**Marine Licence Variation 2 – Options Paper**

## 1. Introduction

The changes being sought in Marine Licence Variation 2 are:

1. Dredging of the Berth Pocket to a level of 15.9m bCD. The design dredge level within the berth pocket is at a level of 15.4m bCD; this increase to 15.9m bCD is required to allow for 500mm of dredging tolerance in the Berth Pocket, due to the dredging equipment being utilised for the works. To incorporate this change to the dredge depth of 15.9m bCD, section 'Site 5' under 'Activity 5.1' will also need to be updated to take cognisance of the dredge depth being 15.9m CD.

2. An increase in the quantity of material being permitted to be dredged and disposed of at sea. The additional material for disposal at sea is to be dredged from the area highlighted green in Figure 1 between the existing OSPAR/MHWS line and the new quay wall. The extents of this for the site are demonstrated on Figure 2 (highlighted magenta) and on drawing SBQ1-GCL-ZZZ-SBKXX-DR-WM-0008 C01.

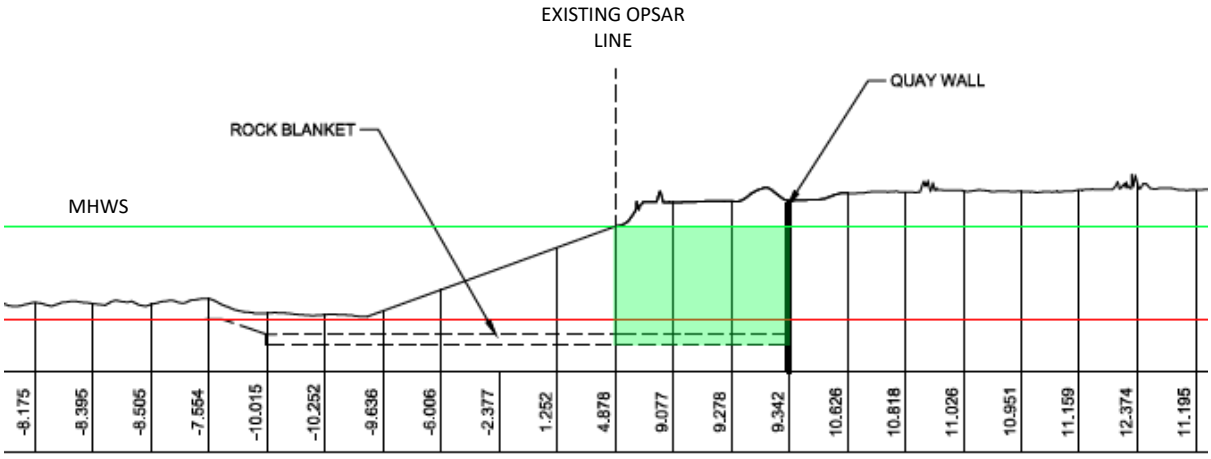


Figure 1: Cross Section with highlighted area showing the area between the existing OSPAR line and the newly constructed quay wall

Partial removal of the material in this area will be carried out using land-based excavators and recovered to land (in line with the current Marine Licence). This partial removal includes all made ground and all material which has been identified as having action level 2 exceedances (this is further elaborated in Section 4 and 5).

Once the partial removal material has been completed, we propose that the remaining material shall be removed as part of the capital dredging campaign and disposed of at sea. This will increase the total volume of material being disposed of at sea. This variation will require the licenced quantities to be updated to reflect this.

This approach has been discussed and agreed in principle with MMO/ Cefas during our regular project update meetings which have been taking place since the outset of the project.

Adopting this approach will make the use of the Cutter Suction Dredger more economically viable but will also generate a number of other benefits to the project and other stakeholders, such as:

- Anticipated efficiencies in the programme for the capital dredging campaign
- Reduced impact on the environment
- Reduced impact on other river users such as vessels and other operational facilities.

This note will outline the process which has been undertaken in developing the option which is presented in this paper.

