

Sediment Management in Cowes Harbour



Aim

To develop and deliver the most cost effective and environmentally responsible sustainable Dredging Management Plan for all stakeholders.

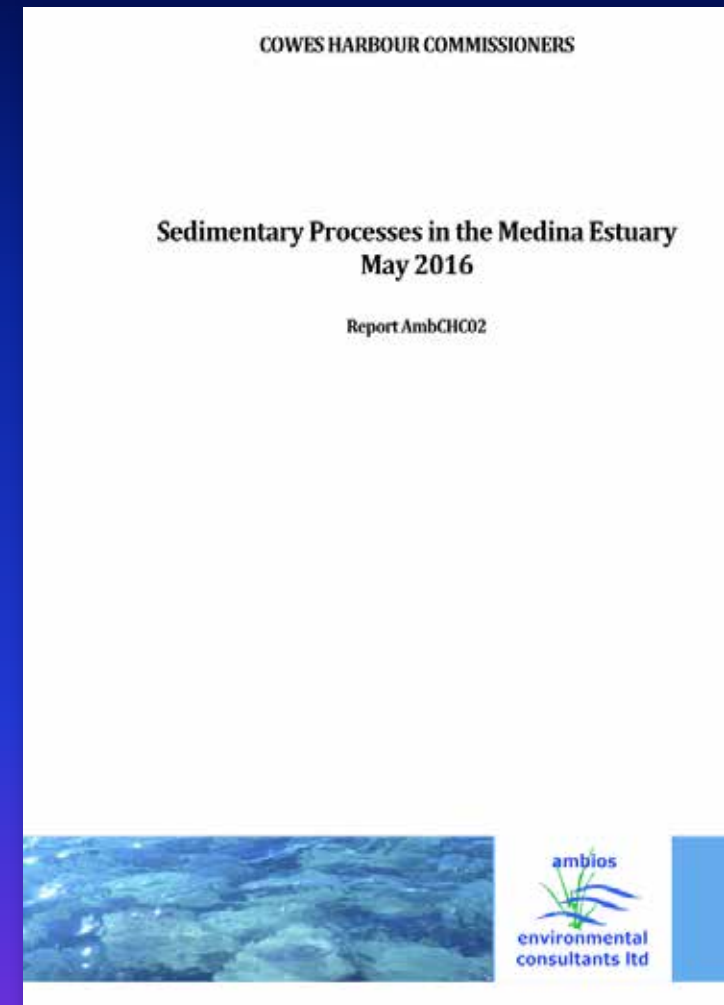
Background

- The development of OHP has resulted in extensive studies, modelling and surveying.
- Further work was undertaken to develop a conceptual model of the Medina
- Based on current information and understanding of the Medina hydrodynamics, CHC consider that we are now well placed to develop a Dredging Management Plan.
- Sedimentation is a complex process and the natural hydrodynamics of any estuary is to endeavour to maintain an equilibrium.

Sedimentation Studies

The initial studies (late 2015) involved a review of existing data and new field observations. The studies focussed on:

- The geomorphological and anthropogenic **history** of the locality
- The **energy** that drives sediment movement (wind, waves, tide and river flow)
- The **characteristics** of the sediments flooring the estuary and adjacent coast
- Local and regional **sources** of sediment
- Spatial and temporal variability in the **patterns of fine sediment suspension** in the estuary waters

