

# LIVING SEAWALLS



## PRODUCT INFORMATION

JULY 2023

ENHANCING THE ECOLOGICAL VALUE OF  
ARTIFICIAL MARINE STRUCTURES







## Contents.

|                                |    |
|--------------------------------|----|
| LIVING SEAWALLS SOLUTION       | 1  |
| HABITAT DESIGN BASED ON NATURE | 2  |
| HABITAT PANELS                 | 3  |
| BESPOKE DESIGN                 | 7  |
| A VERTICAL RANGE               | 8  |
| A WORLDWIDE SOLUTION           | 9  |
| HABITAT ENHANCEMENT            | 10 |
| RETROFIT SEAWALLS              | 11 |
| INSTALL ON NEW SEAWALLS        | 12 |
| MOUNT PANELS TO A FRAME        | 13 |
| EXPECTED INSTALL DURATION      | 14 |







## Living Seawalls Solution.

Living Seawalls increase the ecological value of new and existing foreshore developments. This is achieved by designing structures from the outset that are ecologically sustainable and provide multiple end-user benefits. These multi-purpose objectives can be incorporated through a range of engineered and ecological applications. The ideal management response to address the impacts from artificial marine structures is to restore

and/or rehabilitate natural habitats. When this is not possible and construction is inevitable, we offer evidence-based advice on how to best design such structures and/or developments. We offer habitat modules that can be pre-fabricated and incorporated into the design of new marine built structures or fitted to existing structures to enhance their ecological value and provide multiple end-user benefits.



CONTROL



RIDGES



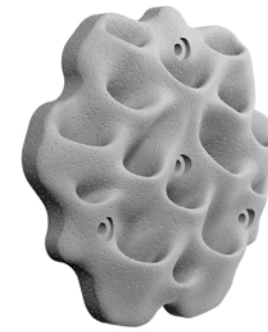
HONEYCOMB



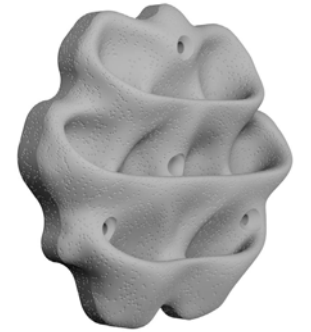
KELP HOLDFAST



SWIM-THROUGH



ROCKPOOL



LARGE ROCKPOOL

## Habitat Design Based on Nature.

Built structures have, typically, smooth, vertical surfaces, lacking the diversity of micro-habitats often present on natural habitats. Consequently, ecoengineering has mostly focused on increasing surface area and/or habitat complexity of the hard substrata provided by these structures.

