.20	< 0.08	0.19
	2.30-2.60	0.16	< 0.08	0.25	< 0.08	< 0.08	0.10	0.11	< 0.08	< 0.08	< 0.08	< 0.08
VC-04	0.00-0.30	0.41	0.50	1.28	0.45	0.13	0.51	0.87	0.73	1.02	0.35	0.99
	1.00-1.30	1.84	1.96	4.75	1.49	0.44	2.03	3.26	2.39	2.86	0.85	2.64
	2.00-2.30	0.31	0.17	0.44	0.15	< 0.08	0.25	0.41	0.24	0.52	0.12	0.49
	2.50-3.00	0.39	0.14	0.44	0.1	< 0.08	0.12	0.28	< 0.08	< 0.08	< 0.08	< 0.08
VC-05	0.00-0.30	0.35	0.37	1.03	0.37	0.13	0.43	0.75	0.57	0.67	0.30	0.82
	1.00-1.30	0.78	0.89	2.26	0.71	0.26	1.19	2.48	1.34	5.02	0.67	3.12
	2.00-2.30	0.80	0.39	1.00	0.44	0.10	0.35	0.67	0.26	0.20	< 0.08	0.11
	2.30-2.60	0.26	0.11	0.36	0.08	< 0.08	0.17	0.22	< 0.08	< 0.08	< 0.08	< 0.08
VC-06	0.00-0.30	1.05	0.77	1.96	0.60	0.21	0.76	1.50	0.90	1.12	0.41	1.13
	1.00-1.30	1.13	0.89	2.27	0.66	0.29	1.03	1.86	1.31	1.89	0.56	1.14
	2.00-2.30	0.15	0.10	0.17	< 0.08	< 0.08	0.11	0.13	< 0.08	< 0.08	< 0.08	< 0.08
	2.50-2.80	0.38	0.16	0.45	< 0.08	< 0.08	0.15	0.35	< 0.08	< 0.08	< 0.08	< 0.08
VC-07	0.00-0.30	0.75	0.63	1.76	0.56	0.22	0.68	1.26	0.72	1.25	0.51	1.26
	1.00-1.30	0.58	0.29	0.74	0.23	< 0.08	0.27	0.56	0.16	0.21	< 0.08	0.18
	1.50-1.80	0.28	0.09	0.27	0.10	< 0.08	< 0.08	0.20	< 0.08	< 0.08	< 0.08	< 0.08
VC-08B	0.00-0.20	1.01	0.90	2.37	0.87	0.24	1.13	1.81	1.34	1.70	0.62	1.35
	1.00-1.20	0.64	0.24	0.70	0.19	< 0.08	0.23	0.48	0.12	0.10	< 0.08	0.06
	2.00-2.20	< 0.08	< 0.08	0.10	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	2.20-2.50	0.34	0.12	0.37	0.10	< 0.08	0.11	0.24	< 0.08	< 0.08	< 0.08	< 0.08
VC-09	0.00-0.30	0.67	0.70	1.77	0.56	0.21	0.83	1.28	0.98	1.99	0.63	1.56
	1.00-1.30	0.97	1.02	2.49	0.89	0.28	1.18	1.94	1.47	1.81	0.64	1.74
	2.05-2.35	0.73	0.69	1.74	0.68	0.22	0.94	1.41	0.90	1.22	0.29	1.07
VC-10	0.00-0.30	0.59	0.68	1.70	0.54	0.19	0.78	1.26	1.05	1.32	0.50	1.06
	1.30-1.60	0.14	< 0.08	0.12	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-11	0.00-0.30	0.73	0.77	2.02	0.72	0.25	0.92	1.68	1.11	1.66	0.60	1.60
	0.70-1.00	0.14	0.09	0.23	0.08	< 0.08	< 0.08	0.14	< 0.08	< 0.08	< 0.08	< 0.08
VC-12	0.00-0.30	0.16	< 0.08	0.22	< 0.08	< 0.08	< 0.08	0.13	< 0.08	< 0.08	< 0.08	< 0.08
	0.80-1.10	0.27	0.11	0.28	0.14	0.08	0.18	0.29	0.16	0.13	0.09	0.18
VC-13	0.00-0.30	0.84	1.00	2.3	0.84	0.28	1.12	1.67	1.30	1.79	0.54	1.98
	0.50-0.80	0.31	0.13	0.32	0.12	< 0.08	0.14	0.25	0.02	0.09	< 0.08	< 0.08
VC-14	0.00-0.30	0.54	0.69	1.65	0.54	0.21	0.85	1.32	1.07	1.52	0.54	1.46
VC-15A	0.00-0.30	0.47	0.27	0.75	0.29	0.09	0.32	0.60	0.37	0.45	0.11	0.40
	0.80-1.10	0.11	< 0.08	0.1	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-16	0.00-0.30	0.11	< 0.08	0.09	< 0.08	< 0.08	< 0.08	0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-17	0.00-0.30	0.33	0.15	0.33	0.12	< 0.08	0.11	0.27	0.09	< 0.08	< 0.08	< 0.08
VC-18	0.00-0.30	0.11	< 0.08	0.1	< 0.08	< 0.08	< 0.08	0.08	< 0.08	< 0.08	< 0.08	< 0.08
	0.30-0.85	0.25	0.09	0.23	0.10	< 0.08	0.10	0.18	< 0.08	< 0.08	< 0.08	< 0.08
VC-19	0.00-0.30	0.63	0.84	1.88	0.67	0.25	1.11	1.72	1.46	1.95	0.50	1.52
VC-20	0.00-0.30	0.24	< 0.08	0.23	< 0.08	< 0.08	0.08	0.18	< 0.08	< 0.08	< 0.08	< 0.08
	0.80-1.10	0.22	0.09	0.30	0.11	< 0.08	0.08	0.19	< 0.08	< 0.08	< 0.08	< 0.08
BH-08	1.60-1.80	0.37	0.18	0.43	0.14	< 0.08	0.12	0.2	< 0.08	< 0.08	< 0.08	< 0.08

Station	Depth [m BRL]	PCB 18	PCB 28	PCB 31	PCB 44	PCB 47	PCB 49	PCB 52	PCB 66	PCB 101	PCB 105	PCB 110
BH-09	2.30-3.00	0.27	0.14	0.21	0.11	0.08	0.09	0.18	0.11	0.10	< 0.08	< 0.08
BH-10	2.30-2.50	0.39	0.16	0.25	0.10	< 0.08	0.12	0.22	< 0.08	< 0.08	< 0.08	< 0.08
BH-11	2.40-2.60	0.22	0.12	0.23	0.10	< 0.08	0.1	0.17	< 0.08	< 0.08	< 0.08	< 0.08
BH-12	2.25-2.50	0.25	0.10	0.20	0.10	< 0.08	< 0.08	0.16	< 0.08	0.09	< 0.08	< 0.08
BH-13	3.90-4.10	0.18	0.12	0.21	< 0.08	< 0.08	< 0.08	0.15	< 0.08	< 0.08	< 0.08	< 0.08
BH-30	0.00-0.50	0.43	0.38	0.68	0.36	0.13	0.45	0.63	0.43	0.69	0.11	0.60
	0.95-1.25	0.53	0.17	0.38	0.12	< 0.08	0.14	0.27	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.20	0.11	< 0.08	0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	3.00-3.20	0.28	0.12	0.23	0.08	< 0.08	0.09	0.16	< 0.08	< 0.08	< 0.08	< 0.08
	4.00-4.20	0.22	< 0.08	0.16	< 0.08	< 0.08	< 0.08	0.12	< 0.08	< 0.08	< 0.08	< 0.08
	5.00-5.20	0.27	< 0.08	0.14	< 0.08	< 0.08	< 0.08	0.14	< 0.08	< 0.08	< 0.08	< 0.08
	6.00-6.20	0.35	0.12	0.23	< 0.08	< 0.08	0.09	0.19	< 0.08	< 0.08	< 0.08	< 0.08
	6.80-7.00	0.26	0.12	0.29	< 0.08	< 0.08	0.11	0.20	0.09	< 0.08	< 0.08	< 0.08
BH-31	0.00-0.80	1.28	2.37	3.64	1.76	0.54	1.94	2.45	2.00	3.59	1.24	3.76
	1.00-1.60	0.60	0.31	0.53	0.22	0.08	0.15	0.34	0.11	0.13	< 0.08	< 0.08
	2.00-2.30	0.48	0.28	0.43	0.10	< 0.08	0.14	0.30	0.10	< 0.08	< 0.08	< 0.08
	3.30-3.70	0.14	0.08	0.16	< 0.08	< 0.08	< 0.08	0.11	< 0.08	< 0.08	< 0.08	< 0.08
	4.00-4.30	0.22	< 0.08	0.17	< 0.08	< 0.08	0.09	0.12	< 0.08	< 0.08	< 0.08	< 0.08
	5.00-5.30	0.35	0.12	0.30	0.09	< 0.08	0.12	0.20	< 0.08	< 0.08	< 0.08	< 0.08
	6.10-6.40	0.17	< 0.08	0.13	< 0.08	< 0.08	< 0.08	0.13	< 0.08	< 0.08	< 0.08	< 0.08
BH-32	0.00-0.50	0.86	1.37	2.50	0.97	0.32	1.12	1.68	1.29	2.29	0.71	2.34
	1.00-1.50	0.17	0.18	0.23	0.09	< 0.08	0.13	0.17	< 0.08	0.08	< 0.08	< 0.08
	2.00-2.50	0.53	0.26	0.55	0.21	< 0.08	0.17	0.37	0.10	0.10	< 0.08	< 0.08
	3.00-3.50	0.26	0.13	0.22	< 0.08	< 0.08	0.10	0.20	< 0.08	< 0.08	< 0.08	< 0.08
BH-33	0.00-1.00	1.23	1.66	3.37	1.24	0.31	1.09	1.69	1.63	1.97	0.86	2.30
	1.00-1.70	0.31	0.23	0.40	0.10	< 0.08	0.12	0.24	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.50	0.43	0.28	0.53	0.16	< 0.08	0.19	0.34	0.11	0.10	< 0.08	< 0.08
	3.00-3.30	0.48	0.27	0.56	0.14	< 0.08	0.18	0.33	0.15	0.11	< 0.08	< 0.08
BH-34	0.00-0.50	1.71	2.83	5.23	2.08	0.67	2.36	3.44	2.94	4.73	1.52	4.52
	1.00-1.50	9.80	20.10	23.22	7.17	2.80	8.78	10.96	10.86	12.55	3.43	12.11
	2.00-2.50	2.02	4.28	6.86	2.07	0.82	2.7	3.65	3.14	5.08	1.51	5.37
	3.00-3.50	3.81	8.71	12.47	3.79	1.15	4.17	5.70	5.40	7.12	2.51	7.34
	4.00-4.50	4.01	8.67	12.12	3.91	1.24	4.31	5.67	5.36	6.60	1.92	7.00
	5.00-5.50	4.32	8.81	11.97	3.48	1.19	4.40	5.90	5.55	6.85	2.07	6.88

Notes
Concentrations expressed as ng/g of dry sediment
BH = Borehole
VC = Vibrocore
PCB = Polychlorinated biphenyl
BRL = Below riverbed level

Station	Depth [m BRL]	PCB 118	PCB 128	PCB 138	PCB 141	PCB 149	PCB 151	PCB 153	PCB 156	PCB 158	PCB 170
VC-01	0.00-0.30	0.81	0.12	0.95	< 0.08	0.78	0.20	1.35	< 0.08	0.18	0.26
	1.00-1.30	1.63	0.30	1.79	0.15	1.77	0.38	3.00	0.18	0.27	0.48
	2.00-2.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-02	0.00-0.30	0.81	0.10	0.94	0.09	0.94	0.21	1.65	0.11	0.21	0.22
	1.00-1.30	0.89	0.15	0.58	0.16	0.88	0.16	1.07	< 0.08	< 0.08	0.11
VC-03	0.00-0.30	0.79	0.16	0.78	< 0.08	0.64	0.19	1.23	< 0.08	0.23	0.15
	1.00-1.30	1.59	0.22	1.54	0.15	1.38	0.42	2.52	0.16	0.21	0.33
	2.00-2.30	0.17	< 0.08	< 0.08	< 0.08	0.09	< 0.08	0.21	< 0.08	< 0.08	< 0.08
	2.30-2.60	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-04	0.00-0.30	1.06	0.11	1.02	0.19	0.74	0.17	1.27	0.08	< 0.08!	0.17
	1.00-1.30	2.42	0.30	2.52	0.39	2.14	0.58	3.93	0.25	0.39	0.55
	2.00-2.30	0.30	< 0.08	0.45	0.11	0.49	0.14	0.81	< 0.08	< 0.08	< 0.08
	2.50-3.00	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-05	0.00-0.30	0.69	< 0.08	0.54	0.12	0.64	0.17	1.28	0.11	0.15	0.20
	1.00-1.30	2.34	0.52	4.36	0.99	3.76	1.56	6.70	0.23	0.55	0.83
	2.00-2.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	2.30-2.60	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-06	0.00-0.30	1.16	0.22	1.29	0.21	1.02	0.32	1.81	0.10	0.14	0.25
	1.00-1.30	1.55	0.13	1.74	0.18	1.72	0.38	2.08	0.12	0.21	0.34
	2.00-2.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	2.50-2.80	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-07	0.00-0.30	1.10	0.31	1.06	0.16	1.00	0.30	1.69	0.12	0.17	0.28
	1.00-1.30	0.12	< 0.08	0.15	< 0.08	0.15	< 0.08	0.26	< 0.08	< 0.08	< 0.08
	1.50-1.80	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-08B	0.00-0.20	1.12	0.19	1.41	0.18	1.22	0.40	2.41	0.17	0.23	0.34
	1.00-1.20	< 0.08	< 0.08	0.04	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.20	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	2.20-2.50	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-09	0.00-0.30	1.58	0.35	2.66	0.31	1.54	0.42	2.79	0.18	0.34	0.46
	1.00-1.30	1.44	0.27	1.81	0.27	1.06	0.55	2.47	0.12	0.20	0.57
	2.05-2.35	0.86	0.15	0.87	< 0.08	0.83	0.21	1.47	< 0.08	0.11	0.17
VC-10	0.00-0.30	1.14	0.26	1.47	0.14	1.04	0.38	2.14	0.15	0.21	0.26
	1.30-1.60	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-11	0.00-0.30	1.67	0.27	1.6	0.29	1.34	0.43	2.44	0.09	0.37	0.36
	0.70-1.00	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-12	0.00-0.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	0.80-1.10	0.12	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	0.09	0.09	0.12	< 0.08
VC-13	0.00-0.30	1.61	0.32	1.95	0.35	1.62	0.52	2.83	0.19	0.25	0.59
	0.50-0.80	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-14	0.00-0.30	1.21	0.27	1.22	0.14	1.27	0.29	2.29	0.11	0.22	0.34
VC-15A	0.00-0.30	0.36	< 0.08	0.39	0.09	0.27	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	0.80-1.10	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	0.02	< 0.08
VC-16	0.00-0.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-17	0.00-0.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-18	0.00-0.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	0.30-0.85	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
VC-19	0.00-0.30	1.90	0.26	1.54	0.23	1.80	0.42	3.05	0.12	0.20	0.50
VC-20	0.00-0.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	0.80-1.10	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
BH-08	1.60-1.80	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
BH-09	2.30-3.00	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
BH-10	2.30-2.50	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
BH-11	2.40-2.60	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08

Station	Depth [m BRL]	PCB 118	PCB 128	PCB 138	PCB 141	PCB 149	PCB 151	PCB 153	PCB 156	PCB 158	PCB 170
BH-12	2.25-2.50	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
BH-13	3.90-4.10	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
BH-30	0.00-0.50	0.45	< 0.08	0.51	0.13	0.36	< 0.08	0.64	< 0.08	< 0.08	< 0.08
	0.95-1.25	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.20	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	3.00-3.20	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	4.00-4.20	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	5.00-5.20	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	6.00-6.20	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	6.80-7.00	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
BH-31	0.00-0.80	3.70	0.41	3.36	0.62	3.64	0.83	5.38	0.43	0.77	0.90
	1.00-1.60	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	3.30-3.70	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	4.00-4.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	5.00-5.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	6.10-6.40	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
BH-32	0.00-0.50	2.54	0.31	2.54	0.37	2.11	0.49	3.24	0.21	0.30	0.48
	1.00-1.50	< 0.08	< 0.08	< 0.08	< 0.08	0.10	< 0.08	0.1	< 0.08	< 0.08	< 0.08
	2.00-2.50	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	3.00-3.50	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
BH-33	0.00-1.00	2.27	0.57	2.21	0.18	2.05	0.61	2.76	0.52	0.40	0.96
	1.00-1.70	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.50	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
	3.00-3.30	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
BH-34	0.00-0.50	3.81	0.69	4.25	0.50	4.01	1.16	5.85	0.39	0.60	1.01
	1.00-1.50	11.09	2.33	11.45	1.25	11.75	3.26	14.78	0.82	1.18	2.35
	2.00-2.50	5.10	0.82	5.09	0.65	5.09	1.51	6.63	0.57	0.67	1.07
	3.00-3.50	5.91	1.14	5.59	0.82	6.64	1.83	9.54	0.59	1.10	1.55
	4.00-4.50	6.21	1.18	5.83	0.74	6.35	1.95	7.77	0.58	0.73	1.64
	5.00-5.50	6.29	1.24	6.17	0.74	6.27	1.71	8.19	0.69	0.58	1.49

Notes
Concentrations expressed as ng/g of dry sediment
BH = Borehole
VC = Vibrocore
BRL = Below riverbed level
PCB = Polychlorinated biphenyl