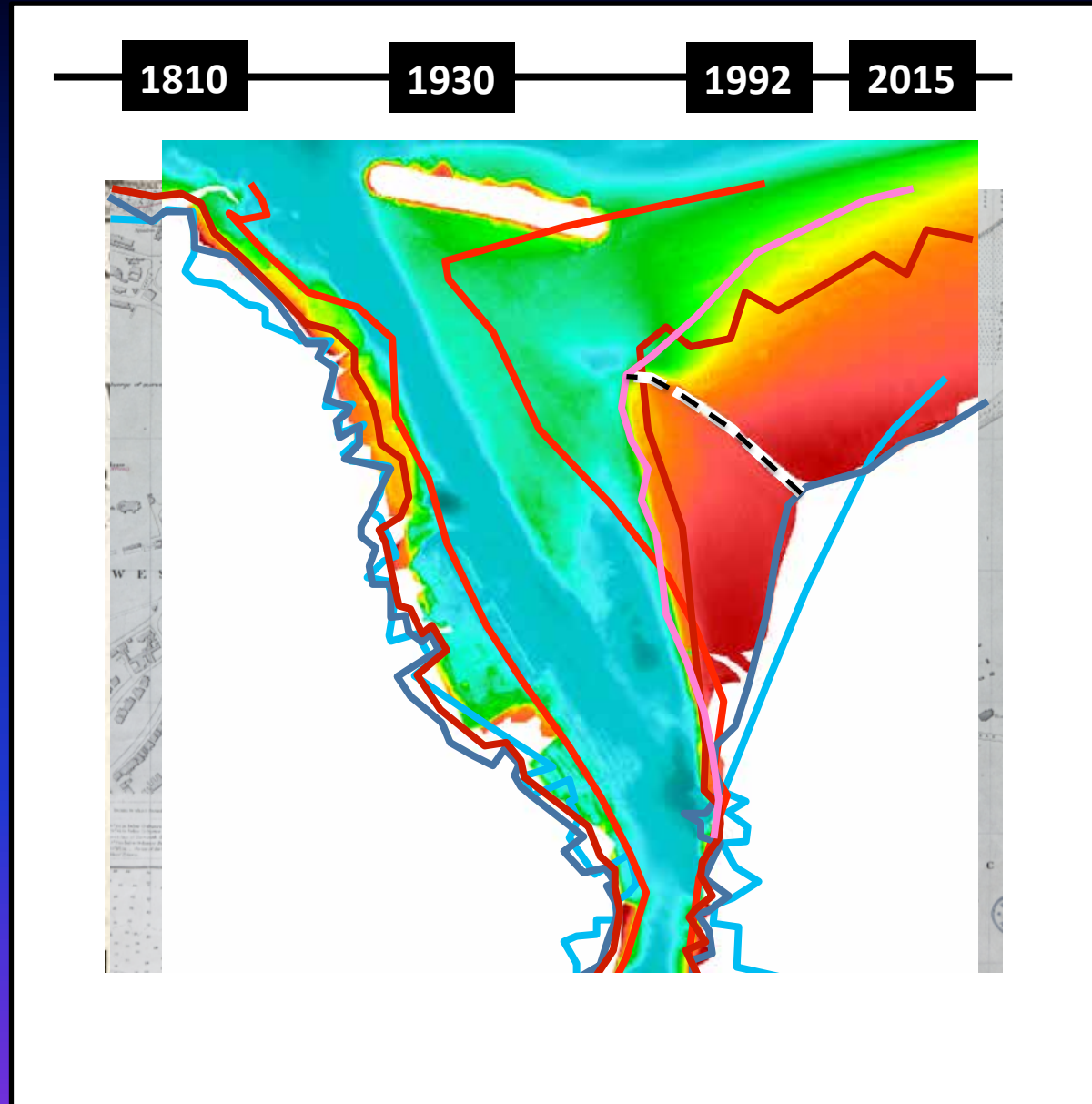


Medina Estuary

Since the mid-19th century the Medina has been steadily changing due to the impact of human activities.

The lower and mid estuary is now unnaturally enlarged:

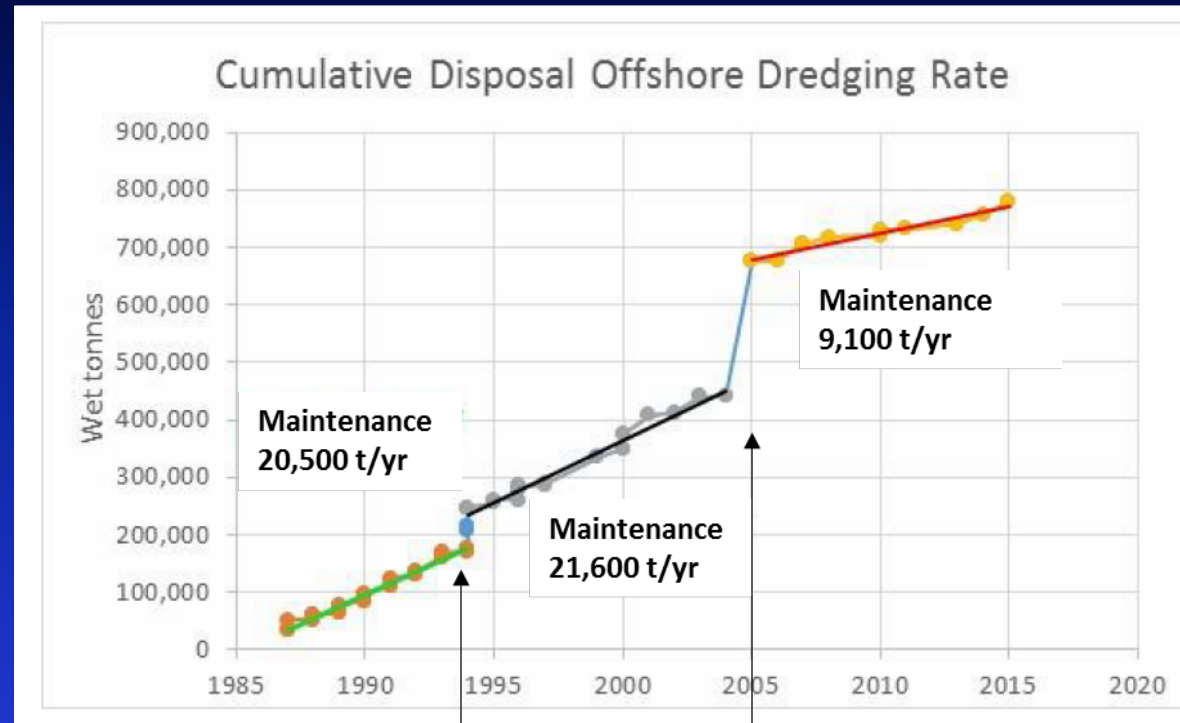
- On average the estuary is **deeper**.
- The **volume** of water has **increased**.
- The high water area has **decreased**.



