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7 MARINE SEDIMENT AND WATER QUALITY

7.1 Introduction

This section presents the baseline conditions with regard to sediment and water quality of the Tees estuary and describes the predicted effects of the construction and operational phases of the proposed scheme on water quality. The section incorporates work undertaken to assess the potential effects on hydrodynamic and sedimentary regime (see **Section 6**) as well as recent survey data collected to inform other project EIAs within the estuary, the latest being from a survey undertaken in 2019 to inform the NGCT EIA.

The findings of this assessment have the potential to influence other technical sections within this EIA, namely:

- **Section 9** Marine ecology;
- **Section 13** Fish and fisheries; and
- **Section 28** WFD compliance assessment.

7.2 Policy and consultation

7.2.1 Policy

National Policy Statement for Ports

The assessment of potential impacts on marine sediment and water quality has been made with reference to the policy guidance for this topic area contained within the NPS for Ports. **Table 7.1** summarises the requirements of the NPS which are of relevance to this section of the EIA Report.

Table 7.1 Summary of NPS requirements with regard to marine sediment and water quality

NPS for Ports requirement	NPS reference	EIA Report reference
Infrastructure development can have adverse effects on the water environment, including groundwater, inland surface water, transitional waters and coastal waters. During the construction, operation and decommissioning phases, it can lead to increased demand for water, involve discharges to water and cause adverse ecological effects resulting from physical modifications to the water environment.	Section 5.6, Paragraph 5.6.1	Refer to **Section 7.5** and **7.6** where potential impacts are assessment and mitigation measures outlined where required. The WFD compliance assessment is presented in **Section 28**.
There may be increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse impacts on health or on protected species and habitats and could, in particular, result in surface waters, groundwaters or protected areas failing to meet environmental objectives established under the Water Framework Directive.	Section 5.6, Paragraph 5.6.2	Method statements and risk assessments would be developed prior to works commencing. These would be supplemented with a CEMP where measures to minimise reductions in water quality due to accidental spills would be detailed. See **Section 3** for further detail.
Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of, the proposed project on water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent.	Section 5.6, Paragraph 5.6.3	Refer to **Section 7.5** and **7.6** where potential impacts are assessed, and mitigation measures outlined where required.

7.2.2 Consultation

As noted in **Section 5**, scoping consultation has been undertaken with both the MMO and RCBC during August and September 2020 (see **Appendix 3**). The consultation with both parties was informed through the formal scoping process undertaken for the same site in 2019. The comments of relevance to this section of the EIA Report are contained within **Table 7.2**.

Table 7.2 Summary of scoping consultation responses with regard to marine sediment and water quality

Comment	Response / section of report where comment addressed
Scoping Opinion from RCBC (September 2020)	
The Environment Agency recommended following the *Clearing the Waters for All* guidance before ruling out a quantitative assessment of water quality.	A quantitative water quality assessment has been undertaken and the results are presented in **Section 7.5**.
The applicant must ensure no deterioration in water quality as a result of the development in terms of WFD.	Refer to **Section 28** where the findings of the WFD compliance assessment are presented.
The applicant needs to ensure they can demonstrate no adverse impacts will be observed (to water quality), and mitigation may be required such as water quality monitoring.	Refer to **Section 7.5** and **7.6** where potential impacts are assessment and mitigation measures outlined where required.
Method statements need to ensure that consideration is given to the sensitivities during the build process; this should include surface run-off management during construction and following completion of construction to ensure no impact to water quality.	Method statements and risk assessments would be developed prior to works commencing. These would be supplemented with a CEMP where measures to minimise reductions in water quality due to surface water runoff would be detailed.
Mitigation measures with regard to dredging may be required to manage potential impacts to migratory fish due to potential water quality reductions. Such measures would entail limiting dredging to certain times of the year and/or providing suitable monitoring and mitigation including stop / start thresholds for parameters such as suspended sediment and dissolved oxygen.	Refer to **Section 7.5** and **7.6** where potential impacts are assessment and mitigation measures outlined where required.
Scoping Opinion from MMO (received in August 2019)	
The MMO would expect water quality to be scoped into the EIA.	Noted. This section of the report addresses this comment.
Dredging has the potential to cause negative impacts on the water environment. It can alter flow regimes, release contaminants within the sediment and create smothering effects / turbidity / sediment plumes.	Refer **to Section 7.5** and **7.6** where effects of the proposed dredge on water and sediment quality are assessed. The assessment has been informed by the findings of hydrodynamic and sedimentary plume modelling. Impacts to marine ecology associated with the proposed dredge are detailed in **Section 9**
The applicant should consider the (dredging) methodology to be used, the disposal of dredged material and the timing of works.	The proposed dredging plant has been selected based on the anticipated sediment types to be encountered during the dredge, as well as the plant which has been used for previous capital dredging projects elsewhere in the Tees. The proposed plant to be used, disposal of dredged material and timing of works is set out in **Section 3** of this report.

Comment	Response / section of report where comment addressed
The disposal site must be specified, ensuring that it has taken capital dredged material previously and it can accept the total proposed amount of dredged material.	As detailed in **Section 3**, the dredged material is proposed to be deposited in the Tees Bay C offshore disposal site. This site has previously been used to dispose of capital dredged sediment. Impacts associated with offshore disposal are detailed in **Section 26**.
As part of the application, the applicant will need to provide sediment sample analysis results to ensure that the material is suitable for offshore disposal.	Refer to **Section 7.4** where this matter is discussed further.
Due to the quantity of material proposed to be dredged, it is advised that the plan for beneficial use / disposal should be clearly defined within the application.	Refer to **Section 3** where the proposals for disposal of dredged material are presented.

7.3 Methodology

7.3.1 Study area

For marine sediment and water quality, the study area comprises the likely maximum extent over which potentially significant environmental impacts of the proposed scheme may occur. This is informed by hydrodynamic and sediment dispersion modelling and is based on the maximum extent over which effects are predicted to occur (e.g. sediment plumes generated during capital dredging and effects on tidal currents during operation) (see **Figure 6.1**).

7.3.2 Methodology used to describe the existing environment

The description of the existing environment with regard to sediment quality has been informed through desk-based review of existing sediment quality data. The most recent publicly available sediment quality data to the proposed scheme footprint has been sourced from the MMO's Public Register.

Information on water quality has been collected through desk-based review and information from the Environment Agency's Catchment Data Explorer and the Northumbria River Basin Management Plan (RBMP) (Environment Agency, 2019). Although water quality information from the Catchment Data Explorer and the RBMP is routinely used to inform the WFD compliance assessment (**Section 28**), the data that was used to classify chemical status within and adjacent to the proposed scheme footprint is of relevance to this section of the EIA Report.

7.3.2.1 Sediment data

The assessment of potential impacts associated with disturbance of sediment during the construction phase has been undertaken in accordance with recognised guidelines and Action Levels, namely:

- Cefas Guideline Action Levels for the disposal of dredged material (Cefas, 2000); and,
- Canadian Sediment Quality Guidelines (CSQG) for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment (CCME), 2002).

The Action Levels are used as part of a 'weight of evidence' approach to assessing the suitability of dredged material for disposal at sea but are not themselves statutory standards. Selected Action Levels are set out in **Table 7.3**.

Table 7.3 Selected Cefas Action Levels

Contaminant	Action Level 1 (mg/kg)	Action Level 2 (mg/kg)
Arsenic	20	100
Cadmium	0.4	5
Chromium	40	400
Copper	40	400
Nickel	20	200
Mercury	0.3	3
Lead	50	500
Zinc	130	800
Organotins (TBT, DBT)	0.1	1
Polychlorinated biphenyl (PCBs) (sum of ICES 7)	0.01	None
PCBs (sum of 25 congeners)	0.02	0.2
Polyaromatic Hydrocarbons (PAHs)	0.1	None
Dichlorodiphenyltrichloroethane (DDT)	0.001	None
Dieldrin	0.005	None

The MMO (using the Cefas Action levels) states that, in general, contaminant levels below Action Level 1 are not considered to be of concern. Material with persistent contaminant levels above Action Level 2 is generally considered to pose an unacceptable risk to the marine environment (and therefore material is unlikely to be considered suitable for disposal to sea). For material with persistent contaminant levels between Action Levels 1 and 2, further consideration of additional evidence is often required before the risk can be quantified. Therefore, for EIA, in the same way, if contaminant levels in the sediments under consideration persistently exceed Action Levels, additional assessment is required. This might be the application of additional sediment quality guidelines (as outlined below) or undertaking more detailed water quality assessment against Environmental Quality Standards (EQS).

The CSQG involved the derivation of interim marine sediment quality guidelines (ISQGs), or Threshold Effect Levels (TEL) and Probable Effect Levels (PEL). Selected Canadian guidelines are presented in **Table 7.4** and comprise two assessment levels. The lower level is referred to as the TEL and represents the concentration below which adverse biological effects are expected to occur only rarely (in some sensitive species for example). The higher level, the PEL, defines a concentration above which adverse effects may be expected in a wider range of organisms.

These levels were derived from an extensive database containing direct measurements of toxicity of contaminated sediments to a range of aquatic organisms exposed in laboratory tests and under field conditions (CCME, 2002). As a result, these guidelines provide an indication of likely toxicity of sediments to aquatic organisms. However, these guidelines should be used with caution as they were designed specifically for Canada and are based on the protection of pristine environments. In the absence of suitable alternatives, however, it has become commonplace for these guidelines to be used by regulatory and statutory bodies in the UK, and elsewhere, as part of a 'weight of evidence' approach.

