

**Medina Estuary  
Baseline Document**  
**Volume II - 2010**

**Maintenance Dredging Protocol 2004**

**Prepared by Cowes Harbour  
Commission in association with  
the Isle of Wight Estuaries Project.**

## Table of Contents

1.0 Introduction.....	3
2.0 Background .....	3
3.0 Currently Available Information - Update of Volume I.....	5
3.1 Research and Understanding .....	5
3.2 Maintenance Dredging Requirement.....	8
3.2.1 <i>Future change to the maintenance dredge requirement</i> .....	10
3.3 Dredging Methods and Disposal .....	12
3.5 Alternative Methods and Uses for dredge material.....	12
3.5.1 <i>Development of a Medina Dredge Management Plan</i> .....	13
3.6 Monitoring Requirements.....	16
3.7 Other relevant information.....	16
3.8 Gaps in the knowledge base.....	16
4.0 Condition and Interest features of the European site .....	17
4.1 Status of the European Site .....	20
4.1.1 <i>Condition of the SSSI</i> .....	20
5. Applying the Habitats Regulations .....	20
6. Conclusions .....	22
7. Next Steps.....	23
References .....	24
Appendices.....	25

# Baseline Document - Volume II

## 1.0 Introduction

This document, together with Volume I, forms a key element of the protocol for the treatment of maintenance dredging applications under the Habitats Regulations 1994. It draws on existing and readily available information and describes the current and historical patterns of dredging in the Medina Estuary. The information provides a context against which maintenance dredging applications can be assessed.

Establishing the background to maintenance dredging on an estuary-wide scale allows a holistic approach to be taken in considering potential impacts on the European Site. The majority of activities undertaken in and around the Medina Estuary were present when the European Site was designated and in some cases are responsible for the presence of key habitats and species. Although the preparation of the Baseline Document does not in itself mean that there is no adverse effect, the presumption is that most maintenance dredging proposals in line with established practice as described in the Baseline Document will fit within the tolerance range and thus be found unlikely to have a significant effect, usually without the need for further detailed information or consideration. It is expected that most maintenance dredges will fall into this category (DEFRA, 2007).

Volume I of this document was produced in 2004, the Medina Estuary being one of three pilot areas that helped to develop the Maintenance Dredging Protocol (published in 2007). In the last 5 years there has been a substantial increase in the amount and quality of information relating to the estuary and some change in the dredging requirement. This document updates Volume I by summarizing new and additional information about the estuary, the maintenance dredging requirement and the condition of the European marine site. It forms Volume II of the Medina Baseline Document.

## 2.0 Background

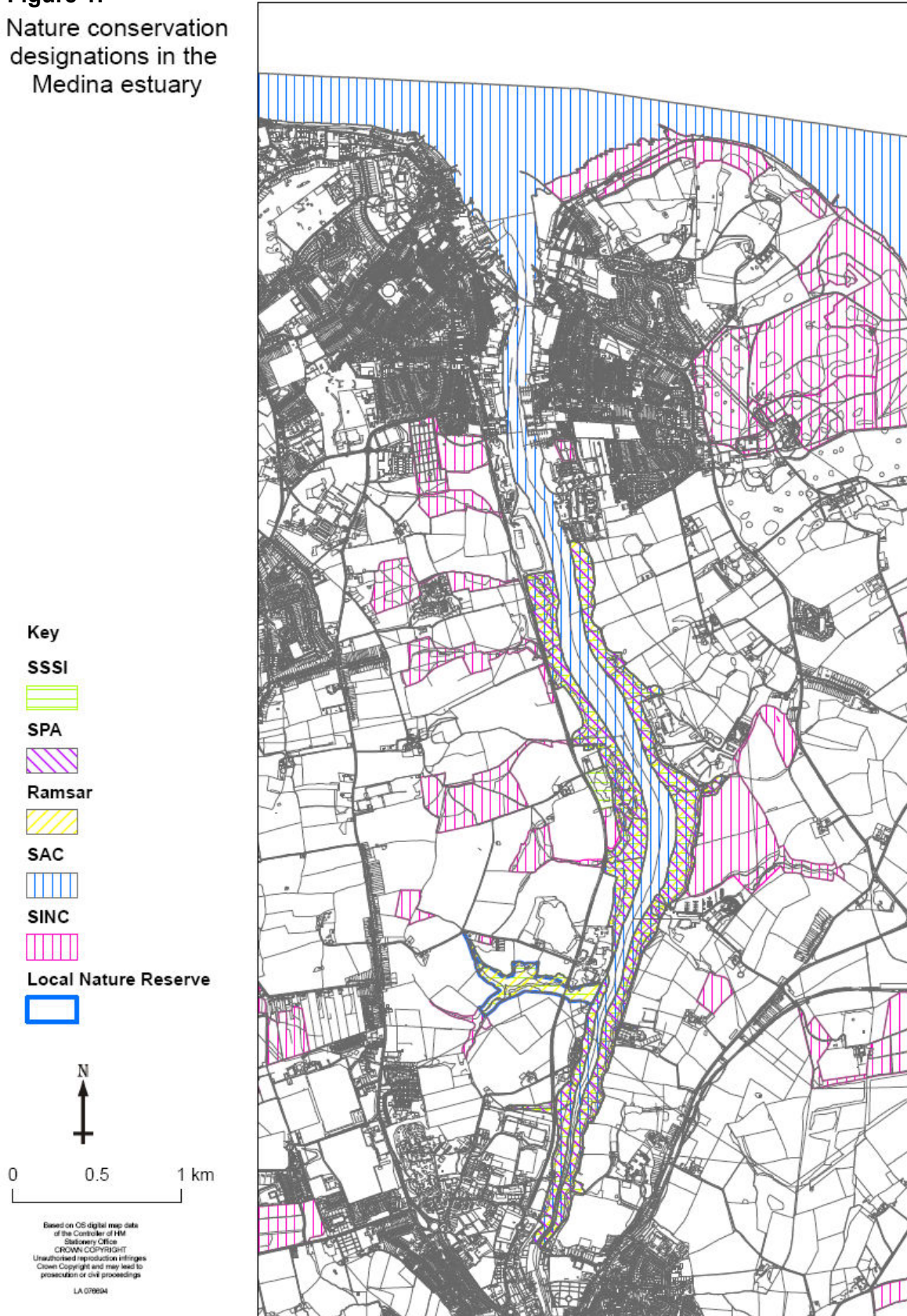
The Medina estuary extends approximately 7km from its tidal limit at Newport to its mouth between Cowes and East Cowes. It has a total area of 219ha and is flood dominant, allowing the import of fine sediments. The entire sub-tidal area of the estuary is designated as a component part of the Solent Maritime Special Area of Conservation (SAC), this extends into the intertidal within the boundary of the Medina Estuary SSSI. The boundary of the SSSI also encompasses the Medina estuary component of the Solent and Southampton Water Special Protection Area (SPA) and Ramsar site. Figure 1 shows the nature conservation designations within the Medina estuary.

The morphology of the Medina estuary varies considerably between Cowes and Newport, but it is essentially a single main channel with intertidal mudflats on either side. The estuary shows two distinctly different morphological sections: the tidally-dominated but wave influenced section to the north of the chain ferry; and the tidally-dominated section to the south. The constriction of the estuary at the Chain Ferry has a significant influence on current velocities and is considered to be a geological



control, such that the future evolution of the estuary will remain strongly influenced by this zone. Due to this it is considered that the true estuary mouth is at the Chain Ferry and that areas to the north exhibit some characteristics of an open coast bay.

**Figure 1:**  
Nature conservation designations in the Medina estuary



### **3.0 Currently Available Information - Update of Volume I**

This section looks at any changes that have occurred since Volume I was written and provides additional information where relevant. The information provided is not intended to represent an assessment of the dredging activity in the Medina but a baseline against which future applications can be considered.

Although early reports suggested that the Medina Estuary might have a potential issue in respect to sediment budget, further detailed modelling, survey work and research over the last three years has indicated that the magnitude of these effects are small with respect to the estuary as a whole. Results from the surveys, research and comprehensive marine impact assessment tools (MAT) show the present day Medina Estuary to be in a relatively stable form and slightly accreting overall. The detailed research will inform both the assessment of development proposals and decisions on the way forward for developments which increase the maintenance dredging quantities over the currently agreed baseline criteria.

Despite the amount of work already carried out on the Medina dredging issue and the introduction of the Maintenance Dredging Protocol in 2008, there are local and national issues that have not yet been resolved and may require further guidance from the Environment Agency, Natural England and the Marine Management Organisation. These issues are summarized in section 3.5.

### **3.1 Research and Understanding**

A three year project to develop a set of assessment tools for the Medina Estuary began in 2005. The aim of the project was to improve the understanding of the estuary and its processes and to develop a hydrodynamic model that would help the statutory authorities with their assessments of proposed coastal developments. As the Medina had become a focus for the regeneration of East Cowes and the Isle of Wight, it was felt that the assessment of individual applications may not reflect the combined impact of small developments on the European site. The research undertaken since 2004 was therefore carried out in the context of development proposals for the regeneration of the East Cowes area and its potential impact on the European marine site designations. The research and reports produced for the project are listed in Appendix 1. Although they are not specifically written for dredging, the information they contain provides a much greater level of understanding of the estuary and the baseline conditions against which dredging applications are set.

Table 1 summarizes the broad scale parameters of the Medina estuary from the Futurecoast database and calculations made more recently by ABPmer based on a bathymetric survey in 2005/06. This is followed by a summary of the historic understanding of the estuary based on a report that reviewed all available data, including that which had been collected in surveys between 2005 and 2007 for the 'Assessment Tools' project (ABPmer, 2007).

**Table 1: Broad scale parameters of the Medina Estuary**

Parameter	Measured volume
Area	219 ha (218 ha - ABPmer, 2006)
Intertidal area	101 ha (104 ha - ABPmer, 2006)
Saltmarsh area	13 ha (13.7 ha - ABPmer, 2006)
Shoreline length	19.6 km
Channel length	7.4 km
Tidal range (spring)	4.2 m
Mean river flow	0.36 cumecs
Maximum river flow	5.4 cumecs
Mouth width (at Shrape breakwater)	420 m
Parameter	Estuary classification
Estuary Type	Ria, no spits
Tides	Large
Littoral drift	Small
Rock	Hard
River flow	Small
Weather effects	Small
Geomorphology	Saltmarsh, mudflat, low water channel

Overall, the historical chart analysis suggests that accretion of fine material has continually occurred since 1856 (albeit at a relatively slow rate) but the man-made interventions, mostly between the 1920s and 1950s, probably caused a temporary change to the system. This changed the hydrodynamics, inducing additional flows at the lower states of the tides (particularly ebb) which have scoured the LW channel. This scour has mainly been at the edges, removing the finer fractions of sediments to leave the coarser gravels as bed armouring thus reducing the effect depth-wise. This temporary change appears to have worked through the system up to the area around Island Harbour and the net accretionary regime has re-established down estuary. The rates of future accumulation are, however, likely to be lower than those before the construction of the Shrape breakwater due to its effect on reducing the supply of sediment into the system.