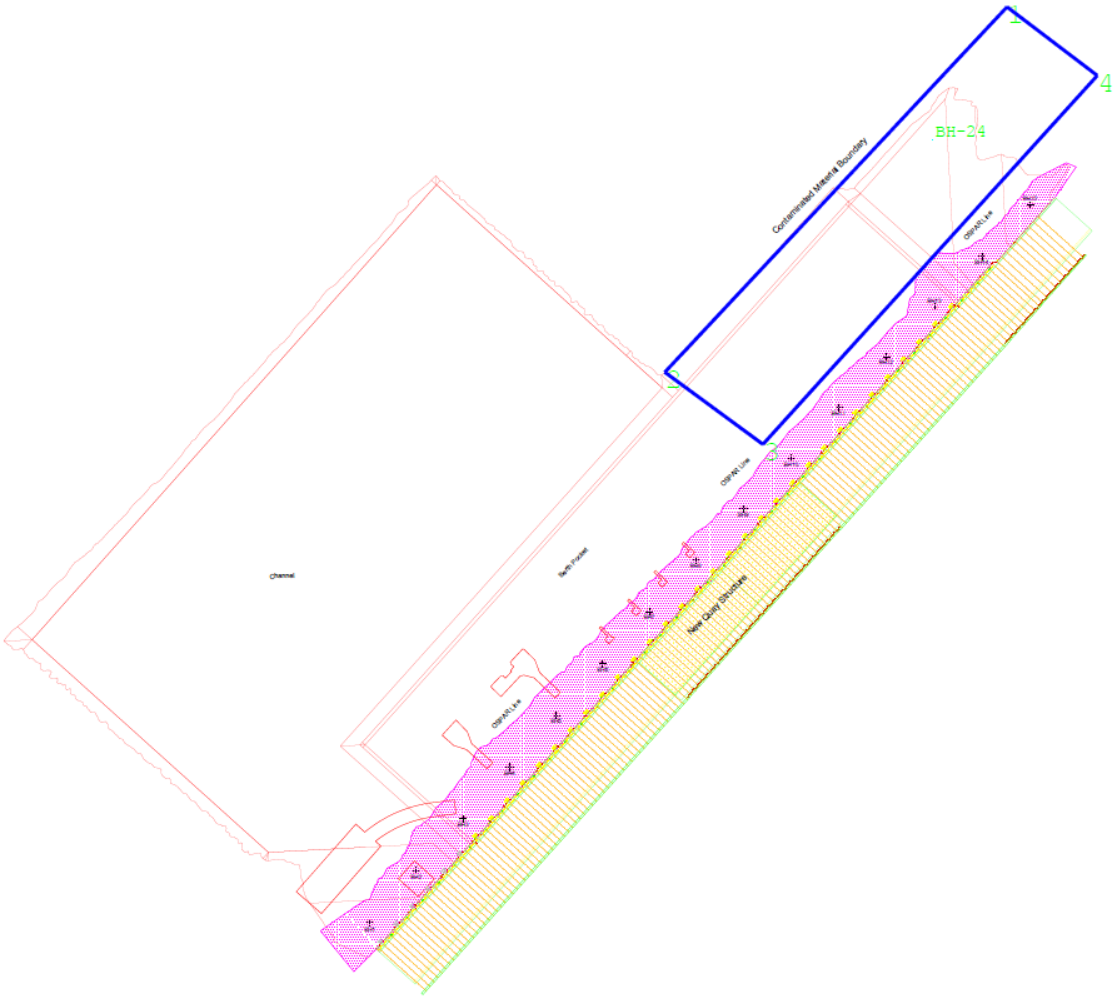


Figure 2: Plan with the highlighted area showing the area between the OSPAR line and the newly constructed quay wall

## 2. Background

A general enquiry (ENQ/2021/00205) was submitted to the MMO on 14 December 2021 to consider the suitability of this material being disposed offshore. The response to this request was