The changes have caused imbalance in the way the estuary naturally circulates sediment.

Deeper water causes reduced scour by tide and wave action.

As a result **regular maintenance dredging has been historically necessary to maintain navigation depths.**



TWO CAPITAL DREDGING EVENTS

The 2016 study led to **5 key findings** which guided the monitoring programme and initial thoughts on the management of maintenance dredging.

COWES HARBOUR COMMISSIONERS

Sedimentary Processes in the Medina Estuary
May 2016

Report AmbCHC02



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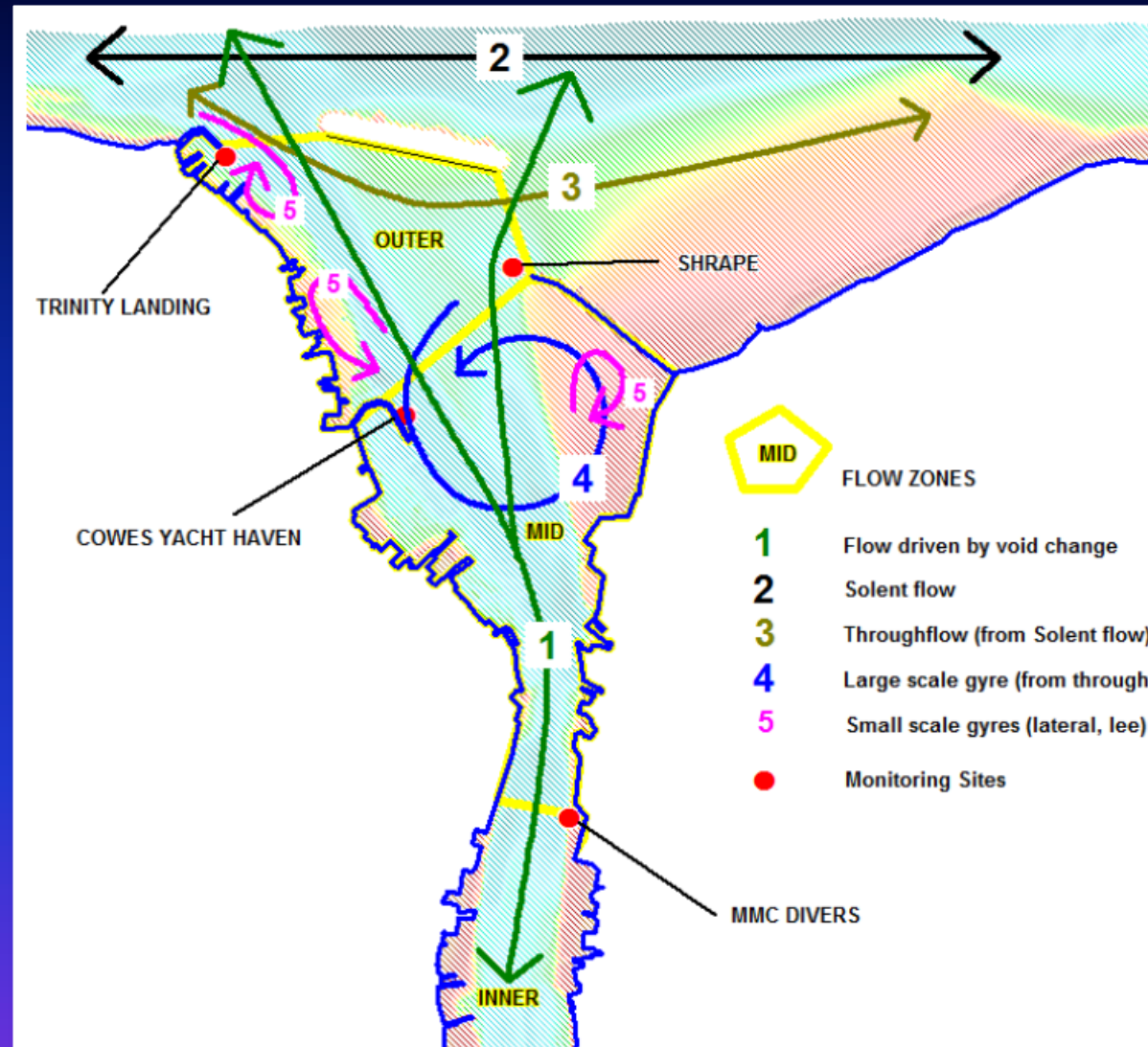
Key Findings

1) The Medina estuary has been severely modified by human activity.