Since the 1940s the area of saltmarsh has reduced by 10.3 ha as a consequence of direct reclamation, capital dredging or impoundment such as at Island Harbour as well as from natural processes. A reduction in area of saltmarsh has occurred throughout the Solent Area and therefore a proportion of the natural change may reflect regional trends rather than local developments. The rate of erosion has slowed considerably in recent years.

Upstream of Dodnor, the net accretionary trend has been continuous but may be reduced for a period in the future as the effects of the developments continues to work its way up the estuary, unless the effect has decayed sufficiently not to cause a significant change relative to the accretion and erosion thresholds.

#### Summary of current understanding

Historic chart analysis, a review of estuary processes and morphometric analysis on the estuary (ABPmer, 2007) has shown:

- The estuary has always been flood dominant allowing the import of fine sediments;

- The main control on the estuary geometry is the Chain Ferry constriction which has changed little since 1856 and could be considered the true mouth of the estuary;
- The range of processes at work (natural and human imposed) differ either side of the chain ferry, but nevertheless the changes that occur in the Outer estuary may have an effect up estuary depending on the 'nature' of the works, and vice versa;
- Reclamations, capital dredging and the construction of the Shrape breakwater have caused a temporary change to the natural 'working' of the system causing morphological readjustment to the estuary system, predominantly in respect to the LW channel;
- Post 1980s the effects of the earlier developments appear to have substantially worked their way through the estuary system. However, some residual change may continue to occur in the Upper estuary in the near future (order of a decade).
- The Shrape breakwater has contributed (along with coastal protection works) to reduce the overall supply of sediment to the estuary, compared to 1856;
- Since the 1980s the estuary has had a net accretionary trend, particularly over the intertidal. Rates of change are small, being measured in millimetres per year;
- There has been a net reduction in surface area (at high water) due to coastal squeeze, predominantly from embankments and reclamation.

Table 2 shows the main reports that have been undertaken since 2000 that are relevant to the issue of sustainable dredging in the Medina Estuary. A large amount of research, resources and discussion led first to the production of the Baseline Document in 2004 and then to the Medina Dredge Management Plan in 2005.

**Table 2: Main reports undertaken since 2000**

Medina Estuary Volume Changes	2000	May
Development of Shepards Wharf Boatyard	2002	March
Sustainable Use of the Medina Estuary as a further development of the Estuary Management Plan Key Tasks 1 and 2	2002	September
East Cowes Marina Extension - River Medina	2002	October
Consideration of Alternative Use of Dredge Material in the Medina Estuary	2003	June
Medina Estuary Baseline Document Volume I	2004	October
Cowes Ecology Phase 1 Survey Report.	2005	January
Ecological Review of the Medina Estuary.	2005	June
Medina Dredge Management Plan	2005	July
The Medina Estuary: Opportunities for Conservation and Enhancement of Biodiversity	2005	July
Marine Impact Assessment Tools: Data Collation Document.	2006	August

Medina Estuary: Review of Intertidal and Subtidal Benthic Communities.	2006	October
Marine Impact Assessment Tools: Model Calibration and Validation Report - Medina Estuary, Isle of Wight.	2007	February
Marine Impact Assessment Tools: Medina Estuary Historic Understanding.	2006 updated 2007	September July
Marine Impact Assessment Tools: Medina Estuary Historic Understanding – Executive Summary.	2006 updated 2007	September July
Marine Impact Assessment Tools: Medina Estuary Scheme Testing.	2007	August
Sustainable dredging in the Medina Estuary	2008	November

### 3.2 Maintenance Dredging Requirement

Maintenance dredging is essential to maintain navigational responsibilities, port activities and marine industries based on and around the Medina. Cowes Harbour Commission and Newport Harbour have a statutory obligation to maintain a navigable depth in the harbour and fairway under their jurisdiction.

The history of dredging in the Medina estuary is well documented in Volume I. Volume II updates the dredging figures for the last 5 years but includes the entire updated table for reference purposes. The locations of maintenance dredging in the Medina Estuary and the main organisations likely to undertake it are also shown in Volume I. The majority of sedimentation and therefore maintenance dredging requirement takes place in the outer harbour north of the floating bridge, with only East Cowes Marina, Island Harbour and Newport Harbour having any requirement in the middle / upper estuary. All recorded dredged material removed from the estuary has been deposited at either Hurst Fort or the Nab Tower disposal sites.

The Disposal at Sea (DAS) database was interrogated for the period 1986 to 2008 and Table 3 shows the information extracted relating to dredging activities within the Medina Estuary. Unfortunately, as reported in Volume I, the information derived from this database is not an ideal record because:

- Records only began in 1986;
- It does not differentiate between capital and maintenance dredging activities;
- It appears to have duplicate entries in two locations;
- Some of the names of the marinas have subsequently been changed (i.e. Ancasta Marina is now Cowes Yacht Haven and Cowes Marina is East Cowes Marina, these have been added to the table in brackets).
- It is sometime rather vague (i.e. describing the location as ‘the river’); and
- It presents dredging volumes in units of ‘wet tonnes’ rather than ‘m<sup>3</sup>’.

**Table 3: Summary of information from a search of the DAS Database**  
(ABPmer, 2002a updated)

Date	Volume (wet tonnes)	Location	Comments	Disposal Site at Sea
1987	32,591	Cowes	Possibly Capital dredge	Hurst Fort
	1,500	Newport		Hurst Fort



Date	Volume (wet tonnes)	Location	Comments	Disposal Site at Sea
	750	River	Unspecified location	Nab Tower
	16,900	Cowes special		Nab Tower
1988	200	Ancasta Marina (Cowes Yacht Haven)		Hurst Fort
	8,105	(East) Cowes Marina		Hurst Fort
	1,200	Newport Harbour		Hurst Fort
1989	1,415	River	Unspecified location	Hurst Fort
	11,369	Ancasta Marina (Cowes Yacht Haven)		Hurst Fort
	3,564	Newport Harbour		Hurst Fort
1990	6,597	(East) Cowes marina		Hurst Fort
	528	Ferry stand by pontoon		Hurst Fort
	8,154	Newport Harbour		Hurst Fort
	390	Albury outfall, Town Quay		Nab Tower
	5,260	Whitegates Yard		Nab Tower
1991	12,935	Ancasta Marina (Cowes Yacht Haven)		Hurst Fort
	4,940	(East) Cowes marina		Hurst Fort
	252	Newport Harbour		Hurst Fort
	1,495	Ancaster (Cowes Yacht Haven)		Nab Tower
	6,900	(East) Cowes Marina		Nab Tower
1992	4,788	Newport Harbour		Hurst Fort
	2,203	Shepards Wharf		Hurst Fort
	1,950	Kingston Wharf		Nab Tower
	1,950	Medina Wharf	Probable duplication of above record in database	Nab Tower
1993	24,572	Cowes special	Possible Capital dredge	Hurst Fort
	6,156	Newport Harbour		Hurst Fort
	1,300	Kingston Wharf		Nab Tower
	1,300	Medina Wharf	Probable duplication of above record in database	Nab Tower
1994	860	Cowes special		Hurst Fort
	6,426	Newport Harbour		Hurst Fort
	29,500	Red Funnel East Cowes		Nab Tower
	10,998	(East) Cowes Marina		Nab Tower
	28,464	Channel Fairway - deepening <sup>1</sup>		Nab Tower
	1,036	Channel Fairway - deepening		Nab Tower
1995	9,050	Cowes special		Hurst Fort
	3,000	Medina Wharf		Hurst Fort
	2,160	Newport Harbour		Hurst Fort
1996	400	Kingston Quay		Hurst Fort
	17,895	Cowes special		Hurst Fort
	400	Medina Wharf		Hurst Fort
	5,400	Newport		Hurst Fort
1997	2,160	Newport Harbour		Hurst Fort
	2,200	Shepards Wharf		Hurst Fort

<sup>1</sup> Cowes approach channel was deepened to a depth of 2.8m in early 1994.

Date	Volume (wet tonnes)	Location	Comments	Disposal Site at Sea
1999	45,500	Main Fairway (north of chain ferry)	25% maintenance dredging	Nab Tower
2000	15,600	Cowes Yacht Haven		Nab Tower
	24,989	East Cowes Marina		Nab Tower
2001	32,955	East Cowes Marina		Nab Tower
2002	3,770	UKSA Basin		Nab Tower
2003	28,523	East Cowes Marina	25% maintenance dredging	Nab Tower
2004	6,500	Cowes Yacht Haven		Injection dredge method
2005	157,320 235,980	Kingston lift dock Shepards Wharf	100% Capital dredge	Nab Tower
2006	0			
2007	29,400	Island Harbour Marina	100% Capital dredge	Nab Tower
2008	7,000	Cowes Harbour	Cowes Yacht Haven	Nab Tower
2009	0			

The maintenance dredging requirement has increased during the last 40-50 years due predominantly to specific marina developments and provision for Red Funnel Ferries. The supply of sediment to the inner and upper estuary is likely to have been reduced by the maintenance dredging required, predominantly in the outer estuary, since the material has, for the most part, been deposited outside the Medina estuary system.

Volume I included analysis of the dredging returns for the estuary since 1987 and indicated the average annual maintenance dredging requirement to be about 14,000m<sup>3</sup> per annum for the period 1987–97 (ABPmer, 2002). Volume I also estimated that with the inclusion of more recent projects, such as the Shepards Wharf redevelopment, the extension of East Cowes Marina, the RYS Yacht Haven, the proposals for Newport Harbour and works at the former GKN site, the average annual maintenance dredging requirement for the estuary was projected to increase to around 20,000m<sup>3</sup>. This projection pre-dated any hydrodynamic and sedimentation modelling which has allowed far more accurate calibrated estimates of sedimentation within the harbour and shows the current baseline figure to be an average of **14,000m<sup>3</sup>** per annum. This is based on both historical records and runs from the calibrated sediment model. While this represents a long term average, due to the number of locations requiring dredging, this average rate fluctuates considerably from year to year. An estimated 84% of dredging occurs within the outer harbour and recent studies have shown little effect on the sediment budget upstream (ABPmer, 2009).

