

MLA/2020/00506 Variation 2 - Cefas Consultation Comments

SEAL (Dredge and Disposal) Team

In response to a request by Cefas to confirm the existing and proposed volumes; the applicant has responded by directing Cefas back to the variation paper reviewed at the previous consultation. This paper is written to refer to each currently licensed activity, which, whilst effective for licensing purposes, remains ambiguous as to the exact change to the volumes that are being proposed. It would have been clearer if the volumes had been described before listing the changes to the licence. Ultimately this does not change my conclusions.

The second response relevant to my previous advice was to a question asking why only a subset of samples were tested for polybrominated diphenyl ethers (PBDEs), whereas all samples were tested for all other contaminants. The applicant explains that, as the rest of the sampling (i.e., not including PBDEs) was conducted prior to obtaining a sample plan, a “precautionary approach” was taken, in that, samples which comprised glacial deposits and geological material (glacial till and Mercia mudstone) were tested for contaminants. Then, on receiving the sample plan, the applicant tested only those sample not deemed exempt under OSPAR (i.e., not the samples of glacial till and mudstone).

It would have perhaps been easier if sampling had not started until provision of the sample plan, though such advice is not essential. The samples of glacial till and mudstone which were tested for contaminants other than PBDEs show levels of some organic contaminants (organotins, PCBs, OCs) to be broadly below the limit of detection, which supports their exemption under the OSPAR guidelines. However, I note that PAHs are either consistent throughout the samples – the levels in glacial till and non-glacial/geological material are similar – or are higher in the samples of glacial till. Ultimately, the PAH levels in these samples are not of concern (please refer to previous advice (Joe Perry, 3rd August; 16th November 2022)).

It is potentially concerning that samples of glacial till/mudstone show levels of contaminants which are comparable with those within shallower layers of sediment. The OSPAR exemption for glacial deposits / geological material is based on the assumption that such types of sediment will not have been exposed to pollutants due to their transport pre-dating industrial activity. It could be the case that the PAH levels observed reflect the background concentrations – as PAHs do occur naturally – but there is a lack of data to confirm or deny this. PBDEs, by comparison, are entirely man-made, and so, given their concentrations within the samples tested, and comparing these to the trends of other man-made contaminants (organotins, PCBs OCs), PBDEs are unlikely to be present at concentrations which would require restrictions in the glacial till / mudstone samples.

Applicant Actions:

1. Please review table 1, provided to you in RFI 18. This table was compiled by Cefas to base their assessments upon. The MMO require you to confirm whether their interpretation of the proposed changes as depicted in Table 1 is correct. Please clearly state whether this table is correct or not. If not, please explain what is incorrect and offer an alternative in a similar format.

Coastal Processes

The question posed by the MMO during the first round of advice asked whether the increase in the amount of material to be disposed of to sea was appropriate and within the scope of the methods previously assessed. My response highlighted that it was unclear whether the quantities were within the scope previously assessed and that the dredge depth had lowered to beyond that previously assessed.

The applicant's latest response has not particularly clarified why the quantities previously quoted were not consistent and has now additionally stated that "...total dredge volume does now exceed the total dredge volume assessed within the ES. However, the material to be dredged was always going to be removed...", which still seems to be slightly contradictory.

Thus, in response to the original questions posed, it is seemingly the case that the new application does go beyond the ES scope (in respect of the project total volumes).

However, the additional information now provided does clarify whether the new phase 1 volumes in isolation are of particular concern – the volume to be disposed (in this application/phase only) is within the range modelled in the ES and so the previous impact assessment (of water quality and sediment plumes) is sufficient to cover this activity. It is also noted that the approach taken has been previously agreed as not requiring further EIA, therefore I do not believe there are any further clarifications required for this activity.

Previous advice also noted that the dredge depth increase to -15.9m (an increase of 0.3m beyond that assessed in the ES) did exceed the original scope. The applicant's response to the MMO's subsequent enquiry regarding hydrodynamic modelling notes that the target depth has not increased, but that the tolerance required to ensure this depth is achieved has increased the depth by the stated amount. This is as previously understood and so it is clear from the response that the hydrodynamic modelling has not accounted for the additional 30cm. I am not familiar with the modelling and am unable to comment with certainty as to whether this is a significant change, but I would consider it very unlikely to significantly alter the hydrodynamic consequences (and hence the impact significance) of the berth dredge.