Station	Depth [m BRL]	PCB 180	PCB 183	PCB 187	PCB 194
VC-01	0.00-0.30	0.66	0.14	0.46	0.14
	1.00-1.30	1.22	0.27	0.95	0.39
	2.00-2.30	< 0.08	< 0.08	< 0.08	< 0.08
VC-02	0.00-0.30	0.78	0.2	0.56	0.21
	1.00-1.30	0.59	< 0.08	0.29	< 0.08
VC-03	0.00-0.30	0.41	< 0.08	0.24	0.15
	1.00-1.30	0.95	0.17	0.72	0.26
	2.00-2.30	< 0.08	< 0.08	< 0.08	< 0.08
	2.30-2.60	< 0.08	< 0.08	< 0.08	< 0.08
VC-04	0.00-0.30	0.39	0.13	0.37	0.14
	1.00-1.30	1.91	0.51	1.29	0.76
	2.00-2.30	0.17	< 0.08	< 0.08	< 0.08
	2.50-3.00	< 0.08	< 0.08	< 0.08	< 0.08
VC-05	0.00-0.30	0.51	0.18	0.29	0.20
	1.00-1.30	1.74	0.45	1.24	0.30
	2.00-2.30	< 0.08	< 0.08	< 0.08	< 0.08
	2.30-2.60	< 0.08	< 0.08	< 0.08	< 0.08
VC-06	0.00-0.30	0.80	0.11	0.49	0.21
	1.00-1.30	1.09	0.32	0.63	0.30
	2.00-2.30	< 0.08	< 0.08	< 0.08	< 0.08
	2.50-2.80	< 0.08	< 0.08	< 0.08	< 0.08
VC-07	0.00-0.30	0.68	0.14	0.57	0.19
	1.00-1.30	< 0.08	< 0.08	< 0.08	< 0.08
	1.50-1.80	< 0.08	< 0.08	< 0.08	< 0.08
VC-08B	0.00-0.20	1.07	0.28	0.88	0.28
	1.00-1.20	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.20	< 0.08	< 0.08	< 0.08	< 0.08
	2.20-2.50	< 0.08	< 0.08	< 0.08	< 0.08
VC-09	0.00-0.30	1.76	0.37	1.18	0.44
	1.00-1.30	1.38	0.36	0.88	0.42
	2.05-2.35	0.51	0.09	0.34	0.12
VC-10	0.00-0.30	0.88	0.25	0.60	0.23
	1.30-1.60	< 0.08	< 0.08	< 0.08	< 0.08
VC-11	0.00-0.30	0.97	0.21	0.72	0.26
	0.70-1.00	< 0.08	< 0.08	< 0.08	< 0.08
VC-12	0.00-0.30	< 0.08	< 0.08	< 0.08	< 0.08
	0.80-1.10	< 0.08	< 0.08	< 0.08	< 0.08
VC-13	0.00-0.30	1.49	0.32	0.90	0.44
	0.50-0.80	< 0.08	< 0.08	< 0.08	< 0.08
VC-14	0.00-0.30	0.92	0.20	0.51	0.30
VC-15A	0.00-0.30	0.22	< 0.08	0.19	< 0.08
	0.80-1.10	< 0.08	< 0.08	< 0.08	< 0.08
VC-16	0.00-0.30	< 0.08	< 0.08	< 0.08	< 0.08
VC-17	0.00-0.30	< 0.08	< 0.08	< 0.08	< 0.08
VC-18	0.00-0.30	< 0.08	< 0.08	< 0.08	< 0.08
	0.30-0.85	< 0.08	< 0.08	< 0.08	< 0.08
VC-19	0.00-0.30	1.26	0.35	0.95	0.46
VC-20	0.00-0.30	< 0.08	< 0.08	< 0.08	< 0.08
	0.80-1.10	< 0.08	< 0.08	< 0.08	< 0.08
BH-08	1.60-1.80	< 0.08	< 0.08	< 0.08	< 0.08
BH-09	2.30-3.00	< 0.08	< 0.08	< 0.08	< 0.08
BH-10	2.30-2.50	< 0.08	< 0.08	< 0.08	< 0.08
BH-11	2.40-2.60	< 0.08	< 0.08	< 0.08	< 0.08

Station	Depth [m BRL]	PCB 180	PCB 183	PCB 187	PCB 194
BH-12	2.25-2.50	< 0.08	< 0.08	< 0.08	< 0.08
BH-13	3.90-4.10	< 0.08	< 0.08	< 0.08	< 0.08
BH-30	0.00-0.50	0.14	< 0.08	0.16	< 0.08
	0.95-1.25	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.20	< 0.08	< 0.08	< 0.08	< 0.08
	3.00-3.20	< 0.08	< 0.08	< 0.08	< 0.08
	4.00-4.20	< 0.08	< 0.08	< 0.08	< 0.08
	5.00-5.20	< 0.08	< 0.08	< 0.08	< 0.08
	6.00-6.20	< 0.08	< 0.08	< 0.08	< 0.08
	6.80-7.00	< 0.08	< 0.08	< 0.08	< 0.08
BH-31	0.00-0.80	2.57	0.67	2.12	0.64
	1.00-1.60	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.30	< 0.08	< 0.08	< 0.08	< 0.08
	3.30-3.70	< 0.08	< 0.08	< 0.08	< 0.08
	4.00-4.30	< 0.08	< 0.08	< 0.08	< 0.08
	5.00-5.30	< 0.08	< 0.08	< 0.08	< 0.08
	6.10-6.40	< 0.08	< 0.08	< 0.08	< 0.08
BH-32	0.00-0.50	1.56	0.31	1.35	0.33
	1.00-1.50	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.50	< 0.08	< 0.08	< 0.08	< 0.08
	3.00-3.50	< 0.08	< 0.08	< 0.08	< 0.08
BH-33	0.00-1.00	1.73	0.41	0.91	0.96
	1.00-1.70	< 0.08	< 0.08	< 0.08	< 0.08
	2.00-2.50	< 0.08	< 0.08	< 0.08	< 0.08
	3.00-3.30	< 0.08	< 0.08	< 0.08	< 0.08
BH-34	0.00-0.50	2.92	0.60	1.46	0.92
	1.00-1.50	6.67	1.55	4.04	1.96
	2.00-2.50	3.31	0.86	1.77	0.96
	3.00-3.50	4.04	0.89	2.32	1.25
	4.00-4.50	4.74	1.01	2.83	1.24
	5.00-5.50	4.17	1.00	2.70	1.27

Notes
Concentrations expressed as ng/g of dry sediment
BH = Borehole
VC = Vibrocore
BRL = Below riverbed level
PCB = Polychlorinated biphenyl

D.4.2 Summary of Polychlorinated Biphenyls (PCBs)

Station	Depth [m BRL]	Total ICES 7 PCBs	Total 25 PCBs
VC-01	0.00-0.30	6.11	< 13.38
	1.00-1.30	12.80	28.48
	2.00-2.30	< 0.59	< 2.15
VC-02	0.00-0.30	7.52	17.40
	1.00-1.30	5.66	< 12.61
VC-03	0.00-0.30	5.24	< 11.20
	1.00-1.30	11.65	25.55
	2.00-2.30	< 1.16	< 3.12
	2.30-2.60	< 0.59	< 2.30
VC-04	0.00-0.30	6.13	< 13.16
	1.00-1.30	18.86	42.45
	2.00-2.30	2.83	< 6.21
	2.50-3.00	< 0.82	< 2.99
VC-05	0.00-0.30	4.81	< 10.95
	1.00-1.30	23.53	44.29
	2.00-2.30	< 1.58	< 5.52
	2.30-2.60	< 0.73	< 2.72
VC-06	0.00-0.30	< 8.45	18.54
	1.00-1.30	11.10	23.82
	2.00-2.30	< 0.63	< 2.26
	2.50-2.80	< 0.91	< 3.09
VC-07	0.00-0.30	7.67	17.37
	1.00-1.30	< 1.67	< 4.86
	1.50-1.80	< 0.69	< 2.54
VC-08B	0.00-0.20	10.42	23.52
	1.00-1.20	< 1.10	< 4.00
	2.00-2.20	< 0.56	< 2.02
	2.20-2.50	< 0.76	< 2.80
VC-09	0.00-0.30	12.76	25.56
	1.00-1.30	11.87	26.23
	2.05-2.35	7.03	< 15.78
VC-10	0.00-0.30	8.89	18.82
	1.30-1.60	< 0.56	< 2.10
VC-11	0.00-0.30	10.79	23.08
	0.70-1.00	< 0.63	< 2.28

Station	Depth [m BRL]	Total ICES 7 PCBs	Total 25 PCBs
VC-12	0.00-0.30	< 0.61	< 2.27
	0.80-1.10	< 0.90	< 3.13
VC-13	0.00-0.30	12.34	27.04
	0.50-0.80	< 0.79	< 2.74
VC-14	0.00-0.30	9.17	19.68
VC-15A	0.00-0.30	< 2.37	< 6.28
	0.80-1.10	< 0.56	1.99
VC-16	0.00-0.30	< 0.56	< 2.04
VC-17	0.00-0.30	< 0.82	< 2.84
VC-18	0.00-0.30	< 0.56	< 2.05
	0.30-0.85	< 0.67	< 2.47
VC-19	0.00-0.30	12.26	25.57
VC-20	0.00-0.30	< 0.66	< 2.41
	0.80-1.10	< 0.68	< 2.51
BH-08	1.60-1.80	< 0.78	< 2.96
BH-09	2.30-3.00	< 0.74	< 2.57
BH-10	2.30-2.50	< 0.78	< 2.76
BH-11	2.40-2.60	< 0.69	< 2.46
BH-12	2.25-2.50	< 0.67	< 2.42
BH-13	3.90-4.10	< 0.67	< 2.34
BH-30	0.00-0.50	< 3.44	< 7.84
	0.95-1.25	< 0.84	< 3.13
	2.00-2.20	< 0.56	< 2.03
	3.00-3.20	< 0.68	< 2.48
	4.00-4.20	< 0.60	< 2.26
	5.00-5.20	< 0.62	< 2.31
	6.00-6.20	< 0.71	< 2.58
	6.80-7.00	< 0.72	< 2.59
BH-31	0.00-0.80	23.42	50.61
	1.00-1.60	< 1.10	< 3.75
	2.00-2.30	< 0.98	< 3.27
	3.30-3.70	< 0.59	< 2.17
	4.00-4.30	< 0.06	< 2.28
	5.00-5.30	< 0.72	< 2.70
	6.10-6.40	< 0.61	< 2.19
BH-32	0.00-0.50	15.22	31.59

Station	Depth [m BRL]	Total ICES 7 PCBs	Total 25 PCBs
	1.00-1.50	< 0.77	< 2.53
	2.00-2.50	< 1.05	< 3.65
	3.00-3.50	< 0.73	< 2.51
BH-33	0.00-1.00	14.29	33.89
	1.00-1.70	< 0.87	< 2.92
	2.00-2.50	< 1.04	< 3.50
	3.00-3.30	< 1.03	< 3.58
BH-34	0.00-0.50	27.83	60.20
	1.00-1.50	87.60	196.26
	2.00-2.50	33.14	71.60
	3.00-3.50	46.61	105.38
	4.00-4.50	45.49	103.61
	5.00-5.50	46.38	103.93
Cefas Guideline Action Levels			
AL1		**10**	**20**
AL2		**-**	**200**

Notes
Concentrations expressed in ng/g dry weight
Cefas = Centre for Environment, Fisheries and Aquaculture Science
ICES = International Council for the Exploration of the Sea
VC = Vibrocore
BH = Borehole
BRL = Below riverbed level
AL1 = Action Level 1
AL2 = Action Level 2
ICES 7 PCBs = PCB 28, PCB 52, PCB 101, PCB 118, PCB 138, PCB 153 and PCB 180
ICES 25 PCBs = PCB 18, PCB 28, PCB 31, PCB 44, PCB 47, PCB 49, PCB 52, PCB 66, PCB 101, PCB 105, PCB 110, PCB 118, PCB 128, PCB 138, PCB 141, PCB 149, PCB 151, PCB 153, PCB 156, PCB 158, PCB 170, PCB 180, PCB 183, PCB 187 and PCB 194
Cefas action levels available at https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans

Key:	Below AL1	Above AL1	Above AL2

D.5 Organotins

Station	Depth [m BRL]	Dibutyltin (DBT)	Tributyl Tin (TBT)
VC-01	0.00-0.30	23	< 5
	1.00-1.30	52	13
	2.00-2.30	6	< 5
VC-02	0.00-0.30	14	< 5
	1.00-1.30	13	< 5
VC-03	0.00-0.30	14	< 5
	1.00-1.30	9	< 5
	2.00-2.30	8	< 5
	2.30-2.60	< 5	< 5
VC-04	0.00-0.30	24	< 5
	1.00-1.30	38	< 5
	2.00-2.30	< 5	< 5
	2.50-3.00	< 5	7
VC-05	0.00-0.30	17	< 5
	1.00-1.30	27	< 5
	2.00-2.30	< 5	< 5
	2.30-2.60	< 5	< 5
VC-06	0.00-0.30	14	< 5
	1.00-1.30	36	< 5
	2.00-2.30	< 5	< 5
	2.50-2.80	< 5	< 5
VC-07	0.00-0.30	19	< 5
	1.00-1.30	< 5	20
	1.50-1.80	6	6
VC-08B	0.00-0.20	48	30
	1.00-1.20	8	11
	2.00-2.20	6	17
	2.20-2.50	6	< 5
VC-09	0.00-0.30	31	30
	1.00-1.30	65	43
	2.05-2.35	21	13
VC-10	0.00-0.30	27	16
	1.30-1.60	6	< 5
VC-11	0.00-0.30	36	25
	0.70-1.00	8	< 5

Station	Depth [m BRL]	Dibutyltin (DBT)	Tributyl Tin (TBT)
VC-12	0.00-0.30	6	< 5
	0.80-1.10	6	< 5
VC-13	0.00-0.30	39	< 5
	0.50-0.80	7	< 5
VC-14	0.00-0.30	21	< 5
VC-15A	0.00-0.30	9	15
	0.80-1.10	< 5	20
VC-16	0.00-0.30	< 5	< 5
VC-17	0.00-0.30	< 5	< 5
VC-18	0.00-0.30	6	< 5
	0.30-0.85	6	< 5
VC-19	0.00-0.30	41	37
VC-20	0.00-0.30	6	< 5
	0.80-1.10	9	< 5
BH-08	1.60-1.80	< 5	< 5
BH-09	2.30-3.00	< 5	< 5
BH-10	2.30-2.50	< 5	< 5
BH-11	2.40-2.60	< 5	< 5
BH-12	2.25-2.50	< 5	< 5
BH-13	3.90-4.10	< 5	< 5
BH-30	0.00-0.50	< 5	< 5
	0.95-1.25	< 5	< 5
	2.00-2.20	< 5	< 5
	3.00-3.20	< 5	< 5
	4.00-4.20	< 5	< 5
	5.00-5.20	< 5	< 5
	6.00-6.20	< 5	< 5
	6.80-7.00	< 5	< 5
BH-31	0.00-0.80	33	117
	1.00-1.60	< 5	< 5
	2.00-2.30	< 5	< 5
	3.30-3.70	< 5	< 5
	4.00-4.30	< 5	< 5
	5.00-5.30	< 5	< 5
	6.10-6.40	< 5	< 5
BH-32	0.00-0.50	24	31

Station	Depth [m BRL]	Dibutyltin (DBT)	Tributyl Tin (TBT)
	1.00-1.50	< 5	< 5
	2.00-2.50	< 5	< 5
	3.00-3.50	< 5	< 5
BH-33	0.00-1.00	< 5	19
	1.00-1.70	< 5	< 5
	2.00-2.50	< 5	< 5
	3.00-3.30	< 5	< 5
BH-34	0.00-0.50	47	111
	1.00-1.50	60	60
	2.00-2.50	13	72
	3.00-3.50	72	94
	4.00-4.50	25	69
	5.00-5.50	41	63
Cefas Guideline Action Levels			
AL1		**100**	**100**
AL2		**1000**	**1000**

Notes
Concentrations expressed as ng/g dry weight
VC = Vibrocore,
BH = Borehole
BRL = Below riverbed level
AL1 = Action Level 1
AL2 = Action Level 2
Cefas = Centre for Environment, Fisheries and Aquaculture Science
Cefas action levels available at https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans

Key:	Below AL1	AL1	AL2

D.6 pH

Station	Depth [m BRL]	pH
VC-01	0.00-0.30	7.7
	1.00-1.30	8.1
	2.00-2.30	8.6
VC-02	0.00-0.30	8.1
	1.00-1.30	8.2
VC-03	0.00-0.30	7.7
	1.00-1.30	8.0
	2.00-2.30	8.9
	2.30-2.60	8.9
VC-04	0.00-0.30	7.7
	1.00-1.30	8.3
	2.00-2.30	8.8
	2.50-3.00	9.1
VC-05	0.00-0.30	7.7
	1.00-1.30	8.2
	2.00-2.30	8.3
	2.30-2.60	8.5
VC-06	0.00-0.30	7.8
	1.00-1.30	8.2
	2.00-2.30	8.8
	2.50-2.80	9.2
VC-07	0.00-0.30	7.8
	1.00-1.30	8.7
	1.50-1.80	8.5
VC-08B	0.00-0.20	8.0
	1.00-1.20	8.6
	2.00-2.20	8.5
	2.20-2.50	8.5
VC-09	0.00-0.30	7.9
	1.00-1.30	8.3
	2.05-2.35	8.0
VC-10	0.00-0.30	8.0
	1.30-1.60	8.5
VC-11	0.00-0.30	8.1
	0.70-1.00	8.3

Station	Depth [m BRL]	pH
VC-12	0.00-0.30	8.9
	0.80-1.10	8.8
VC-13	0.00-0.30	7.8
	0.50-0.80	8.6
VC-14	0.00-0.30	7.7
VC-15A	0.00-0.30	8.2
	0.80-1.10	8.4
VC-16	0.00-0.30	8.0
VC-17	0.00-0.30	9.0
VC-18	0.00-0.30	8.5
	0.30-0.85	8.5
VC-19	0.00-0.30	8.1
VC-20	0.00-0.30	8.8
	0.80-1.10	8.4
BH-08	1.60-1.80	8.5
BH-09	2.30-3.00	8.6
BH-10	2.30-2.50	8.0
BH-11	2.40-2.60	8.2
BH-12	2.25-2.50	8.4
BH-13	3.90-4.10	8.3
BH-30	0.00-0.50	8.8
	0.95-1.25	9.0
	2.00-2.20	8.7
	3.00-3.20	8.5
	4.00-4.20	8.6
	5.00-5.20	8.4
	6.00-6.20	8.1
	6.80-7.00	7.9
BH-31	0.00-0.80	8.6
	1.00-1.60	8.3
	2.00-2.30	8.3
	3.30-3.70	8.2
	4.00-4.30	8.5
	5.00-5.30	8.5
	6.10-6.40	8.4
BH-32	0.00-0.50	7.9