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Table 7.4 Selected CSQG values (taken from CCME, 2002)

Contaminant	Units	TEL	PEL
Arsenic	mg/kg	7.24	41.6
Cadmium	mg/kg	0.7	4.2
Chromium	mg/kg	52.3	160
Copper	mg/kg	18.7	108
Mercury	mg/kg	0.13	0.7
Lead	mg/kg	30.2	112
Zinc	mg/kg	124	247
Acenaphthene	µg/kg	6.71	88.9
Acenaphthylene	µg/kg	5.87	128
Anthracene	µg/kg	46.9	245
Benz(a)anthracene	µg/kg	74.8	693
Benzo(a)pyrene	µg/kg	88.8	763
Chrysene	µg/kg	108	846
Dibenz(a,h)anthracene	µg/kg	6.22	135
Fluoranthene	µg/kg	113	1,494
Fluorene	µg/kg	21.2	144
Napthalene	µg/kg	34.6	391
Phenanthrene	µg/kg	86.7	544
Pyrene	µg/kg	153	1,398

7.3.2.2 Water quality

If additional assessment is indicated to be required as a result of recording elevated sediment concentrations above the lower Cefas Action Level 1, the undertaking of simple calculations using estimates of sediment losses from dredging equipment and concentrations of contaminants within the sediments to be dredged can be used to provide an indication of the amount of contamination that could be released into the water body. The volume of water into which the contamination is released can then be used to calculate the potential dilution and indicate potential water concentrations. These are then compared to EQSs as shown in **Table 7.5**.

Table 7.5 Selected Environmental Quality Standards

Contaminant	AA (Annual Average) (µg/l)	MAC (Maximum Allowable Concentration) (µg/l)
Arsenic	25	-
Cadmium	0.2	-
Chromium	0.6	32
Copper	2.15	3.76
Mercury	-	0.07
Lead	1.3	14
Zinc	7.9	-

Contaminant	AA (Annual Average) (µg/l)	MAC (Maximum Allowable Concentration) (µg/l)
Fluoranthene	-	0.120
Benzo[k]fluoranthene	-	0.017
Benzo[ghi]perylene	-	0.00082
Benzo(b) fluoranthene	-	0.017
Benzo(a)pyrene	-	0.027
Tributyl Tin (TBT)	-	0.0015

7.3.3 Methodology for assessment of potential impacts

The methodology used to assess the significance of the potential environmental impacts on marine sediment and water quality is as described in **Section 5**. Water quality in the Tees estuary is considered to be of medium sensitivity due to the failing of chemical status under the WFD and therefore potential for limited capacity to accommodate physical or chemical changes or influences. Parts of the estuary are also designated as a SPA and Ramsar site and bathing waters are located at the estuary mouth. The potential impacts associated with the proposed offshore disposal of dredged material are considered in **Section 26**, whilst potential effects on the SPA and Ramsar site are detailed in **Section 29**.

7.4 Existing environment

As noted above, baseline information has been sourced from publicly available information. The most applicable information to this EIA is outlined below.

7.4.1 Sediment quality

Results of the sediment quality data from the NGCT marine licence application

PDT carried out a sediment quality survey in July 2019 to inform the marine licence application for the NGCT application. The footprint of the proposed NGCT scheme is located approximately 1km downstream of the proposed new quay at South Bank. There is however a degree of overlap between the dredge footprint for the two schemes, specifically at the Tees Dock turning circle. Results from the NGCT sediment quality survey are detailed below. The NGCT sediment quality sampling positions in relation to the proposed scheme footprint are shown in **Figure 7.1**. The results from the survey are summarised in **Table 7.6** and discussed below.

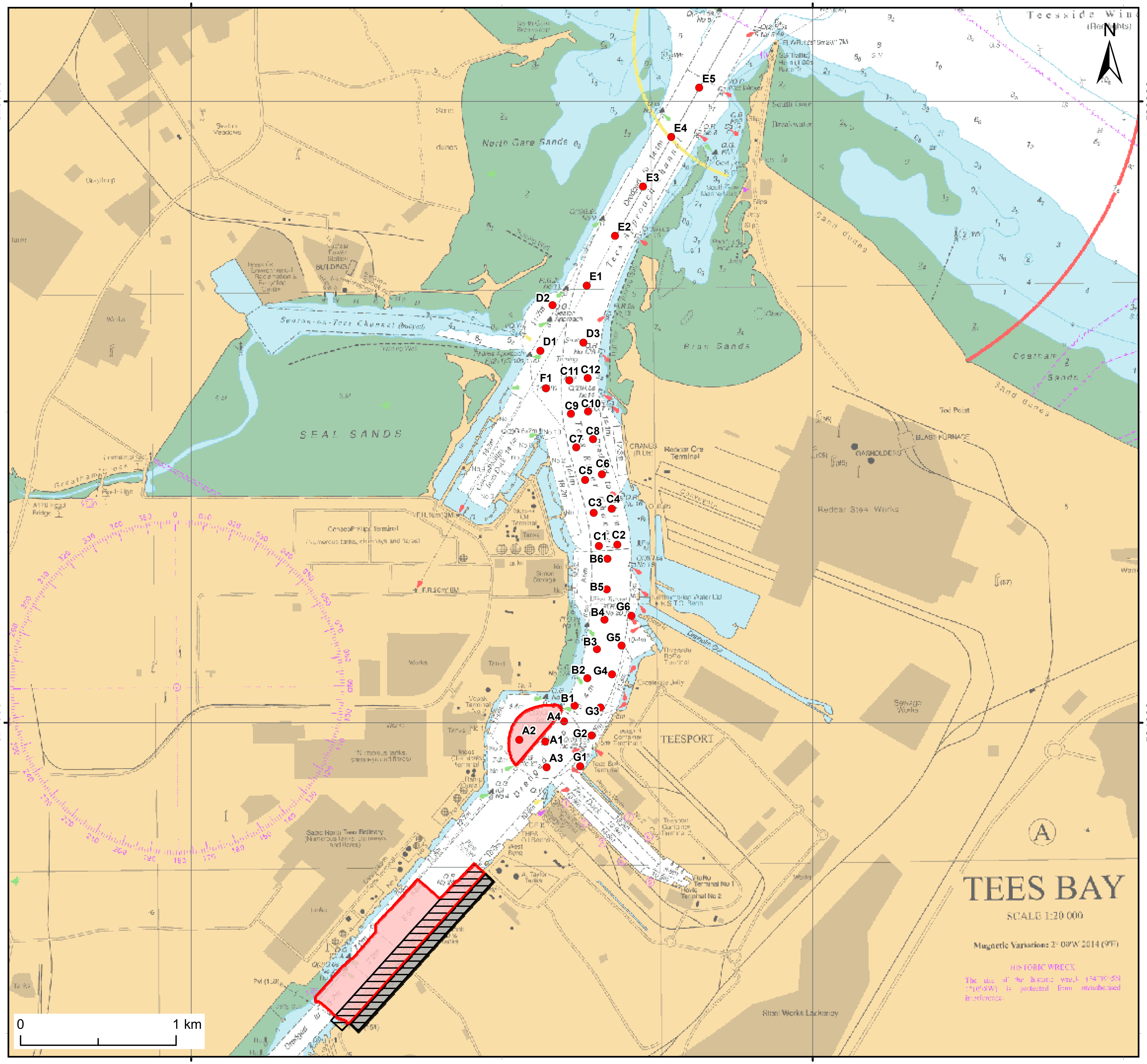
Metals

Concentrations of metals in the vast majority of samples were elevated above Action Level 1 (30 of the 36 samples contained at least one metal above Action Level 1). The exceedances above Action Level 1 were marginal only. There were no exceedances of Action Level 2.

With regard to the CSQG values, the vast majority of samples contained arsenic, copper, mercury, lead and zinc in concentrations above the TEL. Two metals exceeded the PEL – lead and zinc.

Organotins

Concentrations of organotins in all samples were below Action Level 1. In the vast majority of cases, concentrations were less than the laboratory detection limit. There is no TEL or PEL for organotins and therefore screening of the results against the CSQG was not possible.



Legend

- Proposed Dredge and Excavation Envelope (including side slopes)
- Proposed Quay Envelope
- Proposed Demolition Area
- 2019 sediment sampling locations for NGCT

Client:	Project:
Tees Valley Combined Authority	South Bank Quay

Title: NGCT Sediment sampling locations (2019)

Figure: 7.1

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	27/10/2020	TC	CP	A3	1:25,000

Co-ordinate system: British National Grid

Royal HaskoningDHV
Enhancing Society Together
ROYAL HASKONINGDHV
Marlborough House
Marlborough Crescent
Newcastle-upon-Tyne, NE1 4EE
+44 (0)191 211 1300
www.royalhaskoningdhv.com

Table 7.6 Summary of sediment quality data from the NGCT sediment quality survey (2019)

