

**DOVER WESTERN DOCKS REVIVAL (DWDR)
DOVER, ENGLAND**

DOVER HARBOUR BOARD & VSBW (A JOINT VENTURE COMPRISING VOLKERSTEVIN AND BOSKALIS WESTMINSTER)

BIG Biodiversity Challenge Award Category: Medium - Large

Project overview

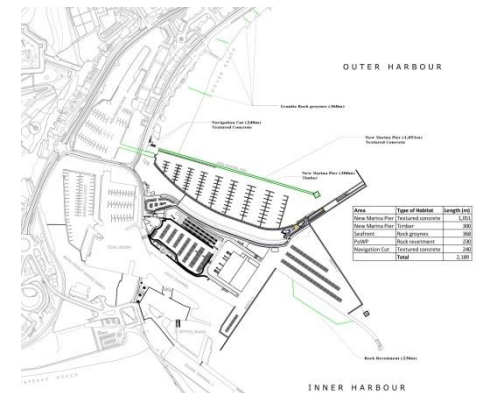
Dover Western Docks Revival (DWDR) - marine civil engineering and infrastructure project comprises of two deep-water berths, a new refrigerated cargo terminal with 13 hectares of reclaimed land for future port-centric development, a new marina with pier and marina curve to revitalise 1,050m of public access waterfront promenade.

What were the biodiversity conditions on site, prior to the enhancement?

Macroalgae and epifauna habitats exist throughout the Western Docks - areas of habitat will be lost due to land reclamation within the development. The materials in these area generally consists of hard facing materials such as: granite, concrete and brick for the dock walls; steel piling for dock walls and pontoon restraints; and rock for berms and revetments. Macroalgae exists principally in the old dock walls. Epifauna are present in the same habitat as macroalgae, but are found mainly within the crevices and cracks of the old dock walls.

What were the reasons behind this project?

A Side Agreement to the Harbour Revision Order (HRO) 2012 was established with the Environment Agency requiring us to replace 1,900 meters of lost habitat due to the land reclamation element of the construction works. It was agreed that it should be mitigated with an equal amount of new compensatory habitat of similar types - featured concrete, rock, timber and granite. The new proposed habitat are located in a mix of tidal, non-tidal and submerged locations which will help to provide similar tidal, salinity and isolation regimes. The new habitat linear length is 2,186m thereby providing an enhanced harbour environment.



DWDR: 2,186m of new habitat



Example of algal habitat – Wick Channel

What were the biodiversity measures taken?

The new formed textured surface and channelled grout lines along the marina walls have been designed to promote the adhesion and growth of algae, a key foundation species of the marine fauna. The featured surface implemented is highly replicable for any marine project that incorporates both prefabricated and shutter moulded structures. The versatility of the texture means it can be applied to any concrete structure within the tidal range.

Reclaimed timber marine fenders and marine timbers sourced from the reclamation area will be fixed vertically to the face of the new Marina Pier to add to the mix of different substrates.

Granite rock groynes have also been placed along the beach in the inner harbour which function as artificial reefs that support fish and species like lobsters – these habitats can provide rock pooling opportunities.

The measures are designed to be maintenance free once constructed, allowing algae to inhabit the area naturally, which would occur at a slower rate on a smooth surface. The compensatory habitats are located in a mix of tidal, brackish and submerged locations, helping to provide tidal, salinity and isolation regimes similar to pre-existing dock walls in the harbour. The measures implemented will increase biodiversity in the marina by providing the ideal conditions for macroalgae and epifauna to grow. By providing opportunity for this key foundation species, it will benefit a wide range of species at many levels, including migratory fish such as brown trout (*Salmo trutta*) which will pass through the new marina and Wellington Navigation Channel.

The case study serves as a best practice measure for civil engineering projects of this nature and scale by demonstrating how the incorporation of simple design solutions can have a positive impact on localised biodiversity.



Figure 3. DWDR: Installation of Textured Concrete Surface at Wellington Navigation Channel.



Figure 4. DWDR: New Habitation on Textured Concrete Surface at Marina Pier

Further information

VSBW engaged a form-liner specialist, who designed a bespoke blockwork pattern which are similar to the existing granite retaining structures in Dover’s existing marina. VSBW’s engineers trialled bespoke patterns in Dover and presented these to the Dover Harbour Board (Client) and the Environment Agency for review and approval. Particular attention was paid to the coarseness of the surface to match the existing granite currently found within the Wellington Dock. Once the final pattern was agreed, the form-liner specialist moulded the bespoke pattern using a rubber compound, which is used to form the surface of the precast and the concrete retaining structure on the new Pier and navigation channel.

Before constructing the textured surface, VSBW engineers consulted with the specialist to maximise the recyclability of the bespoke form-liners, reducing the quantity of rubber moulds required.

The textured surface liners were installed on concrete formwork shutters, prior to pouring the concrete, the textured surface liners allow the wet concrete to form the desired surface. As a permanent feature of DWDR’s development, the textured surface will serve as a new permanent metrological habitat for Dover’s local coastal environment.

Project Team

- Client: Dover Harbour Board (DHB)/ assisted by the Environment Agency
- VSBW (a joint venture comprising VolkerStevin and Boskalis Westminster)

What was the motivation for carrying out the enhancement?

To ensure full compliance with the Side Agreement made between the Environmental Agency and the Port of Dover regarding the Dover Harbour Revision Order. Due to the demands of the business the harbour is an ever changing environment. As part of the planning process the Board considers ecological enhancement a key factor to ensure that the long-term health of the harbour’s biodiversity is not only maintained but enhanced and monitored at each subsequent change to the Ports marine environment.



Figure 5. Finished Surface: Wellington Dock Navigation Channel



Figure 6. Conceptualisation of finished Wellington Dock Navigational Channel