



Poole Harbour Commissioners

FEPA Licence Ref 32691/06/0

Poole Harbour Approach Channel Deepening

**Report on Harbour Monitoring
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1. Introduction

- 1.1 Over the winter of 2005/06 Poole Harbour Commissioners carried out a capital dredge of the approach channels to the Port. The work involved dredging of approximately 2.12 million cubic metres of material to deepen the channels to a navigation depth of 7.5m below Chart Datum, and widen the Middle Ship Channel to 100m.
- 1.2 Of the dredged material, approximately 1.15 million cubic metres was sand, which was placed on beaches at Swanage, Poole and Bournemouth for beach nourishment/coast protection. The remainder, consisting of silts and clays, was placed in the south west quadrant of the licensed disposal ground centred on 50° 37.5' N 1° 52.6' W.
- 1.3 The work was carried out following the completion of extensive studies and the publication of 'Poole Harbour Approach Channel Deepening and Beneficial Use of Dredged Material, Environmental Statement' (ES) in November 2004. Following approval of the ES, a licence was issued under the Food & Environment Protection Act 1985 (FEPA).
- 1.4 Conditions of the FEPA Licence 32691/06/0 required a degree of monitoring and reporting, both during the execution of the works and over the subsequent period. The Conditions also called for the Sediment Management Plan dated 16.06.05 to be implemented to reduce the total amount of fine material lost from the Harbour system, both by natural means and as a result of maintenance dredging.
- 1.5 This report carries a brief summary of the monitoring so far, together with information on progress of on-going work. Completed technical reports are attached as appendices and references to relevant reports are made under each main heading.
- 1.6 This report and all appendices will be available to be downloaded from the Poole Harbour Commissioners' website www.phc.co.uk.

2. Suspended Sediments

- 2.1 The following technical reports are attached as appendices:

Appendix I	<i>Measurement of Metocean and Other Parameters within Poole Harbour, Dorset, during Dredge Operations (09/11/05 – 22/02/06)</i> Partrac Ltd, Report Ref: PHC\SSM\009
Appendix II	<i>Measurement of Suspended Sediment Concentration and Tidal Current during Dredging Operations and Post-Dredge at the Offshore Disposal Area, Poole, Dorset</i> Partrac Ltd, Report Ref: PHC\SSM\010
Appendix III	<i>Measurement of Suspended Sediment Concentration Profiles During a Dredge Overflow Pumping Exercise, Poole Harbour, Dorset</i> Partrac Ltd, Report Ref: PHC\SSM\011

- 2.2 Monitoring was carried out on suspended sediment levels during the works, both within the Harbour and in the vicinity of the disposal ground, as a requirement of the initial approvals. The near surface suspended sediment concentrations were measured by Van Oord UK Ltd, the dredging contractor, whilst bed sedimentation was measured by Partrac Limited. The information gathered has been collated and reported by Partrac in the above-mentioned reports.
- 2.3 The report on the measurement of metocean and other parameters within Poole Harbour concluded that the main risk of sediment suspension within the Harbour arose from wind generated wave action. It was found that in a situation where this was coupled on rare occasions with a prolonged high tide “stand”, as can occur during neap tides under certain conditions, appreciable deposition of silt can occur over short time periods. The work suggested, however, that under normal circumstances the sediment disturbed under dredging operations in the Harbour would not have an adverse effect.
- 2.4 Measurement of suspended sediment conditions at the offshore disposal area was not achieved in the manner originally anticipated. Equipment placed on site at the start of the operation was lost as a result of collision or interference, and it was not possible to re-establish this until towards the end of the disposal operations. As a result, the “baseline” measurements were taken at the end of the operation. Findings from this work suggest that the predictions of behaviour of material disposed of at the site as outlined in the ES were consistent with what actually occurred in the locality.
- 2.5 During the works, an exercise was carried out to test the movement of silt as a result of deliberately allowing overflow for a prolonged period from a trailer suction hopper dredger within the Harbour. The details are reported in Appendix III. It had been suggested in the Sediment Management Plan that agitation dredging of fine materials in the shipping basin might fulfil the requirement to mitigate net loss of such material from the Harbour system. The conclusion of Appendix III, however, suggests that local agitation dredging will not have the desired effect of removal of the material from the channels, since a large proportion of the suspended material is transported along the channel access and settles locally. Coupled with the added risk this method may present to other interests in the Harbour, it has been decided not to pursue the agitation dredging proposal for the time being (see Section 4).