Contaminant	Min conc. (mg/kg) (dry weight)	Max conc. (mg/kg) (dry weight	Average (mg/kg) (dry weight)	Action Level 1 exceedance (number of samples)	Action Level 2 exceedance (number of samples)	TEL exceedance (number of samples)	PEL exceedance (number of samples)
Arsenic	6.9	33.3	24.89	Yes (30)	No (0)	Yes (35)	No (0)
Cadmium	0.04	0.59	0.25	Yes (4)	No (0)	No (0)	No (0)
Chromium	5.4	52.2	33.0	Yes (12)	No (0)	No (0)	No (0)
Copper	7.8	74.3	36.9	Yes (12)	No (0)	Yes (31)	No (0)
Mercury	0.05	0.6	0.33	Yes (22)	No (0)	Yes (32)	No (0)
Nickel	5.2	35.6	24.7	Yes (27)	No (0)	No (0)	No (0)
Lead	13.2	135	80.7	Yes (30)	No (0)	Yes (33)	Yes (6)
Zinc	35.2	254	144.69	Yes (23)	No (0)	Yes (25)	Yes (2)
DBT	<0.005	0.020	0.006	No (0)	No (0)	-	-
TBT	<0.005	0.014	0.005	No (0)	No (0)	-	-
Acenaphthene	0.04	0.88	0.21	Yes (33)	-	Yes (36)	Yes (33)
Acenaphthylene	0.02	3.78	0.26	Yes (24)	-	Yes (36)	Yes (19)
Anthracene	0.05	1.20	0.29	Yes (33)	-	Yes (36)	Yes (36)
Benzo(a)anthracene	0.07	1.15	0.52	Yes (34)	-	Yes (36)	Yes (5)
Benzo(a)pyrene	0.06	1.10	0.49	Yes (34)	-	Yes (34)	Yes (4)
Benzo(b)fluoranthene	0.04	0.96	0.48	Yes (34)	-	-	-
Benzo(e)pyrene	0.09	0.85	0.49	Yes (34)	-	-	-
Benzo(ghi)perylene	0.08	0.81	0.47	Yes (34)	-	-	-
Benzo(k)fluoranthene	0.02	0.52	0.22	Yes (32)	-	-	-
C1 Naphthalene	2.14	7.83	4.11	Yes (36)	-	-	-
C1 Phenanthrene	0.65	4.55	1.71	Yes (36)	-	-	-
C2 Naphthalene	1.42	5.46	2.96	Yes (36)	-	-	-

Contaminant	Min conc. (mg/kg) (dry weight)	Max conc. (mg/kg) (dry weight	Average (mg/kg) (dry weight)	Action Level 1 exceedance (number of samples)	Action Level 2 exceedance (number of samples)	TEL exceedance (number of samples)	PEL exceedance (number of samples)
C3 Naphthalene	1.05	3.35	2.37	Yes (36)	-	-	-
Chrysene	0.10	1.05	0.55	Yes (36)	-	Yes (34)	Yes (3)
Dibenzo(ah)anthracene	0.01	0.16	0.09	Yes (14)	-	Yes (36)	Yes (5)
Fluoranthene	0.10	2.20	0.96	Yes (36)	-	Yes (35)	Yes (4)
Fluorene	0.10	3.00	0.42	Yes (36)	-	Yes (36)	Yes (33)
Indeno(1,2,3-c,d)pyrene	0.02	0.65	0.33	Yes (33)	-	-	-
Naphthalene	0.70	1.94	1.40	Yes (36)	-	Yes (36)	Yes (36)
Perylene	0.006	0.23	0.10	Yes (15)	-	-	-
Phenanthrene	0.54	5.83	1.62	Yes (36)	-	Yes (36)	Yes (36)
Pyrene	0.13	2.54	0.95	Yes (36)	-	Yes (34)	Yes (4)
PCB – sum of ICES7	0.001	0.019	0.004	Yes (1)	-	-	-
PCB – sum of ICES25	0.003	0.03	0.011	Yes (1)	No	-	-
Alpha-hexachlorocyclohexane	<0.0001	0.00028	0.00011	-	-	-	-
Beta-hexachlorocyclohexane	<0.0001	0.00014	0.00010	-	-	-	-
Gamma-hexachlorocyclohexane	<0.0001	0.00134	0.00015	-	-	-	-
Dieldrin	<0.0001	0.00059	0.00025	No (0)	-	-	-
Hexachlorobenzene	0.00018	0.00868	0.00147	-	-	-	-
1,1,-dichloro-2,2-bis(p-chlorophenyl) ethane (PPTDE)	0.00012	0.00204	0.00100	-	-	-	-
1,1,-dichloro-2,2-bis(p-chlorophenyl) ethylene (PPDDE)	0.00020	0.00106	0.00062	-	-	-	-
Dichlorodiphenyltrichloroethane (PPDDT)	<0.0001	0.00389	0.00039	Yes (2)	-	-	-

Contaminant	Min conc. (mg/kg) (dry weight)	Max conc. (mg/kg) (dry weight	Average (mg/kg) (dry weight)	Action Level 1 exceedance (number of samples)	Action Level 2 exceedance (number of samples)	TEL exceedance (number of samples)	PEL exceedance (number of samples)
Polybrominated diphenyl ethers BDE17	<0.00002	0.000926	0.0003	-	-	-	-
BDE28	<0.00002	0.000701	0.0002	-	-	-	-
BDE47	0.000104	0.00417	0.0018	-	-	-	-
BDE66	<0.00002	0.000707	0.0002	-	-	-	-
BDE85	<0.00002	0.000278	0.0001	-	-	-	-
BDE99	0.0000988	0.00493	0.0022	-	-	-	-
BDE100	0.0000202	0.000598	0.0003	-	-	-	-
BDE138	<0.00002	<0.00002	0.00002	-	-	-	-
BDE153	<0.00002	0.000968	0.0004	-	-	-	-
BDE154	<0.00002	0.000466	0.0002	-	-	-	-
BDE183	<0.00002	0.000841	0.0003	-	-	-	-
BDE209	0.00381	0.407	0.107	-	-	-	-

Polyaromatic Hydrocarbons (PAH)
Virtually all samples recovered contained nearly all PAH compounds analysed for in concentrations above Action Level 1 (and the TEL and PEL where available). There is no Action Level 2 for PAH compounds.

The concentrations ranged from marginal exceedances above Action Level 1 with regard to the majority of PAH compounds, however, concentrations of napthalenes were present in one location (in the NGCT berth pocket approximately 1.5km downstream of the South Bank scheme footprint) up to seven times greater than Action Level 1 (however were generally two or three times the Action Level 1 value).

Concentrations of C1 Naphthalene, C2 Naphthalene and C3 Naphthalene were present above Action Level 1 in all 36 samples, whilst C1 Phenanthrene, Naphthalene and Phenanthrene were elevated above Action Level 1 in 33 samples. Concentrations of THC were also relatively high, peaking at 975mg/kg.

It should be noted that concentrations of PAH compounds within the Tees estuary have historically been elevated, and based on the results of sampling undertaken in 2006 (to support the NGCT Harbour Revision Order application), there does not appear to have been a significant change in the concentrations of these contaminants throughout the estuary over time.

Polychlorinated biphenyls (PCB)
One of the 36 samples analysed contained PCBs (sum of ICES7 and sum of 25 congeners) in concentrations marginally greater than Action Level 1. This sample was recovered from the proposed NGCT berth pocket, approximately 1.5km downstream of the proposed South Bank scheme footprint (see **Figure 7.1**). There were no exceedances of Action Level 2. There is no TEL or PEL for PCBs and therefore screening of the results against the CSQG was not possible.

Organochlorines
The concentration of organochlorines present was generally less than the laboratory detection limit of 0.0001mg/kg. Dieldrin was not located in any sample above Action Level 1, whilst Dichlorodiphenyltrichloroethane (DDT) was marginally elevated in two of the 36 samples analysed. There is no Action Level 2 for OCPs or CSQG values.

Polybrominated diphenyl ethers (PDBE)
The concentrations of PDBEs ranged from <0.02µg/kg to 4.93µg/kg (excluding BDE209). The concentrations of BDE209 ranged from 3.81µg/kg to 407µg/kg.

Cefas has previously advised (within SAM/2018/00069) that the distribution and concentrations of PBDE congeners in the marine environment are highly variable, and whilst named as a Chemical for Priority Action, there are no formal OSPAR assessment values developed with which to assess status. The significance of the concentrations reported above has therefore been informed by a review of concentrations present within historic samples within the Tees, as well as information provided by Cefas and the MMO within SAM/2018/00069.

Within SAM/2018/00069, Cefas stated that BDE congener 209 is generally expected to be found in much higher concentrations in the marine environment (compared with the results of the other BDE congeners); the data presented above confirms this expectation. This trend was also evident within the findings of the sediment samples recovered in 2006, with BDE209 concentrations ranging from <0.5µg/kg to 340µg/kg. The results of BDE209 found in 2019 as part of the NGCT survey were similar but marginally higher than that found in 2006. The MMO has recently confirmed that the sediment to be dredged from the NGCT footprint is suitable for offshore disposal into the Tees Bay C site, and no concerns were raised with regard to the PDBE concentrations.

Summary of previous sediment quality surveys in the Tees

The findings of sediment quality surveys undertaken in support of previously consented schemes in the Tees estuary is summarised below.

A sediment quality survey was undertaken in the Tees estuary during July 2014 to inform the EIA for the Anglo American Harbour Facilities project. A total of six vibrocores were taken within the footprint of the berth pocket and port terminal for the Anglo American Harbour Facilities, with two vibrocores taken from the adjacent approach channel (that will be deepened as part of the NGCT project and the results are therefore directly applicable to the NGCT scheme). The vibrocore logs reported that the strata within the approach channel (from positions VC1A and VC2A) comprised soft extremely low strength clay, underlain by gravelly sand at 1.5m depth (VC1A) and rock debris at 0.9m depth (VC2A). The samples from all strata from VC1A and VC2A did not contain any concentrations of contaminants above Action Level 2. Minor exceedances of Action Level 1 only were identified.

Royal HaskoningDHV carried out an EIA on behalf of PDT in 2012 for proposed strengthening of the existing No.1 Quay at Tees Dock, and also the widening and deepening of the existing berth and adjacent areas within Tees Dock. Though showing signs of minor contamination, it was determined that the ‘soft’ sediments within ‘Tees Dock Water Area’ (identified in marine licence 34396) were suitable for offshore disposal.

