Centre for Environment Fisheries & Aquaculture Science

Cefas

MARINE AND COASTAL ACCESS ACT (2009). CONSULTATION REQUEST TO REVIEW SEDIMENT QUALITY DATA TO SUPPORT A MARINE LICENCE FOR THE TEES SOUTH BANK DEVELOPMENT PHASES 1 AND 2 BY THE TEES SOUTH BANK CORPORATION (TSBC) AT RIVER TEES, MIDDLESBOROUGH.
Reference Number: MLA/2020/00506

From: Dr Jemma Lonsdale
Cefas, Lowestoft Laboratory
Date: 6th April 2021
Tel: 01502 522244
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To: **Emmanuel Mulenga** **MMO** **(by MCMS)**
Cc: Joe Perry Cefas

1. With reference to the above application your request for comments dated 8th March 2021 please find my comments below in in my capacity as scientific and technical advisor on dredge and disposal.

2. This minute is provided in response to your advisory request in relation to the above proposal in my capacity as scientific and technical advisor dredge and disposal (including sediment quality) activities. The response pertains to those areas of the application request that are of relevance to this field. This minute does not provide specialist advice regarding benthic ecology, marine processes, fish and fisheries, shellfisheries, or underwater noise as, whilst these are within Cefas' remit, they are outside my area of specialism.

3. In providing this advice I have spent 3.5 hours of the allocated 3.5 hours by the MMO. I have booked my time to C8369B003.

Document (s) reviewed

4. To inform my advice, I have reviewed the following documents:
   - MMO_Results_Template - MAR00829 Interim.xlsm
   - MMO_Results_Template - MAR00856 Interim 2.xlsm
   - MMO_Results_Template - MAR00874 Interim.xlsm
   - MMO_Results_Template - MAR00825 Interim 2.xlsm
   - Advice from Joe Perry (Cefas) to Emmanuel Mulenga (MMO) for MLA/2020/00506 (and MLA/2020/00507) dated 8th February 2021
   - Advice from Charlotte Clarke (Cefas) to Julia Stobie (MMO) for SAM/2020/00026 dated 27th May 2020.

Description of the proposed works

5. The applicant is looking for advice on samples that are in exceedance to the Action Levels, as it is unlikely they will be able to do additional sampling, to rule out localised hotspots. They are aware that the PDBE samples are still outstanding.

6. As background, based on SAM/2020/00026 Tees Valley Combined Authority (TVCA) is proposing to undertake a sediment quality and benthic ecology survey in the Tees estuary. The

survey is required to inform both the engineering design and environmental assessment of a proposed new port facility at South Bank Wharf to support the offshore wind industry.

7. Capital dredging is anticipated to be required within part of the Tees Dock turning circle, within the existing navigation channel, and within the proposed berth pocket, with a predicted total dredge volume of 1,960,000 m^3. The breakdown of this dredging is shown in Table 1.

Table 1. Proposed design dredge levels and volumes

Area	Existing Maintained dredge level (bCD)	Proposed design dredge level (bCD)	Proposed Dredge Depth (m)	Proposed total dredge volume (m^3)
Part of Tees Dock Turning Circle	8.8	11	2.2	160,000
Approach channel downstream	8.5	11	2.5	250,000
Approach channel middle	7.2	11	3.8	190,000
Approach channel upstream	5.7	11	5.3	260,000
Berth pocket	2 (approximate, not maintained)	15.6	13.6	1,100,000
			Total	**1,960,000**

8. The sample plan advised 25 sampling stations, with samples taken at the surface and various dredge depths down to the maximum dredge depth, depending on the location, resulting in 155 samples recommended. The samples were recommended for the full suite of analyses, being:
    - Trace metals
    - Organotins
    - Total Hydrocarbons (THC)
    - Polycyclic Aromatic Hydrocarbons (PAHs),
    - Polychlorinated Biphenyls (PCBs)
    - Polybrominated diphenyl ethers (PBDEs)
    - Particle Size Analysis (PSA)

9. Please note I have only reviewed the data provided in the interim results templates as requested. All comments are observations unless otherwise stated.

Comments

10. **Minor Comments**: The results templates all require updating to ensure the data can be used for international reporting purposes, and also for ease of cross referencing:
    - The dredge area tonnages need to be completed (cells D26-D31 on 'application info' tab).
    - Location name needs to be completed (column O on 'application info' tab).
    - Dredge area needs to be completed (Column Q on 'application info' tab, and column I on all subsequent tabs).

11. **Observation**: The analyses were carried out by Ocean Ecology Ltd for particle size (PSA) and SOCOTEC for all others (except PBDEs, which are currently being analysed by Cefas). These laboratories are MMO validated to carry out these analyses.

12. **Major Comments**: Borehole 34 shows elevated contamination, with levels of trace metal determinands above Action Level 2 in all depth samples. This sample station also shows elevated levels of hydrocarbons.