The major plans for the redevelopment of Newport Harbour which would have increased the need to carry out more frequent maintenance dredging have not been progressed and since Volume I was written there has been no further dredging at Newport Harbour.

### **3.2.1 Future change to the maintenance dredge requirement**

Cowes Harbour Commission is currently working with SEEDA on the development of the Cowes Outer Harbour Project which includes a fixed breakwater and marina development. As part of the consents application process an Environmental Impact Assessment has been produced and assesses the impact on maintenance dredging

commitments in the estuary. The Medina Assessment Tools (MAT) project has enabled a detailed assessment of the predicted change to annual sedimentation and maintenance dredging requirement.

The Environmental Impact Assessment for the proposed development calculates the change in sedimentation from present conditions and the predicted annual volume (in situ) of sedimentation and hence potential dredging commitment. Table 4 shows these figures for each location that is currently subject to periodic dredging.

**Table 4: Predicted change to annual sedimentation and hence potential maintenance dredging requirements by percentage and volume for selected locations currently subject to maintenance dredging (ABPmer, 2009).**

Harbour Location	Predicted Change to Annual Sedimentation (by location)	Predicted Post-Development Annual Volume of Maintenance Dredging (m3)
Royal Yacht Squadron	-3%	3,050
Town Quay	9%	2,000**
Cowes Yacht Haven	-15%	3,200
Shepards Wharf	-10%	1,750
Red Funnel Ferry Terminal	-11%	850**
East Cowes Marina	-10%	2,000
<b>Total estimated maintenance dredging commitment for existing sites (post development)</b>		<b>12,850</b>
** Total volume unlikely to occur as the model does not include the effects of vessel disturbance. Some redistribution to other areas could occur.		

The EIA shows that by far the greater proportion of sedimentation and hence maintenance dredging requirements are restricted to the outer harbour. The existing outer harbour facilities listed in Table 4 (i.e. excluding East Cowes Marina) account for about 84% of the predicted annual maintenance dredging commitment for the estuary. The remaining balance of the 14,000m<sup>3</sup> is the 2,000m<sup>3</sup> for East Cowes Marina and a small amount of maintenance dredging associated with Island Harbour and Newport Harbour.

As shown in the footnote to Table 4 in the vicinity of the Red Jet and Red Funnel Ferry terminals some redistribution of the material caused by vessel / propeller wash is likely to reduce the predicted maintenance dredging requirement. Table 4 further shows that all existing marinas will have some benefit from the proposed development in terms of the maintenance dredge requirement.

**Table 5: Predicted post-development annual volume of maintenance dredging for Venture Quay and the New Marina.**

Harbour Location	Predicted Post-Development Annual Volume of Maintenance Dredging (m3)
New marina	2,950
Venture Quay	2,350
Total	5,300

The increase in dredging requirement associated with the proposed development occurs within the proposed new marina and adjacent Venture Quay facilities. The Environmental Impact Assessment estimates that the post-development

maintenance dredging requirement for Venture Quay and the new marina will be approximately 5,300m<sup>3</sup> per annum, as shown in Table 5. However it is also noted in the Environmental Impact Assessment that all existing marina facilities on the west side of the harbour will benefit from a reduction in maintenance dredging commitment of between 3% and 15% (see Table 4) resulting in a combined reduction of about 900m<sup>3</sup> per year (ABPmer, 2009). This reduces the maintenance dredging requirement of the proposed development to 4,400m<sup>3</sup>. The volume of maintenance dredging undertaken annually is likely to vary considerably from year to year, the effects being staggered over a number of years.

As stated in section 2 the floating bridge is considered to be the mouth of the estuary in terms of estuarine processes with the northern section behaving more like open coast. Most of the maintenance dredging in the Medina occurs north of the floating bridge and although it will have some impact on the sediment supply throughout the estuary it is considered that any changes to sediment transport processes in the mouth of the estuary are likely to be difficult to distinguish from natural variation. The proposed outer harbour development would result in a change to the maintenance dredging requirement of about 4,400m<sup>3</sup> for the estuary as a whole but the effect would almost entirely be confined to the outer harbour. This would increase the total maintenance dredge requirement to an average of **18,400m<sup>3</sup>** per annum.

The sensitivity of the maintenance dredging issue in the Medina has been rooted principally in a concern that maintenance dredging is an extractive activity and may reduce the sediment supply to the intertidal habitats contributing to their inability to keep pace with the in-combination effects of sea level rise. Available data does not currently suggest that this reduction in sediment supply is resulting in erosion of intertidal areas. Data since the 1980s has suggested that in the inner harbour, at least, a small accretional trend is evident despite maintenance dredging of the marinas. Furthermore, modelling of the effects of the development shows minor accretion on the intertidal in the inner / upper estuary and no significant change to the Shrape Mud (ABPmer, 2009).

### **3.3 Dredging Methods and Disposal**

As detailed in Volume I nearly all the dredging up to 2004 was carried out by backhoe dredging with disposal at sites around the Isle of Wight, predominantly at Nab Tower disposal site. The main exception was the deepening of the main fairway which was dredged by Trailer Suction Hopper Dredger (TSHD), but this dredge was considered to be a capital development. There are some areas where maintenance dredging only takes place once every five years and there is a degree of bed levelling to remove the high spots. In 2004 hydrodynamic dredging was used for the first time in the Medina estuary but restricted to ebb tide working only (ABPmer, 2005). This remains the case and no other methods of dredging are currently being used in the Medina. If issues associated with the use of hydrodynamic dredging can be resolved it may be used more widely in the estuary in future.

### **3.5 Alternative Methods and Uses for dredge material**

The alternatives to traditional methods of dredging are of increasing interest to the statutory authorities, particularly Natural England and the Environment Agency. The type of material, the location of the dredge and the potential for detrimental impact on



water quality must all be taken into account when considering the use of alternative methods.

Volume I identified issues and limitations associated with beneficial use schemes (ABPmer, 2003) but consents granted around that time included requests from Natural England to introduce a beneficial dredging plan for future works. The premise of these consenting requirements was a belief that the upper estuary was suffering a net loss of material but, as stated in section 3.1, the most up to date information and current understanding show that this is not the case.

### **3.5.1 Development of a Medina Dredge Management Plan**

As a result of the request from Natural England a large amount of work has been carried out since 2004 on the development of a Medina Dredge Management Plan. After lengthy discussion with the Medina Estuary Management Group and other stakeholders, Cowes Harbour Commission took the lead and in 2005 commissioned ABPmer to research and report on a proposed plan. The report drew on the available data that existed on the Medina Estuary, and the collation of relevant information in the Baseline Document. It provided background to the issues that needed to be incorporated into any future plan including a review of the need for maintenance dredging, an overview of the environmental legislation and the Medina's maintenance dredging requirement. It summarised the main issues, set out objectives and proposed a Dredge Management Plan. This plan became the focus of discussion amongst the Medina Estuary Management Group, ABPmer and representatives from the Medina Valley Centre.

Below is a summary of the recommendations of the Dredge Plan and the outstanding issues. These issues will have to be resolved to enable a partnership approach to sustainable dredging in the Medina.

#### The Dredge Management Plan - recommendations

The Medina Dredge Management Plan set out the issues from all perspectives in order to determine the requirements and offer ideas for solutions to the perceived issues. Based on reports that suggested the estuary needed more sediment, it recommended the use of hydrodynamic techniques within the Outer Estuary and a combination of this and the use of Cutter Suction Dredgers (CSD) dredgers pumping to the water column for sites up estuary of the Chain Ferry. It was not known what dredge volumes would be acceptable without introducing further legislative problems but the volume from outside the Chain Ferry is likely to be higher than for inside the Chain Ferry. The methodology would be a change from existing practice for the initial dredge, but backhoe dredging would still be required in specific locations. The further up the estuary the dredging location, the more likely it is that the sediment will stay within the estuary. However, in general, the smaller the volume of material deposited the more likely the natural flow will redistribute the sediment within the estuary.

Taking account of previous annual dredge requirements for the different locations, it was proposed to:

- 1) Initially restrict the volume of dredging at any one location by hydrodynamic methods or pumping of sediment to the flow to about 4,000m<sup>3</sup> per annum;

- 2) Undertake a monitoring programme, appropriate to the size of the dredge, to monitor the likely locations the sediment will disperse to;
- 3) Undertake a trial placement of sediment within the estuary with the objective of determining whether such continued further placements were practical and would provide holistic benefit to the nature conservation features throughout the estuary as a whole. Two options from ABPmer (2003) and discussions with environmental stakeholders on the Medina appeared to have the most potential for such a trial;
  - a. Placement of a bund of backhoe derived material around the edge of Werrar Marsh with the aim of providing a sacrificial berm which would initially protect the edge of the saltmarsh from wave attack either wind or boat generated.
  - b. Pumping of sediment, either by a direct pipeline or from a barge, to an area of higher intertidal as a trial for unconfined intertidal recharge.
- 4) Liaise regularly with relevant stakeholders to review the plan, the dredging requirements and the monitoring scheme.

For each dredge, it would be the responsibility of each operator to apply for the appropriate licences stating the dredging is in accordance with the agreed plan and within the variability with respect to the Maintenance Dredging Protocol Baseline Document. At present WID dredging does not require FEPA licensing. However, it was proposed that a condition be made under the CHC Harbour Works Act that the quality of the sediment is to be established as being suitable for deposit within the estuary. This standard ought to be higher than those operated by CEFAS under FEPA as the sediment would stay within the estuary rather than be disposed of at sea. The cost of this sample analysis will be the dredge applicants' responsibility either directly or through the FEPA licensing, system where required.

For the Medina Dredge Management Plan to be successful, all operators who require dredging (maintenance or capital) and the competent authorities would be required to sign up to the plan. It was proposed that the plan would be administered by CHC and chaired by a representative of the Isle of Wight Council, who would arrange:

- The annual review meeting of the Medina Dredging Management Group;
- Coordinate the agreed trials, monitoring and analysis, and arrange the reimbursement of equal costs to the operator who is overseeing the control for the trials as they occur. The costs of the non-trial related dredging and associated monitoring would remain the responsibility of the operator requiring the dredging.

