

BPEO Statement and Assessment of chemical and physical characteristics of the dredged material

1. Introduction

Perth & Kinross Council is the harbour authority for Perth Harbour in Scotland. Perth Harbour accepts coastal and dry bulk ships up to 90 m in length, carrying up to 2,500 tonnes from Europe, the Baltic and Scandinavia.

The harbour was last dredged circa. 2004. Recent bathymetric surveys have revealed that navigable depths are severely compromised, placing significant restrictions on harbour operations. Following a review of the harbour's Navigational Risk Assessment, the Harbour Operator identified a number of mitigations that were required to reduce the likelihood of grounding. These mitigations have had a significant impact on harbour trade.

To restore navigable depths in the harbour, two phases of dredging are proposed:

- Phase 1: an urgent small-scale plough dredging operation to remove a 'bar' of sediment that has accumulated at the harbour entrance
- Phase 2: a larger scale dredging operation to restore the harbour to its previously dredged levels.

Phase 1 will proceed as soon as a marine licence can be obtained, and this will enable the harbour to remain operational in the short-term. A separate marine licence will be submitted for Phase 2 once the dredging and disposal method options have been determined.

This document describes the Phase 1 dredging and the material to be dredged, and includes a Best Practicable Environmental Option (BPEO) Statement explaining why a full BPEO is not necessary/appropriate for Phase 1.

2. Description of proposed dredging

The area to be dredged comprises a 'bar' of accumulated material at the harbour entrance, as shown on Figure 1. The volume of material to be dredged is approximately 1,500 m³ (2,400 wet tonnes), to achieve a depth of 1.5 m below Chart Datum.

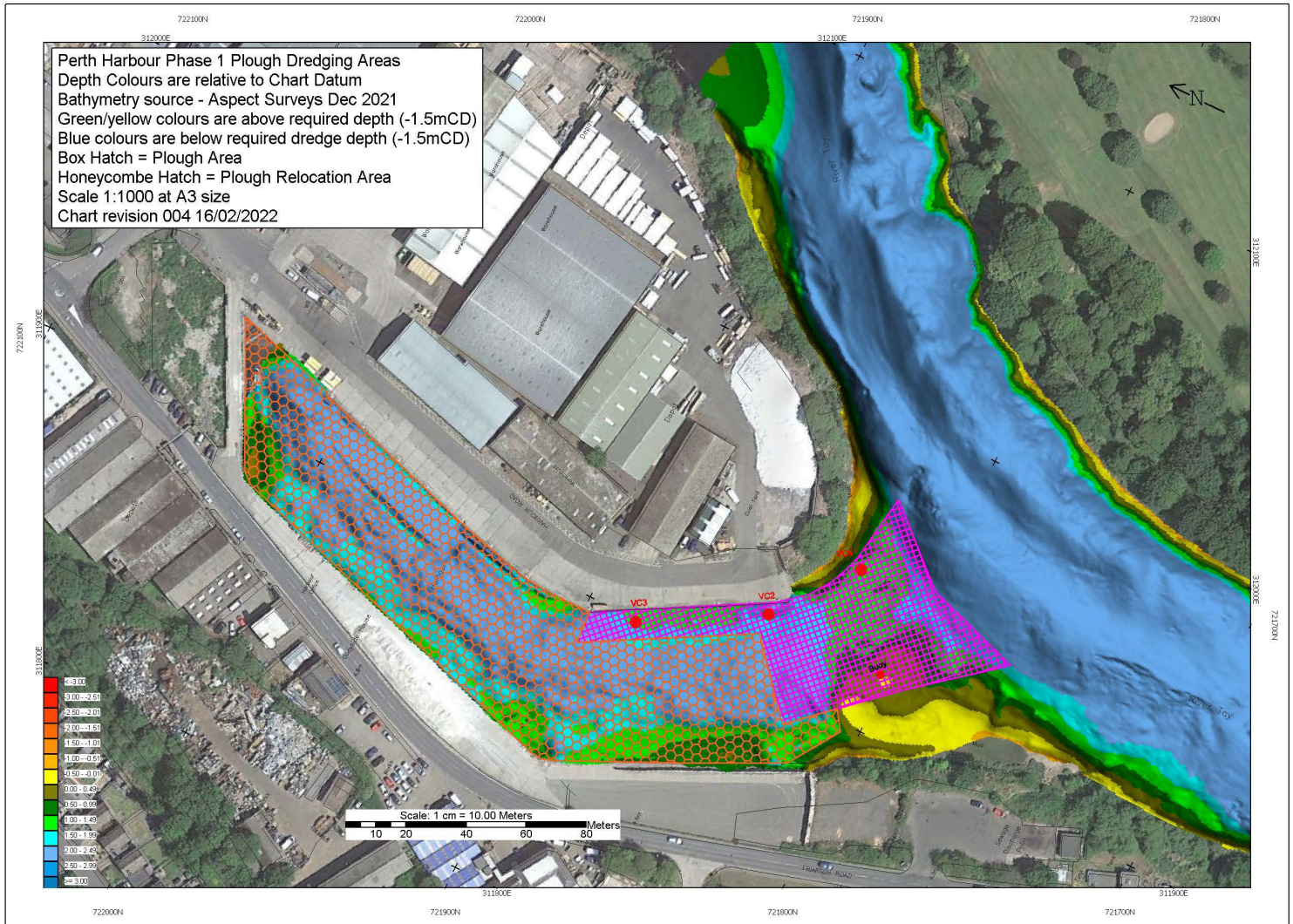


Figure 1 Dredge area and sample locations

2.1. *Material to be dredged*

2.1.1. Physical characteristics

Two surface samples taken from the dredge area in June 2021 and an additional sample taken in December 2021 (shown on Figure 1) indicate that the material is predominantly sand (average 69%) with some silt (average 30%) and minimal gravel (average 1%).