Table 2 Results of trace metal analyses for Borehole 34

Sample Number	Sample Name	TS%	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
MAR00856.003	BH-34 / ES203 / 0.00m-0.50m	52.7	27.9	2.68	144	188	1.56	36.8	311	767
MAR00856.004	BH-34 / ES204 / 1.00m-1.50m	50.4	60.4	14.9	492	429	12.8	41.1	828	2835
MAR00856.005	BH-34 / ES205 / 2.00m-2.50m	47.8	31.2	3.68	187	218	2.54	38.1	354	972
MAR00856.006	BH-34 / ES206 / 3.00m-3.50m	46.5	38.2	6.59	288	284	4.73	39.5	488	1502
MAR00856.007	BH-34 / ES207 / 4.00m-4.50m	44.8	35.5	6.58	280	290	4.36	37.9	503	1488
MAR00856.008	BH-34 / ES208 / 5.00m-5.50m	45.9	38.5	8	302	311	5.15	39	562	1695
MAR00856.009	BH-33 / ES214 / 0.00m-1.00m	50.9	26.9	1.38	85.5	88.3	0.87	37.9	198	426
MAR00856.010	BH-33 / ES215 / 1.00m-1.70m	82.6	5.4	0.2	26.2	24	0.04	27.9	12.8	59.1
MAR00856.011	BH-33 / ES216 / 2.00m-2.50m	84.7	5	0.17	24.2	25.6	0.02	24.7	10.4	50.5
MAR00856.012	BH-33 / ES217 / 3.00m-3.30m	88.3	5.5	0.24	24.4	23.7	0.03	27.1	12.8	55.8
	Action level 1:		20	0.4	40	40	0.3	20	50	130
	Action level 2:		100	5	400	400	3	200	500	800

13. For the PAH results, in the absence of a defined Action Level 2, Cefas utilise the Gorham-Test approach. This is an effects-range approach which considers the sum total of a number of the low molecular weight (LMW) PAH analytes which are seen as acutely toxic, and a selection of the high molecular weight (HMW) PAH's that are considered to be more long term acting (i.e. carcinogenic) which are compared for each sample for two effects ranges. Total values of the LMW PAHs and the total of the HMW PAHs are calculated and then compared to threshold values. If a total value (for either LMW or HMW selection of PAHs) does not exceed the effects-range low (ERL), the indication is that the sediment in the sample can be considered low risk. If a total value exceeds the effects-range median (ERM) for either the LMW or the HMW total values, it can be considered higher risk, with more likelihood of harm occurring. Table 3 shows the level of contamination as indicated by the Gorham test.

14. The results of the Gorham test indicated that all samples exceed the ERL and ERM for LMW and HMW PAHs, but only two samples exceeded the ERL for the HMW PAHs. This indicates that all the samples have the potential for both chronic and acute toxicity on marine organisms.

Table 3: Results of the Gorham test

Sample Number	Sample Name	LMW-ERL exceeded	LMW-ERM exceeded	HMW-ERL exceeded	HMW-ERM exceeded
MAR00856.004	BH-34 / ES204 / 1.00m-1.50m	TRUE	TRUE	TRUE	TRUE
MAR00856.005	BH-34 / ES205 / 2.00m-2.50m	TRUE	TRUE	TRUE	TRUE
MAR00856.006	BH-34 / ES206 / 3.00m-3.50m	TRUE	TRUE	TRUE	TRUE
MAR00856.007	BH-34 / ES207 / 4.00m-4.50m	TRUE	TRUE	TRUE	TRUE
MAR00856.008	BH-34 / ES208 / 5.00m-5.50m	TRUE	TRUE	TRUE	TRUE

15. **Major Comment**: I would therefore recommend that the material surrounding Sample Station Borehole 34 is excluded from disposal to sea given the significantly elevated levels of contamination.

16. Sample MAR00829.020-29 and MAR0856.001-003 also show elevated levels of hydrocarbons however, on reviewing the results against the Gorham Test, no samples exceeded the ERM or ERL for the LMW nor HMW hydrocarbons.

17. The PCB results show generally high levels of PCBs. ICES7 does have an associated Cefas AL 1 (but no AL 2). As there is no Action Level 2, I have used the value in the most recent action level review as it is currently the most up to date evidence. The values do not exceed the Action Level 2, however one sample (MAR00856.004) is close at 0.0876 ppb, however this sample is part of Borehole 34 which is already recommended for exclusion from sea disposal.

18. All sample results show levels below AL 1 for the sum of 25 pcb congeners (∑25) but no sample exceeds the AL2, although there are samples with levels which approach AL2. The PCB results, taking into account the historic use of the Tees, show that the material is suitable for disposal to sea however given the elevated levels observed, I would recommend that any future sample plans also recommend PCB analysis.

Summary

19. Given the elevated levels of multiple determinands across the depth to be dredged, I recommend material from, and immediately surrounding Borehole 34 is excluded from disposal to sea. In my opinion, all other material is suitable for disposal to sea however, this will require revision following the results from the PBDE analysis.

Dr Jemma Lonsdale
Senior Advisor

Quality Check	*Date*
Sylvia Blake	06/04/2021