Station	Depth [m BRL]	pH
	1.00-1.50	8.5
	2.00-2.50	8.3
	3.00-3.50	8.4
BH-33	0.00-1.00	7.7
	1.00-1.70	8.5
	2.00-2.50	8.4
	3.00-3.30	8.6
BH-34	0.00-0.50	8.6
	1.00-1.50	8.4
	2.00-2.50	8.5
	3.00-3.50	8.3
	4.00-4.50	8.2
	5.00-5.50	8.3

Notes
VC = Vibrocore
BH = Borehole
BRL = Below riverbed level

Appendix E

Species Lists

E.1 Intertidal Quadrat Samples

Sample	QS01	QS02	QS03	QS04	QS05	QS06	QS07	QS08	QS09	QS10
Zone	**Mid eulittoral**	**Supralittoral**	**Mid eulittoral**	**Upper eulittoral**	**Lower eulittoral**	**Mid eulittoral**	**Lower eulittoral**	**Mid eulittoral**	**Lower eulittoral**	**Lower eulittoral**
Substratum	Cobbles/boulders gravelly sand	Rock/muddy sand	Slightly gravelly muddy sand	Cobbles/boulders gravelly mud with pebbles	Boulders/pebbles	Rock/gravel	Muddy, sandy gravel	Muddy gravel with cobbles and pebbles	Muddy gravel with pebbles	Muddy gravel with pebbles
Notes			Dig-over undertaken - no fauna identified						Dig-over undertaken - no fauna identified. No epibiota	Dig-over undertaken
OCHROPHYTA										
Fucus juv.		< 1 %	< 1 %				< 5 %	50 %		
Fucus ceranoides	40 %			20 %						
Fucus vesiculosus				20 %	10 %	70 %				
CHLOROPHYTA										
Chlorophyta	10 %	60 %	2 %	10 %		10 %				
RHODOPHYTA										
Chondrus crispus					60 %		10 %			< 1 %
ANNELIDA										
Annelida										1*
Spirobranchus lamarcki					~ 50					
ARTHROPODA										
Sessilia	> 500				> 250		~ 50			~ 70
Amphipoda						1		~ 50		
MOLLUSCA										
Patella vulgata	1						3			2
Littorina littorea	81			2	30		18			3
Mytilus edulis	4									

Notes
Data show numbers of individuals unless expressed as percentage
* = Identified from dig-over

E.2 Intertidal Core Samples

E.2.1 Abundance

Taxa	SDC	AphiaID	Authority	CS_01	CS_02	CS_03	CS_04	CS_05	CS_06	CS_07	CS_08	CS_09	CS_10	Total
NEMERTEA														
NEMERTEA	G1	152391	-		2	1	15	1	25	39	12	3	9	**107**
ANNELIDA														
Eteone longa	P118	130616	(Fabricius, 1780)	7	4	6	9							**26**
Phyllodoce mucosa	P145	334512	Örsted, 1843									1		**1**
Eumida bahusiensis	P164	130641	Bergstrom, 1914									1		**1**
Microphthalmus similis	P333	130176	Bobretzky, 1870				11		3	3	3			**20**
Hediste diversicolor	P462	152302	(O.F. Müller, 1776)	1		1								**2**
Aonides oxycephala	P722	131106	(Sars, 1862)										1	**1**
Boccardia proboscidea	-	327249	Hartman, 1940							4				**4**
Malacoceros tetracerus	P738	333954	(Schmarda, 1861)		3		1	17			166			**187**
Polydora cornuta	P753	131143	Bosc, 1802	1			4							**5**
Dipolydora quadrilobata	P760	131121	(Jacobi, 1883)				4					15	14	**33**
Pygospio elegans	P776	131170	Claparède, 1863	43	10	11	3		45	3	10	3		**128**
Streblospio benedicti / gynobranchiata	-	-	-				3					2		**5**
Chaetozone gibber	P833	129953	Woodham & Chambers, 1994	2								1		**3**
Cirriformia tentaculata	P839	129964	(Montagu, 1808)									6	2	**8**
Tharyx species A	-	-	-									3		**3**
Chaetozone vivipara	-	332672	(Christie, 1984)	1										**1**
Capitella	P906	129211	Blainville, 1828	51	117	15	630	7	46	62	23	6	1	**958**
Mediomastus fragilis	P919	129892	Rasmussen, 1973							1				**1**
Protodrilus	P1069	129514	Hatschek, 1881						6					**6**
Melinna palmata	P1124	129808	Grube, 1870									1		**1**
Euchone limnicola	-	332800	Reish, 1959				1							**1**
Fabricia stellaris	P1283	130913	(Müller, 1774)	74	3		18		5	19	1	5		**125**
Manayunkia aestuarina	P1294	130926	(Bourne, 1883)	29	15	5								**49**
Tubificoides benedii	P1490	137571	(d'Udekem, 1855)	50	113	1	119	3	4	62	94	168	20	**634**
Tubificoides pseudogaster	P1498	137582	(Dahl, 1960)	58	148	58	426	17	197	283	256	14		**1457**
Tubificoides swirencoides	P1500	137584	Brinkhurst, 1985							1	1	50	1	**53**
Tubificoides galiciensis	-	137576	Martinez-Ansemil & Giani, 1987									23		**23**
Enchytraeidae	P1501	2038	Vejdovský, 1879	3	1	81	1	17	237	225	62	1		**628**

Taxa	SDC	AphiaID	Authority	CS_01	CS_02	CS_03	CS_04	CS_05	CS_06	CS_07	CS_08	CS_09	CS_10	Total
ARTHROPODA														
ACARI	Q53	292684	Leach, 1817										1	**1**
Austrominius modestus	R68	712167	(Darwin, 1854)							19	1			**20**
Semibalanus balanoides	R70	106210	(Linnaeus, 1767)							1				**1**
Gammaridae	S464	101383	Leach, 1814				111		2					**113**
Melita palmata	S525	102843	(Montagu, 1804)								12			**12**
Monocorophium insidiosum	S612	148592	(Crawford, 1937)				1							**1**
Jaera	**S884**	**118364**	**Leach, 1814**	**1**			**20**		**1**		**2**	**3**		**27**
COLLEMBOLA	-	118086	-	12		367								**379**
CARIDEA	-	106674	Dana, 1852				1							**1**
Carcinus maenas	S1594	107381	(Linnaeus, 1758)								2	2		**4**
DIPTERA	-	118088	-				1							**1**
MOLLUSCA	-	-	-											
Littorina littorea	W296	140262	(Linnaeus, 1758)					1						**1**
Littorina saxatilis	W305	140264	(Olivi, 1792)		1				7		7	1		**16**
Onoba aculeus	W368	141308	(Gould, 1841)					1	2	1	2		1	**7**
Peringia ulvae	W385	151628	(Pennant, 1777)	41	33	9	32	1	123	10	188	15	1	**453**
Venerupis corrugata	W2124	181364	(Gmelin, 1791)									1		**1**
Mya arenaria	W2149	140430	Linnaeus, 1758	1										**1**
Number of taxa				**16**	**12**	**11**	**20**	**9**	**14**	**15**	**17**	**22**	**10**	**46**
Abundance				**375**	**450**	**555**	**1411**	**65**	**703**	**733**	**842**	**325**	**51**	**5510**
The following taxa were merged for analysis														
Jaera	**S884**	**118364**	**Leach, 1814**	**1**			**20**		**1**		**2**	**3**		**27**
Jaera	S884	118364	Leach, 1814	1			13		1		2	3		**20**
Jaera albifrons	S885	264171	Leach, 1814				7							**7**
Number of taxa				**1**			**1**		**1**		**1**	**1**		**1**
Abundance				**1**			**20**		**1**		**2**	**3**		**27**
The following taxa were excluded from analysis														
Colonial														
ANTHOATHECATA	D140	13551	Cornelius, 1992						P					**P**
Damaged														
Cirratulidae	P822	919	Ryckholt, 1851		P									**P**

Taxa	SDC	AphiaID	Authority	CS_01	CS_02	CS_03	CS_04	CS_05	CS_06	CS_07	CS_08	CS_09	CS_10	Total
Juvenile														
Malacoceros	P736	129614	Quatrefages, 1843				1							**1**
BALANOMORPHA	R42	106039	Pilsbry, 1916					6		10				**16**
Mytilus	W1693	138228	Linnaeus, 1758						10	2			1	**13**
Cerastoderma	W1960	137735	Poli, 1795									1		**1**
Veneridae	W2086	243	Rafinesque, 1815									1		**1**
Meiofaunal														
NEMATODA	HD1	799		20	22	11	94		6	67	7	10	2	**239**
COPEPODA	R142	1080	Milne Edwards, 1840				1	1		8	32	2		**44**
Number of taxa				**1**	**2**	**1**	**3**	**2**	**3**	**4**	**2**	**4**	**2**	**9**
Abundance				**20**	**22**	**11**	**96**	**7**	**16**	**87**	**39**	**14**	**3**	**315**

E.2.2 Biomass

Taxa	SDC	AphiaID	Authority	CS_01	CS_02	CS_03	CS_04	CS_05	CS_06	CS_07	CS_08	CS_09	CS_10	Total
NEMERTEA														
NEMERTEA	G1	152391	-		0.0015	0.0009	0.0196	0.0001	0.0114	0.0089	0.0061	0.0023	0.0078	**0.0586**
ANNELIDA														
Eteone longa (aggregate)	P118	130616	(Fabricius, 1780)	0.0324	0.0204	0.009	0.0895							**0.1513**
Phyllodoce mucosa	P145	334512	Örsted, 1843									0.0029		**0.0029**
Eumida bahusiensis	P164	130641	Bergstrom, 1914									0.0027		**0.0027**
Microphthalmus similis	P333	130176	Bobretzky, 1870				0.0012		0.0001	0.0001	0.0001			**0.0015**
Hediste diversicolor	P462	152302	(O.F. Müller, 1776)	0.0062		0.0026								**0.0088**
Aonides oxycephala	P722	131106	(Sars, 1862)										0.0081	**0.0081**
Boccardia proboscidea	-	327249	Hartman, 1940							0.0049				**0.0049**
Malacoceros tetracerus	P738	333954	(Schmarda, 1861)		0.0057		0.0032	0.0885			1.1793			**1.2767**
Polydora cornuta	P753	131143	Bosc, 1802	0.0001			0.0052							**0.0053**
Dipolydora quadrilobata	P760	131121	(Jacobi, 1883)				0.0088					0.0185	0.0072	**0.0345**
Pygospio elegans	P776	131170	Claparède, 1863	0.0171	0.0148	0.0061	0.0001		0.0069	0.0022	0.0018	0.0046		**0.0536**
Streblospio benedicti / gynobranchiata	-	-	-				0.0008					0.0006		**0.0014**
Chaetozone gibber	P833	129953	Woodham & Chambers, 1994	0.0028								0.0017		**0.0045**
Cirriformia tentaculata	P839	129964	(Montagu, 1808)									0.1771	0.1506	**0.3277**
Tharyx species A	-	-	-									0.0010		**0.001**
Chaetozone vivipara	-	332672	(Christie, 1984)	0.0006										**0.0006**
Capitella	P906	129211	Blainville, 1828	0.0042	0.0186	0.0015	0.1096	0.0024	0.0209	0.0128	0.0064	0.0053	0.0134	**0.1951**
Mediomastus fragilis	P919	129892	Rasmussen, 1973							0.0027				**0.0027**
Protodrilus	P1069	129514	Hatschek, 1881						0.0008					**0.0008**
Melinna palmata	P1124	129808	Grube, 1870									0.0001		**0.0001**
Euchone limicola	-	332800	Reish, 1959				0.0001							**0.0001**
Fabricia stellaris	P1283	130913	(Müller, 1774)	0.0078	0.0001		0.0009		0.0001	0.001	0.0009	0.0001		**0.0109**
Manayunkia aestuarina	P1294	130926	(Bourne, 1883)	0.0014	0.0006	0.0001								**0.0021**
Tubificoides benedii	P1490	137571	(d'Udekem, 1855)	0.0509	0.0612	0.0015	0.0894	0.0002	0.0009	0.0346	0.0775	0.1039	0.0084	**0.4285**
Tubificoides pseudogaster	P1498	137582	(Dahl, 1960)	0.0153	0.0327	0.0132	0.1045	0.0094	0.3779	0.1736	0.3957	0.0035		**1.1258**
Tubificoides swirencoides	P1500	137584	Brinkhurst, 1985							0.0001	0.0001	0.0054	0.0001	**0.0057**
Tubificoides galiciensis	-	137576	Martinez-Ansemil & Giani, 1987									0.0078		**0.0078**
Enchytraeidae	P1501	2038	Vejdovský, 1879	0.0001	0.0001	0.0119	0.0001	0.0043	0.1543	0.0608	0.0450	0.0001		**0.2767**
ARTHROPODA														
ACARI	Q53	292684	Leach, 1817										0.0001	**0.0001**
Austrominius modestus	R68	712167	(Darwin, 1854)							0.4076	0.0335			**0.4411**

Taxa	SDC	AphiaID	Authority	CS_01	CS_02	CS_03	CS_04	CS_05	CS_06	CS_07	CS_08	CS_09	CS_10	Total
Semibalanus balanoides	R70	106210	(Linnaeus, 1767)							0.0903				**0.0903**
Gammaridae (damaged/juvenile)	S464	101383	Leach, 1814				0.0588		0.0006					**0.0594**
Melita palmata	S525	102843	(Montagu, 1804)								0.0062			**0.0062**
Monocorophium insidiosum	S612	148592	(Crawford, 1937)				0.0006							**0.0006**
Jaera	**S884**	**118364**	**Leach, 1814**	**0.0007**			**0.005**		**0.0001**		**0.0012**	**0.0015**		**0.0085**
COLLEMBOLA	-	118086	-	0.0007		0.0114								**0.0121**
CARIDEA (damaged)	-	106674	Dana, 1852				0.0001							**0.0001**
Carcinus maenas	S1594	107381	(Linnaeus, 1758)								0.0146	0.0072		**0.0218**
DIPTERA (Pupa)	-	118088	-				0.0011							**0.0011**
MOLLUSCA														
Littorina littorea	W296	140262	(Linnaeus, 1758)					4.2398						**4.2398**
Littorina saxatilis	W305	140264	(Olivi, 1792)		0.0017				0.0165		0.0347	0.0107		**0.0636**
Onoba aculeus	W368	141308	(Gould, 1841)					0.0006	0.0026	0.0018	0.0037		0.0008	**0.0095**
Peringia ulvae	W385	151628	(Pennant, 1777)	0.0296	0.036	0.0019	0.0244	0.0008	0.2674	0.0102	0.4764	0.0131	0.0006	**0.8604**
Venerupis corrugata	W2124	181364	(Gmelin, 1791)									0.2200		**0.22**
Mya arenaria	W2149	140430	Linnaeus, 1758	0.0015										**0.0015**
Number of taxa				**16**	**12**	**11**	**20**	**9**	**14**	**15**	**17**	**22**	**10**	**46**
Biomass				**0.1714**	**0.1934**	**0.0601**	**0.523**	**4.3461**	**0.8605**	**0.8116**	**2.2832**	**0.5901**	**0.1971**	**10.0365**
The following taxa were merged for analysis														
Jaera	**S884**	**118364**	**Leach, 1814**	**0.0007**			**0.005**		**0.0001**		**0.0012**	**0.0015**		**0.0085**
Jaera (female)	S884	118364	Leach, 1814	0.0007			0.0032		0.0001		0.0012	0.0015		**0.0067**
Jaera albifrons	S885	264171	Leach, 1814				0.0018							**0.0018**
Number of taxa				**1**			**1**		**1**		**1**	**1**		**1**
Biomass				**0.0007**			**0.005**		**0.0001**		**0.0012**	**0.0015**		**0.0085**
The following taxa were excluded from analysis														
Colonial														
ANTHOATHECATA	D140	13551	Cornelius, 1992						0.0054					**P**
Damaged														
Cirratulidae	P822	919	Ryckholt, 1851		0.0001									**P**
Juvenile														
Malacoceros	P736	129614	Quatrefages, 1843				0.0001							**0.0001**
BALANOMORPHA	R42	106039	Pilsbry, 1916					0.0001		0.0151				**0.0152**
Mytilus	W1693	138228	Linnaeus, 1758						0.0206	0.0079			0.0065	**0.035**

Taxa	SDC	AphiaID	Authority	CS_01	CS_02	CS_03	CS_04	CS_05	CS_06	CS_07	CS_08	CS_09	CS_10	Total
Cerastoderma	W1960	137735	Poli, 1795									0.0070		**0.007**
Veneridae	W2086	243	Rafinesque, 1815									0.0010		**0.001**
Meiofaunal														
NEMATODA	HD1	799	-	0.0001	0.0011	0.001	0.0029		0.0001	0.0029	0.0021	0.0001	0.0001	**0.0104**
COPEPODA	R142	1080	Milne Edwards, 1840				0.0001	0.0001		0.0001	0.0070	0.0001		**0.0074**
Number of taxa				**1**	**2**	**1**	**3**	**2**	**3**	**4**	**2**	**4**	**2**	**9**
Biomass				**0.0001**	**0.0012**	**0.001**	**0.0031**	**0.0002**	**0.0261**	**0.026**	**0.0091**	**0.0082**	**0.0066**	**0.0761**