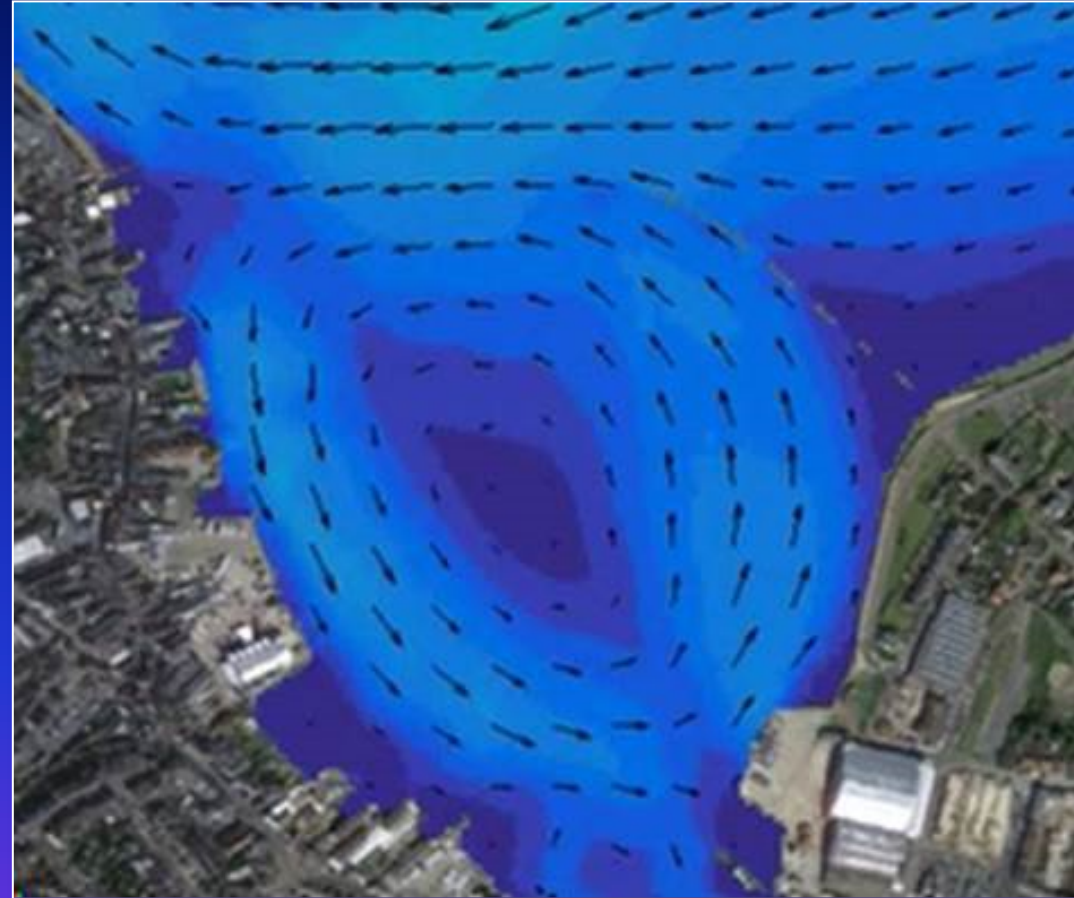
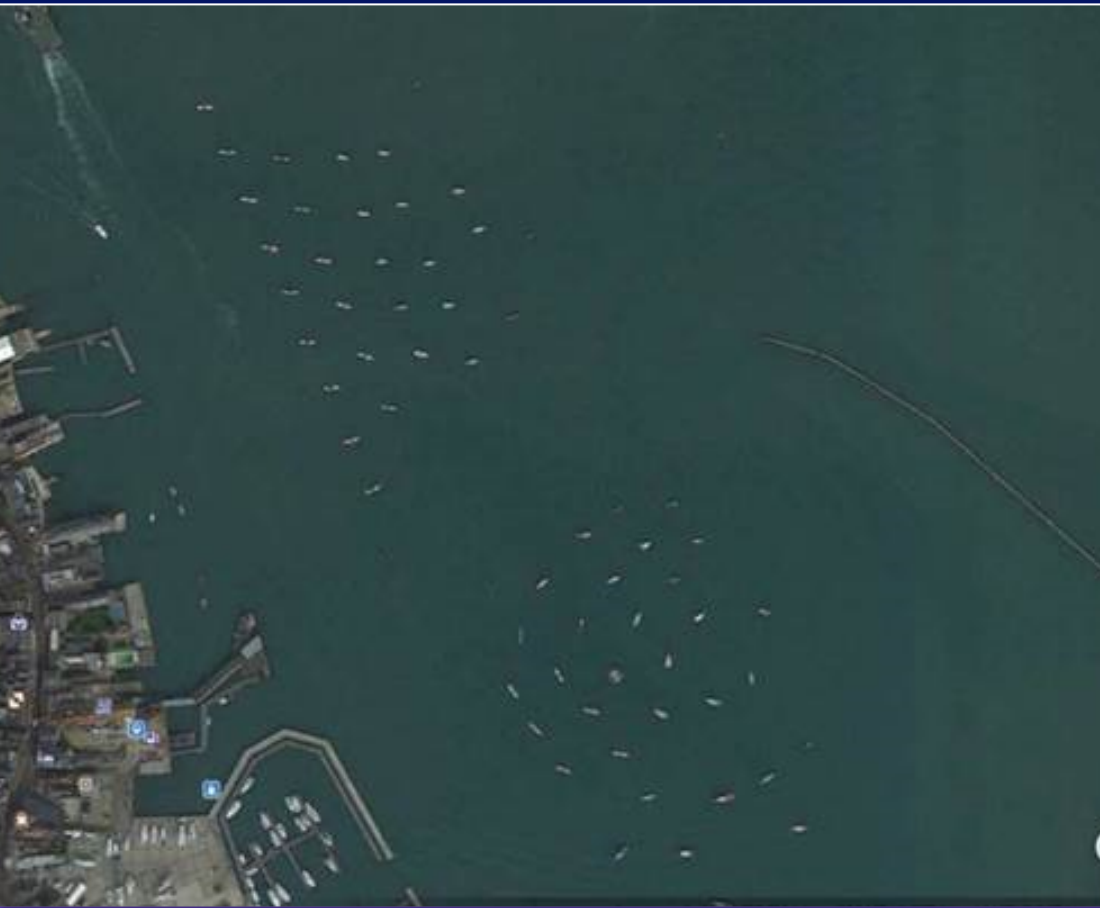
2) The lower Medina estuary has an unusual tidal circulation.