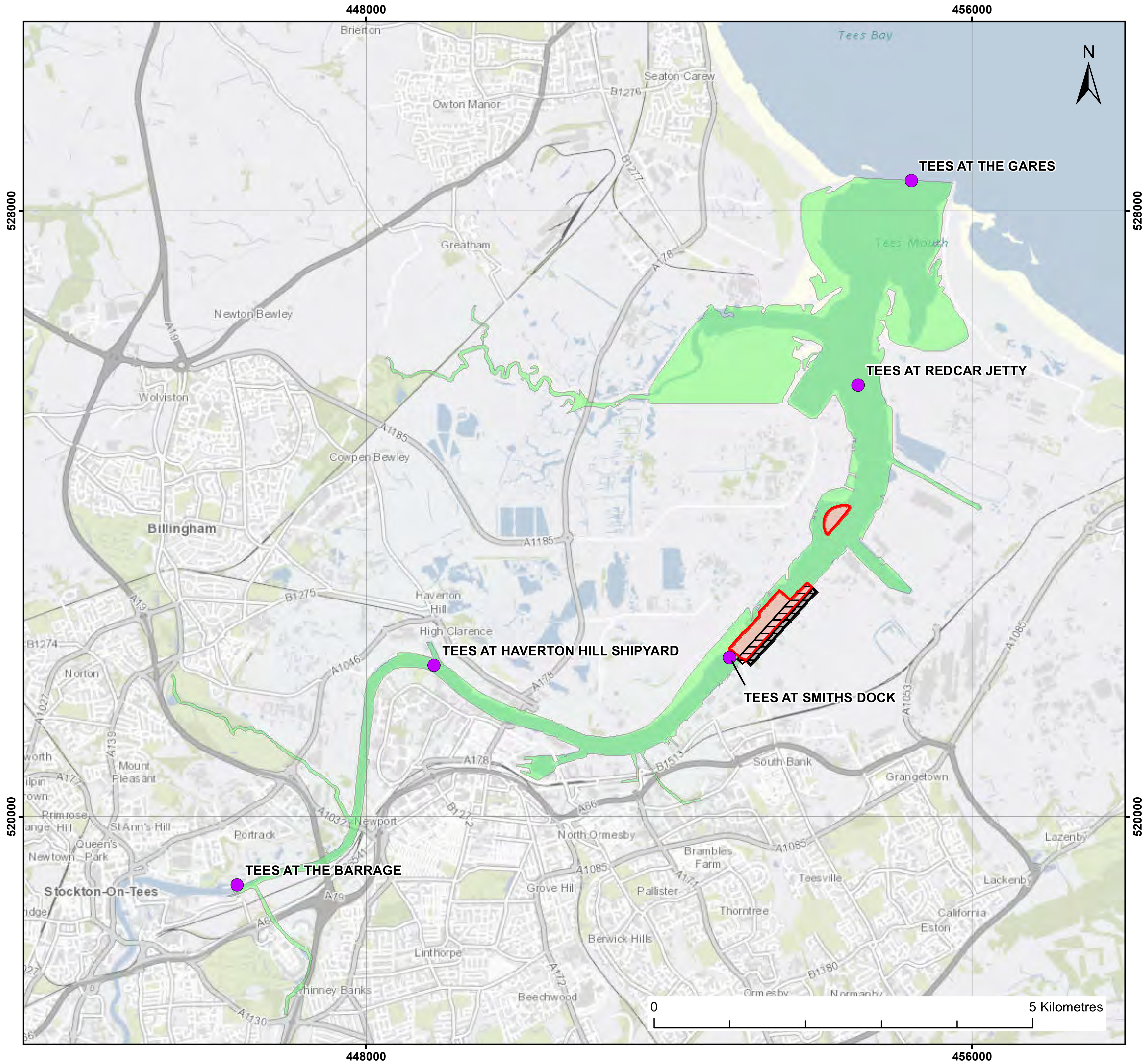
The 2006 sediment quality survey undertaken to inform the 2008 HRO application involved the recovery of 13 surface samples from within and adjacent to the proposed dredge footprint for the NGCT scheme. Overall, the chemical data from the NGCT study indicated some level of contamination within the samples, particularly heavy metals and PAH compounds. However, levels were not deemed high enough to prohibit the material from being disposed of to sea (no exceedances of Action Level 2 were present). Concentrations of individual PAH compounds were found in concentrations greater than three times Action Level 1.

7.4.2 Water quality

Water Framework Directive baseline information

In terms of marine water bodies, the proposed scheme is located within the Tees transitional water body (ID GB510302509900) (see **Figure 7.2**). The Tees transitional water body is heavily modified and has an overall potential of ‘Moderate’. The chemical quality element of the water body has been assessed in 2019 due to concentrations of cypermethrin, Polybrominated diphenyl ethers (PBDE), Benzo(g-h-i) perylene, Mercury (and its compounds) and Tributyltin (TBT) compounds. Dissolved Inorganic Nitrogen (DIN) was also classified as moderate.

Water quality data was also obtained from the Environment Agency for the latest classification that has been formally quality assured for metals and PAHs, the parameters exceeding Cefas Action Level 1. This is for the period 2016 to 2018 and is presented in **Table 7.7** for Tees at Smiths Dock, the monitoring point closest to proposed project (see **Figure 7.2**).



Legend

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

WFD Transitional Waterbody

- Tees (GB510302509900)

Client:	Project:
Tees Valley Combined Authority	South Bank Quay

Title: Water Quality Monitoring Points

Figure: 7.2

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

Royal HaskoningDHV
Enhancing Society Together
ROYAL HASKONINGDHV
Marlborough House
Marlborough Crescent
Newcastle-upon-Tyne, NE1 4EE
+44 (0)191 211 1300
www.royalhaskoningdhv.com

Table 7.7 Summary of selected water quality data for Tees at Smiths Dock monitoring point

Parameter	Mean (µg/l)	Maximum (µg/l)
Benzo(a)pyrene	0.001485	0.00319
Benzo(b)fluoranthene	0.001561	0.00361
Benzo(g-h-i)perylene	0.001538	0.00295
Benzo(k)fluoranthene	0.000771	0.00195
Cadmium	0.030333	0.03
Copper	1.03725	1.49
Fluoranthene	0.018595	0.05
Indeno(1-2,3-cd)pyrene	0.001625	0.00362
Arsenic[1]	1	1
Lead	0.628917	1.83
Mercury[2]	0.01	0.01
Nickel	1.614417	3.35
TBT	0.000313	0.00125
Zinc	3.99	5.06
Chromium[3]	0.3	0.3

Bathing Waters

The Environment Agency takes water samples at each of England's designated bathing waters during the bathing season, which is between May and September each year. The samples are analysed for bacteria that indicate the presence of faecal matter in the water. A classification for each bathing water is calculated annually based on samples from the previous four years. The classifications are:

- Excellent – the cleanest seas;
- Good – generally good water quality;
- Sufficient – the water meets minimum standards; and,
- Poor – the water has not met the minimum standards

The proposed scheme footprint is not located within a designated bathing water. However, there are bathing waters located to both the north and south of the proposed scheme footprint, the closest of which are:

- Seaton Carew North Gare - Carew North Gare Beach is the southern end of an extensive sandy beach close to the mouth of the Tees. The water quality has been classified as Excellent.
- Seaton Carew Centre - this designated bathing water is at the southern end of an extensive sandy beach fronting the town of Seaton Carew, approximately 1.5km north of the mouth of the Tees estuary. This bathing water has a classification of Excellent.

[1] Concentrations of arsenic were all below the Limit of Detection (LOD) of 1µg/l
[2] Concentrations of mercury were all below the LOD of 0.01µg/l
[3] Concentrations of chromium were all below the LOD of 0.3µg/l

- Seaton Carew North – this designated bathing water is at the northern end of an extensive sandy beach fronting the town of Seaton Carew, approximately 2.5km north of the estuary mouth. This bathing water has a classification of Good.

Turbidity

In general, suspended sediment concentrations are low within the estuary and within Tees Bay. The highest observed values tend to occur on spring tides. This relationship is not strong, but the extreme values are also attributed to either high rainfall or storm events. In general, concentrations appear to be dominated by freshwater inputs in the reaches above Middlesbrough and marine influences in reaches located further downstream. In the vicinity of the proposed scheme (i.e. in the Tees Dock area) suspended solid concentrations, for the most part, are less than 20mg/l with short-term peaks from 40-80mg/l (Royal Haskoning, 2006).

Further information was also collected during a met ocean Survey in July 2020. In total, 52 water quality samples were collected from the centre point of transect T8 (T8 was located in front of the proposed scheme, within the estuary) and analysed in the laboratory for suspended sediment concentrations. The results from the survey are detailed in **Section 6** and summarised in **Table 7.8** below. The data show that during this period, concentrations of suspended sediment were very low. It should be noted however, that the conditions during this period were very dry and calm and therefore are considered to only be reflective of potential spring/summer conditions.

Table 7.8 Suspended sediment concentrations recorded at Transect T8 in July 2020

Location	Tidal condition	Suspended sediment concentrations (mg/l)		
		Minimum	Mean	Maximum
Transect T8 (shown on **Figure 6.5**)	Neap	0.0	3.9	7.5
	Spring	0.0	2.5	8.5

7.4.3 Planned survey works

A site-specific sediment quality survey is proposed to be undertaken during 2020 to provide a detailed understanding of sediment quality within the proposed scheme footprint and validate the information set out above. As agreed with the MMO via SAM/2020/00026 (**Appendix 6**), this is proposed to comprise recovery of sediment samples from 25 stations from the surface and at depth, with sampling positions equally spread across the proposed dredge footprint. Samples will be recovered at the surface and at 1m intervals at each of the 25 positions to the proposed dredge depth, or until geological mudstone is encountered beforehand (the MMO has confirmed recovery of samples for laboratory analysis within geological mudstone is not required).