E.3 Mudflat Grab Samples

E.3.1 Abundance

Taxa	SDC	AphiaID	Authority	GS_12	GS_16	GS_18	GS_19	GS_20	GS_23	Total
ANNELIDA										
Eteone longa (agg.)	P118	130616	(Fabricius, 1780)	8	3	12	6	3	7	**39**
Phyllodoce mucosa	P145	334512	Örsted, 1843				1		2	**3**
Sphaerodoropsis baltica	P286	131089	(Reimers, 1933)		1	2	2	1	1	**7**
Hediste diversicolor	P462	152302	(O.F. Müller, 1776)		8	2	3	2		**15**
Polydora cornuta	P753	131143	Bosc, 1802	10	18	32	8	11	3	**82**
Dipolydora quadrilobata	P760	131121	(Jacobi, 1883)		5	7	7	1		**20**
Pygospio elegans	P776	131170	Claparède, 1863	7	4	44	71	31	17	**174**
Streblospio benedicti / gynobranchiata	-	-	-	10	8	32	11		15	**76**
Cossura	P868	129251	Webster & Benedict, 1887	1						**1**
Chaetozone gibber	P833	129953	Woodham & Chambers, 1994	1			1		2	**4**
Tharyx species A	-	-	-	388	148	7	26		238	**807**
Capitella	P906	129211	Blainville, 1828	4	8	31			29	**72**
Mediomastus fragilis	P919	129892	Rasmussen, 1973		1				5	**6**
Manayunkia aestuarina	P1294	130926	(Bourne, 1883)	2	2	5	48	1	5	**63**
Tubificoides benedii	P1490	137571	(d'Udekem, 1855)	54	67	233	58	27	60	**499**
Tubificoides pseudogaster	P1498	137582	(Dahl, 1960)	4	30	90	17	6	9	**156**
Enchytraeidae	P1501	2038	Vejdovský, 1879		P		3	3		**6**
ARTHROPODA										
Corophium volutator	S616	102101	(Pallas, 1766)	1	21	104	369	241	72	**808**
Carcinus maenas	S1594	107381	(Linnaeus, 1758)							**1**
MOLLUSCA										
Littorina saxatilis	W305	140264	(Olivi, 1792)						2	**2**
Peringia ulvae	W385	151628	(Pennant, 1777)	100	25	72	2323	237	29	**2786**
Parvicardium scabrum	W1952	139012	(Philippi, 1844)						2	**2**
Limecola balthica	W2029	880017	(Linnaeus, 1758)			2	1			**3**
Mya arenaria	W2149	140430	Linnaeus, 1758		1	1	2	1	6	**11**
Number of taxa				**13**	**18**	**17**	**18**	**13**	**18**	**24**
Abundance				**590**	**350**	**677**	**2957**	**565**	**504**	**5643**
The following taxa were excluded from analysis										
Colonial										
Conopeum reticulum	Y172	111351	(Linnaeus, 1767)						P	**P**
Damaged										
POLYCHAETA	P2	883	Grube, 1850			1				**P**
Pholoidae	P90	941	Kinberg, 1858							**P**
Spionidae	P720	913	Grube, 1850				1			**1**
BIVALVIA	W1560	105	Linnaeus, 1758	1			1			**2**
Juvenile										
Nereididae	P458	22496	Blainville, 1818	1	1	1	4	2		**9**
Cirratulidae	P822	919	Ryckholt, 1851	8						**8**
Cardiidae	W1938	229	Lamarck, 1809	5	1	1	25	3	9	**44**
Cerastoderma	W1960	137735	Poli, 1795	7	2		15	7		**31**
Meiofaunal										
NEMATODA	HD1	799	-	6	12	19	224	11	20	**292**
Number of taxa				**6**	**4**	**4**	**6**	**4**	**3**	**10**
Abundance				**28**	**16**	**22**	**270**	**23**	**29**	**387**

E.3.2 Biomass

Taxa	SDC	AphiaID	Authority	GS_12	GS_16	GS_18	GS_19	GS_20	GS_23	Total
ANNELIDA										
Eteone longa (agg.)	P118	130616	(Fabricius, 1780)	0.0095	0.0137	0.0156	0.0037	0.0030	0.006	0.0515
Phyllodoce mucosa	P145	334512	Örsted, 1843				0.0019		0.0031	0.005
Sphaerodoropsis baltica	P286	131089	(Reimers, 1933)		0.0001	0.0017	0.0013	0.0015	0.0001	0.0047
Hediste diversicolor	P462	152302	(O.F. Müller, 1776)		0.0716	0.0323	0.0133	0.0035		0.1207
Polydora cornuta	P753	131143	Bosc, 1802	0.0036	0.0237	0.0306	0.0043	0.0096	0.0006	0.0724
Dipolydora quadrilobata	P760	131121	(Jacobi, 1883)		0.0059	0.0036	0.0053	0.0001		0.0149
Pygospio elegans	P776	131170	Claparède, 1863	0.0030	0.0029	0.0243	0.0215	0.0206	0.0077	0.08
Streblospio benedicti / gynobranchiata	-	-	-	0.0033	0.0027	0.0151	0.0024		0.0036	0.0271
Cossura	P868	129251	Webster & Benedict, 1887	0.0001						0.0001
Chaetozone gibber	P833	129953	Woodham & Chambers, 1994	0.0001			0.0001		0.0019	0.0021
Tharyx species A	-	-	-	0.3367	0.1004	0.0137	0.0334		3.0978	3.582
Capitella	P906	129211	Blainville, 1828	0.0009	0.0014	0.0082			0.0038	0.0143
Mediomastus fragilis	P919	129892	Rasmussen, 1973		0.0001				0.0008	0.0009
Manayunkia aestuarina	P1294	130926	(Bourne, 1883)	0.0001	0.0001	0.0001	0.0008	0.0001	0.0001	0.0013
Tubificoides benedii	P1490	137571	(d'Udekem, 1855)	0.0310	0.0287	0.092	0.02	0.0139	0.024	0.2096
Tubificoides pseudogaster	P1498	137582	(Dahl, 1960)	0.0013	0.0092	0.0246	0.0043	0.0024	0.0024	0.0442
Enchytraeidae	P1501	2038	Vejdovský, 1879		0.0001		0.0001	0.0001		0.0003
ARTHROPODA										
Corophium volutator	S616	102101	(Pallas, 1766)	0.0014	0.0169	0.0893	0.3602	0.1357	0.0773	0.6808
Carcinus maenas	S1594	107381	(Linnaeus, 1758)			0.0040				0.004
MOLLUSCA										
Littorina saxatilis	W305	140264	(Olivi, 1792)						0.1044	0.1044
Peringia ulvae	W385	151628	(Pennant, 1777)	0.0496	0.0218	0.0761	0.6631	0.0824	0.0139	0.9069
Parvicardium scabrum	W1952	139012	(Philippi, 1844)						0.0116	0.0116
Limecola balthica	W2029	880017	(Linnaeus, 1758)			0.0325	0.0014			0.0339
Mya arenaria	W2149	140430	Linnaeus, 1758		0.0011	0.0015	0.0021	0.0001	0.0083	0.0131
Number of taxa				13	17	17	18	13	18	24
Biomass				0.4406	0.3004	0.4652	1.1392	0.273	3.3674	5.9858
The following taxa were excluded from analysis										
Damaged										
POLYCHAETA	P2	883	Grube, 1850			0.0366				0.0366
Spionidae	P720	913	Grube, 1850				0.0001			0.0001
BIVALVIA	W1560	105	Linnaeus, 1758	0.002			0.0001			0.0021
Juvenile										
Nereididae	P458	22496	Blainville, 1818	0.0006	0.0010	0.0028	0.0017	0.0009		0.007
Cirratulidae	P822	919	Ryckholt, 1851	0.0008						0.0008
Cardiidae	W1938	229	Lamarck, 1809	0.0018	0.0001	0.0001	0.0045	0.0001	0.0031	0.0097
Cerastoderma	W1960	137735	Poli, 1795	0.0054	0.0021		0.0094	0.0045		0.0214
Meiofaunal										
NEMATODA	HD1	799	-	0.0001	0.0013	0.0014	0.0190	0.0001	0.0044	0.0263
Number of taxa				6	4	4	6	4	2	8
Biomass				0.0107	0.0045	0.0409	0.0348	0.0056	0.0075	0.104

E.4 Subtidal Grab Samples

E.4.1 Abundance

Taxa	SDC	AphiaID	Authority	GS_01	GS_02	GS_03	GS_04	GS_05	GS_06	GS_07	GS_08	GS_09	GS_10	GS_11	GS_13	GS_14	GS_15	GS_21	GS_22	GS_24	GS_25	GS_26	Total
CNIDARIA																							
Virgularia mirabilis	D618	128539	(Müller, 1776)				1		1														**2**
ACTINIARIA	D662	1360	Hertwig, 1882													1							**1**
NEMERTEA																							
NEMERTEA	G1	152391	-				2						P		2		1						**5**
ANNELIDA																							
Gattyana cirrhosa	P49	130749	(Pallas, 1766)								3						1						**4**
Harmothoe (damaged)	P50	129491	Kinberg, 1856													1							**1**
Pholoe inornata	P92	130601	Johnston, 1839			1	2				6		8		14	64	3		1	2	4	3	**108**
Pholoe baltica	P95	130599	Örsted, 1843	1					1		1		1		1							1	**6**
Eteone longa (agg.)	P118	130616	(Fabricius, 1780)	4	6	7	13	4	P		25		7	2	26	40	4		2	1		27	**168**
Phyllodoce mucosa	P145	334512	Örsted, 1843		1	1	22	2			6		3	1	11	51	36			1	5	33	**173**
Eumida bahusiensis	P164	130641	Bergstrom, 1914			1	1				3				10	10	2					2	**29**
Eumida sanguinea (agg.)	P167	130644	(Örsted, 1843)														1						**1**
Phyllodoce laminosa	P180	130670	Savigny in Lamarck, 1818				1																**1**
Glycera alba	P256	130116	(O.F. Müller, 1776)				1																**1**
Sphaerodoropsis baltica	P286	131089	(Reimers, 1933)										1										**1**
Psamathe fusca	P305	152249	Johnston, 1836								2					4							**6**
Oxydromus flexuosus	P313	710680	(Delle Chiaje, 1827)	1											1								**2**
Podarkeopsis capensis	P319	130195	(Day, 1963)	2		1		2					3		3							1	**12**
Lumbrineris nr cingulata	-	130240	Ehlers, 1897				1									2						1	**4**
Prosphaerosyllis	-	195974	San Martín, 1984								1												**1**
Alitta virens	P472	234851	(M. Sars, 1835)												1								**1**
Nephtys hombergii	P499	130359	Savigny in Lamarck, 1818	9	4	10	2	8	14	11		10	3	8	5		5	10	7	8	9	4	**127**
Nephtys incisa	P501	130362	Malmgren, 1865		1																		**1**
Nephtys kersivalensis	P502	130363	McIntosh, 1908	4	2	4	7					3		1		3		2					**26**
Nephtys pente	P505	130352	Rainer, 1984								1												**1**
Paramphinome jeffreysii	P518	129837	(McIntosh, 1868)	2	1		2	1			7												**13**
Ophryotrocha	P613	129266	Claparède & Mecznikow, 1869			1				1	12	1	4	10	3	3	1	2		1	1	2	**42**
Prionospio multibranchiata	P746	131160	Berkeley, 1927					1															**1**

Taxa	SDC	AphiaID	Authority	GS_01	GS_02	GS_03	GS_04	GS_05	GS_06	GS_07	GS_08	GS_09	GS_10	GS_11	GS_13	GS_14	GS_15	GS_21	GS_22	GS_24	GS_25	GS_26	Total
Polydora cornuta	P753	131143	Bosc, 1802				7	3			1	1	34	1	22	3	19				32	2	**125**
Dipolydora quadrilobata	P760	131121	(Jacobi, 1883)				8																**8**
Prionospio fallax	P765	131157	Söderström, 1920			2	1	1					4					1		1			**10**
Pseudopolydora pulchra	P774	131169	(Carazzi, 1893)				1					1	1										**3**
Pygospio elegans	P776	131170	Claparède, 1863											1									**1**
Spio decorata	P793	152314	Bobretzky, 1870		1						1	1	1		4	5	3	1	1		1	2	**21**
Spiophanes bombyx	P794	131187	(Claparède, 1870)												1								**1**
Streblospio benedicti / gynobranchiata	-	-	-	2	1	4	1	3	1	2	7	7	88	11	21		18	12	2	12	30	30	**252**
Cossura	P868	129251	Webster & Benedict, 1887			13		1			11	2	14	10	7	2		8		13	3	35	**119**
Aphelochaeta marioni	P824	129938	(Saint-Joseph, 1894)												3	6						2	**11**
Caulleriella alata	P829	129943	(Southern, 1914)								3	1				1	2						**7**
Chaetozone gibber	P833	129953	Woodham & Chambers, 1994	72	39	38	203	198	10	24	588	12	297	65	332	338	156	39	14	1	93	326	**2845**
Chaetozone setosa	P834	129955	Malmgren, 1867							2	1	1	2		7	9	1					4	**27**
Cirriformia tentaculata	P839	129964	(Montagu, 1808)																			1	**1**
Tharyx species A	-	-	-			2		10						5	11		22	1	10	1	405		**467**
Tharyx killariensis	P846	152269	(Southern, 1914)										1										**1**
Chaetozone vivipara	-	332672	(Christie, 1984)	15	22	52	1	26			5	44	61	36	11	23	20	10	7			7	**340**
Diplocirrus (damaged)	P877	129290	Haase, 1915												1	1							**2**
Pherusa plumosa Type A	-	130113	(Müller, 1776)								1		1			1			1	1			**5**
Capitella	P906	129211	Blainville, 1828												1	1			P			12	**14**
Mediomastus fragilis	P919	129892	Rasmussen, 1973	1	1	11	52	1			63	1	32	3	97	70	8	2			7	59	**408**
Ophelina acuminata	P1014	130500	Örsted, 1843	2		2		3				1						1					**9**
Scalibregma inflatum	P1027	130980	Rathke, 1843				4				1				5	4							**14**
Galathowenia oculata	P1093	146950	(Zachs, 1923)		1	6	33									1					2		**43**
Pectinariidae (damaged)	P1100	980	Quatrefages, 1866														1						**1**
Sabellaria spinulosa	P1117	130867	(Leuckart, 1849)													23					1	1	**25**
Melinna palmata	P1124	129808	Grube, 1870	38	31	43	111	26	53	3	1	20	121	8	93	55	12	17	15		25	217	**889**
Terebellides	P1174	129717	Sars, 1835	3	3	7	6	1	6	1	1		14		7	1		1	2	3	1		**57**
Polycirrus	P1235	129710	Grube, 1850				2				1		1										**4**
Chone (damaged)	P1264	129525	Krøyer, 1856										7									11	**18**
Euchone limnicola	-	332800	Reish, 1959		3	49	11	19	4	5	6	7	315	141	380	6	8	64	20	9	39	192	**1278**
Spirobranchus lamarcki	P1340	560033	(Quatrefages, 1866)								1												**1**
Tubificoides benedii	P1490	137571	(d'Udekem, 1855)			3	5	1					2		3		2					3	**19**

Taxa	SDC	AphiaID	Authority	GS_01	GS_02	GS_03	GS_04	GS_05	GS_06	GS_07	GS_08	GS_09	GS_10	GS_11	GS_13	GS_14	GS_15	GS_21	GS_22	GS_24	GS_25	GS_26	Total
Tubificoides pseudogaster	P1498	137582	(Dahl, 1960)			1	2				1											6	**10**
Tubificoides swirencoides	P1500	137584	Brinkhurst, 1985			4	1				18	9	20	10	80	13	4	1	1	2	17	6	**186**
Tubificoides galiciensis	-	137576	Martinez-Ansemil & Giani, 1987			2			1		43	1	22	3	67	31	53		1	23	34	102	**383**
ARTHROPODA																							
Balanus crenatus	R77	106215	Bruguière, 1789												9	29					12		**50**
MYODOCOPIDA	R2413	2104	Sars, 1866			1			1			1	1		21							1	**26**
Tryphosa crenata	-	761800	(Chevreux & Fage, 1925)										1										**1**
Perioculodes longimanus	S131	102915	(Spence Bate & Westwood, 1868)												4	1	1						**6**
Apolochus neapolitanus	S159	236495	(Della Valle, 1893)												1								**1**
Paramphilochoides odontonyx	S170	101982	(Boeck, 1871)										1										**1**
Argissa hamatipes	S360	102064	(Norman, 1869)				1			1										1			**3**
Ampelisca brevicornis	S427	101891	(Costa, 1853)												1								**1**
Ampelisca diadema	S429	101896	(Costa, 1853)													1							**1**
Ampelisca tenuicornis	S440	101930	Liljeborg, 1856				1								2	2							**5**
Cheirocratus	S503	101669	Norman, 1867				2				2				2	9							**15**
Aoridae (female)	S577	101368	Stebbing, 1899										1		1	1							**3**
Corophium volutator	S616	102101	(Pallas, 1766)						5						1								**6**
Pariambus typicus	S651	101857	(Krøyer, 1845)			1	1						2		1				1			1	**7**
Eudorella truncatula	S1208	110535	(Bate, 1856)		1								1		1								**3**
Pseudocuma longicorne	S1236	110627	(Bate, 1858)												2								**2**
Diastylis bradyi	S1248	110472	Norman, 1879			1	1			1												1	**4**
Crangon crangon	S1385	107552	(Linnaeus, 1758)										1										**1**
Carcinus maenas	S1594	107381	(Linnaeus, 1758)												1	2							**3**
MOLLUSCA																							
Rissoa parva	W334	141365	(da Costa, 1778)																	1			**1**
Peringia ulvae	W385	151628	(Pennant, 1777)		36		2												1		3	2	**44**
CEPHALASPIDEA (damaged)	W1002	154	P. Fischer, 1883			1				1													**2**
Nucula nitidosa	W1569	140589	Winckworth, 1930	3	4	24	1		1		1	4	1		16		11	1	2		3	8	**80**
Nucula nucleus	W1570	140590	(Linnaeus, 1758)										1			1							**2**
Yoldia limatula	-	157005	(Say, 1831)			4				1		2	1	2	4		1	3		3		11	**32**
Thyasira flexuosa	W1837	141662	(Montagu, 1803)			4	1	1															**6**
Kurtiella bidentata	W1906	345281	(Montagu, 1803)	1		6	3		1		1		1			1							**14**
Parvicardium pinnulatum	-	181343	(Conrad, 1831)																	1			**1**