Applicant Actions: None

Fish and Fisheries

I recognise that the Tees Bay C disposal site (TY150) was licenced some time ago and that disposal of marine sediments has been occurring at the site since at least 1999. To the best of my understanding and referring to the description of the disposal site given in the original environmental impact assessment (EIA) for the South Bank Quay project (as described in document 11, Section 26.3.1 and Section 3.8), usage of the Tees Bay C disposal site is relatively low. In addition, I note that recent advice provided by Cefas' specialist advisors for sediment quality (SEAL) highlights that the current volume of material consented to be disposed of at the Tees Bay C site is very high relative to the quantities which the site has historically received. It is also highlighted that increasing the volume of material to be disposed of at sea, within the permutations of the proposed variation, is likely to exceed the quantities which Tees Bay C has received in most years in total, which I agree is a sensible consideration. Within the scope of this consultation, I am unable to comment in relation to the likely impacts on fish receptors from the proposed increase in material to be disposed of at sea. To provide such comments, I would require sight of the relevant impact assessment documentation associated with the Tees Bay C disposal site, in order to determine whether the increased dredge and disposal quantities (of sand and clay) proposed are in line with and within the scope of the quantities permitted and impacts assessed. If this is available, I request that the MMO provide the Environmental Statement or similar relevant supporting evidence that were presented at the time when Tees Bay C was permitted as a disposal site.

It is outside of my remit as a fisheries advisor to comment on the suitability (i.e., in relation to material type and possible contaminant level) of the material for disposal at sea and I defer to Cefas specialist SEAL advisors.

The following comments relate to impacts on fish receptors from the proposed works solely within the Tees Estuary. Impacts to fish from disposal of additional material at sea (i.e., at Tees Bay C) are not discussed.

I appreciate that the Applicant has provided brief reassessments of marine water and sediment quality (document 6, 2.1) and hydrodynamic and sedimentary processes (document 6, 2.2), with regards to whether the changes proposed in the variation will cause conditions outside of those that have already been evaluated or modelled. Whilst it is outside of my remit as a fisheries advisor to comment specifically on these topic areas, I note that the Applicant considers that only potential increases in suspended sediment and effects upon water quality are likely to be associated with the increased dredge volumes and recognises that there may be resulting secondary effects on fish receptors. The Applicant therefore concludes that "there are not anticipated to be any effects upon marine ecology, fish or ornithological receptors beyond those concluded within the EIA Report previously submitted". In my opinion, there are some gaps in the information provided and it would be helpful if the Applicant could provide further clarification on the following points.

With regard to the additional material to be removed, under the proposed variation there would be a significant increase in the quantity of clay to be dredged from the channel and berth pocket, increasing from 165,000 m³ to 581,000 m³ (as per document 5). I note from document 8, that the additional material which is proposed to be removed from the channel and berth pocket under this variation is not only clay but is also considered to be 'made ground' in areas. For the purposes of determining whether potential impacts to fish from the proposed

changes are sufficiently negligible for the conclusions of the EIA to remain valid, it would be useful to understand what proportion of this material is consolidated and non-consolidated clay.

Material Type

The reason for this is that increases in suspended sediment concentration in the water column and plumes of suspended sediment created as a result of dredging activity, are known to impact fish ecology and physiology in a number of ways (please refer to Annex 2 for details). It is likely that greater concentrations of non-consolidated finer sediments, such as clay, will remain suspended in the water column for longer than coarser sediments, such as sand, which will settle gradually following the cessation of the activity. Fine sediments such as clay are of greatest concern in relation to fish receptors as there is potential for such sediments to clog gills, which can potentially inhibit respiration and encourage disease and parasites. For example, juvenile rainbow trout exposed to varying concentrations of clay-type material displayed visible aggregation of sediment in the epithelium of their gill filaments and lamellae (Goldes et al., 1988). It should also be noted that the physical characteristics of the sediment (source material, size and angularity of particles) and the immediacy of the response (responses in the short-term may include elevated stress hormones and reduced feeding, in the intermediate-term responses may include interrupted gas exchange due to gill damage and lower tolerance to disease) can influence how fish receptors are impacted (Kemp et al., 2011). Cefas fisheries advisors raised concerns in relation to impacts on fish from increased suspended sediment concentrations repeatedly during previous consultations^{1,2}. With this in mind, it would be helpful if the Applicant could please provide a more detailed reassessment or discussion of how the additional dredged material is likely to compare with the suspended sediment concentrations and plumes modelled within the original EIA, in order for me to determine whether impacts from the proposed variation are sufficiently negligible. Please note that I am not recommending additional modelling is necessary at this stage.