7.4.4 Future evolution of the baseline in the absence of the proposed scheme

In the absence of the proposed scheme, there is no reason to believe that sediment and water quality within the Tees estuary is likely to materially change from the present-day conditions. PDT will continue to undertake maintenance dredging of the river to maintain the advertised dredge depths, with mid-licence sediment sampling being undertaken from the surface in accordance with the conditions on the maintenance dredge disposal licence (to ensure that the maintenance dredged material remains suitable for offshore disposal).

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7.5 Potential impacts during the construction phase

7.5.1 Dispersion and redistribution of sediment during capital dredging

Capital dredging would result in the creation of sediment plumes. To consider the potential extent and severity of effect on suspended solid concentrations within the Tees, hydrodynamic modelling was undertaken. Full detail on the modelling is presented in **Section 6** but the key points are summarised here for ease of reference.

Modelling was undertaken using a MIKE3-MT sediment dispersion model coupled with the 3D hydrodynamic model MIKE3-HD and run for the four-month period over which dredging is likely to occur. The simulations also accounted for the movement of dredgers and transport barges (including dredging, sailing, disposal and downtime) and four ‘stages’ of dredging (which would occur in sequence) were modelled to allow for the potential timing of phasing in the proposed construction methodology as follows:

- Stage 1: BHD working to dredge the upper soft material in the berthing pocket and river channel.
- Stage 2: BHD and TSHD working in parallel to dredge the middle soft material in the berthing pocket and river channel.
- Stage 3: BHD working to dredge the bottom hard material in the berthing pocket and river channel.
- Stage 4: BHD and TSHD working in parallel to dredge the material in the Tees Dock turning circle.

7.5.1.1 Stage 1

An example of the results of the model simulation for Stage 1 is presented in **Figure 7.3**. It can be seen in the figure that the largest concentrations are local to the dredger and typically reach around 100 to 200mg/l. In all tidal conditions modelled, the lateral extent of the plume across the river channel is very narrow and the magnitude of concentrations within the plume beyond a few hundred metres from the point of release is in the order of 10 - 20mg/l and in the extremities of the plume, reduces further to concentrations 0-10mg/l (see **section 7.5**). Plots for the different tidal conditions are presented in **Section 6.**

7.5.1.2 Stage 2

Results for this stage were similar to those in Stage 1 but with separate plumes created by the different dredgers. At some points in the cycle, areas of these initially separate plumes combine as they move upstream and downstream according to the tidal phase, albeit at relatively low (typically <30mg/l and often <10 mg/l) concentrations once a few hundred metres away from the point of initial release. An example plot is shown in **Figure 7.4.** Plots for the different tidal conditions are presented in **Section 6.**

7.5.1.3 Stage 3

The maximum concentrations and the spatial extents of the plume arising from Stage 3 of the dredging are much lower than those experienced during Stage 1, largely because the material being released is coarser and the production rate of dredging is notably lower. **Figure 7.5** shows an example plume during Stage 3 dredging. Plots for the different tidal conditions are presented in **Section 6.**

7.5.1.4 Stage 4

Again, peak concentrations close to the dredger are shown in the plume modelling output. On the ebb phase, the plume can extend at low concentrations (<30mg/l) along the jetties of the Oil Terminal towards (but not entering) the Conoco Phillips Inset Dock, whilst on the flood phase it remains close to the northern bank over a narrow channel width extending along the North Tees Works jetties. An example plot is shown in **Figure 7.6**. Plots for the different tidal conditions are presented in **Section 6.**

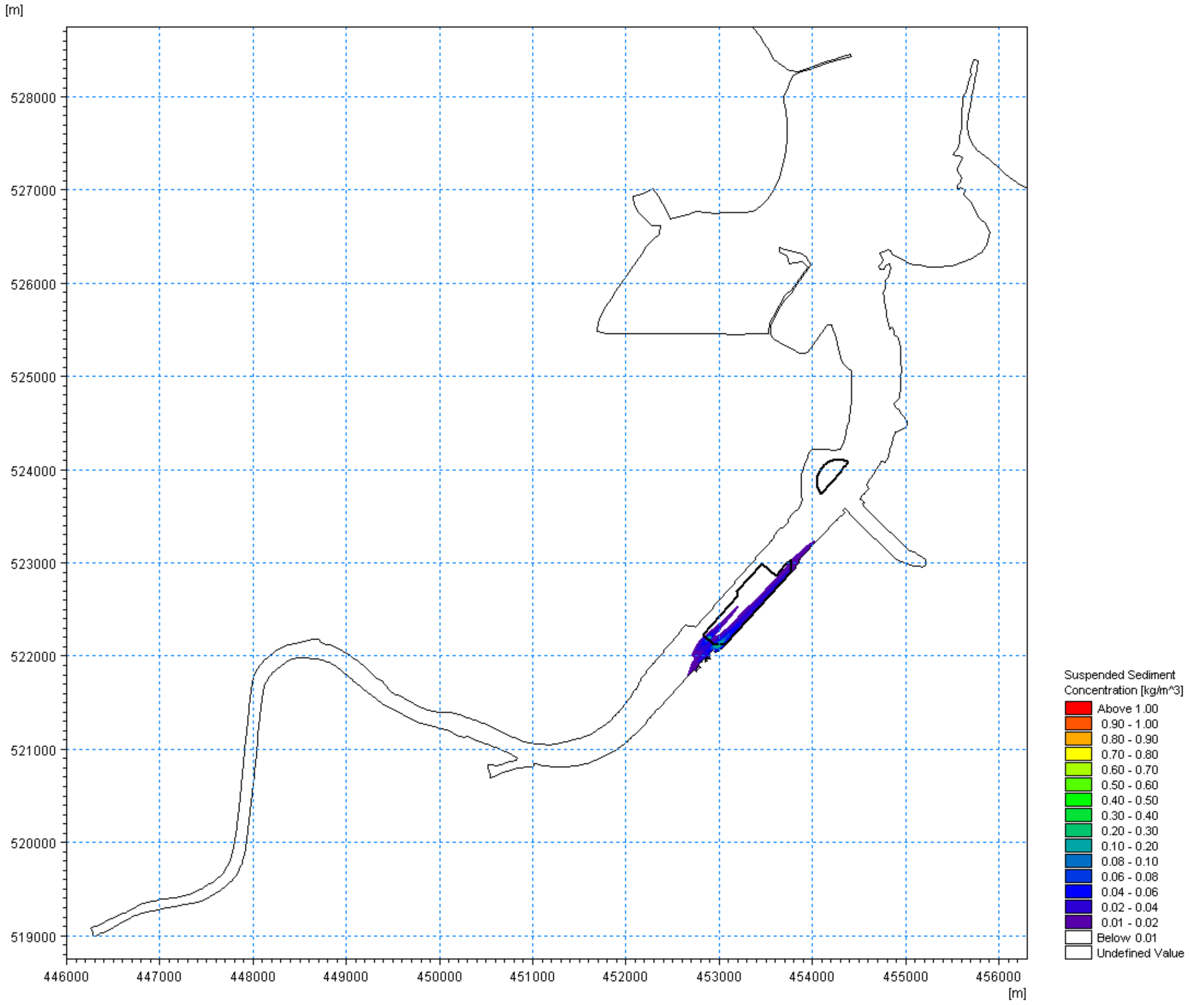

Figure 7. 3 Plume of suspended sediment concentrations arising from dredging activities during Stage 2 (release from south-western ends of the two parallel dredging transects)

