

# HARBOUR *PROTECTION PROJECT*

## *Background*

Lymington is losing its harbour because of the erosion of the salt marsh that has historically provided the protection to shelter the harbour.

This phenomenon is not local to the marshes adjacent to the Lymington River, but has been occurring along the whole North Solent coastline since the 1920s. Erosion is predominantly caused by the effects of sea level rise and natural wave action. The greatest rates of erosion are occurring on the exposed edges of salt marsh facing the Solent.

Without intervention much of the harbour will become untenable for moorings and recreational use as it is enjoyed today. The Commissioners started working on a solution to protect the Harbour in 2002. Much of this time has been taken undertaking consultation and environmental studies to identify any impacts on the protected salt marsh and intertidal mud habitat prior to lodging applications for environmental and regulatory consents. The preferred solution identified was to build stone breakwaters on either side of the river, in a multi phased approach, with the timing of each phase being determined by the rate at which the salt marsh recedes.

We understood that such a significant scheme would require consultation with our full range of stakeholders and in 2002 we commenced this process through a public exhibition at the St. Barbe Museum, which was jointly sponsored by the NFDC, Environment Agency, Hampshire County Council, English Nature (Now Natural England) and the Hampshire & Isle of Wight Trust. In 2007 LHC mounted a publicity campaign in order to enlist the support of the local community for this scheme and to ask them to write to the relevant regulators expressing their views. The proposals received overwhelming support with around 1,000 positive responses to the regulators, including support from the local marine businesses and the New Forest West MP.

Following receipt of consents from environmental and regulatory authorities work commenced on building Phase 1 in 2010.

## **Phases 1 & 2 Construction**

The first phase construction of a single 100m long breakwater on the western side of the channel was completed in 2010 at a cost of £1.4m.

Construction of the second phase on the eastern side of the river took place over the summer of 2014 and was completed in October at an overall cost of £2.32m. This included £2.14m for construction with the balance related to the provision of engineering services and professional fees associated with obtaining project consents and the loan finance agreement. Funding of the second phase was facilitated through a combination of reserves and a fixed rate HM Treasury loan of £2.007m facilitated by New Forest District Council over a ten year term.

It was intended to construct the maximum permissible length of breakwater (170m crest) between the edge of the navigation channel and the present position of the marsh under the current licence to extend the timeframe before the next phase on the eastern side of the channel (Phase 5) is required and this was the basis of the contract awarded. However due to excessive settlement, a much greater amount of rock was consumed than was allowed for within the contract and the breakwater was built to a 135m crest length. After taking advice LHC reached a cost sharing settlement with the contractor where both parties contributed to the purchase of additional rock in order to see the project through to an acceptable level of completion within the licenced timeframe. As part of the Phase 2 mobilisation, the Commissioners also took the opportunity to bring forward the top up of the Phase 1 breakwater to offset predicted post construction settlement and the cost of this is included within the above figures. During construction LHC and its advisors have gained valuable knowledge on the river's geology which will be applied on future phases.



## Future Strategy

New Forest District Council and the Channel Coastal Observatory have recently updated their analysis and projections for saltmarsh loss due to erosion. Their original projections published in 2002 were estimated based on the recession of the vegetated saltmarsh areas, as observed from the available historic aerial photography data. Over the intervening 10 years the data resolution has improved and monitoring and analysis techniques have become significantly more sophisticated. It is now possible to identify and monitor both the vegetated saltmarsh and the fringing areas of high mud where the vegetation itself has died back, both of which dissipate wave energy and provide a natural flood defence function.