This has implications for:

- How sediment naturally circulates
- Opportunities for sediment management strategies



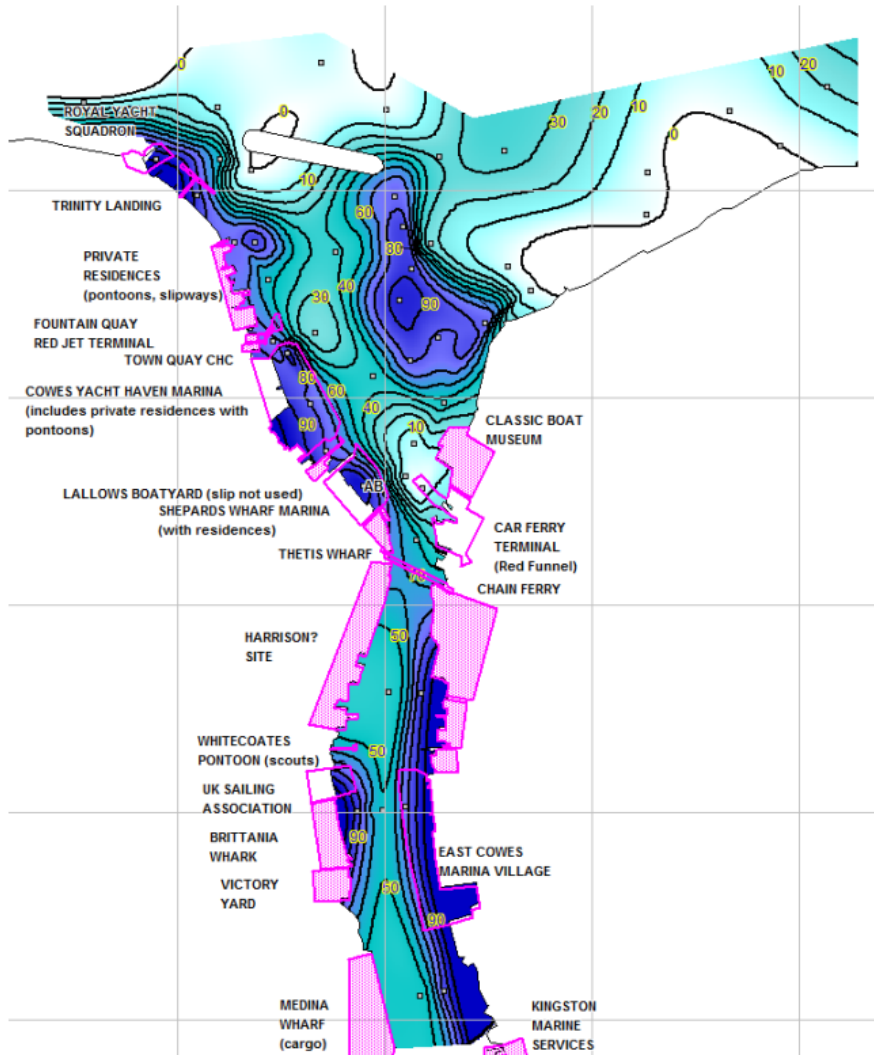
Tidal circulation



3) Mud dominates sedimentary processes south of the breakwaters:

- indicating that suspended sediment processes dominate.
- Cohesive bed sediments will have a time-varying resistance to erosion

Seaward of the breakwaters, and along adjacent coasts, bed load (sand and gravel) processes are found.