3. Hydrodynamic and Sedimentary Regime

- 3.1 The following technical reports are attached as appendices:

Appendix IV	<i>Review of Physical Monitoring in Poole Bay, Technical Note 1</i> HR Wallingford
Appendix V	<i>Review of Physical Monitoring in Poole Harbour, Technical Note 2</i> HR Wallingford

- 3.2 HR Wallingford have prepared two reports, one dealing with the regime in Poole Bay, and the other dealing with the regime in Poole Harbour. These reports are aimed at comparing the predictions that were made in the ES with the actual conditions that were experienced during the carrying out of the dredging work. In addition to these reports, a current metering comparison has been carried out in the Harbour entrance and the relevant results commented on in Appendix V.
- 3.3 Technical Note 1 (Appendix IV) compares predictions of conditions outside the Harbour made in the ES with measured results as they have been determined so far. This report includes bathymetric measurements carried out by Poole Harbour Commissioners on the disposal ground. This Note also takes into account the work carried out by Partrac and reported in Appendix II above. Conclusions are that the actual events are generally in line with the predictions made in the ES, although in certain respects ideal monitoring conditions were not achieved (see para 2.4).
- 3.4 Technical Note 2 (Appendix V) reviews the physical data collected during and after the works within Poole Harbour against the ES predictions. Consideration is given to the Partrac work reported in Appendix I above, and also the results of the post dredging current measurement carried out by Compass Hydrographic Limited reported in Appendix VI. Sedimentation predictions were generally borne out, although it was concluded that under certain unusual natural conditions, relatively large scale mobilisation of fine sediment could occur, possibly resulting in heavy short-term accumulation of fine material in some areas of the Harbour (see para 2.3).
- 3.5 Flow measurements in the Harbour entrance were undertaken following completion of the work (Appendix VI) in an attempt to verify the expected current changes that had been predicted. It was impossible to measure on a precisely similar tide (these are only expected to occur on an 18 year cycle and are likely to be further affected by weather variations). The results, however, indicate that there is no appreciable change in the current velocities at the Harbour entrance.

4. Sediment Management Plan

- 4.1 The following technical report is attached as an appendix:

Appendix VII *Poole Harbour Approach Channel Deepening EIA; Sediment Management Plan*
Royal Haskoning, Report Ref 9P017/N/SAJ/PBor

- 4.2 It is a requirement of the approvals for the Harbour Deepening that the Harbour Commissioners' Sediment Management Plan is developed to minimise the amount of fine material taken to sea as a result of maintenance dredging within the Harbour.

- 4.3 The Sediment Management Plan explores the possibility of using agitation dredging to displace the silt fraction from the main shipping channels. It also suggests a system of allowing disposal of small amounts of fine material from third party dredging at a suitable location within the Harbour. These actions would reduce the total amount of fine material being lost from the Harbour.
- 4.4 Following monitoring and the findings of the agitation dredging experiment during the dredging works, this concept has been modified. HR Wallingford have carried out more detailed modelling of various potential disposal positions in the Harbour. Discussions are now taking place with the regulators on the concept of controlled placement at one or more of these positions, of silt dredged from the main shipping basin using the Commissioners' dredger *CH Horn*. This will be closely monitored, and the information used to develop a disposal regime which will allow most of the fine material dredged within the Harbour to be disposed of in a sustainable manner. It is expected that this process and the necessary approvals and monitoring regimes will take some time to develop.

5. Hydrographic Changes

- 5.1 The following technical report is attached as an appendix:

Appendix VIII *Bed Level Monitoring Report – Poole Harbour 2007*
Poole Harbour Commissioners

- 5.2 Hydrographic changes are monitored on a routine basis by Poole Harbour Commissioners, and this continues. Appendix VIII summarises the routine hydrographic work carried out since the completion of dredging. The point is made that the changes and rates of change predicted in the ES are generally below tolerances measurable using normal survey equipment.
- 5.3 Comparisons of specific areas in more detail are recorded, but it is not practicable to publish the huge amount of data available. The report, therefore, summarises the overall situation while more detailed information on small areas can be extracted.
- 5.4 The survey and comparison work will continue, and as natural changes in the Harbour take place, influences from the capital dredging may become apparent. There is, however, no indication of major unexpected changes to the system.