Taxa	SDC	AphiaID	Authority	GS_01	GS_02	GS_03	GS_04	GS_05	GS_06	GS_07	GS_08	GS_09	GS_10	GS_11	GS_13	GS_14	GS_15	GS_21	GS_22	GS_24	GS_25	GS_26	Total
Parvicardium scabrum	W1952	139012	(Philippi, 1844)				2															1	**3**
Spisula subtruncata	W1978	140302	(da Costa, 1778)				3						3	1	3				3			1	**14**
Fabulina fabula	W2019	146907	(Gmelin, 1791)			1					2												**3**
Abra alba	W2059	141433	(W. Wood, 1802)		1	1		1	1			2			2				1			1	**10**
Chamelea striatula	-	141908	(da Costa, 1778)										1										**1**
Mya arenaria	W2149	140430	Linnaeus, 1758																		5		**5**
Varicorbula gibba	W2157	378492	(Olivi, 1792)							1					1					1		2	**5**
Number of taxa				**16**	**19**	**34**	**40**	**21**	**15**	**13**	**34**	**23**	**42**	**19**	**49**	**39**	**27**	**18**	**20**	**21**	**22**	**38**	**99**
Abundance				**160**	**159**	**309**	**522**	**313**	**100**	**54**	**827**	**132**	**1084**	**319**	**1303**	**820**	**396**	**176**	**92**	**86**	**732**	**1121**	**8705**
The following taxa were excluded from analysis																							
Colonial																							
ANTHOATHECATA	D140	13551	Cornelius, 1992										P										**P**
Conopeum reticulum	Y172	111351	(Linnaeus, 1767)						P					P	P	P				P			**P**
Damaged																							
POLYCHAETA	P2	883	Grube, 1850																				**P**
Polynoidae	P25	939	Kinberg, 1856													1							**1**
Pholoidae	P90	941	Kinberg, 1858					P															**P**
Prionospio	P745	129620	Malmgren, 1867																			1	**1**
Spio	P787	129625	Fabricius, 1785												1								**1**
Cirratulidae	P822	919	Ryckholt, 1851										1			1							**2**
Sabellidae	P1257	985	Latreille, 1825				1												2			12	**15**
Tubificoides	P1487	137393	Lastočkin, 1937								3		2		2	5	12			10	3	23	**60**
BALANOMORPHA	-	106039	Pilsbry, 1916													4							**4**
DECAPODA	S1276	1130	Latreille, 1802						P		P												**P**
CARIDEA	-	106674	Dana, 1852																		2		**2**
GASTROPODA	W88	101	Cuvier, 1795			1										1							**2**
BIVALVIA	W1560	105	Linnaeus, 1758			1					1		3			2					1		**8**
Abra	W2058	138474	Lamarck, 1818								1					1							**2**
Juvenile																							
Malmgrenia	-	147006	McIntosh, 1874				1																**1**
Phyllodocidae	P114	931	Örsted, 1843													3							**3**
Nereididae	P458	22496	Blainville, 1818													1							**1**
Nephtys	P494	129370	Cuvier, 1817	36	23	34	8	10	33	6	2	12	26	5	15	17	9	9	12	13	7	12	**289**

Taxa	SDC	AphiaID	Authority	GS_01	GS_02	GS_03	GS_04	GS_05	GS_06	GS_07	GS_08	GS_09	GS_10	GS_11	GS_13	GS_14	GS_15	GS_21	GS_22	GS_24	GS_25	GS_26	Total
Spio	P787	129625	Fabricius, 1785													1							**1**
Cirratulidae	P822	919	Ryckholt, 1851	2	2	5	1	1	3	4	7	1	6	2	1	1		1		1	2	5	**45**
Chaetozone	P832	129242	Malmgren, 1867														1						**1**
Terebellidae	P1179	982	Johnston, 1846												3	3							**6**
BALANOMORPHA	R42	106039	Pilsbry, 1916																		1		**1**
Ampelisca	S423	101445	Krøyer, 1842		1											3							**4**
Chrysallida	W928	138401	Carpenter, 1856																		1		**1**
BIVALVIA	W1560	105	Linnaeus, 1758																		1		**1**
Nuculidae	W1563	204	Gray, 1824		1				2				1							5			**9**
Nucula		138262	Lamarck, 1799		1					13								1		21		2	**38**
Yoldiidae		2097	Dall, 1908	2	4	4	1		2	6	4	4	19	6		1	12	7	7	83	7	56	**225**
Mytilus	W1693	138228	Linnaeus, 1758	8	36	12	1	1	8		2	8	2			10	1		1	17			**107**
Anomiidae	W1805	214	Rafinesque, 1815													6							**6**
Cardiidae	W1938	229	Lamarck, 1809									1								1	3		**5**
Cerastoderma	W1960	137735	Poli, 1795								1										1		**2**
Spisula	W1973	138159	Gray, 1837																		1		**1**
Tellinidae	W2008	235	Blainville, 1814		2							1			1						1		**5**
Abra	W2058	138474	Lamarck, 1818	1	1		5			2			2		5	5	4	2	3	4		3	**37**
Veneridae	W2086	243	Rafinesque, 1815							1					1	2							**4**
OPHIUROIDEA	ZB105	123084	Gray, 1840				1						1						1	1	1		**5**
Cucumariidae	ZB266	123187	Ludwig, 1894							1													**1**
Meiofaunal																							
PLATYHELMINTHES	F1	793	Minot, 1876										1			2							**3**
NEMATODA	HD1	799	-								64		4		29	14	3		1		1	14	**130**
Number of taxa				**5**	**9**	**6**	**8**	**4**	**7**	**7**	**10**	**6**	**13**	**4**	**10**	**22**	**7**	**5**	**7**	**11**	**15**	**9**	**43**
Abundance				**49**	**71**	**57**	**19**	**12**	**48**	**33**	**85**	**27**	**68**	**13**	**58**	**84**	**42**	**20**	**27**	**156**	**33**	**128**	**1030**

E.4.2 Biomass

Taxa	SDC	AphiaID	Authority	GS_01	GS_02	GS_03	GS_04	GS_05	GS_06	GS_07	GS_08	GS_09	GS_10
CNIDARIA													
Virgularia mirabilis	D618	128539	(Müller, 1776)				0.0619		0.0033				
ACTINIARIA	D662	1360	Hertwig, 1882										
NEMERTEA													
NEMERTEA	G1	152391	-				0.0524						0.0013
ANNELIDA													
Gattyana cirrhosa	P49	130749	(Pallas, 1766)								0.2582		
Harmothoe (damaged)	P50	129491	Kinberg, 1856										
Pholoe inornata	P92	130601	Johnston, 1839			0.0001	0.0001				0.0009		0.0009
Pholoe baltica	P95	130599	Örsted, 1843	0.0001					0.0017		0.0001		0.0001
Eteone longa (agg.)	P118	130616	(Fabricius, 1780)	0.0206	0.0103	0.0127	0.0181	0.0145	0.0001		0.0629		0.0246
Phyllodoce mucosa	P145	334512	Örsted, 1843		0.0013	0.0006	0.0713	0.0048			0.0088		0.0029
Eumida bahusiensis	P164	130641	Bergstrom, 1914				0.0045				0.0001		
Eumida sanguinea (agg.)	P167	130644	(Örsted, 1843)										
Phyllodoce laminosa	P180	130670	Savigny in Lamarck, 1818				0.005						
Glycera alba	P256	130116	(O.F. Müller, 1776)				0.1744						
Sphaerodoropsis baltica	P286	131089	(Reimers, 1933)										0.0008
Psamathe fusca	P305	152249	Johnston, 1836								0.002		
Oxydromus flexuosus	P313	710680	(Delle Chiaje, 1827)	0.0051									
Podarkeopsis capensis	P319	130195	(Day, 1963)	0.0109		0.0050		0.0041					0.0109
Lumbrineris nr cingulata	-	130240	Ehlers, 1897				0.0001						
Prosphaerosyllis	-	195974	San Martín, 1984								0.0001		
Alitta virens	P472	234851	(M. Sars, 1835)										
Nephtys hombergii	P499	130359	Savigny in Lamarck, 1818	0.4396	0.4856	0.8122	0.1248	0.8803	1.4527	1.0761		0.9492	0.2393
Nephtys incisa	P501	130362	Malmgren, 1865		0.6048								
Nephtys kersivalensis	P502	130363	McIntosh, 1908	0.1238	0.0807	0.0671	0.1697					0.0479	
Nephtys pente	P505	130352	Rainer, 1984								0.0128		
Paramphinome jeffreysii	P518	129837	(McIntosh, 1868)	0.0011	0.0001		0.0027	0.0006			0.006		
Ophryotrocha	P613	129266	Claparède & Mecznikow, 1869			0.0001				0.0001	0.0015	0.0001	0.0001
Prionospio multibranchiata	P746	131160	Berkeley, 1927					0.0001					
Polydora cornuta	P753	131143	Bosc, 1802				0.0073	0.0058			0.0001	0.0001	0.0188
Dipolydora quadrilobata	P760	131121	(Jacobi, 1883)				0.0138						
Prionospio fallax	P765	131157	Söderström, 1920			0.0005	0.0001	0.0006					0.0011
Pseudopolydora pulchra	P774	131169	(Carazzi, 1893)				0.0007					0.0012	0.0035

Taxa	SDC	AphiaID	Authority	GS_01	GS_02	GS_03	GS_04	GS_05	GS_06	GS_07	GS_08	GS_09	GS_10
Pygospio elegans	P776	131170	Claparède, 1863										
Spio decorata	P793	152314	Bobretzky, 1870		0.0001						0.0001	0.0001	0.0001
Spiophanes bombyx	P794	131187	(Claparède, 1870)										
Streblospio benedicti / gynobranchiata	-	-	-	0.0001	0.0001	0.0010	0.0007	0.0006	0.0007	0.0001	0.0010	0.0018	0.0287
Cossura	P868	129251	Webster & Benedict, 1887			0.0009		0.0001			0.0010	0.0001	0.0006
Aphelochaeta marioni	P824	129938	(Saint-Joseph, 1894)										
Caulleriella alata	P829	129943	(Southern, 1914)								0.0013	0.0001	
Chaetozone gibber	P833	129953	Woodham & Chambers, 1994	0.132	0.0685	0.0407	0.3343	0.4161	0.0127	0.0364	1.378	0.0209	0.6416
Chaetozone setosa	P834	129955	Malmgren, 1867							0.0025	0.0001	0.0001	0.0010
Cirriformia tentaculata	P839	129964	(Montagu, 1808)										
Tharyx species A	-	-	-			0.0011		0.0027					
Tharyx killariensis	P846	152269	(Southern, 1914)										0.0001
Chaetozone vivipara	-	332672	(Christie, 1984)	0.0004	0.0218	0.0350	0.0006	0.0181			0.0009	0.0293	0.0252
Diplocirrus (damaged)	P877	129290	Haase, 1915										
Pherusa plumosa Type A	-	130113	(Müller, 1776)								0.0008		0.0010
Capitella	P906	129211	Blainville, 1828										
Mediomastus fragilis	P919	129892	Rasmussen, 1973	0.0001	0.0009	0.0019	0.0214	0.0007			0.0296	0.0012	0.0129
Ophelina acuminata	P1014	130500	Örsted, 1843	0.1459		0.0807		0.1299				0.0269	
Scalibregma inflatum	P1027	130980	Rathke, 1843				0.0693				0.0248		
Galathowenia oculata	P1093	146950	(Zachs, 1923)		0.0001	0.0011	0.0062						
Pectinariidae (damaged)	P1100	980	Quatrefages, 1866										
Sabellaria spinulosa	P1117	130867	(Leuckart, 1849)										
Melinna palmata	P1124	129808	Grube, 1870	0.3317	0.2118	1.1181	2.7933	0.1274	0.2071	0.0012	0.0222	0.0205	0.0968
Terebellides	P1174	129717	Sars, 1835	0.9643	0.0237	0.6940	1.1500	0.0009	0.0298	0.0031	0.0001		0.3048
Polycirrus	P1235	129710	Grube, 1850				0.0064				0.0007		0.0289
Chone (damaged)	P1264	129525	Krøyer, 1856										0.0014
Euchone limnicola	-	332800	Reish, 1959		0.0001	0.007	0.0038	0.0033	0.0001	0.0007	0.0007	0.0018	0.0502
Spirobranchus lamarcki	P1340	560033	(Quatrefages, 1866)								0.0007		
Tubificoides benedii	P1490	137571	(d'Udekem, 1855)			0.0008	0.0031	0.0001					0.0007
Tubificoides pseudogaster	P1498	137582	(Dahl, 1960)			0.0001	0.0001				0.0001		
Tubificoides swirencoides	P1500	137584	Brinkhurst, 1985			0.0007	0.0001				0.0035	0.0015	0.0052
Tubificoides galiciensis	-	137576	Martinez-Ansemil & Giani, 1987			0.0001			0.0001		0.0048	0.0008	0.0058
ARTHROPODA													
Balanus crenatus	R77	106215	Bruguière, 1789										
MYODOCOPIDA	R2413	2104	Sars, 1866			0.0001			0.0001			0.0001	0.0001
Tryphosa crenata	-	761800	(Chevreux & Fage, 1925)										0.0012

Taxa	SDC	AphiaID	Authority	GS_01	GS_02	GS_03	GS_04	GS_05	GS_06	GS_07	GS_08	GS_09	GS_10
Perioculodes longimanus	S131	102915	(Spence Bate & Westwood, 1868)										
Apolochus neapolitanus	S159	236495	(Della Valle, 1893)										
Paramphilochoides odontonyx	S170	101982	(Boeck, 1871)										0.0001
Argissa hamatipes	S360	102064	(Norman, 1869)				0.0001			0.0001			
Ampelisca brevicornis	S427	101891	(Costa, 1853)										
Ampelisca diadema	S429	101896	(Costa, 1853)										
Ampelisca tenuicornis	S440	101930	Liljeborg, 1856										
Cheirocratus	S503	101669	Norman, 1867				0.0009				0.0018		
Aoridae (female)	S577	101368	Stebbing, 1899										0.0001
Corophium volutator	S616	102101	(Pallas, 1766)						0.0016				
Pariambus typicus	S651	101857	(Krøyer, 1845)			0.0001	0.0001						0.0006
Eudorella truncatula	S1208	110535	(Bate, 1856)		0.0001								0.0001
Pseudocuma longicorne	S1236	110627	(Bate, 1858)										
Diastylis bradyi	S1248	110472	Norman, 1879			0.0006	0.0008			0.0001			
Crangon crangon	S1385	107552	(Linnaeus, 1758)										0.2438
Carcinus maenas	S1594	107381	(Linnaeus, 1758)										
MOLLUSCA													
Rissoa parva	W334	141365	(da Costa, 1778)										
Peringia ulvae	W385	151628	(Pennant, 1777)		0.0204		0.0010						
CEPHALASPIDEA (damaged)	W1002	154	P. Fischer, 1883			0.0001				0.0001			
Nucula nitidosa	W1569	140589	Winckworth, 1930	0.0123	0.0065	0.0893	0.0021		0.0027		0.0330	0.0090	0.0008
Nucula nucleus	W1570	140590	(Linnaeus, 1758)										0.0127
Yoldia limatula	-	157005	(Say, 1831)		0.0017	0.0643				0.0175		0.0653	0.0274
Thyasira flexuosa	W1837	141662	(Montagu, 1803)			0.0092	0.0053	0.0028					
Kurtiella bidentata	W1906	345281	(Montagu, 1803)	0.0029		0.0289	0.0031		0.0001		0.0006		0.0044
Parvicardium pinnulatum	-	181343	(Conrad, 1831)				0.0063						
Parvicardium scabrum	W1952	139012	(Philippi, 1844)										
Spisula subtruncata	W1978	140302	(da Costa, 1778)				0.0274						0.0341
Fabulina fabula	W2019	146907	(Gmelin, 1791)			0.0009					0.0001		
Abra alba	W2059	141433	(W. Wood, 1802)		0.0038	0.0562		0.0196	0.0076			0.0323	
Chamelea striatula		141908	(da Costa, 1778)										1.8248
Mya arenaria	W2149	140430	Linnaeus, 1758										
Varicorbula gibba	W2157	378492	(Olivi, 1792)							0.001			
Number of taxa				**16**	**20**	**33**	**39**	**21**	**15**	**13**	**34**	**23**	**42**
Biomass				**2.1909**	**1.5424**	**3.1312**	**5.1433**	**1.6331**	**1.7204**	**1.139**	**1.8594**	**1.2103**	**3.6595**

Taxa	SDC	AphiaID	Authority	GS_01	GS_02	GS_03	GS_04	GS_05	GS_06	GS_07	GS_08	GS_09	GS_10
The following taxa were excluded from analysis													
Colonial													
ANTHOATHECATA	D140	13551	Cornelius, 1992										0.0001
Damaged													
Polynoidae	P25	939	Kinberg, 1856					0.0001					
Pholoidae	P90	941	Kinberg, 1858				0.0001						
Prionospio	P745	129620	Malmgren, 1867										
Spio	P787	129625	Fabricius, 1785										
Cirratulidae	P822	919	Ryckholt, 1851										0.0001
Sabellidae	P1257	985	Latreille, 1825				0.0001						
Tubificoides	P1487	137393	Lastočkin, 1937								0.0009		0.0012
BALANOMORPHA	-	106039	Pilsbry, 1916										
DECAPODA	S1276	1130	Latreille, 1802						3.1958		0.0059		
CARIDEA	-	106674	Dana, 1852										
GASTROPODA	W88	101	Cuvier, 1795			0.0010							
BIVALVIA	W1560	105	Linnaeus, 1758			0.0001					0.0018		0.0025
Abra	W2058	138474	Lamarck, 1818								0.0025		
Juvenile													
Malmgrenia	-	147006	McIntosh, 1874				0.0005						
Phyllodocidae	P114	931	Örsted, 1843										
Nereididae	P458	22496	Blainville, 1818										
Nephtys	P494	129370	Cuvier, 1817	0.0666	0.1020	0.1142	0.0133	0.01800	0.1100	0.0111	0.0058	0.0315	0.0879
Spio	P787	129625	Fabricius, 1785										
Cirratulidae	P822	919	Ryckholt, 1851	0.0001		0.0010		0.0001	0.0001	0.0001	0.0014	0.0001	0.0002
Chaetozone	P832	129242	Malmgren, 1867		0.0001		0.0001						
Terebellidae	P1179	982	Johnston, 1846										
BALANOMORPHA	R42	106039	Pilsbry, 1916										
Ampelisca	S423	101445	Krøyer, 1842		0.0001		0.0007						
Chrysallida	W928	138401	Carpenter, 1856										
BIVALVIA	W1560	105	Linnaeus, 1758										
Nuculidae	W1563	204	Gray, 1824		0.0001				0.0009				0.0001
Nucula	-	138262	Lamarck, 1799		0.0016					0.0172			
Yoldiidae	-	2097	Dall, 1908	0.0011	0.0017	0.0025	0.0001		0.0006	0.0057	0.0015	0.0020	0.0082
Mytilus	W1693	138228	Linnaeus, 1758	0.003	0.0136	0.0069	0.0006	0.0028	0.003		0.0002	0.0020	0.0035
Anomiidae	W1805	214	Rafinesque, 1815										
Cardiidae	W1938	229	Lamarck, 1809									0.0001	