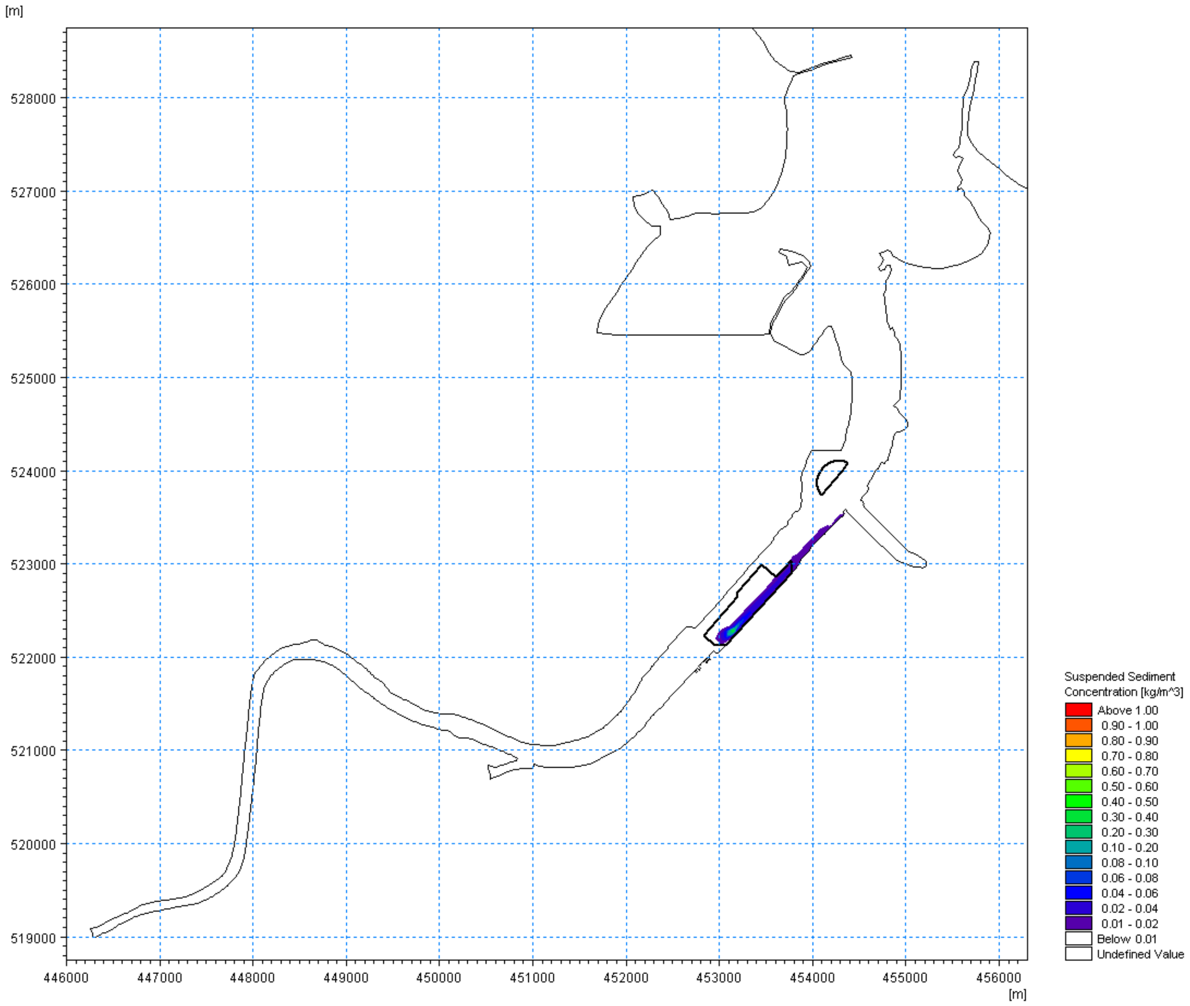

Figure 7. 4 Plume arising from dredging activities during Stage 1 of the capital dredge (release from the south-western corner of the dredging transect during the ebb phase)

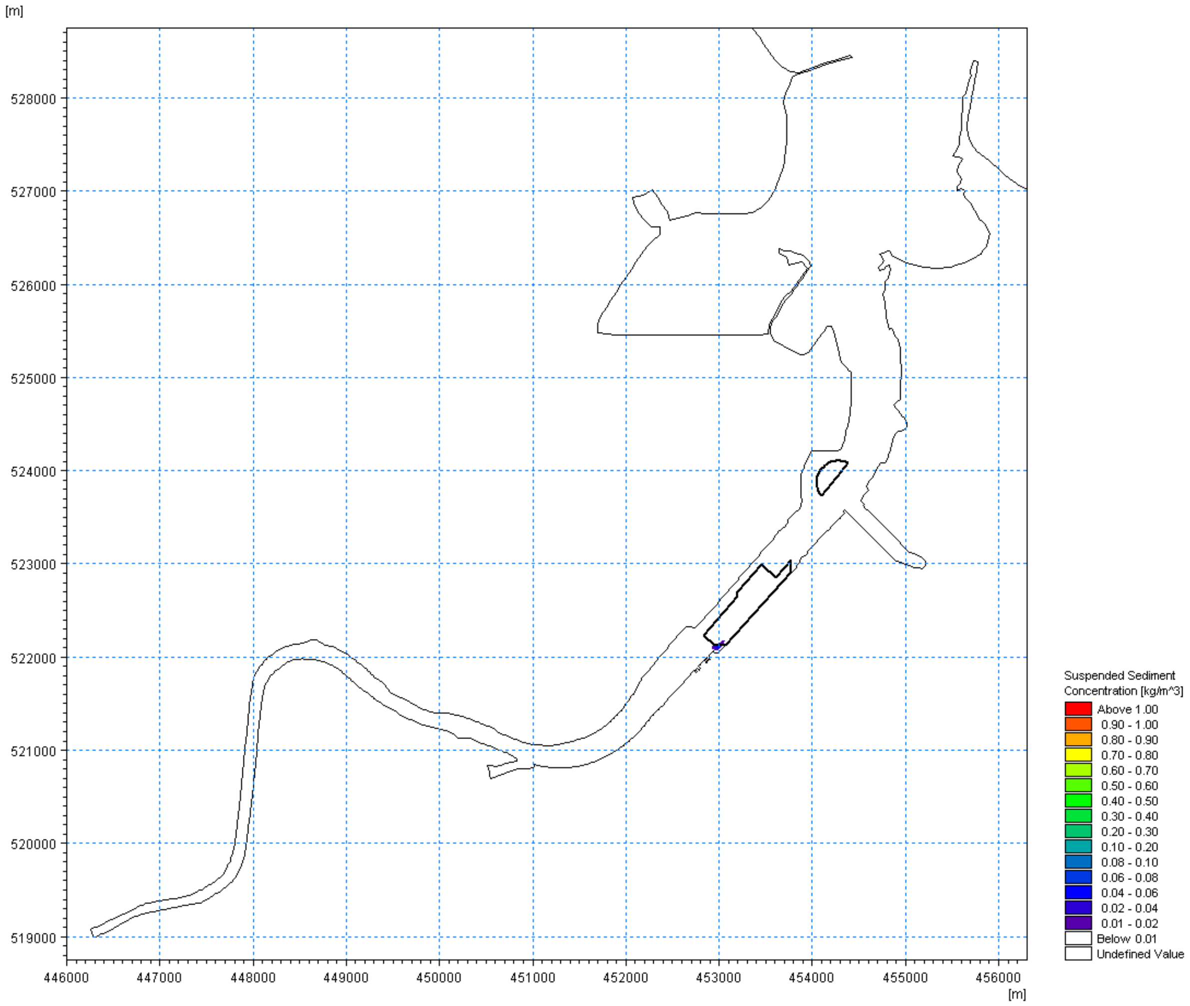

Figure 7. 5 Plume of suspended sediment concentrations arising from dredging activities during Stage 3 (release from the south-western corner of the dredging transect during the ebb phase)

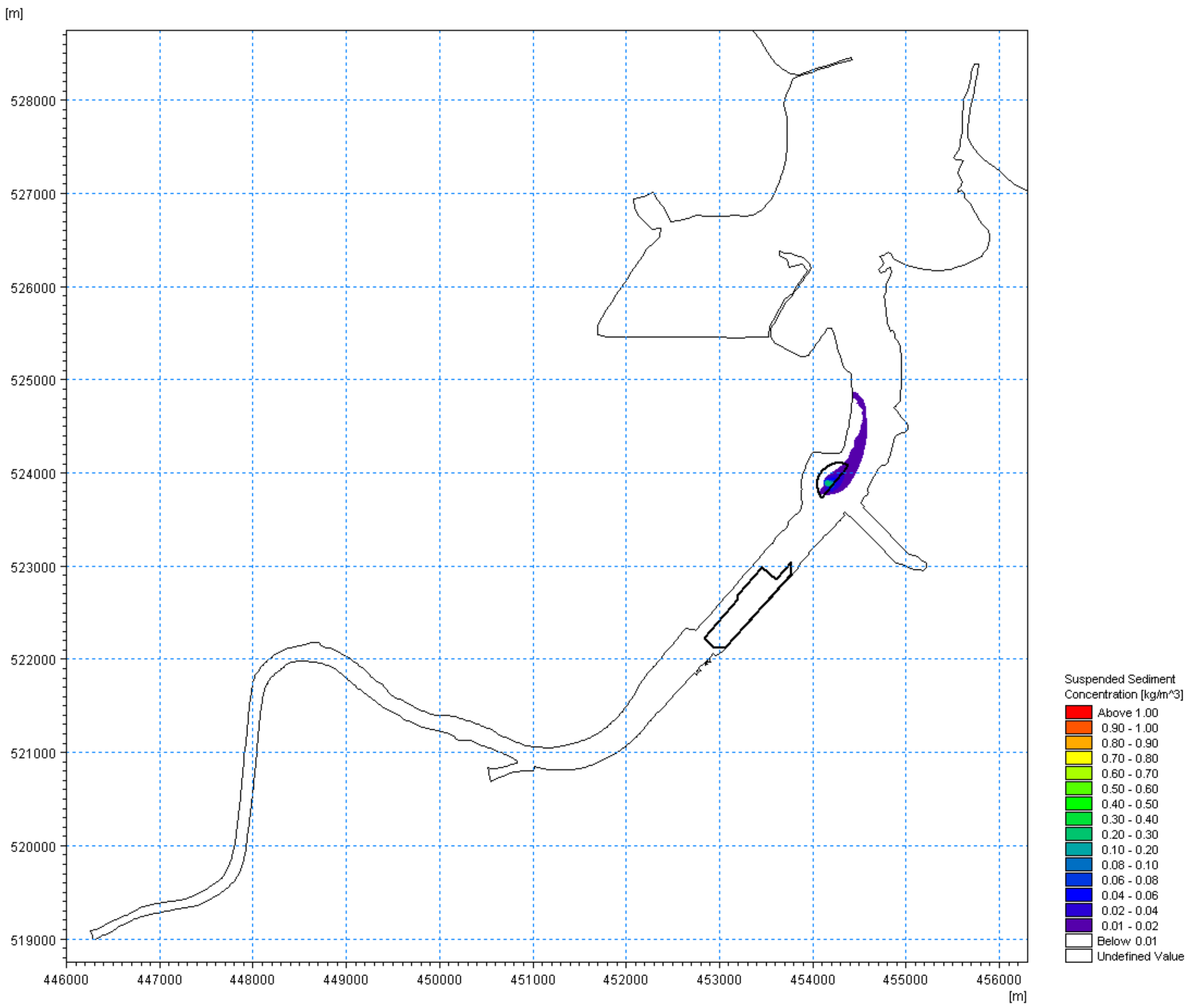

Figure 7.6 Plume of enhanced suspended sediment concentrations arising from dredging activities during Stage 4 (during a release from the turning circle during the flood phase of the tide).