- *The MMO considers that the proposed works are feasible under OSPAR. The works have similarities to other works that have previously been licensed in England, for example from port constructions that change the boundaries of MHWS.*
- *The MMO are of the opinion that samples are required to assess the suitability of the material for disposal at sea, and given there is likely to be water ingress, the samples can be taken prior to the inundation of the area. Sampling requirements can be considered further through a request for a sample plan via MCMS.*
- *It is likely that we will advise that samples are taken for the full vertical area of material to be dredged and disposed of to sea and that a full suite of analyses, including polybrominated diphenyl ethers, are carried out, given the location of the Tees. This will be determined on response to the sample plan request.*

On 11th April 2022 a sampling plan (SAM/2022/00019) was received from the MMO which noted:

- *The MMO agree that the Mercia Mudstone present within the Tees meets the OSPAR exemption criteria around "undisturbed geological material"… As such, the MMO agree that these two types of material can be exempted from sampling.*
- *Eight sample stations have been proposed by the applicant, which is in line with OSPAR guidelines which recommend seven to fifteen stations for dredges between 100,000 m³ and 500,000 m³. The MMO agree that this is an appropriate number, though would also consider seven sample stations to be sufficient.*
- *Samples should be taken at the surface (0 metres depth) and at 1m depth intervals*
- *analysis is… required for*
    - *Trace metals including arsenic;*
    - *Organotins;*
    - *Polycyclic Aromatic Hydrocarbons (PAHs);*
    - *Polychlorinated Biphenyls (PCBs);*
    - *Polybrominated Diphenyl Ethers (PBDEs) and;*
    - *Particle size analysis (PSA).*

## 3. Sampling & Testing

In response to the sampling plan response and to inform the decision-making process in the formulation of our proposals, 15 No. boreholes (the locations of which can be seen in Figure 3) were completed on the South Bank Quay Phase 1 project. These were carried out between the OSPAR line and the new quay wall line, during February and March 2022.

### 3.1 Borehole Logs

The borehole logs can be found in document "Final BH01-BH15 Logs" which have been supplied with this variation request. These show the levels of the various soil strata including the made ground.

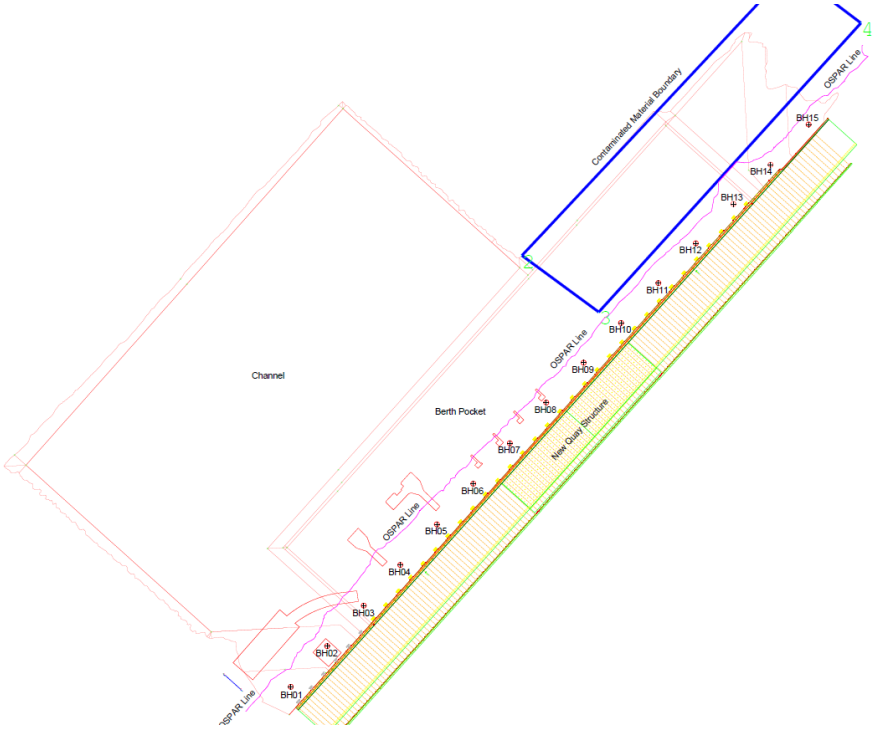


Figure 3: Plan showing the locations of the 15no. boreholes which were conducted between the quay wall and the OSPAR line