In addition, I notice from documents 8 and 9 that the additional material will be removed from a section of riverside between the existing OSPAR/mean-high-water-spring mark and the new quay wall (highlighted in pink in Annex 3). It is indicated that some of this additional material will be extracted from an area bordering the existing contaminated material exclusion zone. It should be noted that disturbance and removal of sediments, using both land-based excavators and cutter suction dredging, in close proximity to the contaminated material boundary has the potential to cause the resuspension of contaminated sediments. In particular, where consolidated clay is removed, organic matter and contaminants imbued within the clay soils may be released into the water column. Fine sediment particles (<63 µm) are understood to be the sediments of greatest concern with regard to contaminants, showing a high affinity to combine with soluble metals, and organic contaminants and materials (Kemp et al., 2011). Such increases in bioavailability of contaminants through resuspension of contaminated materials has the potential to impact fish health and physiology. Therefore, it would also be useful if the Applicant could please clarify whether any mitigation associated with dredging activity in proximity to the contaminated material boundary is proposed to minimise the resuspension of contaminated sediments.

Dredging Method

With regards to the method by which the additional material will be removed, I note from document 8 that the Applicant has described that all the 'made ground' within the extended dredge area will be removed using land-based excavators and recovered to shore. The remaining clay material will be removed as part of the capital dredging campaign using a cutter suction dredger. Use of cutter suction dredging machinery was permitted under the first variation of the South Bank Quay marine licence, which was issued in August 2022, however, impacts to fish arising from this method of dredging were not included in the original project EIA. To the best of my knowledge, Cefas fisheries advisors were not consulted in relation to this first variation and so have not had the opportunity to provide comments on the amended methodology.

To my understanding, in cutter suction dredging, the cutter head works to loosen material by boring through the riverbed in a rotational motion and loosened material is then drawn into a suction pipe. This is somewhat different to the backhoe and trailing suction hopper dredging methods which were assessed in the original project EIA, whereby material is removed by being scooped up by a hydraulic excavator (backhoe dredging) or where material is collected by an enclosed drag head and drawn into the suction pipe (trailing suction hopper dredging). By comparison, the rotational cutting of sediment by cutter suction dredging may have greater potential to release suspended sediment into the water column, thus it may be likely that greater concentrations of suspended sediments are observed as a result of this method. Suspended sediment is of concern in relation to fish receptors for the reasons outlined in comment 20 above, and in previous advice.

However, elevated suspended sediment concentrations also have the potential to deplete levels of dissolved oxygen (DO) in the water (hence there are monitoring conditions attached to the marine licence for this project). As there is no reference to the use of cutter suction dredging in the original project EIA (document 11) and Cefas fisheries advisors were not consulted in relation to the change in methodology, it is unclear to me whether or not the impacts to fish receptors associated with this cutter suction dredging are in line with those originally assessed. I recognise that the use of this method has already been permitted under a previous licence variation, however for the purposes of determining whether impacts to fish receptors from the latest proposed variation are sufficiently negligible, it would be helpful if the Applicant could please clarify how the impacts associated with cutter suction dredging compare to methods already assessed within the original EIA. It would also be useful if the Applicant could please clarify whether any mitigation associated with cutter suction dredging (such as shielding or enclosing of the cutter head to contain disturbed sediment) has been proposed.

Dredging Schedule

Finally, in relation to an amended dredging campaign schedule, the Applicant states in document 6 that "whilst MLV [marine licence variation] 2 requests an increase to the disposal volume, this total volume is less than what was modelled as part of the Hydrodynamic and Sediment Plume Modelling report. As such, there is no change to the required durations of dredging as proposed and assessed as part of MLV1." As far as I am aware, Cefas fisheries advisors were not consulted in relation to the first licence variation for this project and so it is unclear whether the dredging schedule related to this current variation is consistent with that assessed within the original EIA. In the original project EIA (document 11, section 3.9), it was indicated that capital dredging activities for Phases 1 and 2 of the South Bank Quay project had an expected duration of 4-5 months if combined (or 2 months and 3 months respectively if completed separately), assuming all dredging plant and machinery were working at full capacity and without any restrictions. It was also indicated that works would be undertaken 24 hours per

day for 7 days each week for the duration. In my opinion, this represents an already high intensity dredging programme and similar concerns were raised to the MMO and the Applicant in previous consultations for this project¹. Given that this current variation relates to the removal of an additional 416,000m³ of clay material from the channel and berth pocket, and an additional 29,000m³ of sand material from the Tees Dock turning circle, it may be that an even higher intensity dredging schedule will be implemented in order for the works to be completed within the original timeframe of 4-5 months. Alternatively, a longer dredging schedule may be necessary to remove the total volume of material permitted under this licence. Additional information is needed from the Applicant in order to fully understand how the dredging schedule has or will be amended to incorporate the removal of the additional material.