To investigate potential levels of suspended solid concentrations at the WFD water quality monitoring points (see **Figure 7.2**), time series plots were produced as follows:

- WQ1 – Water quality monitoring point (Tees at the Gares);
- WQ2 – Water quality monitoring point (Tees at Redcar Jetty);
- WQ3 – Water quality monitoring point (Tess at Smiths Dock);
- WQ4 – Water quality monitoring point (Tees at Haverton Hill Shipyard);
- WQ5 – Water quality monitoring point (Tees at the Barrage);

The results are presented in **Figure 7.7**.

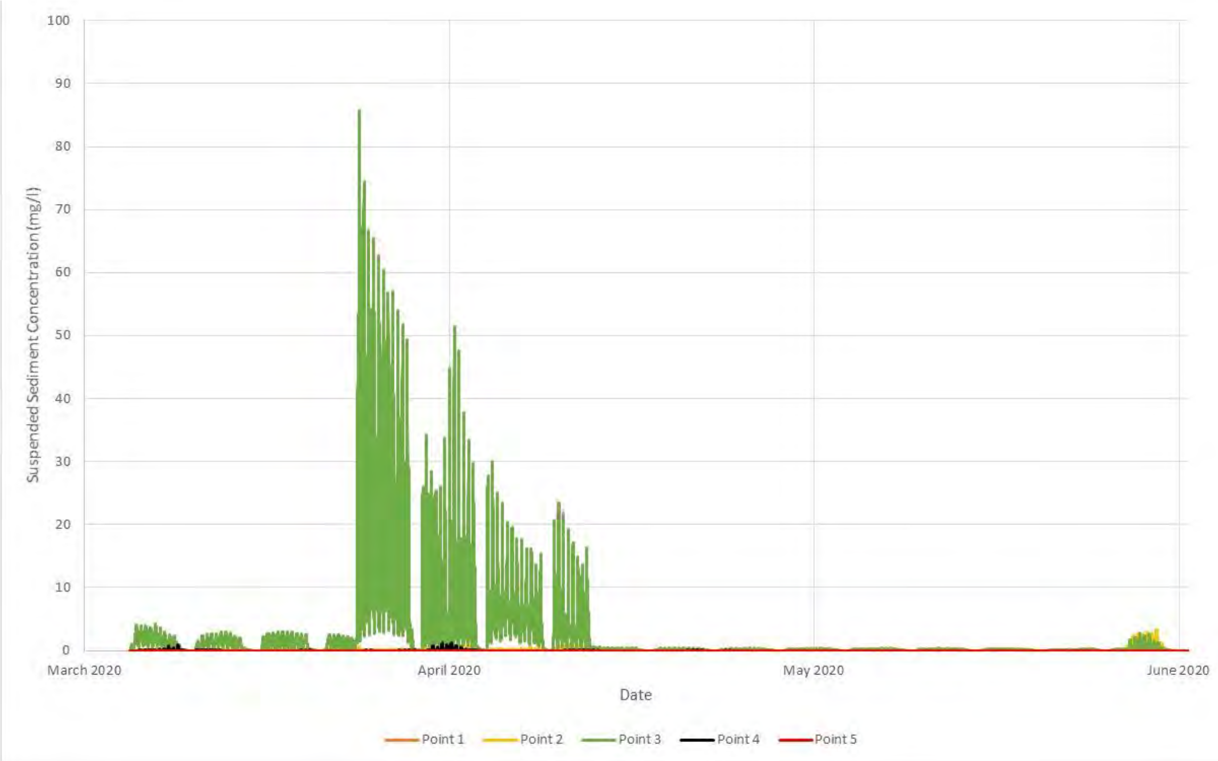

Figure 7.7 Timeseries of changes in suspended sediment concentrations at water quality monitoring points in the Tees Estuary.

Only point 3 (Smiths Dock – **Figure 7.2**) experiences elevated levels of suspended solids and only during Stage 2 of the proposed dredging schedule (when the BHD and TSHD would be working in parallel to dredge the middle soft material in the berthing pocket and river channel for a period of approximately four weeks). Peak concentrations reach 85mg/l which reduce back to baseline within an hour followed by subsequent, but lower concentration peaks, again reducing to baseline concentations within an hour. All other stages of the proposed capital dredging works either do not cause elevations at the water quality monitoring points or only elevate concentrations by very small amounts (i.e. by up to 5mg/l). It should be noted that given the sediment plume is not predicted to reach The Gares water quality monitoring point, no effects on the designated bathing waters are predicted.

As a result, the magnitude of effect on water quality in the Tees estuary is deemed to be medium as there will be exceedances over baseline conditions throughout Stage 2 of the dredging schedule (as noted above, a period of approximately four weeks within the approximately four month dredging programme). The effect is, however, temporary and reversible. Given the sensitivity of the Tees estuary is medium, the overall impact is of **minor adverse** significance.

Mitigation measures and residual impact
No mitigation measures are required. The residual impact is predicted to be of **minor adverse** significance.

7.5.2 Effects on water quality physical parameters during capital dredging

The relatively limited nature of the plume extents predicted for the proposed capital dredging indicates that long term effects on dissolved oxygen concentrations are unlikely to be experienced within the Tees estuary. Additionally, a significant component of the dredged material is likely to be geological sediment, which is unlikely to contain significant amounts of organic matter. Any effect is therefore likely to be temporary i.e. only for the duration of the dredge (approximately four months) and reversible. As a result, the magnitude of effect is deemed to be low. Given the sensitivity of the Tees estuary is medium, the overall impact is of **minor adverse** significance.

Mitigation measures and residual impact
No mitigation measures are required. The residual impact is predicted to be of **minor adverse** significance.

7.5.3 Remobilisation of contamination during capital dredging

The concentrations of PAHs and metals within the sediments in the Tees estuary could potentially affect water quality, given the significantly elevated concentrations greater than Action Level 1 and the CSQGs. An assessment to look at the potential for sediments exceeding Action Level 1 to cause EQS failures has therefore been undertaken. It should be noted that data for TBT did not indicate elevated concentrations and all samples were below Cefas Action Level 1 with the majority being below the limit of detection. As a result, no further consideration is given to this parameter.

This assessment uses a previously accepted methodology agreed with the Environment Agency which was undertaken to inform whether maintenance dredging within a dock in Dover Harbour could give rise to EQS failures (see MLA/2019/00055). This exercise requires the undertaking of simple calculations using estimates 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 can then be used to calculate the potential dilution and indicate potential water concentrations. These are then be compared to EQSs.

The volume of water within the Tees transitional water body was taken from Townend (2005) which calculates that the volume at mean low water is 1.31×10^7 m^3 and at mean high water is 3.23×10^7 m^3 (see **Section 6** for further detail). Additionally, it is assumed that the maximum predicted loss occurs (as presented in CIRIA guidance) and that all contamination is released into the water column. Note that this is a highly precautionary approach given the preference of PAH compounds to remain adsorbed to sediments and no account is made of any settlement of sediment that may occur immediately following release (see **Section 6**).

The results are presented in **Table 7.9** for mean low water (i.e. worst-case estuary volume). It can be seen from these calculations that a risk is presented by the concentrations of zinc in the sediment and benzo(b)fluoranthene. Benzo(g-h-i) perylene, using the Environment Agency data set, indicates that there is the potential for an EQS exceedance in the existing baseline situation (i.e. prior to any disturbance of sediment as a result of the proposed scheme) although the maximum allowable concentration was not formally applied to the data to assess compliance during this period. The latest data available on the Catchment Data Explorer does, however, record ‘fail’ for this parameter.

Calculations were also undertaken for the high tide volume for zinc and benzo(b)fluoranthene to see what implications this would have on EQS exceedances predicted in **Table 7.9**. The results are presented in **Table 7.10.**

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Table 7.9 Summary of calculations undertaken for potential water column effects within the Tees estuary at low water (based on removal of 15,000m³ of dredged sediment per day and maximum concentrations both in the water and in the sediment)

Parameter	Max [4]concentration in sediments (µg/kg)	Mean concentration in sediments (µg/kg)	Max loss to water body (µg)[5]	Mean loss to water body (µg)[5]	Mean concentration in water (µg/l)	Max concentration in water (µg/l)	MAC[6] EQS (µg/l)	Exceedance without baseline	Baseline concentration (max value at Smiths Dock) (µg/l)[7]	Sum of baseline plus max concentration (µg/l)	Exceedance with baseline
Arsenic	33300	24890	7.493E+09	5600250000	0.4275	0.57194656	25	No	1	1.57194656	No
Cadmium	590	250	132750000	56250000	0.004293893	0.01013359	0.2	No	0.03	0.04013359	No
Chromium	52200	33010	1.175E+10	7427250000	0.566965649	0.89656489	32	No	0.3	1.19656489	No
Copper	74300	36850	1.672E+10	8291250000	0.632919847	1.27614504	3.76	No	1.49	2.76614504	No
Lead	135000	80700	3.038E+10	1.8158E+10	1.386068702	2.31870229	14	No	1.83	4.14870229	No
Mercury	600	330	135000000	74250000	0.005667939	0.01030534	0.07	No	0.01	0.02030534	No
Nickel	35600	24710	8.01E+09	5559750000	0.424408397	0.61145038	34	No	3.35	3.96145038	No
Zinc	254000	144700	5.715E+10	3.2558E+10	2.485305344	4.36259542	7.9	No	5.06	9.42259542	Yes
Benzo(g-h-i)perylene	810	470	182250000	105750000	0.008072519	0.013912214	0.00082	Yes	0.00295	0.016862214	Yes
Benzo(b)fluoranthene	960	490	216000000	110250000	0.008416031	0.01648855	0.017	No	0.00361	0.02009855	Yes
Benzo(k)fluoranthene	520	220	117000000	49500000	0.003778626	0.008931298	0.017	No	0.00195	0.010881298	No
Fluoranthene	2200	960	495000000	216000000	0.01648855	0.03778626	0.12	No	0.05	0.08778626	No
Benzo(a)pyrene	1100	490	247500000	110250000	0.008416031	0.01889313	0.027	No	0.00319	0.02208313	No

