



**the BIG
Biodiversity
Challenge**
do one thing

Shelter Shells

Commissioner's Quay, Blyth

Biomatrix Water Solutions and Groundwork NE & Cumbria: Revitalising Our Estuaries

BIG Biodiversity Challenge Award Category: *Innovation Award*

Project overview

In Commissioner's Quay in Blyth 57 Shelter Shells were installed to provide habitat for marine wildlife. Shelter Shells are an innovative new product that provide habitat for aquatic life under the water's surface. Biotechnology, biomimicry and art combine to form a pioneering artificial reef habitat that is free hanging and easy to install. Completed April 2023

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

The Blyth estuary is a leading offshore energy support base and a strategic hub used by many shippers serving northern England and Scotland. Commissioner's Quay was chosen because it is out of the main channel of the port where natural habitats have been lost due to the industrial workings of the river. There is little to no marine wildlife in this location. Extensive planning and preparation went into this project, from landowner and stakeholder engagement, survey work, licencing and permissions to the installation and monitoring.

What were the reasons behind this project ?

This project will help to restore lost habitat and increase biodiversity and water quality. The aim is to offer some defence in the fight against climate change by increasing intertidal habitat, which is at risk due to sea-level rise and coastal development. The Shelter Shells will increase biodiversity net gain through providing habitat for juvenile fish, crustaceans, and corals. They also attract and connect the community with their environment through an engaging sculptural aesthetic.



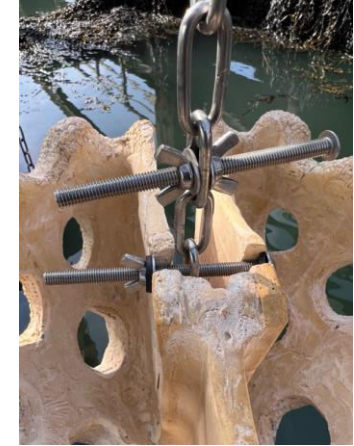
*Shelter Shells at Commissioner's Quay in Blyth
Photo by Biomatrix Water*



*Detail of free hanging Shelter Shells at Low
Tide Photo by Biomatrix Water*

What were the biodiversity measures taken?

The installation covers 15m across and 4m down and hangs from horizontal beams within Commissioner's Quay. It is submerged under water at different tidal times and visible to the public at low tide. Shelter Shells are an innovative new type of artificial reef habitat that will restore this degraded Quayside environment. They can hang freely from trestle works, pontoons, quays, floating solar panels, offshore wind platforms, ferry terminals or floating platforms. They have a top half and bottom half, which are indexed onto a stainless steel chain. The gap between the two can be adjusted so that it can have a small opening suitable for small species or a larger opening to accommodate larger species. The top half of the Shelter Shells has a series of apertures with different diameters to provide surface area complexity and to suit juvenile fish, crustaceans, and corals that may otherwise be less likely to reach maturity due to predation. Shelter Shells are well suited to locations such as Commissioners Quay where the tide rises and falls, revealing the Shells at low tide. When the tide is low a sheltered pool remains inside the bottom half some Shells, protected from the sun and from predation. The surface of the Shell is often pitted with shapes that are found in seashells to provide texture and surface area to support marine life adhesion. This type of structure has been found through numerous studies to increase biodiversity over hard edged seawalls or pontoons. The bottom of the shell can sometimes be filled with gravel substrate to provide further shelter for crawling species that can take refuge within the aggregate interior. The Harbour Master and the Port of Blyth who own and operate the Quay have backed the project and assisted with the installation.



*Close-up of Shelter Shells During Installation by Project Team with Assistance from the Harbour Master and the Port of Blyth
Photo by Biomatrix Water*



*Shelter Shells Are Indexed Onto a Stainless Steel Chain
Photo by Biomatrix Water*

Further information

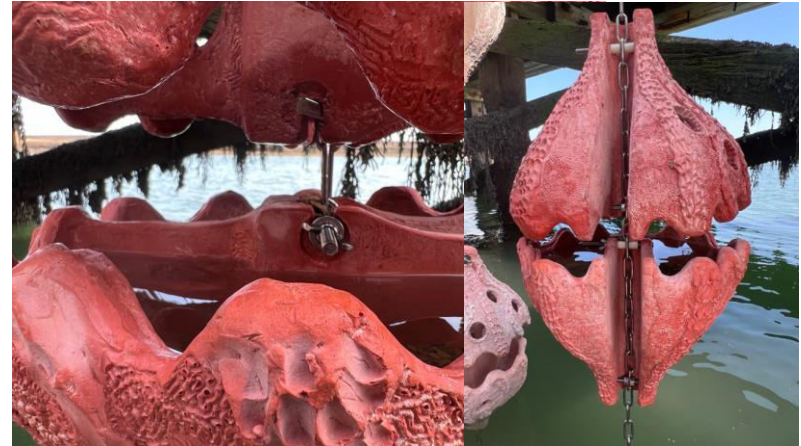
The biomimicry-based inspiration for the Shelter Shells has been developed by a team of artists and habitat innovators. Many of the original textures and forms have been made through sculptural processes in clay and a mixed media approach to develop the unique structure and texture of each shell. Additional models utilised 3D printing technology to create a prototype mould to then be cast in mortar. It is now highly replicable and can be produced in quantity. The product is adaptive to a wide range of locations and easy to install. The habitat benefits a wide range of marine life, allowing it to get a toehold and to live in safety in degraded environments. Community engagement is a key part of Biomatrix’s work and Groundwork’s Revitalising our estuaries focusses on employment and skills for young people in the region enabling them to deliver nature restoration across the region.

Project Team

- Biomatrix Water Solutions and Groundwork NE & Cumbria: Revitalising Our Estuaries
- Funded by the Environment Agency and DEFRA’s Green Recovery Challenge Fund, administered by the National Lottery Heritage Fund.

- **What was the motivation for carrying out the enhancement?**

The motivation for this enhancement was to restore a degraded estuarine environment, allowing industry and nature to coincide. Our aim is to increase biodiversity, allowing fish, crustaceans and corals to once again live in safety, in what had become a habitat desert, while demonstrating to the local community the type of innovative nature-based solutions that are possible.



Shelter Shells with their lower halves filled with water to provide a tidepool-like oasis during low tide. Photo by Biomatrix Water



Shelter Shells being submerged by the incoming tide. Photo by Biomatrix Water