The refined definition of the saltmarsh edge has the effect of changing the 'baseline' for projecting the future extent of saltmarsh systems from that used for the 2002 projections. The revised long term projections for the extent of the vegetated and high mud, non-vegetated saltmarsh indicate that the estimated area of saltmarsh in 2050 is likely to be higher than originally estimated in 2002, and the marsh is now expected to still make a significant contribution to harbour protection in 2050



<span style="display:inline-block; width:10px; height:10px; background-color:yellow;"></span>	2050 Predicted edge of high mud
<span style="display:inline-block; width:10px; height:10px; background-color:purple;"></span>	2030 Predicted edge of high mud
<span style="display:inline-block; width:10px; height:10px; background-color:lightblue;"></span>	2020 Predicted edge of high mud
<span style="display:inline-block; width:10px; height:10px; background-color:lightgreen;"></span>	2013 Predicted edge of high mud
<span style="display:inline-block; width:10px; height:10px; background-color:yellow;"></span>	2010 Predicted edge of high mud

Channel Coastal Observatory  
Aerial Photography: 2013

0 95 190 380 M



High mud erosion rates (2014) and Predicted edge of high mud

Lympington

In the light of the revised forecasts and the shortened Phase 2 breakwater, the Commissioners asked their engineering consultants to review the implications for the timing of future phases of the breakwater project. The projected timing for extension to the breakwater on the western side of the river (Phase 3) remains broadly unchanged and will need to be completed before 2030. A projected construction window between 2024 and 2028 has been identified. The Phase 2 breakwater on the east side of the river is forecast to provide the required level of protection until at least 2039 before requiring extension. Beyond that the timeline for constructing future Phases is considered to be too long to be meaningful given the variables that prevail in the marine habitat.

## Options to Reduce Marsh Erosion Rates

LHC's overwhelming priority for the foreseeable future is to ensure the Harbour remains viable as protection is lost as the marshes retreat. The existing strategy to construct rock breakwaters in phases as the marsh recedes is the 'default option' to ensure the harbour remains protected.

However, as noted above Phase 3 will not be required for at least 10 years. During this time, LHC wish to explore whether there are low cost sustainable options to beneficially use sediment dredged from the harbour in order to replenish saltmarsh and slow down the rate at which it is being lost. If successful this could delay the rate at which future phases of the breakwater will be required.

In 2012 and 2013 both Wightlink and LHC undertook separate marsh recharge works as mitigation to offset possible impacts of the introduction of new ferries and the harbour protection project. These works raised the area within the tidal frame by pumping mud on to poor areas of marsh with sediment retention being aided by using brushwood polders (fencing). In both cases, subsequent monitoring has shown that the sediment deposited has consolidated and stayed in place and that the sites were functioning well ecologically with marsh plants growing in the upper sections and birds feeding in other parts.

Although the techniques adopted for the above schemes appear to have been effective at delivering relatively small amounts of mud in a beneficial way, these schemes have proved very expensive. In

LHC's case the cost was approximately 13 times as expensive as disposal at sea and in Wightlink's case, because of the sites more remote location, costs were considerably higher. Although LHC were fortunate to secure grant funding to undertake their trial, the high cost makes this method of recharge unsustainable as a long term option.

To bring the costs down it is necessary to dispense with retaining structures and use the techniques used for disposal at sea, but close inshore thus ensuring there is no additional cost of disposal. The barges used by Berthon Boat Company and Lymington Yacht Haven for maintenance dredging are unusual in that the hopper doors open within the hull, without increasing the draft. It is therefore possible to discharge the load in very shallow water. A further advantage is that the sediment will be of thicker consistency as there is no requirement to mix with water to facilitate pumping through a pipeline. This should aid retention following placement.

The Commissioners have been granted a marine licence for a trial to discharge 12,500 tonnes over three years by "bottom dumping" in Boiler Marsh Bay to the east of the river. The plan is to create an unconfined intertidal reef within the bay that will provide shelter to the edge of the marsh behind from wave action or a source of sediment to feed the marsh in the immediate vicinity. This year's limit of 2,380 tonnes was successfully placed close to the marsh in November (see photo below). Subject to the results of monitoring, it is hoped to apply for a licence to substantially increase the amount of mud that can be beneficially used in this way with the ambition of prolonging the life of the saltmarsh and delaying the need for some future phases of breakwater construction.



## Funding & Financing

Since 2006, the additional funds required to pay for harbour protection have come through charging all harbour users a Harbour Protection Levy. This is a separately identified element of the harbour dues which will continue to be charged until all phases of the scheme have been completed. This is a long term project (approximately 40+ years) and the Commissioners will remain alive to the opportunities to generate additional revenues from new and previously unexplored sources including grant funding.