Taxa	SDC	AphiaID	Authority	GS_01	GS_02	GS_03	GS_04	GS_05	GS_06	GS_07	GS_08	GS_09	GS_10
Cerastoderma	W1960	137735	Poli, 1795								0.0006		
Spisula	W1973	138159	Gray, 1837										
Tellinidae	W2008	235	Blainville, 1814		0.0015							0.0016	
Abra	W2058	138474	Lamarck, 1818	0.0001	0.0001		0.0001			0.0001			0.0030
Veneridae	W2086	243	Rafinesque, 1815							0.0028			
OPHIUROIDEA	ZB105	123084	Gray, 1840				0.0001						0.0001
Cucumariidae	ZB266	123187	Ludwig, 1894							0.0011			
Meiofaunal													
PLATYHELMINTHES	F1	793	Minot, 1876										0.0012
NEMATODA	HD1	799	-								0.0005		0.0007
Number of taxa				**5**	**9**	**6**	**10**	**4**	**6**	**7**	**10**	**6**	**13**
Biomass				**0.0709**	**0.1208**	**0.1257**	**0.0157**	**0.021**	**3.3104**	**0.0381**	**0.0211**	**0.0373**	**0.1088**

Taxa	SDC	AphiaID	Authority	GS_11	GS_13	GS_14	GS_15	GS_21	GS_22	GS_24	GS_25	GS_26	Total
CNIDARIA													
Virgularia mirabilis	D618	128539	(Müller, 1776)										**0.0652**
ACTINIARIA	D662	1360	Hertwig, 1882			0.0006							**0.0006**
NEMERTEA													
NEMERTEA	G1	152391	-		0.0006		0.0001						**0.0544**
ANNELIDA													
Gattyana cirrhosa	P49	130749	(Pallas, 1766)				0.0011						**0.2593**
Harmothoe (damaged)	P50	129491	Kinberg, 1856			0.0048							**0.0048**
Pholoe inornata	P92	130601	Johnston, 1839		0.0030	0.0113	0.0001		0.0001	0.0009	0.0011	0.0008	**0.0193**
Pholoe baltica	P95	130599	Örsted, 1843		0.0001							0.0001	**0.0022**
Eteone longa (agg.)	P118	130616	(Fabricius, 1780)	0.0041	0.0479	0.0386	0.0081		0.0030	0.0015		0.0805	**0.3475**
Phyllodoce mucosa	P145	334512	Örsted, 1843	0.0001	0.0212	0.0691	0.0714			0.0013	0.0123	0.0798	**0.3449**
Eumida bahusiensis	P164	130641	Bergstrom, 1914		0.0069	0.0031	0.0013					0.0009	**0.0168**
Eumida sanguinea (agg.)	P167	130644	(Örsted, 1843)				0.0001						**0.0001**
Phyllodoce laminosa	P180	130670	Savigny in Lamarck, 1818										**0.005**
Glycera alba	P256	130116	(O.F. Müller, 1776)										**0.1744**
Sphaerodoropsis baltica	P286	131089	(Reimers, 1933)										**0.0008**
Psamathe fusca	P305	152249	Johnston, 1836			0.0049							**0.0069**
Oxydromus flexuosus	P313	710680	(Delle Chiaje, 1827)		0.0103								**0.0154**
Podarkeopsis capensis	P319	130195	(Day, 1963)		0.0018							0.0021	**0.0348**
Lumbrineris nr cingulata	-	130240	Ehlers, 1897			0.0385						0.0009	**0.0395**
Prosphaerosyllis	-	195974	San Martín, 1984										**0.0001**
Alitta virens	P472	234851	(M. Sars, 1835)		0.5117								**0.5117**
Nephtys hombergii	P499	130359	Savigny in Lamarck, 1818	0.8553	0.9385		0.2774	0.6162	0.7509	0.5698	0.3813	1.5121	**12.3613**
Nephtys incisa	P501	130362	Malmgren, 1865										**0.6048**
Nephtys kersivalensis	P502	130363	McIntosh, 1908	0.009		0.1109		0.0174					**0.6265**
Nephtys pente	P505	130352	Rainer, 1984										**0.0128**
Paramphinome jeffreysii	P518	129837	(McIntosh, 1868)										**0.0105**
Ophryotrocha	P613	129266	Claparède & Mecznikow, 1869	0.0001	0.0001	0.0001	0.0001	0.0001		0.0007	0.0001	0.0001	**0.0033**
Prionospio multibranchiata	P746	131160	Berkeley, 1927										**0.0001**
Polydora cornuta	P753	131143	Bosc, 1802	0.0009	0.0137	0.0039	0.0145				0.0139	0.0010	**0.08**
Dipolydora quadrilobata	P760	131121	(Jacobi, 1883)										**0.0138**
Prionospio fallax	P765	131157	Söderström, 1920							0.0001			**0.0024**
Pseudopolydora pulchra	P774	131169	(Carazzi, 1893)										**0.0054**
Pygospio elegans	P776	131170	Claparède, 1863	0.0010									**0.001**
Spio decorata	P793	152314	Bobretzky, 1870		0.0009	0.0009	0.0010	0.0007	0.0001		0.0001	0.0001	**0.0042**

Taxa	SDC	AphiaID	Authority	GS_11	GS_13	GS_14	GS_15	GS_21	GS_22	GS_24	GS_25	GS_26	Total
Spiophanes bombyx	P794	131187	(Claparède, 1870)		0.0001								**0.0001**
Streblospio benedicti / gynobranchiata	-	-	-	0.0018	0.0036		0.0058	0.0027	0.0008	0.0029	0.0105	0.0069	**0.0698**
Cossura	P868	129251	Webster & Benedict, 1887	0.0009	0.0001	0.0001		0.0007		0.0007	0.0001	0.0018	**0.0071**
Aphelochaeta marioni	P824	129938	(Saint-Joseph, 1894)		0.0010	0.0023						0.0001	**0.0034**
Caulleriella alata	P829	129943	(Southern, 1914)			0.0008	0.0008						**0.003**
Chaetozone gibber	P833	129953	Woodham & Chambers, 1994	0.0935	0.5651	0.5284	0.2255	0.077	0.0106	0.0007	0.0846	0.5028	**5.1694**
Chaetozone setosa	P834	129955	Malmgren, 1867		0.0027	0.0042	0.0015					0.0030	**0.0151**
Cirriformia tentaculata	P839	129964	(Montagu, 1808)									0.0009	**0.0009**
Tharyx species A	-	-	-	0.0010	0.0037		0.0076	0.0007	0.0057	0.0001	0.2748		**0.2974**
Tharyx killariensis	P846	152269	(Southern, 1914)										**0.0001**
Chaetozone vivipara	-	332672	(Christie, 1984)	0.0287	0.0040	0.0048	0.0557	0.0042	0.0015			0.0035	**0.2337**
Diplocirrus (damaged)	P877	129290	Haase, 1915		0.0001	0.0001							**0.0002**
Pherusa plumosa Type A	-	130113	(Müller, 1776)			0.0022		0.0057	0.0016	0.0032			**0.0145**
Capitella	P906	129211	Blainville, 1828		0.0001	0.0006			0.0009			0.0013	**0.0029**
Mediomastus fragilis	P919	129892	Rasmussen, 1973	0.0007	0.0479	0.0192	0.0033	0.0009			0.0012	0.0544	**0.1963**
Ophelina acuminata	P1014	130500	Örsted, 1843					0.0428					**0.4262**
Scalibregma inflatum	P1027	130980	Rathke, 1843		0.0215	0.0667							**0.1823**
Galathowenia oculata	P1093	146950	(Zachs, 1923)			0.0001					0.0001		**0.0076**
Pectinariidae (damaged)	P1100	980	Quatrefages, 1866				0.0032						**0.0032**
Sabellaria spinulosa	P1117	130867	(Leuckart, 1849)			0.0291					0.0007	0.0008	**0.0306**
Melinna palmata	P1124	129808	Grube, 1870	0.0017	0.2976	0.2700	0.1334	0.0103	0.0599		0.0549	3.7911	**9.549**
Terebellides	P1174	129717	Sars, 1835		0.5536	0.0027		0.0014	0.0021	0.0021	0.0001		**3.7327**
Polycirrus	P1235	129710	Grube, 1850										**0.036**
Chone (damaged)	P1264	129525	Krøyer, 1856									0.0048	**0.0062**
Euchone limnicola	-	332800	Reish, 1959	0.0332	0.0602	0.0006	0.0031	0.0105	0.003	0.0019	0.0066	0.0584	**0.2452**
Spirobranchus lamarcki	P1340	560033	(Quatrefages, 1866)										**0.0007**
Tubificoides benedii	P1490	137571	(d'Udekem, 1855)		0.0032		0.0024					0.0024	**0.0127**
Tubificoides pseudogaster	P1498	137582	(Dahl, 1960)	0.0012								0.0007	**0.0022**
Tubificoides swirencoides	P1500	137584	Brinkhurst, 1985		0.0112	0.0015	0.001	0.0013	0.0001	0.0007	0.0017	0.0014	**0.0299**
Tubificoides galiciensis	-	137576	Martinez-Ansemil & Giani, 1987	0.0011	0.0154	0.0054	0.0153		0.0001	0.0085	0.0060	0.0340	**0.0974**
ARTHROPODA													
Balanus crenatus	R77	106215	Bruguière, 1789		1.1196	1.2089					0.9806		**3.3091**
MYODOCOPIDA	R2413	2104	Sars, 1866		0.0037							0.0001	**0.0042**
Tryphosa crenata	-	761800	(Chevreux & Fage, 1925)										**0.0012**
Perioculodes longimanus	S131	102915	(Spence Bate & Westwood, 1868)		0.0017	0.0001	0.0001						**0.0019**
Apolochus neapolitanus	S159	236495	(Della Valle, 1893)		0.0006								**0.0006**

Taxa	SDC	AphiaID	Authority	GS_11	GS_13	GS_14	GS_15	GS_21	GS_22	GS_24	GS_25	GS_26	Total
Paramphilochoides odontonyx	S170	101982	(Boeck, 1871)										**0.0001**
Argissa hamatipes	S360	102064	(Norman, 1869)							0.0001			**0.0003**
Ampelisca brevicornis	S427	101891	(Costa, 1853)		0.0075								**0.0075**
Ampelisca diadema	S429	101896	(Costa, 1853)			0.0010							**0.001**
Ampelisca tenuicornis	S440	101930	Liljeborg, 1856		0.0015	0.0019							**0.0034**
Cheirocratus	S503	101669	Norman, 1867		0.0013	0.0058							**0.0098**
Aoridae (female)	S577	101368	Stebbing, 1899		0.0011	0.0008							**0.002**
Corophium volutator	S616	102101	(Pallas, 1766)		0.0001								**0.0017**
Pariambus typicus	S651	101857	(Krøyer, 1845)		0.0001				0.0001			0.0001	**0.0011**
Eudorella truncatula	S1208	110535	(Bate, 1856)		0.0009								**0.0011**
Pseudocuma longicorne	S1236	110627	(Bate, 1858)		0.0001								**0.0001**
Diastylis bradyi	S1248	110472	Norman, 1879									0.0080	**0.0095**
Crangon crangon	S1385	107552	(Linnaeus, 1758)										**0.2438**
Carcinus maenas	S1594	107381	(Linnaeus, 1758)		0.0168	0.0071							**0.0239**
MOLLUSCA													
Rissoa parva	W334	141365	(da Costa, 1778)							0.0024			**0.0024**
Peringia ulvae	W385	151628	(Pennant, 1777)						0.0001		0.0018	0.0009	**0.0242**
CEPHALASPIDEA (damaged)	W1002	154	P. Fischer, 1883										**0.0002**
Nucula nitidosa	W1569	140589	Winckworth, 1930		0.0508		0.0150	0.0035	0.0092		0.0039	0.0141	**0.2522**
Nucula nucleus	W1570	140590	(Linnaeus, 1758)			0.0102							**0.0229**
Yoldia limatula	-	157005	(Say, 1831)	0.0049	0.0177		0.0104	0.4411		1.7971		5.6284	**8.0758**
Thyasira flexuosa	W1837	141662	(Montagu, 1803)										**0.0173**
Kurtiella bidentata	W1906	345281	(Montagu, 1803)			0.0022							**0.0422**
Parvicardium pinnulatum	-	181343	(Conrad, 1831)							0.0010			**0.0073**
Parvicardium scabrum	W1952	139012	(Philippi, 1844)									0.0085	**0.0085**
Spisula subtruncata	W1978	140302	(da Costa, 1778)	0.0001	0.0277				0.0067			0.0122	**0.1082**
Fabulina fabula	W2019	146907	(Gmelin, 1791)										**0.001**
Abra alba	W2059	141433	(W. Wood, 1802)		0.0076				0.0024			0.1168	**0.2463**
Chamelea striatula	-	141908	(da Costa, 1778)										**1.8248**
Mya arenaria	W2149	140430	Linnaeus, 1758								0.0048		**0.0048**
Varicorbula gibba	W2157	378492	(Olivi, 1792)		0.0001					0.0001		0.0010	**0.0022**
Number of taxa				**19**	**49**	**39**	**27**	**18**	**20**	**20**	**22**	**38**	**98**
Biomass				**1.0393**	**4.4067**	**2.4635**	**0.8593**	**1.2372**	**0.8589**	**2.3958**	**1.8412**	**11.9368**	**50.2682**
The following taxa were excluded from analysis													
Colonial													

Taxa	SDC	AphiaID	Authority	GS_11	GS_13	GS_14	GS_15	GS_21	GS_22	GS_24	GS_25	GS_26	Total
ANTHOATHECATA	D140	13551	Cornelius, 1992										**0.0001**
Damaged													
Polynoidae	P25	939	Kinberg, 1856			0.0001							**0.0002**
Pholoidae	P90	941	Kinberg, 1858										**0.0001**
Prionospio	P745	129620	Malmgren, 1867									0.0001	**0.0001**
Spio	P787	129625	Fabricius, 1785		0.0001								**0.0001**
Cirratulidae	P822	919	Ryckholt, 1851			0.0001							**0.0002**
Sabellidae	P1257	985	Latreille, 1825						0.0001			0.0029	**0.0031**
Tubificoides	P1487	137393	Lastočkin, 1937		0.0001	0.0016	0.0019			0.0015	0.0008	0.0032	**0.0112**
BALANOMORPHA	-	106039	Pilsbry, 1916			0.0267							**0.0267**
DECAPODA	S1276	1130	Latreille, 1802										**3.2017**
CARIDEA	-	106674	Dana, 1852								0.0099		**0.0099**
GASTROPODA	W88	101	Cuvier, 1795			0.0001							**0.0011**
BIVALVIA	W1560	105	Linnaeus, 1758			0.0441					0.0001		**0.0486**
Abra	W2058	138474	Lamarck, 1818			0.0017							**0.0042**
Juvenile													
Malmgrenia	-	147006	McIntosh, 1874										**0.0005**
Phyllodocidae	P114	931	Örsted, 1843			0.0006							**0.0006**
Nereididae	P458	22496	Blainville, 1818			0.0001							**0.0001**
Nephtys	P494	129370	Cuvier, 1817	0.0187	0.035	0.0337	0.0221	0.0313	0.0245	0.0399	0.0202	0.0493	**0.8351**
Spio	P787	129625	Fabricius, 1785			0.0001							**0.0001**
Cirratulidae	P822	919	Ryckholt, 1851	0.0001	0.0001	0.0001		0.0001		0.0001	0.0009	0.0014	**0.0059**
Chaetozone	P832	129242	Malmgren, 1867				0.0001						**0.0003**
Terebellidae	P1179	982	Johnston, 1846		0.0001	0.0001							**0.0002**
BALANOMORPHA	R42	106039	Pilsbry, 1916								0.0001		**0.0001**
Ampelisca	S423	101445	Krøyer, 1842			0.0001							**0.0009**
Chrysallida	W928	138401	Carpenter, 1856								0.0001		**0.0001**
BIVALVIA	W1560	105	Linnaeus, 1758								0.0001		**0.0001**
Nuculidae	W1563	204	Gray, 1824							0.0022			**0.0033**
Nucula	-	138262	Lamarck, 1799					0.0009		0.0268		0.0001	**0.0466**
Yoldiidae	-	2097	Dall, 1908	0.0033		0.0001	0.0070	0.0029	0.0020	0.0414	0.0048	0.0307	**0.1156**
Mytilus	W1693	138228	Linnaeus, 1758			0.0040	0.0012		0.0001	0.0095			**0.0504**
Anomiidae	W1805	214	Rafinesque, 1815			0.0011							**0.0011**
Cardiidae	W1938	229	Lamarck, 1809							0.0011	0.0010		**0.0022**
Cerastoderma	W1960	137735	Poli, 1795								0.0019		**0.0025**
Spisula	W1973	138159	Gray, 1837								0.0001		**0.0001**

Taxa	SDC	AphiaID	Authority	GS_11	GS_13	GS_14	GS_15	GS_21	GS_22	GS_24	GS_25	GS_26	Total
Tellinidae	W2008	235	Blainville, 1814		0.0001						0.0001		**0.0033**
Abra	W2058	138474	Lamarck, 1818		0.0030	0.0039	0.0010	0.0011	0.0011	0.0014		0.0022	**0.0171**
Veneridae	W2086	243	Rafinesque, 1815		0.0013	0.0112							**0.0153**
OPHIUROIDEA	ZB105	123084	Gray, 1840						0.0001	0.0012	0.0001		**0.0016**
Cucumariidae	ZB266	123187	Ludwig, 1894										**0.0011**
Meiofaunal													
PLATYHELMINTHES	F1	793	Minot, 1876			0.0019							**0.0031**
NEMATODA	HD1	799	-		0.0014	0.0001	0.0001		0.0001		0.0001	0.0001	**0.0031**
Number of taxa				**3**	**9**	**21**	**7**	**5**	**7**	**10**	**15**	**9**	**41**
Biomass				**0.0221**	**0.0412**	**0.1315**	**0.0334**	**0.0363**	**0.028**	**0.1251**	**0.0403**	**0.09**	**4.4177**