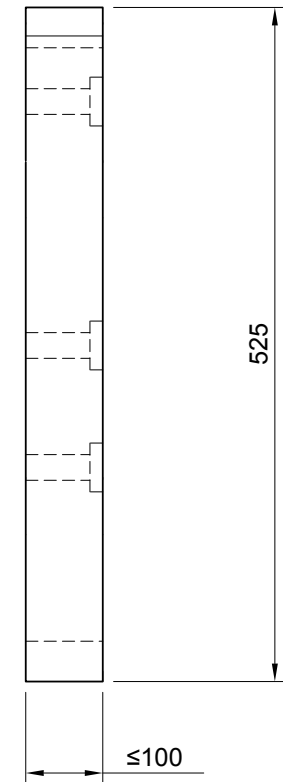
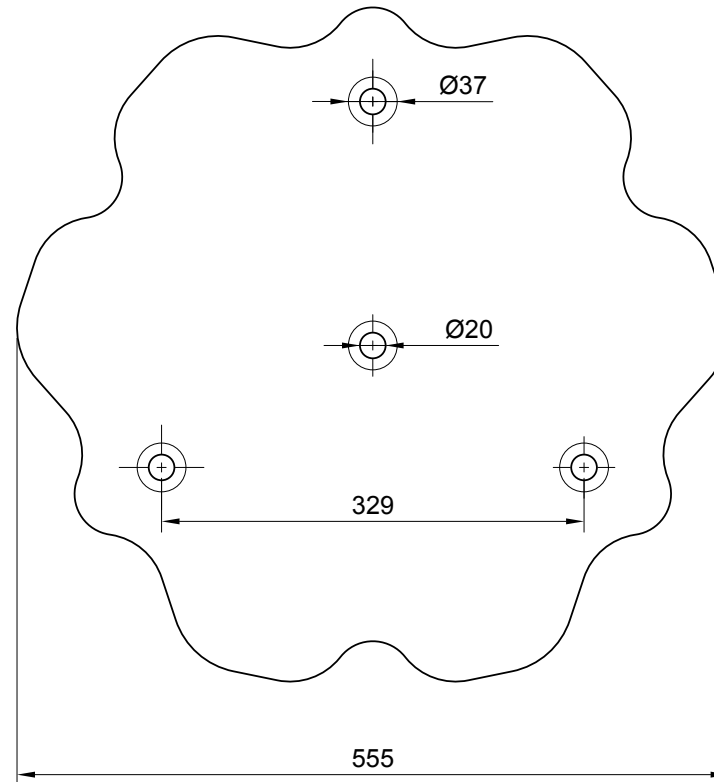
Living Seawalls have innovated an adaptable and customisable approach of adding habitat complexity to marine built structures. Our modular panels come in seven different designs, each mimicking habitat-providing features of natural shorelines. This increases available area for colonisation of species and provides refugia from predators and environmental stressors, increasing overall biodiversity.

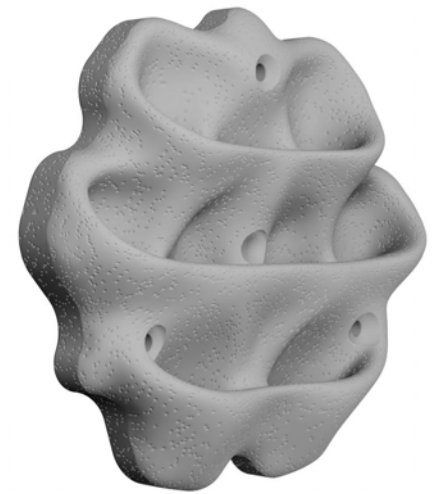
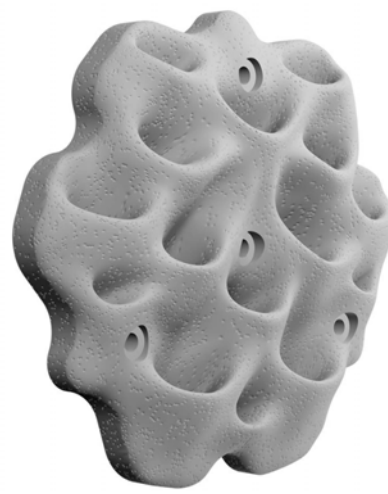
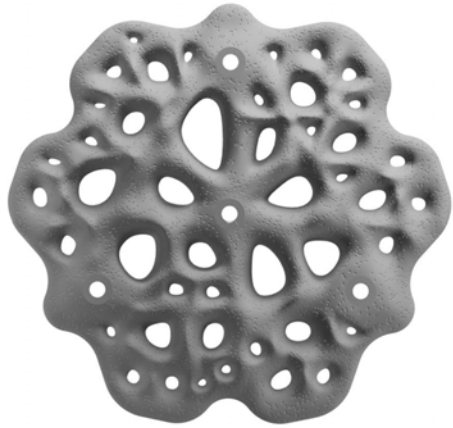


## Habitat Panels.

All panel modules are made from concrete and weigh approximately 23-28 kg.

Descriptions are provided with each panel to illustrate the marine communities that may benefit from the design. We have a variety of other complex designs available, or we can create a bespoke, site-specific design. All designs can potentially be cast into larger prefabricated modules too.