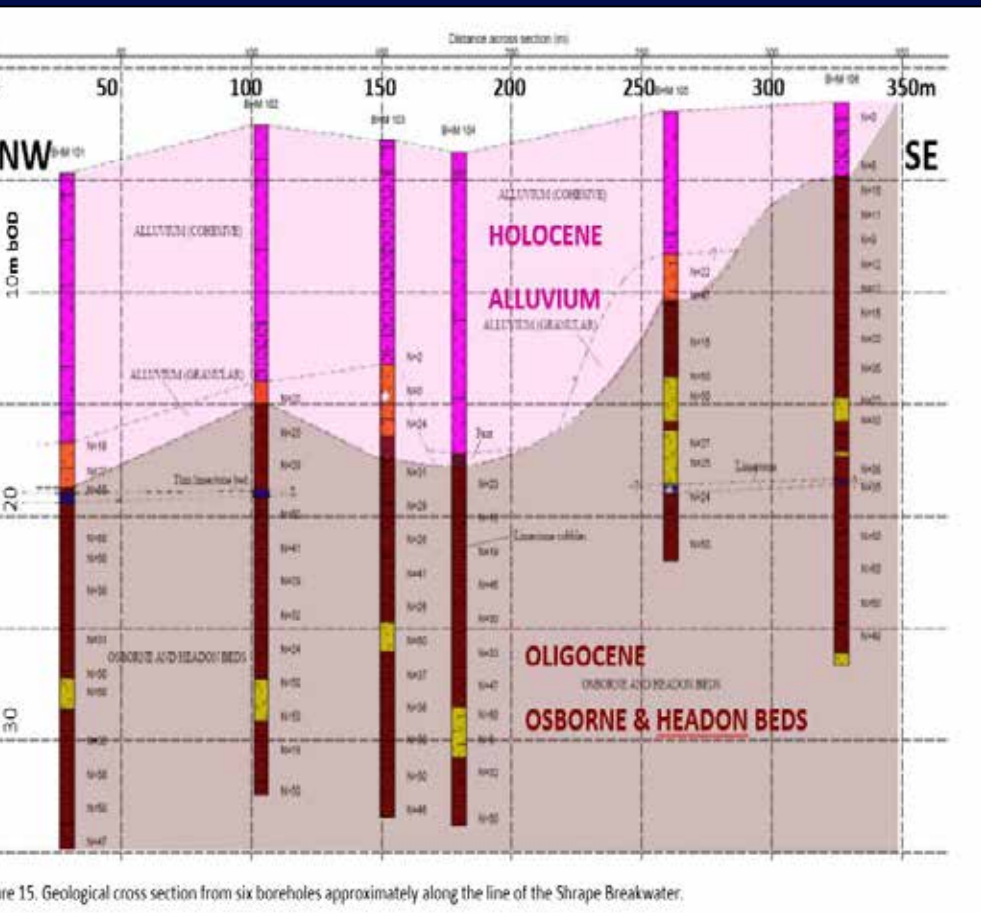


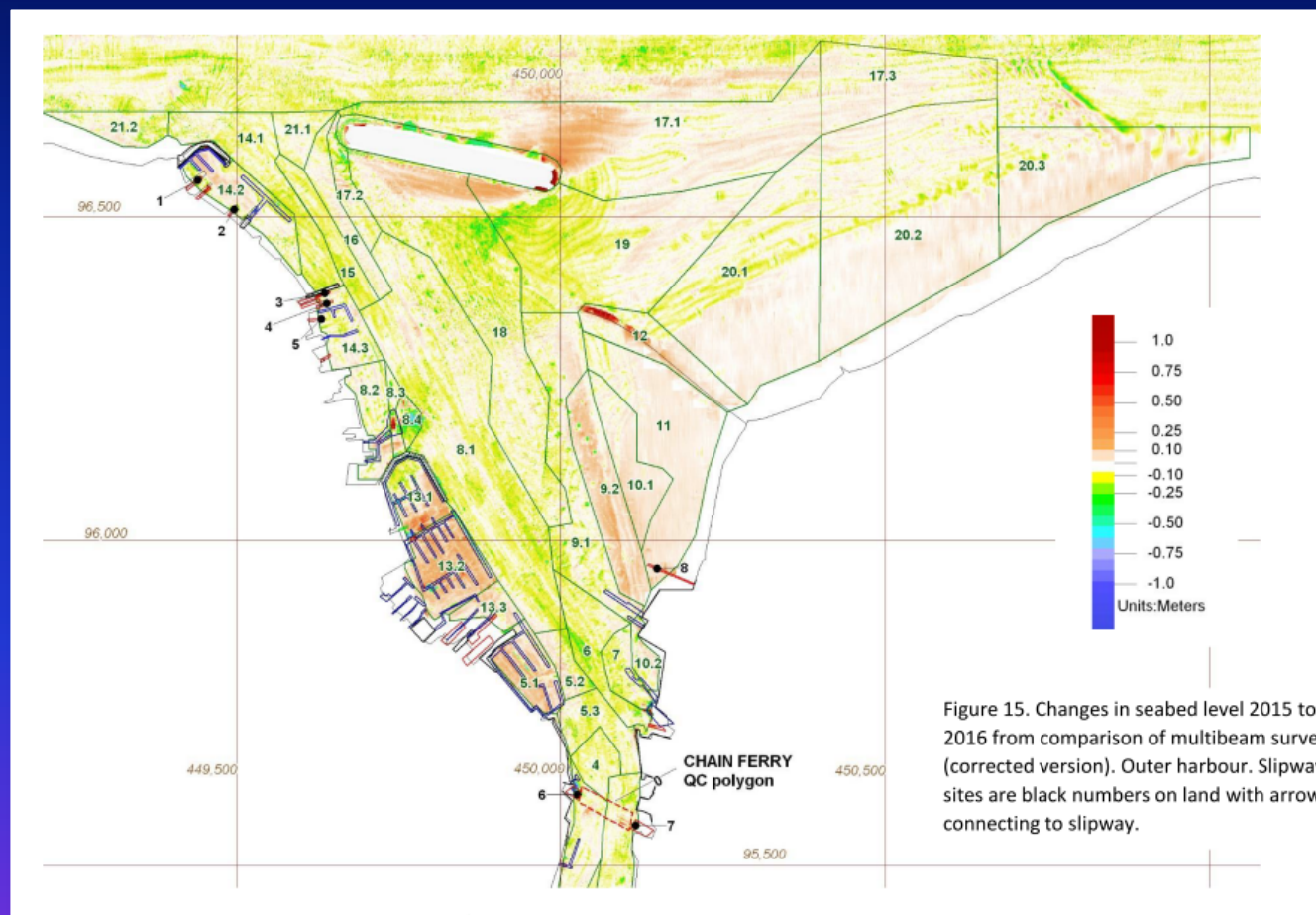
Figure 15. Geological cross section from six boreholes approximately along the line of the Shrape Breakwater.

4) There are two actively mobile sources of mud:
Clay-rich and Silt-rich

5) Tidal energy within the estuary is **not capable** of causing strong erosion of consolidated mud-bed deposits