Since the plan was produced there have been a number of issues that have prevented its implementation and these are outlined in the paper *Sustainable Dredging in the Medina* (see Appendix 2) and summarized below.

#### Issues associated with the Medina Dredge Management Plan

In terms of the Habitats Regulations, the main concern about maintenance dredging in the Medina has been the reduction in supply of sediment to the estuary and the effect on the estuary's ability to maintain existing habitats. The proposed solution to that concern was to retain sediment in the system by the beneficial use of the

dredged material or alternative methods of dredging. However, the techniques associated with this also raised a number of issues:

- Fine sediments in marinas and boatyards may contain various contaminants, such as heavy metals and TBT etc, and it would be unwise to release these sediments and any associated contamination into estuary, especially the upper reaches.
- The Water Framework Directive (WFD) and the Shellfish and Bathing Water Directives are mainly concerned with water quality issues caused by the increase in sediments within the water column from the dredging process. Turbidity and increased concentrations of suspended solids could cause problems with growth of shellfish due to gill blocking, abrasion or excessive smothering or affect growth of flora and interfere with the passage of fish to and from the estuary. The Environment Agency has expressed concerns about the impact of an increase in sediment on the Medina's oyster beds.
- Hydrodynamic dredging is currently outside the existing regulatory / licensing regime, apart from Cowes Harbour Commission (CHC) works and dredge licence powers. Clarification would be required on responsibility and or liability for any damage as a result of a consent being given under these CHC powers.
- The volumes required for alternative use at available sites on the estuary represent only a small proportion of the annual maintenance dredge material. Therefore a conventional dredging requirement will remain and the largest proportion of dredged material will need removal to a licensed disposal ground.
- Existing readily available dredging plant may not be suitable for alternative use. The wrong methods or discharging material too quickly has the potential to harm the environmental system, thus offsetting the intended benefit of sediment relocation.
- Maintenance dredging activities can have a short lead-in time, are of short duration, occur intermittently and can yield a moderate volume of sediment. In contrast, the ideal sediment supply to the estuary would be slow and continuous.
- The material dredged from many of the berths in the Medina estuary may not be of the same physical characteristics as that on the inter-tidal mudflat and saltmarsh. The placement of coarser cohesive sediment on the inter-tidal could change the local sediment properties of the inter-tidal zone. A change in sediment type could potentially result in a change in benthos and therefore impact upon bird usage. As the inter-tidal in the upper areas of the estuary is designated, such a change if proven, would be seen as a negative impact under existing conservation legislation. Clarification is required regarding Appropriate Assessments for any proposed beneficial use.
- There are limited opportunities for realignment and intertidal placement within the Medina estuary and the potential schemes are likely to incur costs beyond the reach of one dredging stakeholder. There is currently no framework to enable stakeholders to 'buy in' to one project that would benefit the whole estuary.

- Some beneficial use schemes would involve habitat creation and restoration. Both the intertidal and subtidal include important habitats and without managed realignment it is difficult to offset subtidal loss without loss to intertidal habitat.
- Resources would need to be allocated to the coordination of a dredging partnership and associated trials, monitoring and analysis.
- New information obtained during the Cowes Outer Harbour Project shows the estuary to be stable and slightly accretional and therefore raises questions about the need / net benefit of beneficial dredging. This issue needs to be resolved and agreement reached between the Estuaries Partnership and the Marine Management Organisation (MMO).

### **3.6 Monitoring Requirements**

There are no monitoring requirements in the Medina Estuary that relate specifically to maintenance dredging activities. However, monitoring schemes related to capital dredging and shore based development will contribute information to the overall understanding of the estuary's processes. If the use of hydrodynamic dredging is considered to be appropriate in future then there will be a high degree of monitoring to assess its impact, particularly on depths at other dredged locations in the estuary.

Information regarding the type and chemical status of material dredged from each area of the Medina is held by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) which test all dredged material as part of the licence application process.

### **3.7 Other relevant information.**

After a successful saltmarsh monitoring programme was set up in the Western Yar estuary, the Isle of Wight Estuaries Project will introduce a small scale monitoring scheme in the Medina in 2010 using existing posts on the saltmarsh and annual photography to measure the extent of the saltmarsh in each area and any change in the level of sediment.

### **3.8 Gaps in the knowledge base**

The production of Volume I of the Baseline Document highlighted a need for a consistent approach to the recording of dredging activities. It is still proposed that a form similar to that contained in Appendix 3 is used to collate information. This will be sent out with applications for maintenance dredging or the information extracted when applications are received by Cowes Harbour Commission.

There is also a gap in information about the material type and chemical status of sediment dredged from the Medina. Ideally this should be collated and any patterns identified but it is unclear whether CEFAS would be able to undertake this additional work as part of their recording process. There is currently no capacity or expertise to carry this task out locally. Confirmation that the dredged material is suitable for placement in the estuary will also be required from CEFAS.



Many different sets of data exist and ideally these should be copied to a central point for consideration in the future. The Isle of Wight Estuaries Project currently holds a large amount of information and may be able to perform this task.

Further information should be collected about the Medina's oyster beds that may be affected by alternative methods of dredging or disposal.

There is uncertainty about the impact that sea level rise will have on the habitats of the Medina. New monitoring schemes would develop understanding of local change and information from the monitoring will be included in future updates to the Baseline Document.

It would be useful to have more information about the input of sediment from the river Medina at Newport Harbour and the significance of it in terms of the overall sediment budget of the estuary. Future dredging in Newport Harbour may form part of a sustainable dredging plan as its location may act as a source of sediment for the central section of the estuary.

Any methods of dredging new to the Medina or management measures undertaken as part of a sustainable dredging plan should be monitored to assess their effectiveness. This information should then be readily available through the Baseline Document to inform future schemes.

With ongoing regeneration aspirations it is likely that there will be renewed drive for the implementation of a Sustainable Dredging Plan and resolution of the issues that have prevented its development. Further data will not automatically mean a solution to these issues which are only likely to be resolved through discussion and understanding of the various regulations and responsibilities. It will also require ongoing commitment from the key regulators to ensure that the mechanism and resources are put in place to develop and maintain a long term plan.

## **4.0 Condition and Interest features of the European site**

The Medina Estuary forms a component of the Solent European marine site which includes interest features of the Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar site. Most of the upper Medina Estuary is designated as a Site of Special Scientific Interest (SSSI) and the importance of the estuarine environment led to the extension of the SSSI boundary to include most of the intertidal area of the estuary (Marston, 1996) see Figure 1.

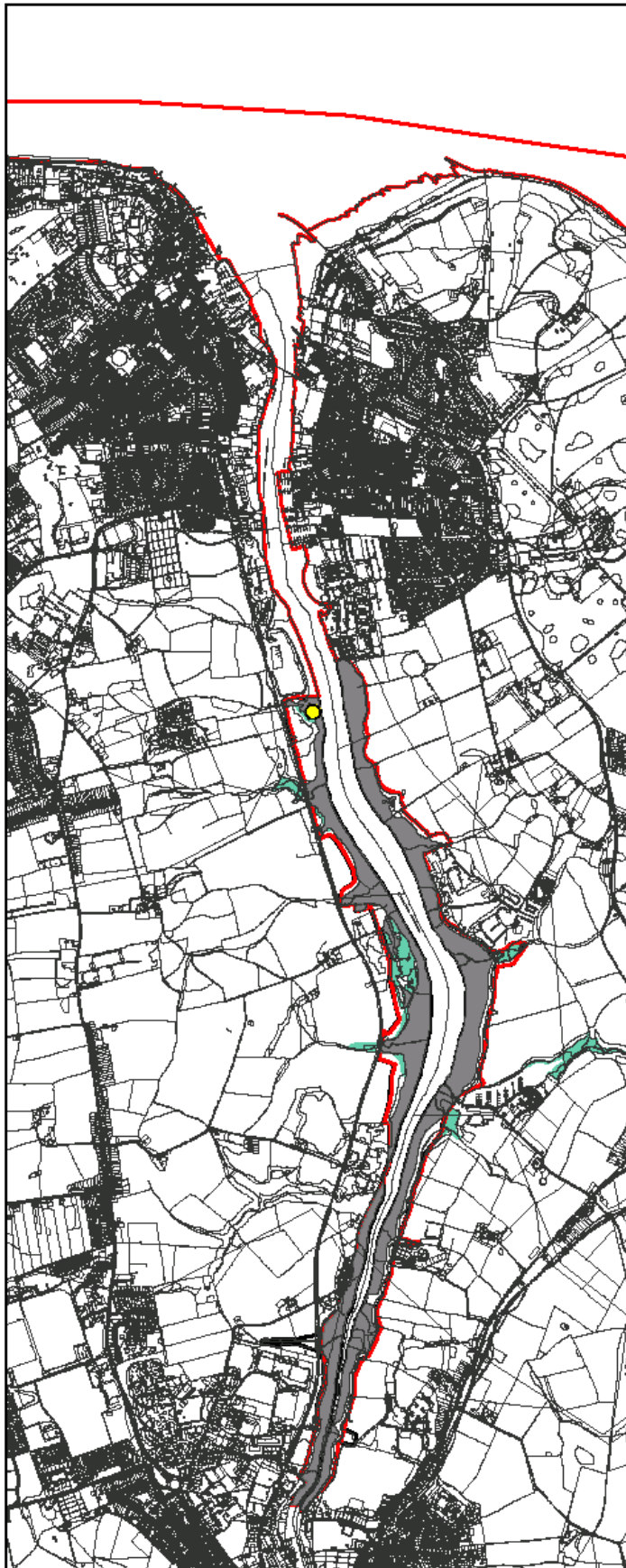
The Medina Estuary qualified for inclusion within the Solent Maritime SAC as part of the functionally linked suite of estuaries and was seen to be an essential functional component of the Solent estuary system. The Solent Maritime SAC was proposed on the basis of the existing conservation value of the component estuaries against a backdrop of extensive human activity and commercial development in the Solent area. It was recognised at the time of the proposal and recommendation to the DETR that past development of harbours has substantially affected the natural habitats in the main harbour areas but that the functional links remained between the more natural habitats of the inner estuaries proposed for inclusion. In terms of the existing developed nature of the component harbours, it was not anticipated that there would be significant conflict between the maintenance of conservation values of estuaries and existing harbour activities undertaken in ways which sustained the features for which the site was proposed.