Table 1 summarises the bottom of made ground levels for each borehole.

| Borehole | Made Ground Level (m CD) |
|---|---|
| BH01 | 2.00m CD |
| BH02 | 1.66m CD |
| BH03 | 1.68m CD |
| BH04 | 2.22m CD |
| BH05 | 2.20m CD |
| BH06 | 2.73m CD |
| BH07 | 2.22m CD |
| BH08 | 2.36m CD |
| BH09 | -0.40m CD |
| BH10 | 2.63m CD |
| BH11 | 2.86m CD |
| BH12 | 2.52mCD |
| BH13 | 2.46m CD |
| BH14 | 2.82m CD |
| BH15 | 2.49m CD |

Table 1: Summary of deepest level at which made ground was encountered in each of the 15no. boreholes conducted.

### 3.2 MMO Suite Testing

The MMO Suite of testing was completed throughout the full vertical profile of each borehole at 1m depth increments.

The results from the MMO Suite of testing were shared previously with the MMO and CEFAS in advance of this Marine Licence Variation submission. A response was received (MLA-2020-00506 Dated 27th June 2022) from the MMO containing a number of comments, which we believe we have addressed through discussion and the submission of our proposal as shown in drawing SBQ1-GCL-ZZZ-SBKXX-DR-WM-0007 C02.

Table 2 contains the contents of 'Table 2' from the MMO Letter (MLA-2020-00506) dated 27th June 2022. We have used the levels shown in this table when formulating our proposal illustrated in drawing SBQ1-GCL-ZZZ-SBKXX-DR-WM-0007 C02.

| Borehole Reference | Deepest Exclusion (mCD) in MMO Letter Dated 27th June 2022 |
|---|---|
| BH02 | +2.86mCD |
| BH03 | -0.12mCD |
| BH05 | +1.95mCD |
| BH06 | +0.93mCD |
| BH07 | -0.08mCD |
| BH08 | -0.14mCD |
| BH15 | +1.34mCD |

Table 2: Sampling Intervals with Contaminants at Concerning Levels

### 3.3 PBDE Testing

PDBE testing was completed at 1m depth increments below +4.9mCD, down to the top of the Glacial Till; as per the requirements of the Sampling plan response.

The results from the PBDE testing identified that the majority of results were below the limit of detection. Across all samples and all PBDE's not below LOD there was only one sample with a result above the lowest threshold (Cefas Action Level 1) for BDE99. This was found in BH09 at 3.9m CD.

### 3.4 Testing Summary

Table 4 summarises the required excavation levels for Made Ground, MMO suite of testing results and PBDE testing results.

| Borehole | Made Ground Excavation Level (m CD) | MMO Suite Excavation Level (m CD) | PBDE Excavation Level (m CD) | Required Excavation Level (m CD) |
|---|---|---|---|---|
| BH01 | +2.00 | - | - | +2.00 |
| BH02 | +1.66 | +2.86 | - | +1.66 |
| BH03 | +1.68 | -0.12 | - | -0.12 |
| BH04 | +2.22 | - | - | +2.22 |
| BH05 | +2.20 | +1.95 | - | +1.95 |
| BH06 | +2.73 | +0.93 | - | +0.93 |
| BH07 | +2.22 | -0.08 | - | -0.08 |
| BH08 | +2.36 | -0.14 | - | -0.14 |
| BH09 | -0.40 | - | +3.9 | -0.40 |
| BH10 | +2.63 | - | - | +2.63 |
| BH11 | +2.86 | - | - | +2.86 |
| BH12 | +2.52 | - | - | +2.52 |
| BH13 | +2.46 | - | - | +2.46 |
| BH14 | +2.82 | - | - | +2.82 |
| BH15 | +2.49 | +1.34 | - | +1.34 |