I would reiterate that there remains considerable potential for cumulative impacts to arise from the dredging works at South Bank Quay with other work involving dredging activities within the River Tees (such as the Northern Gateway Container Terminal (NGCT), the Anglo-American Harbour Facilities project and ongoing maintenance dredging works), as raised in previous consultations¹. I recognise that the marine licence issued in relation to this project carries various conditions which require the Applicant to liaise with other operators, restrict dredging to one side of the channel at any one time, and carry out a scheme of monitoring in order to ensure that potential cumulative effects on water quality are managed and monitored. However, I think it important to restate that Cefas fisheries advisors were not involved in the design of the water quality monitoring scheme but were consulted on its suitability. Please refer to previous consultations for further comments². In previous fisheries advice¹, advisors highlighted that the sediment plume arising from the proposed dredging regime had the potential to influence a cross sectional area of river and be observed for the whole dredging continuous period of 4 months. It was noted that this, alongside other construction activities, had the potential to create physical and acoustic barriers to migrating fish. Given that the Tees Estuary is recognised as the main salmon river in England and Wales with a Salmon Action Plan enforced by the Environment Agency, and in relation to my comments above (comments 20 and 25) regarding the removal of the additional material and possible changes to the anticipated dredging schedule, please can the Applicant provide further information on how the South Bank Quay works fit within the wider dynamic environment of development works in the River Tees? An overview or timeline of the project alongside other relevant ongoing and nearby works with dredging elements would suffice at this stage.

Summary

At this time, I am unable to provide comments on the likely impacts to fish receptors from proposed increases in material to be disposed of at sea as baseline information relevant to fish receptors at the disposal site has not been made available. I would be grateful if the MMO could please provide this additional documentation.

In relation to impacts to fish receptors from works within the Tees Estuary, in my opinion, there are gaps in the information provided by the Applicant to support their request to vary the current marine licence to incorporate additional dredging activities. Further clarification is requested in relation to the additional material to be removed, and the method and schedule under which it will be removed, in order for me to determine whether impacts from the proposed variation are sufficiently negligible. It would also be beneficial to fully understand how the

scheduling of the dredging works under the proposed variation will align other ongoing dredging works within the Tees River, as concurrent dredging campaigns are likely to generate cumulative impacts which have the potential to negatively impact migratory fish receptors.

Applicant Actions:

1. MMO require an impact assessment regarding fish / fishery impacts from increased disposal.
2. Please provide information on what proportion of the material is consolidated and non-consolidated clay.
3. MMO require a more detailed reassessment or discussion of how the additional dredged material is likely to compare with the suspended sediment concentrations and plumes modelled within the original EIA. The MMO do not require additional modelling at this time.
4. MMO require clarification whether any additional mitigation (outside of that detailed in condition 5.2.11) associated with dredging activity in proximity to the contaminated material boundary is proposed to minimise the resuspension of contaminated sediments.
5. MMO require clarification whether any mitigation associated with cutter suction dredging (such as shielding or enclosing of the cutter head to contain disturbed sediment) will be used.
6. MMO require additional information to fully understand how the dredging schedule has or will be amended to incorporate the removal of the additional material.
7. MMO require further information on how the South Bank Quay works fit within the wider dynamic environment of development works in the River Tees. An overview or timeline of the project alongside other relevant ongoing and nearby works with dredging elements would suffice at this stage.

Shellfish

The EIA report (PC1084-RHD-SB-EN-RP-EV-1100, 2020) concluded that adverse effects as a result of the proposed scheme on shellfish would be negligible. The degree to which the increase in amount of material disposed at sea would affect shellfisheries is unclear and would need remodelling and assessing. Without this information I cannot comment on whether the proposed works would have an impact on shellfisheries.

Increased suspended sediment concentration (SSC) can affect an organism's filter-feeding mechanisms and its ability to respire and excrete. Behavioural and biological responses to an increase in SSC will increase energetic costs and may cause metabolic stress and, potentially, mortality. The likelihood of mortality increases with longer levels of exposure (John et al., 2000), and other effects may include reduced growth rates, reduced feeding efficiency and weakened shells.

Juvenile and larval shellfish are more sensitive than adults as they have more limited mobility and hence are less capable of avoiding affected areas (Appleby and Scarratt, 1989).

Modelling and assessment using the new variables would be required to assess the impact on shellfisheries of an increase in the quantity of material being permitted to be dredged and disposed of at sea. Without this information I cannot comment on whether the impacts on receptors are within the scope of that previously assessed.