A full and detailed description of the features of the European Site is contained within Volume I. The Medina Estuary supports a wide range of both intertidal and subtidal habitats displaying the transition from marine to terrestrial environments, although these do not specifically contribute to the interest features. It is both the habitats (generally described by their vegetation or sediment types and location within the tidal frame) and the communities that they support that are considered within the setting of favourable condition status. The SAC designation identifies primary 'interest features' and 'sub-features' which together characterise the conservation value of the designated site and against which conservation objectives are framed. These are described for the designated area as a whole and not all the interest features or sub-features will occur at any particular site within the estuary complex. The habitats in the Medina Estuary component of the SAC are:

- Estuaries
- Cordgrass swards (*Spartinion*)
- Atlantic salt meadow (*Glauco-Puccinellietalia*)
- *Salicornia* and other annuals colonising mud and sand
- Mudflats and sandflats not covered by seawater at low tide
- Sandbanks which are slightly covered by seawater all the time
- Annual vegetation of drift lines





The Solent European Marine Sites support features qualifying under the EU Birds Directive and the Ramsar Convention on Wetlands of International Importance (English Nature, 2001). Qualification is based on bird species and the supporting habitats. The qualifying species for designation as Special Protection Area (SPA) or Ramsar sites are referred to as 'interest features'. The key habitats necessary to support the birds that qualify within the Solent and Southampton Water SPA are classified as 'sub-features'. Not all the interest features of the Solent and Southampton Water SPA and Ramsar designations occur within the Medina or are at a level of abundance for qualification. However they still contribute as part of a component estuary which supports the designation of the wider Solent and Southampton Water interests.

Further information on favourable condition is contained within Natural England's advice under Regulation 33 (English Nature, 2001) which is available at <http://www.ukmpas.org/pdf/Sitebasedreports/SolentRegulation33Advice.pdf>.



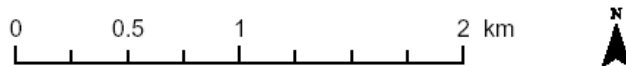
**Figure 2: Medina Estuary - Habitats of nature conservation importance within the SAC**

**Legend**

-  cSAC
-  Vegetated Shingle
-  Mudflats
-  Saltmarsh

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The Solent and Southampton Water SPA supports internationally important numbers of dark bellied brent geese *Branta bernicla* and black-tailed godwits *Limosa limosa*. The Medina Estuary contributes to the estimated over 20,000 waterfowl that use the SPA in the winter (CCZM 1996a). Some of these species are present in the SPA in nationally important numbers and the Medina Estuary helps to support:

- shelduck (*Tadorna*)
- wigeon (*Anas penelope*)
- teal (*A. crecca*)
- ringed plover (*Charadrius hiaticula*)
- grey plover (*Puluvialis squatarola*)
- dunlin (*Calidris alpina*)
- curlew (*Numenius arquata*)
- redshank (*Tringa totanus*)

The Medina Estuary regularly supports 19 species of wildfowl, 15 species of wader, 4 species of gull and 2 species of tern (Marston, 1996a). It is also the most important site on the Isle of Wight for supporting populations of little grebe, oystercatcher, redshank and turnstone.

## 4.1 Status of the European Site

Conservation objectives for SACs (prepared under Regulation 33) are a requirement of the EU Habitats Directive. Objectives for the features of the European marine sites are to maintain them in favourable condition, subject to natural change. In Volume I Natural England described the Medina estuary as being in favourable condition and there has been no change to that status since 2004.

### 4.1.1 Condition of the SSSI

Natural England has assessed the conditions of SSSIs in England, using categories that have been agreed for the UK through the Joint Nature Conservation Committee (JNCC). SSSI condition is usually assessed by Natural England staff visiting the sites and observing and recording information about the special features and their management. The condition of special features within SSSIs was published by English Nature (now Natural England) in 2003 and is available on the internet. The features of the Medina Estuary SSSI are currently recorded as in favourable condition.

Much more detailed information is now available through the research carried out since 2004 and this is all available to assist Natural England with condition assessments for the SSSI and European marine site.

## 5. Applying the Habitats Regulations

There is a need to establish the current understanding of the implications of maintenance dredging on the designated features of interest. This stage follows the provisions of the Regulation 48 of the Habitats Regulations, using terms that the Regulations use in accordance with the guidance notes published by Natural England on behalf of Defra.



Natural England considers maintenance dredging to have a 'likely significant effect' because the Medina Estuary receives a relatively small supply of sediment. The basis for reaching a judgement of likely significant effect is the implications maintenance dredging can have for intertidal habitat evolution in the face of sea level rise. Current predictions suggest sea level rise will be in the order of 6mm per year. The natural tendency of estuaries to deposit sediment on inter-tidal mudflats and saltmarshes will counter this, allowing them to maintain their position in the tidal frame; but this depends upon the provision of an adequate supply of sediment. Where coastal cliffs comprise more consolidated lithology, or where extensive coastal defences limit the level of erosion and input to background marine sediments, there is the possibility that sediment supply will not be sufficient to keep pace with sea level rise. Indeed, it may be anticipated that estuaries lying within largely hard-rock environments that rely more extensively on fluvial sediments for mudflat evolution will experience difficulties.

In the case of the Medina Estuary, it lies within a system that is likely to be deficient in background marine sediment levels and as such could be vulnerable to loss of sediment in the long-term (Bray and Cottle, 2003). As a consequence, for the purposes of testing the implications of maintenance dredging in the context of the Habitats Regulations, the overall conclusion of this first test is that there would be a likely significant effect, and that as a consequence there is a need for further evaluation (appropriate assessment) following Regulations 48(2) *et. seq.*

Reg 48.(2). In this document, Cowes Harbour Commission (CHC), as the navigation authority, provide the information deemed necessary to inform an appropriate assessment of maintenance dredging within the Medina Estuary, and to provide baseline information which should be taken into consideration when other plans and projects are evaluated. In accordance with Regulations 48.(3) and 48.(4), the Competent Authority Defra will undertake its own appropriate assessment of maintenance dredging applications through its Marine Management Organisation (MMO).

However, in preparing this document, CHC in their role as a competent authority have concluded that maintenance dredging does not have an adverse effect on the Medina Estuary, part of the Solent and Southampton Water SPA and Ramsar Site and the Solent Maritime SAC, provided that it is carried out in accordance with the guidelines in this document. The rationale for this judgement is:

- Maintenance dredging largely affects sediment supplies within the water column and is of particular concern in relation to mudflat and saltmarsh evolution. However current understanding of the Medina's processes suggests that the estuary is in a relatively stable form and slightly accreting. Maintenance dredging takes place downstream of the interest features for which the Medina was originally designated; therefore it will not directly affect the intertidal habitats through loss of habitat. However, it does create conditions that lead to interception of a small proportion of sediment that might otherwise feed intertidal habitats upstream of Cowes.
- Current monitoring by Natural England suggests that the habitats for which it was designated both as SPA and SAC are in favourable condition.
- Where maintenance dredging occurs, the process has been ongoing for many years, and the sub-tidal communities that occur within the estuary reflect this pattern of activity. Their intermittent loss is not considered to be detrimental to the interest features for which the site was designated.

- Smothering effects from sediment mobilisation are localised and do not affect interest features within the designated site; indeed this sediment mobilisation may in itself partially offset the loss of sediment to the offshore disposal site. Alternative dredging techniques may have a greater potential for smothering so will have to be monitored and discussed as part of a sustainable dredging plan.
- Long-term testing of sediment chemistry by CEFAS has not given rise to concerns about elevated levels of contaminants and therefore using current guidelines there would appear to be no particular grounds for concern about contaminant remobilisation. However, if sediment were to be placed in sensitive areas as part of a beneficial use scheme tighter controls and monitoring may be necessary. Further information about levels of contaminant in sediment at Newport Harbour would also be useful.

## 6. Conclusions

Volume I and the preceding sections of Volume II set out the historic and current maintenance dredging activities as far as can be ascertained from records held by Cowes Harbour Commission and the MMO. They also summarise the conservation status of the estuary and the locations of particular habitats and species of conservation interest relevant to the designations.

The concluding remarks in Volume I provide a summary of the understanding and discussion underway at that time. They cover the following issues:

- Data gaps and problems associated with data acquisition
- Reduction in supply of sediment caused by the Shrape breakwater
- Understanding of estuary processes and historic understanding
- Maintenance dredging requirement 14,000m<sup>3</sup> – 20,000m<sup>3</sup> per annum
- Concern about erosion of sediment.

As outlined in section 3 there has been a large amount of research carried out since Volume I and this has led to a more detailed understanding of the estuary. In Volume I comments were made on the basis of the erosion of sediment whereas current understanding suggests that the estuary is slightly accreting. Future assessments will be based on this most up to date information. One of the discussion points raised is whether the estuary will have enough sediment to maintain habitats with rising sea levels. There is unlikely to be sufficient information to assess that issue so Cowes Harbour Commission will continue to work with Natural England and the Environment Agency through the Isle of Wight Estuaries Project to develop a sustainable dredging plan for the Medina. There are limited opportunities for beneficial use but some small scale schemes and alternative methods of dredging may help as part of a plan agreed with the dredging applicants and the statutory authorities.


It is the view of Cowes Harbour Commission, as set out in section 5, that this Baseline Document (Volumes I and II) provides sufficient information for the Competent Authorities to undertake appropriate assessment when determining consent for maintenance dredging. In their view, current information together with monitoring reports by Natural England indicate that maintenance dredging is not adversely affecting the designated sites and the interest features that they support.


## 7. Next Steps

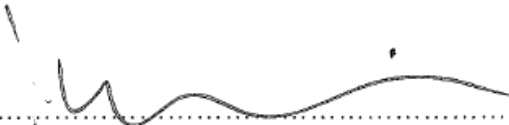
This section has been included to address the issues raised by Natural England whilst preparing Volume II of the Medina Baseline Document. It sets out a series of actions that will ensure ongoing monitoring and review for progression to Volume III.

- Set up a meeting with all dredging stakeholders and regulatory bodies before March 2011 to discuss the latest Baseline Document and implications for licences. Secure agreement for a joint project with dredging stakeholders.
- Set up and maintain the saltmarsh monitoring programme in Medina, initially with annual photographic monitoring in June.
- Monitor small scale sediment replenishment schemes elsewhere in the Solent.
- Investigate opportunities for a trial sediment replenishment scheme and associated costs. Identify the potential impact on shellfish waters and other dredged areas, optimum timing and funding options. Completion by end of 2011.
- Based on the information gathered, secure agreement for a scheme with dredging stakeholders that includes monitoring and a review.
- Include results of any trial schemes undertaken in Volume III of the Medina Baseline Document.