E.5 Beam Trawls

Taxon	Qualifier	SDC	AphiaID	Authority	BT01	BT02	BT03	BT04	BT05	Total
PORIFERA										
PORIFERA	-	C0001	558	Grant, 1836	P					**P**
CNIDARIA										
Hydractinia echinata	-	D0273	117644	(Fleming, 1828)	P	P	P	P	P	**P**
Alcyonium digitatum	-	D0597	125333	Linnaeus, 1758	P		P			**P**
ACTINIARIA	-	D0662	1360	Hertwig, 1882	11					**11**
Metridium	-	D0709	100770	de Blainville, 1824			1			**1**
ANNELIDA										
Alentia gelatinosa	-	P0034	130722	(M. Sars, 1835)			1			**1**
Nephtys hombergii	-	P0499	130359	Savigny in Lamarck, 1818			4			**4**
Terebellides	-	P1174	129717	Sars, 1835	2	1	1			**4**
ARTHROPODA										
Pandalina brevirostris	-	S1374	107647	(Rathke, 1843)				1		**1**
Pandalus	dam.	S1375	107044	Leach, 1814 [in Leach, 1813-1815]	1					**1**
Pandalus montagui	-	S1377	107651	Leach, 1814 [in Leach, 1813-1815]	109	37	44	10	9	**209**
Crangon	dam.	S1383	107007	Fabricius, 1798	1					**1**
Crangon allmanni	-	S1384	107551	Kinahan, 1860	1		2		1	**4**
Crangon crangon	-	S1385	107552	(Linnaeus, 1758)	88	143	50	66	24	**371**
Pagurus bernhardus	-	S1457	107232	(Linnaeus, 1758)	1	5	8	4	8	**26**
Macropodia rostrata	-	S1532	107345	(Linnaeus, 1761)	1					**1**
Liocarcinus depurator	-	S1580	107387	(Linnaeus, 1758)	23	20	39	10	2	**94**

Taxon	Qualifier	SDC	AphiaID	Authority	BT01	BT02	BT03	BT04	BT05	Total
Necora puber		S1589	107398	(Linnaeus, 1767)	11					**11**
Carcinus maenas	-	S1594	107381	(Linnaeus, 1758)	47	48	77	83	21	**276**
MOLLUSCA										
Chamelea striatula	-	W2098	141908	(da Costa, 1778)				1		**1**
BRYOZOA										
Flustra foliacea	-	Y0187	111367	(Linnaeus, 1758)	P					**P**
Securiflustra securifrons	-	Y0194	111374	(Pallas, 1766)	P					**P**
ECHINODERMATA										
Asteria rubens		ZB0102	123776	Linnaeus, 1758	2	2				**4**
Ophiothrix fragilis	-	ZB0124	125131	(Abildgaard in O.F. Müller, 1789)			1			**1**
Ophiura albida	-	ZB0168	124913	Forbes, 1839	6			1		**7**
Ophiura ophiura	-	ZB0170	124929	(Linnaeus, 1758)	3		1			**4**
CHORDATA										
Didemnidae	-	ZD0041	103439	Giard, 1872			P			**P**
Ascidiella aspersa	-	ZD0084	103718	(Müller, 1776)			28			**28**
Gadus morhua	-	ZG0116	126436	Linnaeus, 1758	1	4	4	2	1	**12**
Gaidropsarus vulgaris	-	ZG0119	126458	Cloquet, 1824	5					**5**
Merlangius merlangus	-	ZG0123	26438	Linnaeus, 1758	6	9	6	3	2	**26**
Myoxocephalus scorpius	-	ZG0281	127203	(Linnaeus, 1758)	10			5		**15**
Agonus cataphractus	-	ZG0291	127190	(Linnaeus, 1758)	1	1	1			**3**
Pomatoschistus	juv.	ZG0476	125999	Gill, 1863			3	3	1	**7**
Pomatoschistus lozanoi	-	ZG0477	126925	(de Buen, 1923)	1			2	1	**4**
Pomatoschistus minutus	-	ZG0479	126928	(Pallas, 1770)		5	9	5	5	**24**

Taxon	Qualifier	SDC	AphiaID	Authority	BT01	BT02	BT03	BT04	BT05	Total
Limanda limanda	-	ZG0572	127139	(Linnaeus, 1758)	9			1		**10**
Platichthys flesus	-	ZG0576	127141	(Linnaeus, 1758)			1			**1**
Pleuronectes platessa	-	ZG0578	127143	Linnaeus, 1758	98	110	100	47	11	**366**
Total Taxa					**28**	**13**	**23**	**17**	**13**	**39**
Total Individuals					**438**	**385**	**381**	**244**	**86**	**1534**
Total Fish					**131**	**129**	**124**	**68**	**21**	**473**
Total Commercial Fish					**114**	**123**	**111**	**53**	**14**	**415**

E.6 Scrapes

E.6.1 Algae

Taxon	AphiaID	Authority	SS_01	SS_02	SS_03	SS_04	SS_05	SS_06	SS_07	SS_08	SS_09	SS_10	SS_11	SS_12	SS_13	SS_14	SS_15	SS_16	SS_17	SS_18	SS_19	SS_20	SS_21	SS_22	SS_23	SS_24	SS_25	SS_26	SS_27	SS_28	SS_29	SS_30
CHLOROPHYTA																																
Prasiola stipitata	145800	Suhr ex Jessen, 1848		P	P	P	P	P			P	P		P		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Rosenvingiella radicans	618837	(Kützing) Rindi, L.McIvor & Guiry, 2004										P																				P
Rhizoclonium riparium	145075	(Roth) Harvey, 1849	P	P	P	P	P	P			P	P	P	P	P	P	P	P	P	P			P		P	P	P		P		P	
Gayralia oxysperma	214368	(Kützing) K.L.Vinogradova ex Scagel et al., 1989						P	P	P	P	P	P	P	P	P									P	P						
Ulothrix	144287	Kützing, 1833	P	P		P	P		P	P	P	P	P		P			P	P				P	P						P		P
Ulva intestinalis	234471	Linnaeus, 1753	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			P	P	P	P		P	P	P	P	P
Ulva prolifera	234476	O.F.Müller, 1778	P	P		P	P	P	P		P	P	P	P	P	P	P	P	P	P			P		P	P		P	P	P	P	P
Ulva lactuca	145984	Linnaeus, 1753				P	P								P					P												
Ulva linza	234474	Linnaeus, 1753					P								P																	
Blidingia	144293	Kylin, 1947	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P		P		P	P	P			P		P	P
Cladophora	143996	Kützing, 1843	P			P						P	P		P																P	
Percursaria percursa	145979	(C.Agardh) Rosenvinge, 1893										P																				
Chaetomorpha linum	145027	(O.F.Müller) Kützing, 1845	P				P			P	P				P					P												
?GOMONTIACEAE	196248	De Toni, 1889					P							P		P		P	P		P		P		P	P	P	P	P		P	
RHODOPHYTA																																
Porphyra umbilicalis	144437	Kützing, 1843			P			P		P				P	P		P		P					P							P	
Porphyra ?purpurea	144434	(Roth) C.Agardh, 1824					P													P					P							
Erythrotrichia carnea	145490	(Dillwyn) J.Agardh, 1883	P	P			P	P	P	P	P	P		P						P				P							P	P
Bangia atropurpurea	144423	(Mertens ex Roth) C.Agardh, 1824						P						P					P					P							P	P
Gaillona hookeri	1311368	(Dillwyn) Athanasiadis, 2016	P			P	P																								P	
Rhodochorton purpureum	144404	(Lightfoot) Rosenvinge, 1900	P	P		P	P	P		P	P		P	P	P	P	P	P		P					P	P		P			P	
Rhodothamniella floridula	145777	(Dillwyn) Feldmann, 1978	P											P																		
Osmundea	143921	Stackhouse, 1809															P															
Polysiphonia stricta	144672	(Mertens ex Dillwyn) Greville, 1824	P																													
PHAEOPHYCEAE																																
?Sphacelorbus nanus	624203	(Nageli ex Kützing) Draisma, Prud'homme & H.Kawai, 2010	P			P				P		P										P										
Pylaiella littoralis	157188	(Linnaeus) Kjellman, 1872	P			P	P		P		P	P	P	P	P	P				P												P
Elachista fucicola	144937	(Velley) Areschoug, 1842	P	P			P		P	P			P		P				P	P					P	P			P		P	
Fucus spiralis	145547	Linnaeus, 1753	P	P			P		P	P			P		P				P	P					P	P					P	
Number of taxa			16	10	5	12	17	10	9	11	11	13	11	13	15	9	8	7	11	13	2	3	6	7	11	10	3	5	7	4	14	9
The following taxa have been removed from the rationalised dataset:																																
Indeterminate Taxa																																
Ulva	144296	Linnaeus, 1753	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P	P	P	P		P	P	P	P	P
Juvenile Taxa																																
Fucus	144129	Linnaeus, 1753	P			P	P	P	P	P		P		P	P			P	P	P				P	P	P			P		P	

E.6.2 Fauna

Taxon	Qualifier	SDC	AphiaID	Authority	SS_01	SS_02	SS_03	SS_04	SS_05	SS_06	SS_07	SS_08	SS_09	SS_10	SS_11	SS_12	SS_13	SS_14	SS_15	SS_16	SS_17	SS_18	SS_19	SS_20
NEMATODA																								
NEMATODA		HD0001	799	-	69	4		227	20				9	90										
ANNELIDA																								
Fabriciidae	dam.	P1256	154918	Rioja, 1923	2			56						27										
Fabricia stellaris		P1282	146433	(O. F. Müller, 1774)	16			526						82			3							
Fabricia	dam.	P1282	129529	Blainville, 1828				37																
Enchytraeidae		P1501	2038	Vejdovský, 1879	8				2															
ARTHROPODA																								
ACARI		Q0053	292684	Leach, 1817		2		42	8	198	6	1	133	28	1	36	2		7	1	81	6	1	
CIRRIPEDIA	dam.	R0014	1082	Burmeister, 1834		9			53		164*	204*	204*	2	41	512*	7	176*	168*	164*	1	260*	276*	4
Austrominius modestus		R0068	712167	(Darwin, 1854)	2	13		80	43	5	416*	300*	664*	75	101	580*	4	296*	1072*	744*	7	164*	436*	3
Semibalanus balanoides		R0070	106210	(Linnaeus, 1767)	1	2		3	7		88*	44*	12*	1	3	224*	1	72*	240*	88*			100*	
Echinogammarus marinus		S0466	102261	(Leach, 1815)																				
Monocorophium insidiosum		S0612	148592	(Crawford, 1937)				6						1										
Jaera	female	S0884	118364	Leach, 1814													5							
Jaera albifrons		S0885	264171	Leach, 1814				1								1	5		1					
Ligia oceanica		S1056	146999	(Linnaeus, 1767)														2		2				
DIPTERA	dam.	T0000	118088	-																		2		
DIPTERA	pupa	T0000	118088	-			1	2			1	2		1	1		1							4
Chironomidae	larva	T0000	118100	Erichson, 1841	11	1	1	83	6	1	11	33	8	56	17	68	10	2			1			
Limoniidae	larva	T0000	150929	Rondani, 1856			4			1			2	5	13	1	40	9	21	6				
MOLLUSCA																								
GASTROPODA	dam.	W0088	101	Cuvier, 1795																			1	
Littorina	juv.	W0294	138135	Férussac, 1822														10	58	142			73	
Littorina	dam.	W0294	138135	Férussac, 1822																			12	
Littorina littorea		W0296	140262	(Linnaeus, 1758)				1				1				1			8	1				
Littorina arcana/saxatilis		W0298/0305	140259 / 140264	Hannaford-Ellis, 1978/ (Olivi, 1792)														9	120	107		1	7	1
Melarhaphe neritoides		W0309	140266	(Linnaeus, 1758)																1				
Limapontia depressa		W1136	140230	Alder & Hancock, 1862				1						9										
Mytilus	juv.	W1693	138228	Linnaeus, 1758	1																			
Mytilus edulis		W1695	140480	Linnaeus, 1758																				
Number of taxa					8	6	3	13	7	4	6	7	7	12	7	8	10	8	9	10	4	5	8	4
Abundance					110	31	6	1065	139	205	686	585	1032	377	177	1423	78	576	1695	1256	90	433	906	12

Notes
* = Barnacle abundance derived by sub-sampling. Abundance values obtained by multiplying counts from ¼ subsample by four

Appendix 4

Bird survey report

Report ID INCA 2021-22

South Bank Wharf
Non-breeding Bird Surveys
2020-2021

Mike Leakey

March 2021

Industry Nature Conservation Association

This report has been produced for Royal HaskoningDHV (on behalf of Teesworks) for the purpose of informing project development.

The report, and the data within it, belong to Teesworks and are not to be used for any other purpose nor relied upon by any third party, without their express permission.

Report prepared for and on behalf of the
Industry Nature Conservation Association by:

M Leakey

Mike Leakey
Ecologist
March 2021

Checked and approved by

Ian Bond
Ecologist
March 2021

Introduction

INCA was commissioned by Royal HaskoningDHV (RHDHV) (working on behalf of Teesworks) to investigate non-breeding waterbird usage of South Bank Wharf, the adjacent tidal River Tees and North Tees Mudflat from July 2020 to March 2021 inclusive. The central National Grid Reference for this area is NZ528222. INCA's quotation (dated 24 June 2020) specified the following elements:

i) Surveys of non-breeding birds will be undertaken on intertidal areas and adjacent habitats on both the northern and southern side of the river channel, both within the footprint of and in the vicinity of the proposed scheme. This is to include the entirety of North Tees Mudflats as far is as practically possible. To accommodate this, two surveyors will be required who will carry out counts simultaneously, one at South Bank Wharf and the second at the Dockside Road Viewpoint.

ii) At South Bank Wharf it would not be possible to survey the foreshore in front of the quay in its entirety given the height of the quay and various obstructions on it and access and safety considerations. It is instead proposed that the surveyor moves along the quay from one end to another, undertaking counts at a number of vantage points (we estimate four as a minimum). The surveyor then returns to the starting point to start the next round of counts. The key vantage points will be located at each end of the development footprint; NZ 53545 22680 in the north, and NZ 53026 22084 in the south. From each of these vantage points birds can be surveyed up to a radius of 500m (on the river itself and the intertidal habits on the north bank).

ii) Two low tide and two high tide surveys will be undertaken each month for the period August 2020 to March 2021. Single surveys at both high and low tide will take place in the second half of July. Two point-counts will be undertaken on each low tide survey within the periods -1.5 to -0.5 hours and -0.5 to +0.5 hours in relation to LW. Each high tide period will be covered by a single count, timed at -0.5 to +0.5 hours in relation to HW. Low tide counts will be undertaken during periods of Spring tides. The survey programme will cover different times of day, with a focus on the periods after dawn and before dusk.

iv) The peak count for each species recorded over the non-breeding bird season will be compared with relevant existing data (to be determined by the Contractor), including but not limited to: a) the 5 year peak mean (using the most recent data available at the time of the reporting from the Wetland Birds Survey (WeBS) core counts) for the Tees estuary; and b) the waterbird populations set out in the Teesmouth and Cleveland Coast Special Protection Area (SPA) citation (or supporting documentation to justify the recent SPA extension).

v) Any notable aggregations of birds will be recorded on a base map. Significant flight lines will also be recorded. Any high tide roost sites identified will be clearly mapped with coordinates provided and described in accompanying text.

vi) Any potential sources of disturbance will be recorded (e.g. noise, movements of people, predators).

vii). The results of the monitoring will be provided in Excel format on a monthly basis with a final data report issued within 2 weeks of the completion of the survey programme.

Survey details

A total of 34 visits were made between 14 July and 24 March. These comprised 17 visits at low water and 17 at high water, one at each tidal state in late July and two per month at each tidal state thereafter. All waterbirds were recorded, including terns but not gulls. Waterbirds recorded were ascribed to one of four sectors (shown in Figure 1). At high water birds on the water were similarly ascribed, as the boundary between North Tees Mudflat and the River Channel is clearly demarcated by various timber structures.

The boundary between Sectors 3 (North Tees Mudflat north) and 4 (North Tees Mudflat south) is marked by a line of timber trestles previously supporting an outfall pipe.

The survey viewpoints used were initially those shown in Figure 1, but after the first few surveys it was concluded that deploying a second observer at the southernmost viewpoint (Dockside Road) was superfluous, since the whole of North Tees Mudflat could be adequately covered from the principal South Bank Wharf viewpoints by a single observer. Along South Bank Wharf itself, additional checks were made throughout its length to scan for birds present on the foreshore and wharf structures.

The surveys were carried out by Mike Leakey, Ecologist with INCA, who has almost 30 years' experience of working on Teesside, most of them with Natural England and its predecessor bodies. He also fulfilled the role of Wetland Bird Survey Local Organiser for the Tees Estuary from 1993 to 2016, and regularly counted the "Tees Opposite Smiths Dock" WeBS Sector at high water during that period. Ian Bond of INCA also contributed to the 2020-2021 survey programme.