2.1.2. Chemical characteristics

The samples were analysed for the Marine Scotland suite of parameters and the results are summarised in Table 1.

The results have been compared to the Marine Scotland Revised Action Levels, which are used to determine the contaminant loading of the material and its suitability for disposal at sea. Levels of heavy metals copper and zinc were elevated above Marine Scotland Revised Action Level 1, but were well below Action Level 2.

Tributyl tin marginally exceeded Action Level 1 in sample VC2/1; all other organotins were below Action Level 1.

Total hydrocarbons exceeded Action Level 1 in two samples, but levels of polycyclic aromatic hydrocarbons (PAHs) only marginally exceeded Action Level 1 for three individual PAHs (Dibenzo(ah)Anthracene, Fluoranthene and Pyrene).

Based on the results of the sediment sampling, the material to be dredged is considered to be suitable for both dispersive dredging and disposal at sea.

Table 1 2021 sediment sampling results

Parameter	Units (dry weight)	Marine Scotland Revised Action Levels		Sample reference & date		
		AL1	AL2	VC2/1 Jun 21	VC3/1 Jun 21	VC4/top Dec 21
Heavy metals						
Arsenic	mg/kg	20	70	4.7	6.3	2.8
Cadmium	mg/kg	0.4	4	0.33	0.37	0.19
Chromium	mg/kg	50	370	26.8	34	18.8
Copper	mg/kg	30	300	39.8	33.7	15.1
Lead	mg/kg	50	400	31.2	25.9	12.9
Mercury	mg/kg	0.25	1.5	0.09	0.09	0.05
Nickel	mg/kg	30	150	21.9	25.9	13.8
Zinc	mg/kg	130	600	106	248	51.8
Organotins						
Tributyl tin	mg/kg	0.1	0.5	0.113	0.0137	0.008
Dibutyl tin	mg/kg	None exist	None exist	0.0204	<0.005	0.029
PAHs						
Acenaphthene	µg/kg	100	None exist	15.4	6.69	11.8
Acenaphthylene	µg/kg	100	None exist	5.10	8.26	2.8
Anthracene	µg/kg	100	None exist	16.1	15.4	10.1
Benzo(a)Anthracene	µg/kg	100	None exist	32.6	67.4	48.3
Benzo(a)Pyrene	µg/kg	100	None exist	45.4	72.1	52.2
Benzo(b/k) Fluoranthene	µg/kg	100	None exist	46.9	81.3	32.1
Benzo(ghi)Perylene	µg/kg	100	None exist	46.3	65.9	35
Chrysene	µg/kg	100	None exist	53	81.0	54.9
Dibenzo(ah) Anthracene	µg/kg	10	None exist	5.93	13.3	4.8
Fluoranthene	µg/kg	100	None exist	64.8	122	66
Fluorene	µg/kg	100	None exist	19.1	11.3	6.7
Indeno(123-cd) Pyrene	µg/kg	100	None exist	19.1	11.3	33.5
Naphthalene	µg/kg	100	None exist	15.6	11.3	7.9
Phenanthrene	µg/kg	100	None exist	52.3	58.2	29
Pyrene	µg/kg	100	None exist	79.6	117	65.2
Total hydrocarbons	µg/kg	100,000	None exist	327,000	459,000	97,200

3. BPEO Statement

Section 34 of the Environmental Protection Act 1990 (as amended) makes it a duty to take all measures available as are reasonable in the circumstances to apply the waste hierarchy set out in Article 4(1) of the Waste Directive. The waste hierarchy ranks waste management options according to the best environmental outcome taking into consideration the lifecycle of the material. In its simplest form, the waste hierarchy gives top priority to preventing waste. When waste is created, it gives priority to reuse, then recycling, then other recovery, and last of all disposal (i.e. landfill).

The preferred dredging method for Phase 1 is to use a plough box mounted on a small tug to move material from the bar at the harbour entrance into deeper water within the harbour, where there is sufficient capacity within adjacent areas of deeper water, as shown on Figure 1. Further information on the dredging method is provided in the Dredging Method Statement submitted with the marine licence application.

The plough dredging method eliminates the requirement for ‘disposal’ as material is redistributed from a shallow area of the harbour to a deeper area without mechanical removal of the material. All other dredging options would involve mechanical removal of the dredged material with a requirement for disposal. As such, it is possible to conclude without a detailed assessment of all potential disposal options that plough dredging to retain material within the harbour area is the BPEO as it eliminates the requirement for disposal.

For the larger-scale Phase 2 dredging operation described in Section 1, mechanical removal of the dredged material is likely to be required, and a full BPEO assessment will be carried out to support the marine licence application.

Document history

Document Reference	Date	Notes
P2021-03-BPEOP1-R1	22 December 2021	Draft for client review
P2021-03-BPEOP1-R2	6 January 2022	Final issue
P2021-03-BPEOP1-R3	16 February 2022	Updated dredge plan and sample results