Table 3: Summary of required excavation levels for Made Ground, MMO suite and PBDE

## 4 Proposal

Drawing SBQ1-GCL-ZZZ-SBKXX-DR-WM-0007 C02 has been produced to illustrate our proposal for the removal of material between the OSPAR line and the new pile wall on the South Bank Quay Phase 1 project.

During the formulation of the proposal illustrated in drawing SBQ1-GCL-ZZZ-SBKXX-DR-WM-0007 C02, we considered alternative options, which were discussed with both the MMO and CEFAS during a meeting on Tuesday 30th August 2022. There were 3 options proposed, ranging from the least conservative, to the most conservative. The most conservative option is illustrated on drawing SBQ1-GCL-ZZZ-SBKXX-DR-WM-0007 C02. In summary the principles of our proposal are:

- Removal of all material down to +4.9m CD
- Remove all made ground as identified in the borehole logs
- Where Action Level 2 exceedances are observed below the made ground:
    - The material will be removed down to this level at the borehole where the exceedance was identified;
    - and at the two adjacent boreholes

On this basis the proposed excavation levels for the material being recovered to land have been developed. As noted in the table below the proposed excavation levels are equal to or deeper than those required from the testing.

| Borehole | Required excavation level (m CD) | Proposed Excavation Level (m CD) |
|---|---|---|
| BH01 | +2.00 | +2.00 |
| BH02 | +1.66 | -0.40 |
| BH03 | -0.12 | -0.40 |
| BH04 | +2.22 | -0.40 |
| BH05 | +1.95 | -0.40 |
| BH06 | +0.93 | -0.40 |
| BH07 | -0.08 | -0.40 |
| BH08 | -0.14 | -0.40 |
| BH09 | -0.40 | -0.40 |
| BH10 | +2.63 | +2.63 |
| BH11 | +2.86 | +2.86 |
| BH12 | +2.52 | +2.52 |
| BH13 | +2.46 | +2.46 |
| BH14 | +2.82 | +2.82 |
| BH15 | +1.34 | +1.34 |

Table 4: Summary of required excavation levels and proposed levels

Figure 4 has been extracted from drawing SBQ1-GCL-ZZZ-SBKXX-DR-WM-0007 C02, and a line added for the required excavation levels as indicated previously by the MMO/ Cefas. Figure 4 shows that the proposed excavation levels ensure that the required excavation levels will be satisfied.