Applicant Actions:

1. MMO require modelling and an assessment using the new variables to assess the impact on shellfisheries of an increase in the quantity of material being permitted to be dredged and disposed of at sea.

Benthic

To unequivocally answer this [whether the increase in the amount of material to be disposed of to sea likely to impact upon receptors covered by this specialism], I would need to see a full assessment of the significance of the potential impacts on benthic ecology receptors of the revised licence conditions. Thus, I cannot currently provide a view regarding the acceptability of the proposed changes without this assessment being undertaken.

I just want to reiterate my comment in response principally to question 1. To answer such a question from a benthic ecology advisor perspective, one would need to consult/review an assessment of the implications of the change in the licence variation request, not merely having access to information regarding the material change (e.g., the increased tonnage) in the licence request. In the document cited in Comment 8 above, it states “*In light of the review of the marine water and sediment quality assessment and hydrodynamic and sedimentary processes, it is considered that the conclusions of previous assessments presented within the EIA Report (Royal HaskoningDHV, 2020) submitted in support of the original marine licence application remain valid for the changes applied for in MLV2*”. One would need to appraise the justification for this verdict as opposed to making the assumption that it has been founded on credible science.

Applicant Actions:

1. Please provide an assessment of significance of the potential impacts on benthic ecology receptors.

References

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Goldes, S.A., Ferguson, H.W., Moccia, R.D. and Daoust, P.Y., (1988). Histological effects of the inert suspended clay kaolin on the gills of juvenile rainbow trout, *Salmo gairdneri* Richardson. *Journal of Fish Diseases*, 11(1), pp.23-33.

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John, S.A., Challinor, S.L., Simpson, M., Burt, T.N. and Spearman, J. (2000). Scoping the assessment of sediment plumes arising from dredging. Construction Industry Research and Information Association (CIRIA) Report C547.

Kemp, P., Sear, D., Collins, A., Naden, P. and Jones, I., (2011). The impacts of fine sediment on riverine fish. *Hydrological processes*, 25(11), pp.1800-1821.

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Schleiger, S.L. (2000). Use of an index of biotic integrity to detect effects of land use on stream fish communities in wet-central Georgia. *Trans. Am. Fish. Soc.* 129: 1118-1183

Annex 2 Potential impacts to marine and migratory fish from dredging and disposal of marine sediments

The Tees Estuary represents the main salmon river in England and Wales (with a Salmon Action Plan enforced by the Environment Agency) and migrating fish must travel through this region of the Tees river twice, once on their way towards natal spawning grounds upstream and again upon their return to the sea after spawning. Elevated concentrations of suspended sediment resulting from dredging and disposal of marine sediments can have the following physical effects on all life stage of fish, particularly salmonids:

- I. Damage to gills as a result of erosion of the mucus coating and abrasion of tissue (Redding and Schreck, 1982). The extent of damage depends on size and shape of particles, suspended sediment concentration, water velocity and gill dimensions (Appleby and Scarratt, 1989). Fish species have been found with increasing levels of deformities, eroded fins, lesions, tumours, gill flaring and 'coughing', all related to increasing SS in the water column (Berg, 1982; Schleiger, 2000).
- II. Disruption of gaseous exchange by fine particles which bind with the gill epithelium and clog gill rakers and filaments.
- III. A reduction in feeding and foraging effort by visual predators as a result of increased turbidity (Henley *et al.*, 2000).
- IV. An increase in respiration and heart rate (Redding and Schreck, 1982).
- V. An increase in energy expenditure and reserves resulting from the above impacts is likely to inhibit migration activities for species such as sea trout and river lamprey as they attempt to negotiate estuarine environments on their upstream migrations.
- VI. Entrainment of demersal and benthic fish, fish eggs and larvae taken up through the drag head of the dredger.
- VII. Potential disturbance caused by underwater noise from the dredging process.
- VIII. Reduction in suitable spawning habitat and declines in egg/early life stage success.

Settlement of sediment around areas of dredging and disposal can have the following impacts:

- I. Smothering of benthic foraging grounds by settlement of sediment.
- II. Smothering of benthic eggs and larvae by settlement of sediment.
- III. Reduced oxygen levels in water due to release of sediments containing high organic matter.
- IV. Exposure to contaminants contained within dredged sediment.

- V. Re-suspension of sediments causes nutrient enrichment promoting the formation of algal blooms, causing a reduction in water quality by decreasing oxygen levels or release of toxins.
- VI. Resuspension of sediments resulting from dredging can smother organisms and hinder growth, feeding and survival rates (Gilmour 1999; Kemp *et al.*, 2011).