6. Shoreline Sections

- 6.1 There is a requirement to monitor shoreline cross-sections at Studland and Brownsea Island. The baseline information is available from the Channel Coast Observatory (www.channelcoast.org). The first cross-sections to be taken following the completion of the dredging works have not yet been carried out, therefore quantitative information is not yet available for this aspect of the monitoring.

- 6.2 Visual observation of the beach at Studland strongly suggests that there has been no adverse effect arising from the dredging, and the indications are that the beach has been generally accreting at the north end, as has been the case for some time.
- 6.3 There is no indication of unusual deterioration on the relevant Brownsea Island frontage.

7. Saltmarsh

- 7.1 The following technical report is attached as an appendix:

Appendix IX *Poole Harbour Saltmarsh Monitoring 2006*
DERC, J Corkhill and B Edwards

- 7.2 There is a requirement for a survey of the extent of saltmarsh in the Harbour to be repeated at five-yearly intervals. A comparison has been made between aerial surveys carried out in 2005 and previous aerial surveys to establish the baseline rate of change prior to the dredging. This is reported in detail in Appendix IX.
- 7.3 It should be noted that the areas showing significant change in the extent of saltmarsh cover prior to 2005 are in Holes Bay, Brands Bay and Whitley Lake. The first two are physically very remote from the works, and unlikely to be affected directly unless gross changes occur to the Harbour regime. The area in Whitley Lake is subject to heavy pressure from public access.
- 7.4 A comparative survey will be carried out in 2010 in accordance with the requirements.

8. Marine Habitats in Poole Bay

- 8.1 The following technical report is attached as an appendix:

Appendix X *Poole Bay/Harbour Marine Habitat Surveys: Post Channel Deepening EIA Studies 2006. Progress Report February 2007*
Dr Ken Collins

- 8.2 Work is still on-going on surveys of marine habitat in the western part of Poole Bay following the dredging and disposal operation. Appendix X gives details of the work concluded to date.
- 8.3 Statistical tests show that there is no clear relationship showing change in sedimentation rates in Poole Bay over the period preceding and following the dredged spoil disposal and beach nourishment exercise. However, it is possible there is now a new reservoir of sediment within Poole Bay as a result of the disposal that continues to be remobilised and redistributed within the system.

- 8.4 Work has therefore been extended to provide a better understanding of the sedimentation rates in Poole Bay over a longer time frame. This should ascertain whether levels of sediment settlement will return to the “pre-dredge” situation or whether the possible reservoir of sediment will persist longer before finding its way out of the Bay.
- 8.5 Work is also continuing on the determination of on-going maerl density to ensure that findings so far are fully understood and statistically significant.

9. Archaeology

- 9.1 The following technical report is attached as an appendix:

Appendix XI *Swash Channel Wreck; 2006 Season Report*
P Palmer and D Parham, Bournemouth University

- 9.2 Bournemouth University completed their first season’s monitoring of the Swash Channel Wreck in 2006 and their report appears as Appendix XI. A further programme has been agreed between Poole Harbour Commissioners and Bournemouth University and is currently being carried out during the 2007 diving season.
- 9.3 English Heritage have produced a Draft Conservation Statement and Management Plan for the wreck, and this is expected to be published shortly.
- 9.4 It is likely that certain items will be recovered from the wreck during the 2007 season and the necessary arrangements have been made between Poole Borough Museum Services and Bournemouth University for their curation.

10. Forward Work

- 10.1 Work will continue on the various pieces of on-going monitoring as outlined in this report. A further update will be provided in one years time and at the same time, relevant additional reporting of monitoring will be made available. This will all work towards the requirement for a full review of on-going monitoring in conjunction with the Regulatory Authorities and their advisors in 2009, three years after completion of the works.