### SWIM-THROUGH

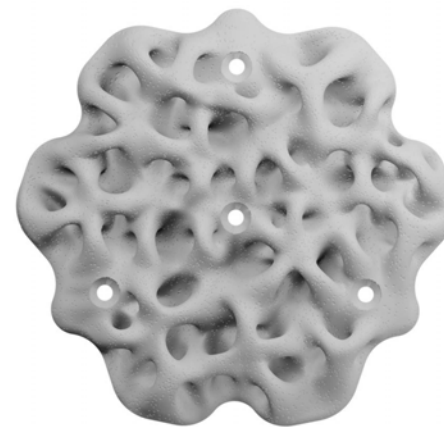
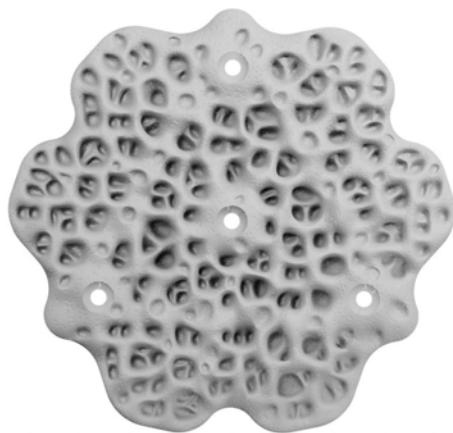
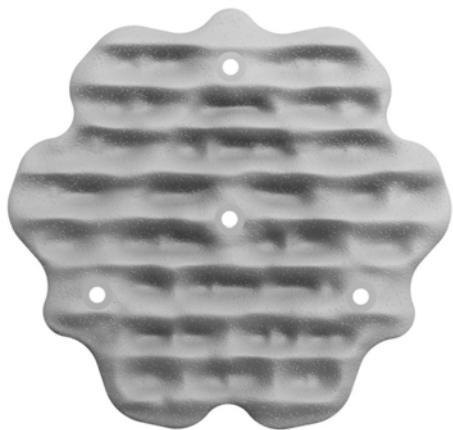
Swim-through panels have been designed to provide habitat for small fish such as gobies and blennies. The panels have openings that allow fish to swim through and forage between the seawall and open water. They may be applied at low-intertidal or subtidal elevations. When the Swim-through panel is fitted with a small gap between it in the built structure, it can also promote growth of fucoid seaweeds at some locations

### ROCKPOOL

These mimics of natural rockpools can be quickly colonised by different types of invertebrates and seaweed. In intertidal locations, they keep organisms moist at low tide and protect them from temperature extremes. In subtidal locations they provide refuge for small fish such as gobies and blennies.

### LARGE ROCKPOOL

Large rockpool panels contain water-retaining features, which are virtually missing from seawalls. The rockpools on these panels match the dimensions of natural rockpools in the mid-reaches of estuaries



## CREVICES

Crevices are a habitat feature that is common on rocky shores. In the mid- to high-intertidal, the crevices provide a cool and/or moist microhabitat and may protect sessile species from large predators at both intertidal and subtidal elevations