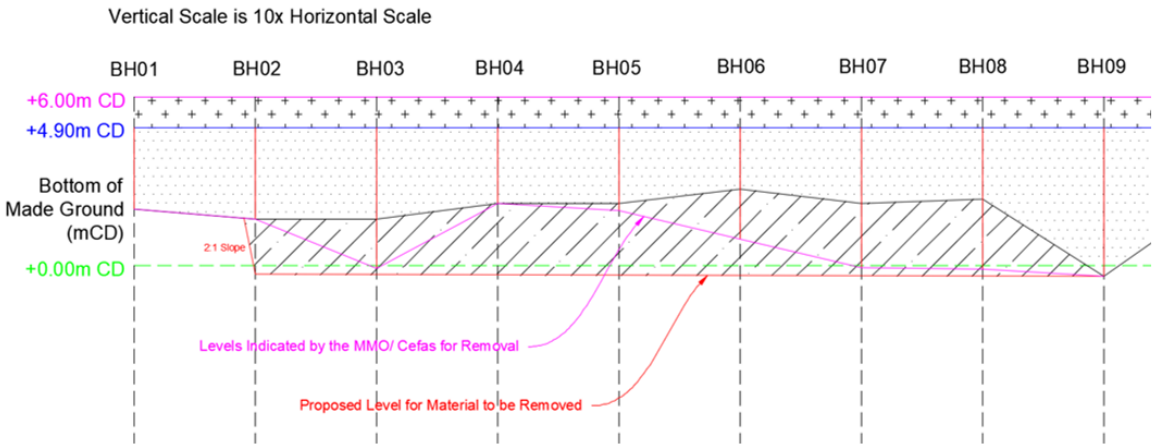


Figure 4: Example of Proposed Excavation Levels

# 5 Methodology

## 5.1 Material to be Excavated and Brought Onshore

The methodology for our proposal illustrated in drawing SBQ1-GCL-ZZZ-SBKXX-DR-WM-0007 C02 is as follows:

1. Remove all of the material above +4.9mCD down to the level of the mean high-water spring (MHWS) tide, between the OSPAR Line and the new pile wall line and bring this material to shore for disposal.
2. Work from the East (at BH15) to the West (BH01) of the project, to remove all of the made ground, which is considered material of 'non-marine' origin, and down to the at least the levels shown in Table 1, to remove any Action Level 2 (AL2) exceedances identified from the MMO Suite of Testing, and the 1 no. Action Level 1 (AL1) PBDE exceedance (identified in BH09 at +3.9mCD). This material would also be brought to shore.

The high level of sequence of work for this proposal is as follows:

a) Landside excavation techniques to be utilised.
b) Work to be completed from East to West (BH15 to BH01).
c) Remove material above +4.9mCD and bring to shore.
d) Remove the made ground between BH15 & BH14.
e) Remove AL2 exceedance from BH15 to BH14 at +1.34mCD. Slope back at 2:1 to made ground profile, after BH14.
f) Remove made ground between BH14 to BH09.
g) Remove made ground between BH09 & BH08.
h) Remove AL2 exceedance between BH09 & BH08 to -0.40mCD.
i) Remove made ground between BH08 & BH07.
j) Remove AL2 exceedance between BH08 & BH07, to -0.40mCD.
k) Remove made ground between BH07 & BH06.
l) Remove AL2 exceedance between BH07 & BH06, to -0.40mCD.
m) Remove made ground between BH06 & BH05.
n) Remove AL2 exceedance between BH06 & BH05, to -0.40mCD.
o) Remove made ground between BH05 & BH04.
p) Remove AL2 exceedance between BH05 & BH04, to -0.40mCD.
q) Remove made ground between BH04 & BH03.
r) Remove AL2 exceedance between BH04 & BH03, to -0.40mCD.

s) Remove made ground between BH03 & BH02.
t) Remove AL2 exceedance between BH02 & BH01, to -0.40mCD. Slope back at 2:1 to made ground profile, after BH14.
u) Remove made ground between BH02 & BH01.

The quantities of the material to be excavated and disposed of onshore are as follows:

- Existing Ground to +4.9mCD – 20,155$m^3$
- +4.9mCD to base of Made Ground – 59,34$m^3$
- Base of Made Ground to Base of AL2 Exceedance – 16,282$m^3$

**5.2 Material to be Dredged and Disposed of Offshore**

Once the material identified in Section 5.1 have been excavated and brought to shore. The remainder of the material, below the levels shown on drawing SBQ1-GCL-ZZZ-GCL-ZZZ-SBKXX-DR-WM-0007 C02, and within Table 4, will be dredged using a Trailer Suction Hopper Dredger (TSHD), Backhoe Dredger (BHD) or Cutter Suction Dredger (CSD), and disposed of offshore. There is also a requirement for the dredge depth to be increased to 15.9m bCD within the Berth Pocket, to allow for 500mm of dredging tolerance beyond the design level of 15.4m bCD.

To allow for this additional volume of material to be disposed of offshore, the updated total volume of material to be disposed of offshore is 1,133,000m3, an increase from the 902,000$m^3$ consented within Marine Licence Variation 1.