



Figure 1 Completed Project

Development:	Redeveloped Harbour.
Consultant:	Hyder
Developer:	David Barriball

## Site Overview

Mylor Harbour is situated on the Fal Estuary in Cornwall. The inner sediments were primarily contaminated with Tributyl Tin (TBT), an organometallic compound, and associated degradation products. The chemical had been extensively used in the area as far back as the Second World War, and as a consequence both the harbor and surrounding estuary sediments were identified as being contaminated.



Figure 2 Mylor Harbor prior to development

## Objective

Enviro-treat were initially commissioned with the view to stabilise the contaminants prior to transport to landfill. Earlier desk studies indicated that the contaminated material could not go to sea & hazardous disposal cost to land was prohibitory and in fact few landfill sites in the UK could accept it, the nearest being 200 miles away at Swindon. No space within the scheme had been identified initially to re-use the material. Following early stage discussions with all parties it was considered an option to re-use the treated material within the harbor area (Admiralty Quay - which itself was heavily contaminated) to construct a much sought after dry dock and parking area.

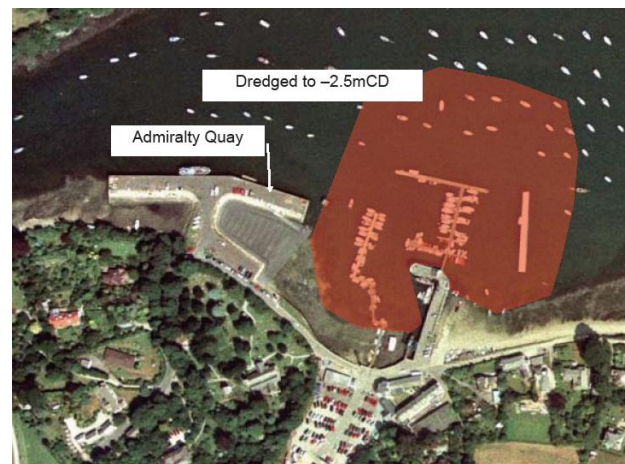


Figure 3 – Area of harbor dredged for treatment.

On this basis Enviro-treat conducted trials with a suitably modified E-Clay and OPC to achieve both effective remediation and overall geotechnical properties. The proposed process was agreed with both the EA and English Nature.

The works were conducted in two phases under the auspices of Enviro-treat's Mobile Plant Licence (MPL).

Silts were dredged from the harbour area using land based and marine plant; the contaminated silts were then transported to the treatment area, whereby they were combined with the E-Clay and OPC at the prescribed levels to achieve the necessary remediation requirements and geotechnical properties.

The treatment technology was applied ex-situ for the treatment of 2,300m<sup>3</sup> of contaminated silt.



Figure 4 Replacement of treated material within Admiralty Quay.

The treatment slurry comprised Ordinary Portland Cement (OPC) and modified organoclay (E-clay) applied at an addition rate of 5% and 0.5% weight-by-volume respectively.

Contaminated soils were treated in 10m<sup>3</sup> batches; this allowed a known volume of contaminated material to be mixed with a known volume of treatment slurry, thus enabling a homogenous mix to be produced. The treated silts were then re-used on site behind a newly constructed block work wall, no impermeable membrane was required. This eliminated the need

for offsite disposal and associated import of clean infill material.

Within 28 days the area had sufficiently cured to allow parking on.

#### Validation and results

Following completion of the project, Enviro-treat demonstrated that the treatment approach achieved the stated objectives of addressing TBT contamination on-site.

Samples were taken for every 10m<sup>3</sup> of material treated and allowed to cure for a nominal period of 28 days. The samples were leached following the standard NRA methodology, the leachates were analysed for tributyl tin. All of the leachate results for TBT were well below the remediation target of 50microg/l indicating that successful chemical immobilisation of TBT has taken place (i.e. a reduction of over 99% following treatment). See table-1

The validation results clearly indicated that successful chemical immobilisation of TBT within the treated material has occurred and that remediation of the contaminated harbour silt has been carried out satisfactorily with the stated objectives having been achieved.

The scheme as a whole won the British Nautical Award for 2003 and the Honda Sustainability Award.



Figure 5 Mylor Harbour 2010



Figure 6 Mylor Harbour 2010 – treated area.

Site Specific Target Levels for the treated materials

Sample ID	TBT conc. (microgram/l)
MH008	<0.02
MH009	<0.02
MH010	<0.02
MH011	<0.02
MH012	<0.02
MH013	<0.1
MH014	<0.1
MH016	<0.1
MH017	<0.1
MH018	<0.1
Target level	50

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