These actions were agreed by the Estuaries Steering Group in October 2010 and Volume II of the Baseline Document was subsequently signed off by Cowes Harbour Commission, Natural England and the Isle of Wight Estuaries Partnership.

  
 On behalf of Cowes Harbour Commission  
 HARBOUR MASTER  
 CHIEF EXECUTIVE  
 STUART MCINTOSH.  
 8<sup>th</sup> October 2010  
 Date

  
 On behalf of Natural England  
 DYLAN TODD  
 8/10/2010  
 Date

  
 On behalf of the Isle of Wight Estuaries Partnership  
 MATTHEW CRAFTIE, CHAIRMAN  
 8-10-10  
 Date

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## **Appendices**

Appendix 1 – Relevant reports

Appendix 2 – Sustainable Dredging in the Medina – discussion paper

Appendix 3 – Example of form to collect information from licence applications

## Appendix 1

### Relevant reports – including those completed for the Medina Assessment Tools Project

Medina Estuary Volume Changes	2000	May
Development of Shepards Wharf Boatyard	2002	March
Sustainable Use of the Medina Estuary as a further development of the Estuary Management Plan Key Tasks 1 and 2	2002	September
East Cowes Marina Extension - River Medina	2002	October
Consideration of Alternative Use of Dredge Material in the Medina Estuary	2003	June
Medina Estuary Baseline Document Volume 1	2004	October
Cowes Ecology Phase 1 Survey Report.	2005	January
Ecological Review of the Medina Estuary.	2005	June
Medina Dredge Management Plan	2005	July
The Medina Estuary: Opportunities for Conservation and Enhancement of Biodiversity	2005	July
Marine Impact Assessment Tools: Data Collation Document.	2006	August
Medina Estuary: Review of Intertidal and Subtidal Benthic Communities.	2006	October
Marine Impact Assessment Tools – Model Calibration and Validation Report: Medina Estuary, Isle of Wight.	2007	February
Marine Impact Assessment Tools: Medina Estuary Historic Understanding.	2006 updated 2007	September July
Marine Impact Assessment Tools: Medina Estuary Historic Understanding – Executive Summary.	2006 updated 2007	September July
Marine Impact Assessment Tools –Medina Estuary Scheme Testing.	2007	August
Sustainable dredging in the Medina Estuary	2008	November
Cowes Outer Harbour Project: Environmental Impact Assessment.	2009	

## Appendix 2

### **Sustainable dredging in the Medina Estuary**

#### **Introduction**

Since the early 1990s there has been a significant increase in marine environmental legislation, predominantly related to nature conservation. The Medina Estuary supports a number of habitats and features, which have become designated under this legislation. This has resulted in on-going activities and future developments requiring compliance with the new regulations.

One of the activities that could have an impact on the nature conservation interests of the Medina Estuary is the potential increase in the requirement for maintenance dredging associated with new development schemes. Maintenance dredging takes place at a number of locations within the Medina Estuary and is essential to maintain important commercial and recreational activities. To comply with the regulations and ensure the safe and economic functioning of the port, a balance needs to be found between ongoing maintenance dredging activities and the sustainable management of the Medina Estuary. The issues involved in this management have been under discussion for a number of years, predominantly through the Medina Estuary Management Group (MEMG), which is part of the Isle of Wight Estuaries Partnership. A list of the MEMG members is attached at Appendix 1. Also during this time the Medina Valley has been the focus of a major regeneration programme, which has increased the pressure for a sustainable solution but has also contributed significantly to the amount of information collected about the estuary and our understanding of its processes.

Each dredge on its own is usually relatively small, but when the individual dredge is considered 'in combination' with other maintenance dredge works the continual removal of sediment from the estuary may result in a net loss of sediment with a potential impact on inter-tidal habitats. Although early reports suggested that the Medina Estuary might have a potential issue in respect to sediment budget, further detailed modelling, survey work and research over the last three years has indicated that the magnitude of these effects are small with respect to the estuary as a whole. Results from the surveys, research and comprehensive marine impact assessment tools (the MAT) show the present day Medina Estuary to be in a relatively stable form and possibly slightly accreting overall. This detailed research will inform both the assessment of development proposals and decisions on the way forward for developments which increase the maintenance dredging quantities over the currently agreed baseline criteria. Despite the amount of work already carried out on the Medina dredging issue and the introduction of the Maintenance Dredging Protocol earlier this year, there are still many local and national issues that have not yet been resolved and to do so may require further guidance from the national statutory authorities.

The purpose of this paper is to summarise the work that has already been undertaken to develop a Sustainable Dredging Management Plan for the Medina Estuary, outline the issues associated with the implementation of such a plan and suggest actions to take the work forward.

#### **Background**

##### **The Medina Estuary**

Studies that have calculated the estuary's morphological parameters (ABP Research, 2000 and ABPmer, 2002) indicate that the Medina Estuary has a relatively strong flood dominance with respect to tidal shape and area / volume characteristics but ebb dominance with respect to main channel flows. This is considered to result in net import of fine sediments and export

of coarse sediments and has the potential for accretion on the intertidal providing a sufficient sediment supply is available. This sediment is essential for maintaining the existing and future environmental character of the estuary and the features for which it was designated.

A reduction in supply was almost certainly caused by the construction of the Shrape Breakwater in the late 1930s. Up until the mid 1930s it would seem likely that the estuary was accretionary with a supply of fine sediment across the area known as Shrape Mud. Historic records report that dredging was frequently required in the outer section of the harbour. The aim of the Shrape Breakwater was to constrict the channel to increase flows thus increasing the 'self cleansing' capacity of the channel, at the same time restricting the quantity of sediment which would enter the estuary.

### Maintenance Dredging

Maintenance dredging is a highly regulated activity undertaken by many ports, berth operators and marinas to maintain safe navigable channels and berths. One of the potential issues and concerns of Natural England relating to maintenance dredging is not the absolute loss of material from any one dredge, nor its direct impacts, but instead the long-term constant loss of material from the estuarine system due to disposal at sea. Maintenance dredging on the Medina is not directly removing material from the inter-tidal but from the sediment sinks of the marinas and berths. One method considered to address the potential issue of a deficit of sediment in the estuary budget was the use of beneficial dredging with material being moved within the system to areas that need it. Not only would this reduce the volume of sediment removed artificially from the system, but also provide a source of sediment for inter-tidal and sub-tidal accretion.

### Maintenance dredging and the Habitats Regulations

Where maintenance dredging operations have the potential to affect European sites, the Government considers that under the Habitats Regulations both new works and maintenance dredge licence applications are considered to be "plans or projects". When looked at in combination a judgement of likely significant effect has been made by Natural England and this requires the competent authorities to undertake an Appropriate Assessment according to the Habitats Regulations.

However, ports and marinas have questioned that view with respect to maintenance dredging which was often taking place in these areas many years before the site was designated and the Habitats Regulations introduced. It is argued that the activity cannot have damaged the site as it still warranted the designation. In some areas the existing activities may actually be partially responsible for the presence of the interest features.

To try and reduce the burden of the continual need for Appropriate Assessments, particularly for renewal of maintenance dredge licences, a Dredging Protocol has been developed by regulators and industry and this is managed by DEFRA/MFA. The Protocol recommends that an initial Baseline Document is produced for the estuary that brings together readily available current and historic data on dredging activities within the area concerned.

The Baseline Document should set out the current and historic level and locations of maintenance dredging throughout the harbour or estuary. This should be set against the context of the relevant designations and condition of the designated site. It is then reviewed and agreed by the statutory authorities that licence the dredging activity. Once the existing baseline is agreed, any maintenance dredging within the parameters detailed in the baseline document should proceed with consent from the authorities responsible without the need for further detailed assessment. This will reduce the amount of work for both the statutory authorities and the dredging applicant. Any maintenance dredging requirement beyond the levels in the Baseline Document may require Appropriate Assessment.

The Baseline Document for the Medina Estuary was developed in 2004 as one of the three pilot areas working to test the development of the Protocol. Within the levels set out in the document it has been established that the impact of existing levels of maintenance dredged

material is acceptable to the environmental quality of the Medina Estuary. However, any further dredging will be subject to Appropriate Assessment by the Environment Agency and Natural England (formerly English Nature) under their responsibilities for the Solent European Marine Sites set out in the Habitats Regulations. The Baseline Document is an evolving document that should be assessed regularly to ensure it is up to date. Any applications for new (Capital) dredging and any subsequent ongoing maintenance requirements will be added to the Baseline Document.

#### Development of a Medina Dredge Management Plan

The regeneration initiative in the Medina Valley instigated a number of development proposals which increased the need for a way forward on the dredging issue. Consents were granted for an extension to East Cowes Marina and Shepards Wharf (both requiring capital dredging and potential increase in maintenance dredging quota). These consents contained a condition requested by Natural England to introduce a beneficial dredging plan for the future works. The premise of these consenting requirements was a belief that the upper estuary was suffering a net loss of material.

After lengthy discussion with the Medina Estuary Management Group and other stakeholders, Cowes Harbour Commission took the lead and in 2005 commissioned ABPmer to write a report on the development of a Medina Dredge Management Plan.

The report drew on the available data that existed on the Medina Estuary, and the collation of relevant information in the Baseline Document. It provided background to the issues that needed to be incorporated into any future plan including a review of the need for maintenance dredging, an overview of the environmental legislation and the Medina's maintenance dredging requirement. It summarised the main issues, set out objectives and proposed a Dredge Management Plan. This plan became the focus of discussion amongst the Medina Estuary Management Group, ABPmer and representatives from the Medina Valley Centre.

The table below shows the main reports that have been undertaken since 2000 that are relevant to the issue of sustainable dredging in the Medina Estuary. A large amount of research, resources and discussion led first to the production of the Baseline Document in 2004 and then to the Medina Dredge Management Plan in 2005. These two reports became the focus of discussion in 2005.