Sediment Monitoring

January 2016 - January 2017



Year 1 Monitoring

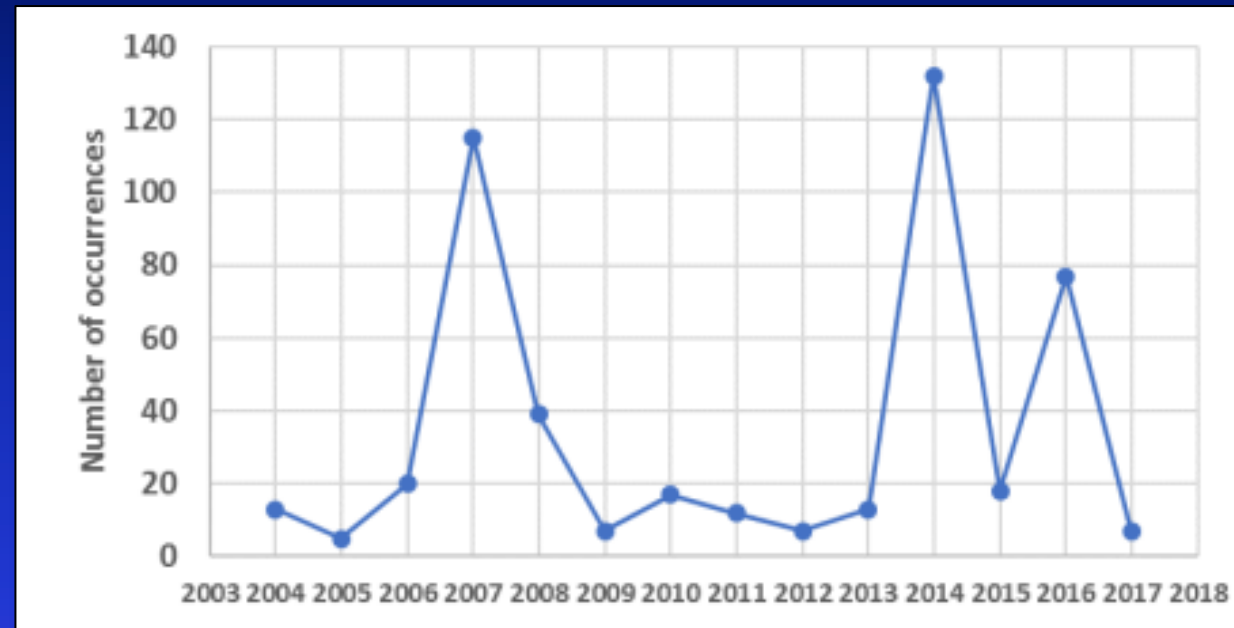
Key Findings

Primary source of fresh mud to the Medina Estuary is created by English Channel winter storms (coastal erosion of Tertiary clay).

Inter-annual variability in English Channel storm intensity can cause medium-term cycles of availability of this source mud.

This mud enhances turbidity through the winter months but becomes negligible during the summer.

Storm events 2004 - 2017



Year 1 Monitoring

Key Findings continued

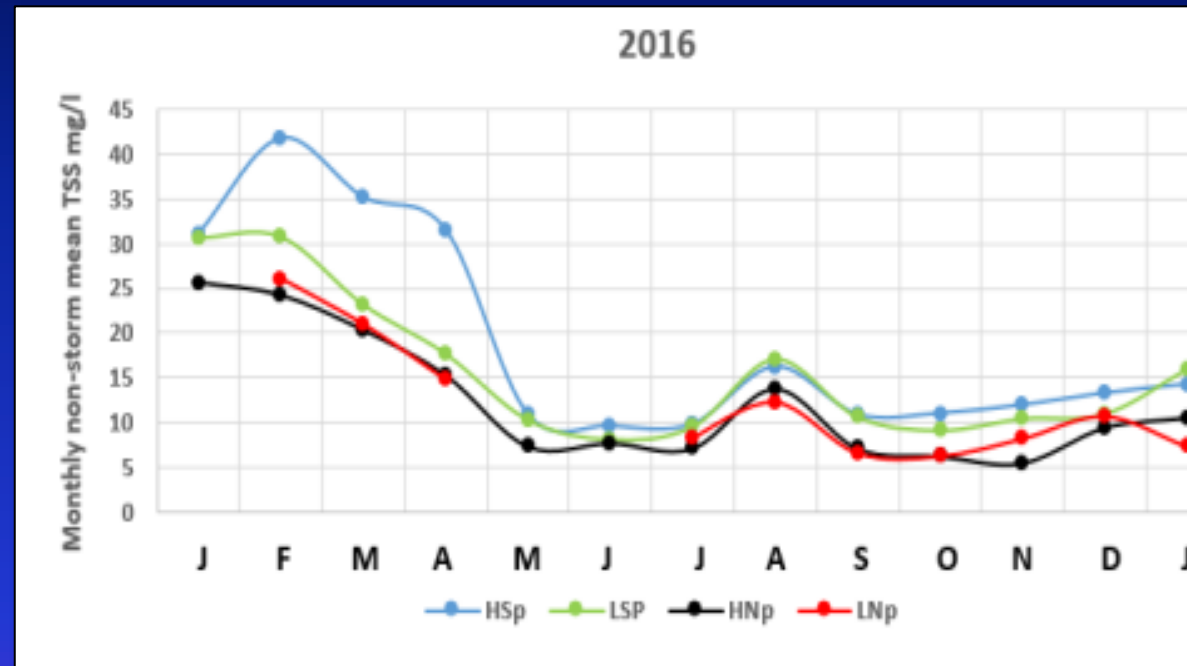
Lower amount of sedimentation in the estuary than has been the norm in recent decades.

Local tidal flow distributes this mud through the estuary and into long-term sinks.

Tidal flow is only effective while new mud is 'fresh' (not consolidated into the bed)

Local storms cause strong but intermittent disturbances of the local mud deposits

Shipping activity is also a secondary process of local mud erosion and redistribution, primarily affecting 'fresh' mud.



Dredging is not a 'sustainable' operation:

- Requires large scale and complex plant.
- Energy-intensive dredging methods are needed due to consolidation of sediment.
- Distant disposal sites.
- Dredging activity can have a negative impact on ecosystems and water quality.
- Deployment of dredging plant causes disruption to other water users.

However with careful management, **dredging activities can be tailored to be as sustainable as possible by working with the natural sedimentary processes to minimise these negative impacts.**

CHC will work with stakeholders to look at: **Timing and Methods**

Next Steps and Recommendations

- CHC are working with stakeholders to develop a Dredge Management Plan for the Medina Estuary to:
 - Streamline the consents process
 - Reduce costs
 - Improve methods of dredging and disposal
- We should work in partnership to increase knowledge of sediment movement within the Solent.