*[4] Sediment data taken from NGCT 2019 (see **Table 7.5**)*
[5] Calculated loss of sediment derived using indicative values for the mass of sediment resuspended per m³ of dredged material in CIRIA guidance (John et al., 1999) in kg/m³. Worst case S-Factor for TSHD with limited overflow is 15kg/m³
[6] MAC EQS Maximum Allowable Concentration. Used given the fact that dredging is not continuous as opposed to annual average EQS which averages samples collected over a year.
[7] Uses highest concentration recorded within the WFD water body sampling data provided by the Environment Agency.

Table 7.10 Summary of calculations undertaken for potential water column effects within the Tees Estuary at high water (based on removal of 15000m^3 of sediment per day and maximum concentrations in the water and in the sediment)

Metals	Max concentration in sediments (µg/kg)	Mean concentration in sediments (µg/kg)	Max loss to water body (µg)	Mean loss to water body (µg)	Mean concentration in water (µg/l)	Max concentration in water (µg/l)	MAC EQS (µg/l)	Exceedance without baseline	Baseline concentration (max value at Smiths Dock) (µg/l)	Sum of baseline plus max concentration (µg/l)	Exceedance with baseline
Zinc	254000	144700	5.715E+10	3.256E+10	1.0079721	1.7693498	7.9	No	5.06	6.82934985	No
Benzo(b)fluoranthene	960	490	216000000	110250000	0.0034133	0.0066873	0.017	No	0.00361	0.01029731	No

Tables 7.9 and **7.10** show that there is the potential for EQS exceedances for both maximum concentrations of zinc and benzo(b)fluoranthene (both sediment and water quality values) at low water volumes within the estuary. If the calculations at mean low water are re-run using average concentrations (sediment and water quality) the anticipated concentrations fall below the respective EQS. This is also the case if the maximum concentrations are run with the mean high-water volume. This indicates that whilst there is a risk to the EQS, this only occurs under a certain set of circumstances that are very unlikely to occur simultaneously because:

- The calculations assume that all sediment remains in suspension. In reality, it is likely that some settlement will occur.
- A relatively large proportion of the total volume of dredged material is anticipated to comprise geological material (i.e. mudstone). It is generally accepted that geological material does not contain contaminants. This is confirmed by MMO advice which does not request analysis of geological material within its sampling plan document (reference SAM/2020/00026).
- The calculations assume that all contamination is released into the water column. In reality, it is likely that some contamination will remain bound to sediment particles.
- The maximum concentration within the sediments used for each parameter does not occur across the dredge area.
- The maximum values for water quality concentrations are not reflective of sediment conditions across the site.
- The daily dredge volume is likely to be less than that accounted for due to stoppages associated with transiting vessels and disposal activities.
- The calculation is based on loss from a TSHD whereas a considerable component of the dredge will be undertaken with a backhoe dredger which has a lower production rate and therefore releases less sediment into the water column.

Additionally, information from sediment plume modelling (see **Section 7.5.1**) indicates that only the Smiths Dock water quality monitoring point (point 3) could experience elevated levels of suspended solid concentrations which could be in the region of 85mg/l above baseline. This would only occur for several weeks during Stage 2 of the proposed dredging programme.

Overall therefore, the magnitude of effect is deemed to be low. Given the sensitivity of the Tees estuary is considered to be medium, the overall impact is of **minor adverse** significance.

Mitigation measures and residual impact
No mitigation measures are required. The residual impact is predicted to be of **minor adverse** significance.

7.5.4 Release of sediment during riverbank excavation to create the berth pocket

The proposed scheme requires the excavation of soils/landside materials from the riverbank in front of the proposed new quay wall to create the berth pocket. There is therefore the potential for some of the soils to spill into the river during the excavation process as some of the material is likely to be excavated below the water line. To reduce the potential effects as far as possible, control measures would be put in place to reduce spill as far as possible and it is proposed to remove the material using a backhoe. This enables control over the excavation process and care will be taken to remove as much as possible at low water and therefore out of the water. Additionally, excavation will only be required for a short period and therefore any potential effect on water would be limited to the timeframe over which excavation in the water would occur.

Overall therefore, the magnitude of effect is deemed to be very low. Given the sensitivity of the Tees estuary is considered to be medium, the overall impact is of **negligible** significance.

Mitigation measures and residual impact
No mitigation measures are required. The residual impact is predicted to be of **negligible** significance.

7.5.5 Remobilisation of contaminants due to construction and riverbank excavation

Construction works would include the excavation and removal of a significant amount of Made Ground and superficial deposits. Land-based construction therefore has the potential to increase the infiltration of rainwater and surface run-off to the underlying strata. This could potentially mobilise any residual contamination that may already be present within the overlying strata, which may ultimately migrate to the estuary.

Prior to the commencement of construction activities, a programme of site characterisation works will be undertaken which would comprise a programme of intrusive ground investigation works across the site to facilitate the recovery of soil and groundwater samples for laboratory analysis. The findings of the intrusive investigation will allow appropriate assessments to be undertaken to ascertain if contaminants are present at concentrations that could result in harm to controlled waters.

It is also possible that potentially contaminated groundwater could be diverted around the physical barriers introduced through the installation of sheet piles and other infrastructure required for the proposed scheme. This could create the potential for contaminated groundwater to impact areas outside of the proposed scheme footprint. However, following the execution of a pre-construction ground investigation, it will be possible to determine whether contaminated groundwater and mobile contaminants are present within the study area. If contaminated groundwater and mobile contaminants are identified, remediation would be required to mitigate the risk the contamination poses to controlled waters.

Overall therefore, the magnitude of effect would be significantly reduced by the proposed mitigation measures outlined above to low. Given the sensitivity of the Tees estuary is considered to be medium, the overall impact is of **minor adverse** significance.

Mitigation measures and residual impact
No mitigation measures are required. The residual impact is predicted to be of **minor adverse** significance.

7.5.6 Effects on water quality associated with other construction works (demolition of derelict structures and rock blanket)

As these works progress, there is the potential for sediment to be suspended when working in and around the riverbed. However, any increases in suspended solids concentrations are likely to be highly localised and reduce to baseline conditions quickly following cessation of works. Overall therefore the magnitude of effect would be very low. Given the sensitivity of the Tees estuary is considered to be medium, the overall impact is of **negligible** significance.

Mitigation measures and residual impact
No mitigation measures are required. The residual impact is predicted to be of **negligible** significance.

7.6 Potential impacts during the operational phase

7.6.1 Dispersion and redistribution of sediment during maintenance dredging

As detailed in **Section 6**, the predicted reductions in current speeds in the reach of the channel local to the proposed new quay, combined with the creation of a new berth pocket at the quay, may lead to a small increase in deposition rates and hence a requirement for more material to be dredged from this local reach annually (see **Section 6** for more information). A 10% increase in annual maintenance dredging requirement in the area local to the new quay has been estimated.

However, the majority of material removed during the weekly maintenance dredging campaigns undertaken by PDT is from the reaches close to the Tees Barrage and at the mouth of the estuary; therefore even a 10% increase in the reach local to the proposed new quay equates to a very small increase in the overall net annual maintenance dredging requirement from the estuary as a whole. Therefore the potential increase in maintenance dredging requirement is not expected to be significant and would be managed within existing maintenance dredging and offshore disposal regimes.

Consequently, the magnitude of water quality effects above those already experienced during maintenance dredging operations is predicted to be very low. Given the sensitivity of the Tees estuary is considered to be medium, the overall impact is of **negligible** significance.

Mitigation measures and residual impact
No mitigation measures are required. The residual impact is predicted to be of **negligible** significance.

7.6.2 Surface water discharge to the Tees associated with run off

As outlined in **Section 3**, it is anticipated that the majority of the quay would be surfaced with crushed stone. Uncontaminated surface water would therefore drain through the crushed stone into the underlying material without the need for a formal drainage system.

In areas where there is a risk that the water could become contaminated, such as in the heavy lift areas of the proposed quay, surfaces would be concreted capturing surface water runoff via a series of gullies. The collected surface water would then be passed through an interceptor to remove contaminants and discharged via the quay wall into the Tees estuary.

Welfare facilities are not proposed on the quay itself in order to maximise the available space to support with operations; there would therefore be no foul sewage generated as a result of the proposed scheme.

As a result, the magnitude of effect is deemed to be very low. Given the sensitivity of the Tees estuary is considered to be medium, the overall impact is of **negligible** significance.

Mitigation measures and residual impact
No mitigation measures are required. The residual impact is predicted to be of **negligible** significance.