Medina Estuary Volume Changes	2000	May
Development of Shepards Wharf Boatyard	2002	March
Sustainable Use of the Medina Estuary as a further development of the Estuary Management Plan Key Tasks 1 and 2	2002	September
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Marine Impact Assessment Tools: Medina Estuary Historic Understanding – Executive Summary.	2006 updated 2007	September July

Marine Impact Assessment Tools –Medina Estuary Scheme Testing.	2007	August
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### The Dredge Management Plan - recommendations

The Medina Dredge Management Plan set out the issues from all perspectives in order to determine the requirements and offer ideas for solutions to the problems. Based on reports that suggested the estuary needed more sediment, it recommended the use of hydrodynamic techniques within the Outer Estuary and a combination of this and the use of Cutter Suction Dredgers (CSD) dredgers pumping to the water column for sites up estuary of the Chain Ferry. It was not known what dredge volumes would be acceptable without introducing further legislative problems but the volume from outside the Chain Ferry is likely to be higher than for inside the Chain Ferry. The methodology would be a change from existing practice for the initial dredge, but backhoe dredging would still be required in specific locations. The further up the estuary the dredging location, the more likely it is that the sediment will stay within the estuary. However, in general, the smaller the volume of material deposited the more likely the natural flow will redistribute the sediment within the estuary.

Taking account of previous annual dredge requirements for the different locations, it was proposed to:

- 5) Initially restrict the volume of dredging at any one location to about 4,000m<sup>3</sup> per annum by hydrodynamic methods or pumping of sediment to the flow;
- 6) Undertake a monitoring programme appropriate to the size of the dredge and the likely locations the sediment will disperse to;
- 7) Undertake a trial placement of sediment within the estuary with the objective of determining whether such continued further placements were practical and would provide holistic benefit to the nature conservation features throughout the estuary as a whole. Two options from ABPmer (2003) and discussions with environmental stakeholders on the Medina appeared to have the most potential for such a trial;
  - a. Placement of a bund of backhoe derived material around the edge of Werrar Marsh with the aim of providing a sacrificial berm which would initially protect the edge of the saltmarsh from wave attack either wind or boat generated.
  - b. Pumping of sediment, either by a direct pipeline or from a barge, to an area of higher intertidal as a trial for unconfined intertidal recharge.
- 8) Liaise regularly with relevant stakeholders to review the plan, the dredging requirements and the monitoring scheme.

For each dredge, it would be the responsibility of each operator to apply for the appropriate licences stating the dredging is in accordance with the agreed plan and within the variability with respect to the Maintenance Dredging Protocol Baseline Document. At present WID dredging does not require FEPA licensing. However, it was proposed that a condition be made under the CHC Harbour Works Act that the quality of the sediment is to be established as being suitable for deposit within the estuary. This standard ought to be higher than those operated by CEFAS under FEPA as the sediment would stay within the estuary rather than be disposed of at sea. The cost of this sample analysis will be the dredge applicants' responsibility either directly or through the FEPA licensing, system where required.

For the Medina Dredge Management Plan to be successful, all operators who require dredging (maintenance or capital) and the competent authorities would be required to sign up to the plan. It was proposed that the plan would be administered by CHC and chaired by a representative of the Isle of Wight Council, who would arrange:

- The annual review meeting of the Medina Dredging Management Group;
- Coordinate the agreed trials, monitoring and analysis, and arrange the reimbursement of equal costs to the operator who is overseeing the control for the trials as they occur. The costs of the non-trial related dredging and

associated monitoring would remain the responsibility of the operator requiring the dredging.

#### Issues associated with the Medina Dredge Management Plan

In terms of the Habitats Regulations, the main concern about maintenance dredging is the reduction in supply of sediment to the estuary and the effect on the estuary's ability to maintain existing habitats. The proposed solution to that concern is to retain sediment in the system by the beneficial use of the dredged material or alternative methods of dredging. However, the techniques associated with this also raise a number of issues:

- Fine sediments in marinas and boatyards may contain various contaminants, such as heavy metals and TBT etc, and it would be unwise to release these sediments and any associated contamination into estuary, especially the upper reaches.
- The Water Framework Directive (WFD) and the Shellfish and Bathing Water Directives are mainly concerned with water quality issues caused by the increase in sediments within the water column from the dredging process. Turbidity and increased concentrations of suspended solids could cause problems with growth of shellfish due to gill blocking, abrasion or excessive smothering or affect growth of flora and interfere with the passage of fish to and from the estuary. The Environment Agency has expressed concerns about the impact of an increase in sediment on the Medina's oyster beds.
- Hydrodynamic dredging is currently outside the existing regulatory / licensing regime, apart from Cowes Harbour Commission (CHC) works and dredge licence powers. Clarification would be required on responsibility and or liability for any damage as a result of a consent being given under these CHC powers.
- The volumes required for alternative use at available sites on the estuary represent only a small proportion of the annual maintenance dredge material. Therefore a conventional dredging requirement will remain and the largest proportion of dredged material will need removal to a licensed disposal ground.
- Existing readily available dredging plant may not be suitable for alternative use. The wrong methods or discharging material too quickly has the potential to harm the environmental system, thus offsetting the intended benefit of sediment relocation.
- Maintenance dredging activities can have a short lead-in time, are short duration, occur intermittently and can yield a moderate volume of sediment. In contrast, the ideal sediment supply to the estuary would be slow and continuous.
- The material dredged from many of the berths in the Medina Estuary may not be of the same physical characteristics as that on the inter-tidal mudflat and saltmarsh. The placement of coarser cohesive sediment on the inter-tidal could change the local sediment properties of the inter-tidal zone. A change in sediment type could potentially result in a change in benthos and therefore impact upon bird usage. As the inter-tidal in the upper areas of the estuary is designated, such a change if proven, would be seen as a negative impact under existing conservation legislation. Clarification is required regarding Appropriate Assessments for any proposed beneficial use.
- There are limited opportunities for realignment and intertidal placement within the Medina Estuary and the potential schemes are likely to incur costs beyond the reach of one dredging stakeholder. There is currently no framework to enable stakeholders to 'buy in' to one project that would benefit the whole estuary.
- Some beneficial use schemes would involve habitat creation. Both intertidal and subtidal are important habitats and without managed realignment it is difficult to offset subtidal loss without loss to intertidal habitat.



## **Discussion and research since 2005**

The Medina Dredge Management Plan appeared to set out a clear way forward for sustainable dredging in the Medina Estuary and many of the proposals were investigated further. A number of the environmental issues outlined above were subsequently discussed at meetings of the Medina Estuary Management Group (MEMG) and special meetings were set up to try and find a way forward. The following is a summary of work that has been carried out since the Plan was completed in July 2005:

### ***Throughout 2005***

The estuary was surveyed by Titan and primary data collected throughout 2005 to develop the Marine Impact Assessment Tools.

### ***September 2005***

The MEMG meeting in September 2005 discussed the management plan and concern was raised about the costs of the intertidal placement scheme and monitoring and whether this cost would fall to the stakeholders. The need to achieve agreement for the intertidal placement was also raised as a potential issue. It was agreed that more work should be done before stakeholders were approached about the project. This included requesting quotes for the intertidal placement and the monitoring scheme and the preparation of a plan (with estimated costs) in the hope that funding would become available.

### ***October 2005***

A plan and estimated costs for the monitoring of hydrodynamic dredging was drafted by ABPmer (estimated costs £14,850 - £16,600 at 2005 rates).

A Conservation Group meeting was called to discuss the above proposal and report back to the MEMC meeting in November.

### ***November 2005***

The MEMG meeting in November discussed the proposal for the hydrodynamic dredging and monitoring scheme and the response provided by the subsequent conservation group meeting. It was felt by the Conservation Group that the proposal may be financially limiting and more extensive than required to achieve the conservation objectives and to satisfy the stakeholders.

Natural England suggested that aerial photographs would be sufficient to show that at least some of the dredged material is retained within the estuary but concern was raised that the majority of the sediment stays close to the estuary bed with WID and might not be seen from the surface. The Environment Agency stated that the dissolved oxygen would need to be measured as well as the mobilisation of bacteria from near sewage outlets due to the presence of shellfish waters within the estuary. They also expressed concern about smothering of invertebrates. Other dredging methods were discussed but were not considered to be suitable. In light of the concerns raised and the uncertainty associated with both methods suggested, it was agreed that a pilot study would be the best way to take forward the plan.

The MEMG agreed to carry out further work on a monitoring scheme and obtain the necessary consents to carry out a pilot study. Further costs were to be sought for the intertidal placement project and associated monitoring scheme.

A quote was received from Land and Water for the intertidal placement project (approximate minimum £64,000).

### ***December 2005 – April 2006***

The dredging project was not taken forward by the Estuaries Officer during this time as there were a couple of months when no-one was in post followed by a couple of months that were focussed on the completion of paperwork for the first stage of the Assessment Tools project.

### ***Throughout 2006***

Work on the dredging issue continued throughout 2006 and costs were sought for a monitoring programme for the intertidal placement project (approximately £12,631). Progress was also made towards designing an application process for a licence for hydrodynamic dredging. This involved discussion with other harbours to try and identify the best system for licensing.

A large amount of work was completed during 2006 on the collation of existing datasets and the development of a set of assessment tools to gain a greater understanding of the estuary and its processes. These tools include historic analysis and a hydrodynamic modelling tool that can be used to model the movement of sediment and water flow. The project was funded by the Area Investment Framework and it was hoped that the tools would assist the monitoring of the dredging plan as well as being used to help assess the impact of new developments on the European Site. In 2007 ABPmer completed a report on the Historic Understanding of the Medina Estuary which had been commissioned by the Isle of Wight Council. This showed the estuary to be in a relatively stable form with slight accretion on the intertidal.

#### ***November 2006***

In November a letter was drafted to stakeholders in the Medina who carry out maintenance dredging. The letter invited them to a meeting to discuss the implications of the imminent Maintenance Dredging Protocol and the likelihood of the requirement for some form of hydrodynamic dredging in the Medina. Cowes Harbour Commission proposed a pilot study into the use of hydrodynamic dredging at Shepards Wharf; with a full monitoring programme and test of the new application process. There was also an intention to investigate funding opportunities to trial the placement of dredged material near Island Harbour in order to feed sediment into the upper estuary. The work was not thought to be possible without extensive monitoring and liaison with other stakeholders.

#### ***December 2006***

At a meeting of south coast Harbour Masters, the Queen's Harbour Master expressed concern about the use of hydrodynamic dredging in Portsmouth Harbour and has effectively banned its use within its area of jurisdiction. This was due to the impact it had on other areas of the harbour and the issues of liability that arose from that impact. These issues were discussed at length and further opinion was sought from other harbours around the Solent. Other harbours, such as the Hamble, did not allow the technique either. Although each estuary has different conditions and the use of hydrodynamic dredging should be assessed on a site by site basis, the issue of liability clearly needed to be addressed before the stakeholders in the Medina could be asked to participate in the proposed scheme. There was the hope that the Maintenance Dredge Protocol may offer some guidance.