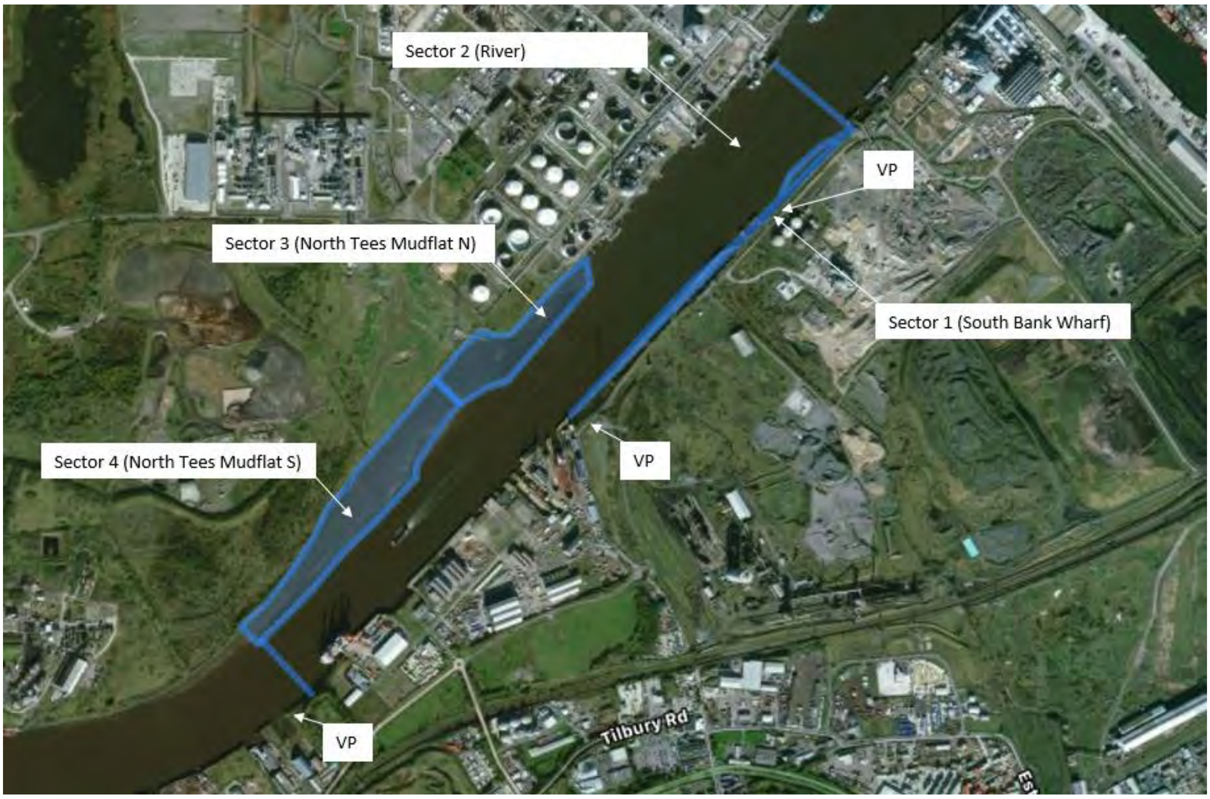


Figure 1 South Bank count sectors

The distance between the survey viewpoint and some parts of the site (in particular Sector 4) is up to 1.2km and did create some difficulties, particularly in weather conditions of poor visibility and strong winds. This could have resulted in some undercounting of smaller, less conspicuous bird species. Nevertheless, it is considered that a robust dataset was compiled over the survey period.

Weather and tidal conditions for each survey visit are tabulated in Table 1.

Table 1 Visit details

Date	Tide	Weather
14/07/20	LW @ 1738hrs BST, 1.9m	Mainly cloudy (6/8-8/8 cloud), 16°C, wind W (Force 3)
28/07/20	HW @ 1020hrs BST, 4.9m	Sunny periods (3/8 cloud), 16°C, wind WNW (Force 5)
05/08/20	LW @ 1159hrs BST, 0.8m	Mainly cloudy (6/8-8/8 cloud), 19°C, wind S (Force 4)
11/08/20	HW @ 0916hrs BST, 4.6m	Sunny (2/8 cloud), 18°C, wind NW (Force 1-2)
18/08/20	LW @ 1012hrs BST, 1.0m	Sunny periods (5/8 cloud), 17°C, wind S (Force 2)
25/08/20	HW @ 0853 BST, 5.2m	Overcast, rain (8/8 cloud), 15°C, wind SE (Force 3)
01/09/20	LW @ 1028hrs BST, 1.0m	Sunny (0/8 cloud), 15°C, wind S (Force 1)
02/09/20	HW @ 1706hrs BST, 5.2m	Overcast, rain (8/8 cloud), 14°C, wind S (Force 3-4)
15/09/20	LW @ 0904hrs BST, 1.2m	Sunny (3/8 high cloud), 13°C, wind SE (Force 1)
22/09/20	HW @ 0738hrs BST, 5.6m	Sunny (1/8 cloud), 10°C, wind S (Force 1)
01/10/20	LW @ 1036hrs BST, 0.9m	Sunny (1/8 high cloud), 10°C, wind SW (Force 1-2)
13/10/21	HW @ 1349hrs GMT, 4.7m	Overcast, rain (8/8 cloud), 10°C, wind NE (Force 4)
15/10/20	LW @ 0925hrs GMT, 0.7m	Sunny periods, showers (6/8 cloud), 10°C, wind NE (Force 2-3)
28/10/20	HW @ 1403hrs GMT, 4.9m	Overcast, light showers (8/8 cloud), 10°C, wind SW (Force 4)
03/11/20	LW @ 1057hrs GMT, 1.2m	Sunny periods (5/8 cloud), 9°C, wind SW (Force 2-3)
10/11/20	HW @ 1108hrs GMT, 4.5m	Sunny periods (6/8 cloud), 11°C, wind S (Force 2)
17/11/20	LW @ 1056hrs GMT, 0.6m	Overcast (8/8 cloud), 13°C, wind SW (Force 4)
24/11/20	HW @ 1142hrs GMT, 4.3m	Sunny periods (3/8-6/8 cloud), 11°C, wind S (Force 4-5)
01/12/20	LW @ 1003hrs GMT, 1.2m	Sunny (1/8 cloud), 5°C, wind N (Force 1-2)
10/12/20	HW @ 1138hrs GMT, 4.7m	Overcast 8/8 cloud), 5°C, wind SE (Force 1-2)
14/12/20	HW @ 1507hrs GMT, 5.5m	Sunny periods (6/8 cloud), 9°C, wind SW (Force 4)
15/12/20	LW @ 0956hrs GMT, 0.8m	Sunny (1/8 cloud), 7°C, wind SW (Force 2-3)
07/01/21	HW @ 0957hrs GMT, 4.6m	Sunny periods (6/8 cloud), -1°C, wind SW (Force 1-2)
13/01/21	LW @ 0946hrs GMT, 1.1m	Sunny (1/8 cloud), 0°C, wind SW (Force 1-2)
20/01/21	HW @ 0838hrs GMT, 4.4m	Overcast (8/8 cloud), 9°C, wind SW (Force 2-3)

Date	Tide	Weather
27/01/21	LW @ 0854hrs GMT, 1.5m	Sunny periods (7/8 cloud), 5°C, wind SW (Force 2)
04/02/21	HW @ 0823hrs GMT, 4.8m	Overcast (8/8 cloud), 4°C; wind SE (Force 2)
10/02/21	LW @ 0852hrs GMT, 1.4m	Sunny periods, snow showers (5/8-8/8 cloud), 0°C, wind E (Force 3)
16/02/21	LW @ 1231hrs GMT, 1.4m	Sunny periods (3/8 cloud), 10°C, wind SW (Force 4)
18/02/21	HW @ 0745hrs GMT, 4.5m	Sunny periods (5/8 cloud), 8°C, wind S (Force 6)
02/03/21	LW @ 1148hrs GMT, 0.8m	Overcast (8/8 cloud), 4°C, wind SE (Force 2)
09/03/21	HW @ 1250hrs GMT, 4.4m	Sunny periods (6/8 cloud), 10°C, wind SW (Force 3)
16/03/21	LW @ 1129hrs GMT, 1.1m	Sunny periods (3/8 cloud), 12°C, wind NW (Force 3)
24/03/21	HW @ 1213hrs GMT, 4.1m	Sunny periods (6/8 cloud), 10°C, wind SW (Force 4)

Survey results

Collated counts were transferred to an Excel spreadsheet provided by RHDHV and returned on a monthly basis as stipulated. Peak counts for each sector are summarised below by species, listed alphabetically as in the spreadsheet. Within the tables, the figures in parentheses give the corresponding percentage of the whole-estuary population derived from the most recently published WeBS data (the five years up to and including March 2019). A brief narrative summarises observed patterns of occurrence after each table, where relevant. In all, 23 species of waterbirds were recorded during the period.

Bar-tailed Godwit
Current Tees Estuary 5-year mean of peak annual counts: 50
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	0	0	1 (2.0%)

A single bird briefly foraged at low water on North Tees Mudflat (Sector 4) on 15 September 2020.

Common Sandpiper
Current Tees Estuary 5-year mean of peak annual counts: 6
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	1 (16.7%)	0	0	

One fed on the bank at the northern end of the South Bank Wharf frontage on 1 September 2020.

Cormorant
Current Tees Estuary 5-year mean of peak annual counts: 360
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	1 (0.3%)	16 (4.4%)	1 (0.3%)	6 (1.7%)
LW	5 (1.4%)	6 (1.7%)	8 (2.2%)	12 (3.3%)

The majority of records related to birds roosting on various timber structures (in particular that at the seaward boundary of North Tees Mudflat south (Sector 4) at NZ523217) and, at low water, on the training walls in Sectors 3 and 4. No more than six birds fed across the whole site at any one time, this peak being achieved on 16 March 2021.

Curlew
Current Tees Estuary 5-year mean of peak annual counts: 797
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	2 (0.3%)	0	3 (0.4%)	0
LW	6 (0.8%)	0	26 (3.3%)	16 (2.0%)

Curlew maintained a remarkably consistent presence on North Tees Mudflat (Sectors 3 and 4 combined) throughout the season at Low Water, with 20-30 individuals recorded at any one time, most of which were foraging widely across the intertidal habitat. Only low single figures utilised the South Bank Wharf foreshore (Sector 1), with maxima of two roosting at high water and six feeding at low water.

Dunlin
Current Tees Estuary 5-year mean of peak annual counts: 1056
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	0	9 (0.9%)	9 (0.9%)

The only records involved nine birds feeding on North Tees Mudflat (Sectors 3 and 4) on 13 January 2021, and four there on 10 February 2021.

Eider
Current Tees Estuary 5-year mean of peak annual counts: 86
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	1 (1.2%)	0	0

One roosted on the river (Sector 2) at high water on 9 March 2021.

Gadwall
Current Tees Estuary 5-year mean of peak annual counts: 695
SPA Citation: Assemblage species (>1% of GB population)

	Sector 1	Sector 2	Sector 3	Sector 4
HW	2 (0.3%)	2 (0.3%)	2 (0.3%)	21 (3.0%)
LW	2 (0.3%)	8 (1.2%)	34 (4.9%)	18 (2.6%)

Only present during the first six weeks of 2020, the high water maximum across the site at any one time was 23 (all roosting) on 7 January 2021 and the corresponding low water maximum was 42 (13 feeding, 29 roosting) on 27 January 2021. Almost all birds utilised North Tees Mudflat, which appears to be favoured during periods of colder weather.

Great Crested Grebe
Current Tees Estuary 5-year mean of peak annual counts: 33
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	2 (6.1%)	0	0
LW	0	0	0	0

Two were feeding on the river (Sector 2) on 9 March 2021.

Grey Heron
Current Tees Estuary 5-year mean of peak annual counts: 45
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	2 (4.4%)	0	10 (22.2%)	5 (11.1%)
LW	2 (4.4%)	0	3 (6.7%)	3 (6.7%)

Maximum counts were made at high water, with most birds roosting on the sheltered banks of Sector 3 (peak of 10 on 25 August 2020), especially in periods of northerly or westerly winds. The generally favoured roosting location is NZ526223.

Grey Plover
Current Tees Estuary 5-year mean of peak annual counts: 163
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	0	1 (0.6%)	0

A single bird fed on North Tees Mudflat (Sector 3) on 15 December 2020.

Guillemot
Current Tees Estuary 5-year mean of peak annual counts: n/a
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	1	0	0

One fed on the river (Sector 2) at high water on 7 January 2021.

Lapwing
Current Tees Estuary 5-year mean of peak annual counts: 3669
SPA Citation: 3892 (>2000 individuals within the waterbird assemblage)

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	0	3 (0.1%)	99 (2.7%)

Frequently recorded at low water between 18 August 2020 and 10 February 2021. Most birds were observed roosting on the mudflats in Sector 4; typically, 20-50 individuals. The only counts to exceed this level were 99 on 1 December 2020 and 74 on 15 December 2020. No birds were present at high water.

Little Egret
Current Tees Estuary 5-year mean of peak annual counts: 61
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	0	1 (1.6%)	1 (1.6%)

Single foraging individuals were noted on 14 July 2020, 18 August 2020 and 1 September 2020, all at low water (and all on North Tees Mudflat (Sectors 3 and 4)).

Mallard
Current Tees Estuary 5-year mean of peak annual counts: 354
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	2 (0.6%)	0
LW	3 (0.8%)	0	3 (0.8%)	0

The peak count across the site was made at low water on 2 March 2021 when three roosted on the wharf in Sector 1 and three fed in Sector 3.

Oystercatcher
Current Tees Estuary 5-year mean of peak annual counts: 1161
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	3 (0.3%)	0	4 (0.3%)	2 (0.2%)
LW	3 (0.3%)	0	5 (0.4%)	4 (0.3%)

Single figures were recorded on most visits, the highest aggregate counts across the site at any one time being nine on 14 July 2020 and ten on 16 March 2021 (both at low water).

Red-Breasted Merganser
Current Tees Estuary 5-year mean of peak annual counts: 51
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	2 (3.9%)	3 (5.9%)	0

All records came at low water, with aggregate totals across the site as follows: three on 13 January 2021, one on 27 January 2021 and three on 10 February 2021.

Redshank
Current Tees Estuary 5-year mean of peak annual counts: 841
SPA Citation: 1648

	Sector 1	Sector 2	Sector 3	Sector 4
HW	7 (0.8%)	0	26 (3.1%)	6 (0.7%)
LW	4 (0.5%)	0	35 (4.2%)	68 (8.1%)

The species maintained a consistent presence across the site from August 2020 through to March 2021, with the great majority of birds observed feeding at low water on North Tees Mudflat, where they were widely distributed across the intertidal habitat. Here, peak monthly aggregate totals for Sectors 3 and 4 comprised 72 on 8 August 2020, 82 on 1 September 2020, 86 on 1 October 2020, 94 on 3 November 2020, 90 on 1 December 2020, 63 on 27 January 2021, 71 on 10 February 2021 and 88 on 2 March 2021. The November peak represents 11% of the current Tees Estuary WeBS 5-year mean and 5.7% of the SPA citation population. Low water usage of Sector 1 was far lower and much more erratic, the maximum being four feeding on 1 December 2020. At high water, double-figure roost counts were obtained in Sector 3 on five dates, maxima being 26 on 10 November 2020 and 24 on 9 March 2021; the favoured roost sites were NZ528224 and NZ526223. A few individuals regularly roosted at various locations on the bank in Sector 1, with a peak of seven on 28 October 2020.

Red-throated Diver
Current Tees Estuary 5-year mean of peak annual counts: 9
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	1 (11.1%)	0	0

One was feeding on the river (Sector 2) on 24 November 2020.

Ringed Plover
Current Tees Estuary 5-year mean of peak annual counts: 255
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	0	0	1 (0.4%)

The only record involved one feeding on 10 February 2021 at Sector 4 (North Tees Mudflat south).

Shag
Current Tees Estuary 5-year mean of peak annual counts: 14
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	0	1 (7.1%)	0	0

One was feeding on the river (Sector 2) on 16 February 2021.

Shelduck
Current Tees Estuary 5-year mean of peak annual counts: 458
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	8 (1.7%)	2 (0.4%)	13 (2.8%)	19 (4.1%)
LW	3 (0.7%)	11 (2.4%)	14 (3.1%)	51 (11.1%)

The sole record up until the turn of the year involved three feeding in Sector 4 (North Tees Mudflat south) on 15 September 2020. However, the early months of 2021 saw a major increase in numbers foraging across North Tees Mudflat at low water (Sectors 3 and 4 combined) with monthly maxima of 61 on 27 January 2021, 53 on 10 February 2021 and 29 on both 2 March 2021 and 16 March 2021. Across the site as a whole, roosting numbers at high water were rather lower, with aggregate peaks of birds present at any one time being 23 on 7 January 2021, eight on 4 February 2021 and 32 on 9 March 2021. No specific locations were favoured by roosting birds on North Tees Mudflat, with most on tidal waters during the high water period. In Sector 1, three roosted on the wharf on 2 March 2021, eight on 9 March 2021 and one on 16 March 2021.

Turnstone
Current Tees Estuary 5-year mean of peak annual counts: 165
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	2 (1.2%)	0	3 (1.8%)	0
LW	1 (0.6%)	0	9 (5.5%)	12 (7.3%)

On North Tees Mudflat (Sectors 3 and 4 combined) usage was greatest by feeding birds at low water in early autumn, with maxima of 12 on 18 August 2020, seven on 1 September 2020 and ten on 15 September 2020; thereafter only one or two were noted on two dates. Up to two were present in Sector 1 on three dates in November 2020 and February 2021.

Whimbrel
Current Tees Estuary 5-year mean of peak annual counts: 20
SPA Citation: n/a

	Sector 1	Sector 2	Sector 3	Sector 4
HW	0	0	0	0
LW	1 (5%)	0	0	0

One was feeding on the bank in Sector 2 at low water on 5 August 2020.

Other Observations

Feeding distribution

At low water, birds were generally well distributed across the intertidal habitats of North Tees Mudflat (Sectors 3 and 4). Usage of the South Bank frontage showed little clear pattern, and the impact of the old wharf structure in impeding sightlines may play a role in inhibiting foraging in what little available habitat exists between the toe of the bank and the low water mark.

Roost locations

Significant roost locations referred to in the textual species accounts are shown on Figure 2.

Figure 2 Roost locations

Flight lines

No regular movements of birds were noted, beyond occasional movements of small numbers of Cormorants (one to three) up and down the river channel.

Disturbance

Very few incidents of potential disturbance were recorded over the season. At low water on 18 August 2020, a bait collector was active on North Tees Mudflat at the northern end of Sector 4 (NZ524219). On 24 November 2020, heavy plant was being used to excavate a bund in the northern portion of Sector 1 at High Water (NZ536228). An excavator was working close to the bank towards the southern end of the wharf in Sector 1 at low water on 27 January 2021. None of these activities caused obvious disturbance to birds. Occasional passage of vessels along the shipping channel elicited no response from birds on North Tees Mudflat (Sector 3 and 4) beyond very minor reactions to ship-wash at the tidal margins. No predators were noted, and there was virtually no human presence either on the foreshore or the immediate hinterland.