#### ***Throughout 2007***

The Estuaries Project continued to work on the development of the Marine Impact Assessment Tools which resulted in an increase in data and greater understanding about the estuary. The delayed sign-off of the assessment tools project by Natural England postponed the use of the model in defining a monitoring scheme for any new dredging programme.

#### ***March 2007***

CHC attended a workshop meeting of the PIANC MARCOM Working Group 51 - Environmental Impacts and monitoring methods for hydrodynamic dredging at the Institution of Civil Engineers on 28th March 2007. CHC were thanked for supplying 'extremely valuable input' into the workshop and the Group by explaining the progress and issues associated with work on the Baseline Document and Sustainable Plan in the Medina. CHC suggested that the Medina could be used as a 'best practice model' due to the variety of issues and challenges involved in the management of WID. The Medina is thought to provide an excellent case study area as it has the key conservation designations and important habitats as well as numerous dredging stakeholders and landowners and a challenging mix of commercial and recreational vessels. There has also been a large amount of data collected, a robust 2D model, a current maintenance dredging baseline document, an estuaries partnership and officer (partners including Natural England, the Environment Agency, local authority and CHC) and a draft sustainable dredging management plan.

**July 2007**

Chart difference analysis was undertaken as part of the Medina Assessment Tools project. The chart difference analysis supported the new model results from the MAT that the estuary was in a relatively stable format with possible accretion in sub and inter-tidal areas through the majority of the estuary. The report on the Historic Understanding of the Medina Estuary was clarified and updated with further information that has been gathered since September 2006.

**August 2008**

The Maintenance Dredging Protocol was completed and released in August 2008. It was hoped that the Protocol would provide further guidance on the development of sustainable dredging plans but unfortunately this does not seem to be the case.

**Development of understanding since 2005**

As can be seen above, the Medina Estuary has been the focus of extensive research since 2005. The new suite of assessment tools were developed to provide up to date information across the whole estuary which is particularly useful as previous information focussed on one issue or an individual development proposal. The Estuaries Partnership was keen to instigate a project that gathered quality data across the range of features and processes that could then be combined to provide a holistic assessment of proposed developments.

The assessment tools project included historic chart analysis, a review of estuary processes and morphometric analysis. Based upon the updated understanding that has arisen through development of the MAT the following is a summary of the current understanding of the Medina Estuary:

- The estuary has always been flood dominant with respect to tidal shape and area / volume characteristics allowing the import of fine sediments, with respect to flow speeds the main channel is ebb dominant with the tendency of exporting coarser material;
- The main control on the estuary geometry is the Chain Ferry constriction which has changed little since 1856 and could be considered the true mouth of the estuary;
- The range of processes at work (natural and human imposed) differ either side of the Chain Ferry, but nevertheless the changes that occur in the Outer estuary may have an effect up estuary depending of the 'nature' of the works, and vice versa;
- Reclamations, capital dredging and the construction of the Shrape Breakwater have caused a temporary change to the natural 'working' of the system causing morphological readjustment to the estuary system, predominantly in respect to the LW channel;
- Post 1980s the effects of the earlier developments appear to have substantially worked their way through the estuary system. However, some residual change may continue to occur in the Upper estuary in the near future (order of a decade);
- The Shrape Breakwater has contributed (along with coastal protection works) to reduce the overall supply of sediment to the estuary, compared to 1856;
- Since the 1980s the estuary has had a net accretionary trend, particularly over the intertidal. Rates of change are small, being measured in millimetres per year;
- There has been a net reduction in surface area (at high water) due to coastal squeeze, predominantly from embankments and reclamation;

It is worth noting that most of the relevant factors were in place or occurred prior to the estuary being designated.

Overall, the historical chart analysis suggests that accretion of fine material has continually occurred since 1856 (albeit at a relatively slow rate) but the man-made interventions probably, mostly between the 1920s and the 1950s, caused a temporary change to the system. This changed the hydrodynamics, inducing additional flows at the lower states of the tide

(particularly ebb), which have scoured the LW channel. This scour has mainly been at the edges, removing the finer fractions of sediments to leave the coarser gravels as bed armouring thus reducing the effect depth-wise. This temporary change appears to have worked through the system up to the area around Island Harbour and the net accretionary regime has re-established down estuary. The rates of future accumulation are, however, likely to be lower than those before the construction of the Shrape Breakwater due to its effect on reducing the supply of sediment into the system. Upstream of Dodnor, the net accretionary trend has been continuous but may be reduced for a period in the future as the effect of the developments continues to work its way up estuary, unless the effect has decayed sufficiently not to cause a significant change relative to the accretion and erosion thresholds.

## Outstanding issues

A greater understanding of the way the estuary is working is extremely helpful in finding a way forward for the management of dredging. There are still however a number of issues that have to be considered before progress can be made. These are summarised below:

- Information gathered between 2005 and 2008 suggests that the estuary is in a relatively stable form and that it has been slowly accreting since the 1980s. The Dredge Management Plan was not based on this updated understanding and will need to be reviewed and updated.
- The possibility of a scheme to place dredged material on the intertidal area of the Medina is in doubt as an approach by Island Harbour to carry out such a scheme was rejected by the Environment Agency under the regulations imposed by the Shellfish Directive. There needs to be clear guidance as to the interaction between the various regulations and the regulators on the estuary and the restrictions on projects to enhance the estuary in terms of the Habitats Directive.
- The cost of a pilot scheme for intertidal placement of dredged material and necessary monitoring is extremely high and there is currently limited funding available. Costs would need to be shared between different operators and there is currently no framework in place to do that. Some dredging operations are ongoing and fit within the limits set out by the Baseline Document. These licence holders would not want to contribute financially to a scheme that would not be of benefit to them.
- Clarification is still required on the responsibility / liability for any damage as a result of a consent given under a CHC works/dredge licence for any form of hydrodynamic dredging currently outside the FEPA/MFA licensing regime.
- As no FEPA licence is required for hydrodynamic dredging there is currently no requirement to send samples of the sediment to CEFAS. It is not clear whether individual applicants would be able to send sediment samples to CEFAS for analysis, how long this would take and how much it would cost. Although contaminant levels have been acceptable for sea disposal in the past, levels may be unacceptable for placement further up the estuary and further guidance is required.
- There are limited opportunities within the Medina to carry out schemes involving managed realignment or the placement of dredged materials on the intertidal area that; a) would not cause damage to the European site b) would be acceptable to landowners and the competent authorities and c) incur a cost that is not disproportionate to the size of the dredging operation. A larger scheme that stakeholders could buy into would require funding to set up and negotiate, consents and permission and the framework or management structure to enable them to do so.

## Proposed actions

When the Medina Baseline Document was compiled in 2004 there was very limited information on the functioning of the estuary. The current position of understanding is that the estuary is in a relatively stable form. In light of the new information and the potential problems associated with the implementation of elements of the Medina Dredge Management Plan (2005) it is necessary to update the Baseline Document and review the proposed plan.

If the aspiration to keep sediment in the system remains, a Sustainable Dredging Plan for the Medina Estuary is unlikely to progress without at least some of the outstanding issues being resolved. It remains a possibility that a sustainable dredging plan cannot be delivered. Any delay has the potential to impact on existing operations and current development proposals. A way forward in the short-term needs to be agreed that reflects the circumstances outlined in this paper.

Due to the high cost of the placement of dredged material on the intertidal and the scale and cost of the monitoring scheme, the use of hydrodynamic dredging may still be the most practical way forward in the medium term. Unless large scale funding can be found to set up the intertidal recharge scheme it is unlikely to progress in the way described in the Medina Sustainable Dredge Plan. There may still be an opportunity to carry out small scale placement but these would first have to be discussed and agreed with the Environment Agency due to the Shellfish Directive and the Water Framework Directive.

The following actions are suggested to progress the development of a Sustainable Dredging Plan:

- Update the Baseline Document in light of the new information that has been collected since 2005 and submit the document for approval by the relevant regulators.
- Review and update the Medina Dredge Management Plan in light of the new information provided by extensive research. This will require further consultation and discussion with both Natural England and the Environment Agency in respect to the requirement and merits of using beneficial dredging or hydrodynamic dredging based on the updated information and knowledge of the issues.
- Obtain clear written guidance on the use of hydrodynamic dredging in the Medina from the Environment Agency and Natural England.
- Obtain clear written guidance from the above organisations on the placement of dredged materials on intertidal areas in the Medina Estuary and the process to apply for permission for the work.
- Obtain clarification from DEFRA and the statutory authorities on the liability issues associated with hydrodynamic dredging techniques that do not require a FEPA licence.

The need to progress the management of dredging in the Medina Estuary and resolve the issues outlined in this paper is now imperative as it affects current and future proposals for the regeneration of the area. The Medina Estuary Management Group will hold a meeting to discuss the paper and the proposed actions.

### List of Medina Estuaries Management Group (Appendix 1)

The membership of the Medina Estuaries Management Group has changed over the years and additional stakeholders are invited depending on the particular project that is being discussed. Since 2005 the representatives from Natural England and Environment Agency change regularly which has had an impact on continuity and consistency of advice. Below are the organisations that form the group to discuss dredging issues.

Natural England representative

Environment Agency representative

Captain Stuart McIntosh

Dave Moore

Cowes Harbour Commission

Isle of Wight Council (Planning Policy)

Matthew Chatfield  
Colin Pope  
Keith Marston  
Roger Herbert  
Richard Reddyhoff  
Sue Hawley

Isle of Wight Council (Parks and Countryside)  
Isle of Wight Council (Ecology)  
Medina Valley Centre  
Medina Valley Centre  
East Cowes Marina (Dean and Reddyhoff)  
Isle of Wight Estuaries Project

## Appendix 3

Example of form required to collect information from dredging applications.

Dear Applicant

Thank you for your application to carry out maintenance or capital dredging. As part of the licence process, please complete the following form when the dredge is finished and **base it on the returns information**. This will provide information that will help to improve the speed and efficiency of the consents process.

<b>Year</b>	.....
<b>Amount wet tonnes</b>	.....
<b>Amount cubic metres</b>	.....
<b>Location (with GR if possible)</b>	.....
<b>% of dredge that is maintenance</b>	.....
<b>Method of dredge</b>	.....
<b>Disposal site or method</b>	.....