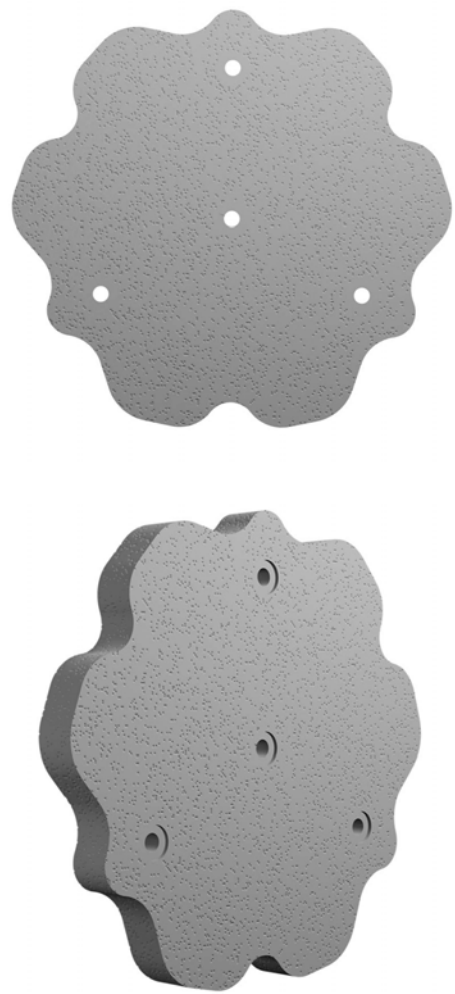
## HONEYCOMB

Honeycomb panels mimic a common weathering pattern of sedimentary rock. When deployed in the mid- to high-intertidal, the small "pits" provide shading and/or moisture retention. They may also provide protection to inhabitants from some large predators.

## KELP HOLDFASTS

This panel mimics the complex texture of holdfasts - the anchoring mechanism of kelps. The design provides protective spaces for invertebrates to hide from fish predation and environmental stressors, and a high surface area for attachment. A feature of the panel is also the inclusion of loops that enable live kelp to be transplanted to the panel and attached.





### CONTROL

The control panels are flat, and other than a fine scale surface roughness mimicking that of sandstone rocks, featureless. Control panels can be used as a baseline against which to assess the benefits of other panel designs, and are therefore recommended for installations where an ecological evaluation is to be done

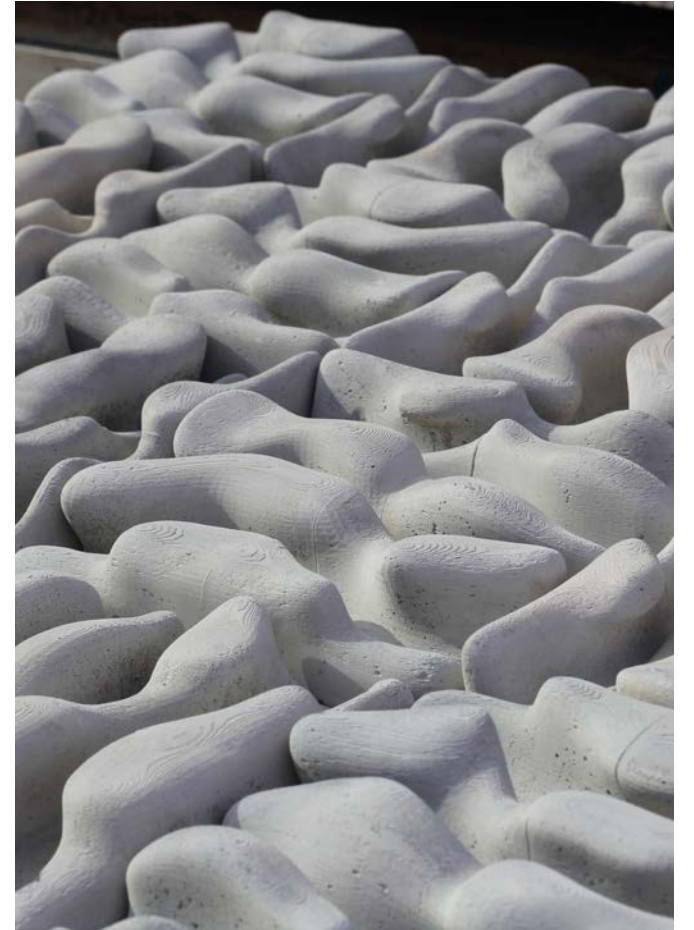






Living Seawalls offer bespoke designs to suit different built structures. In Woollooware Bay, Sydney, we designed rectangular panels to fit within the recesses of a PVC seawall.

We have also designed bespoke mould systems to be integrated into the prefabrication of concrete pile caps for our Living Seawalls - Living Ports project currently under construction in Peru.

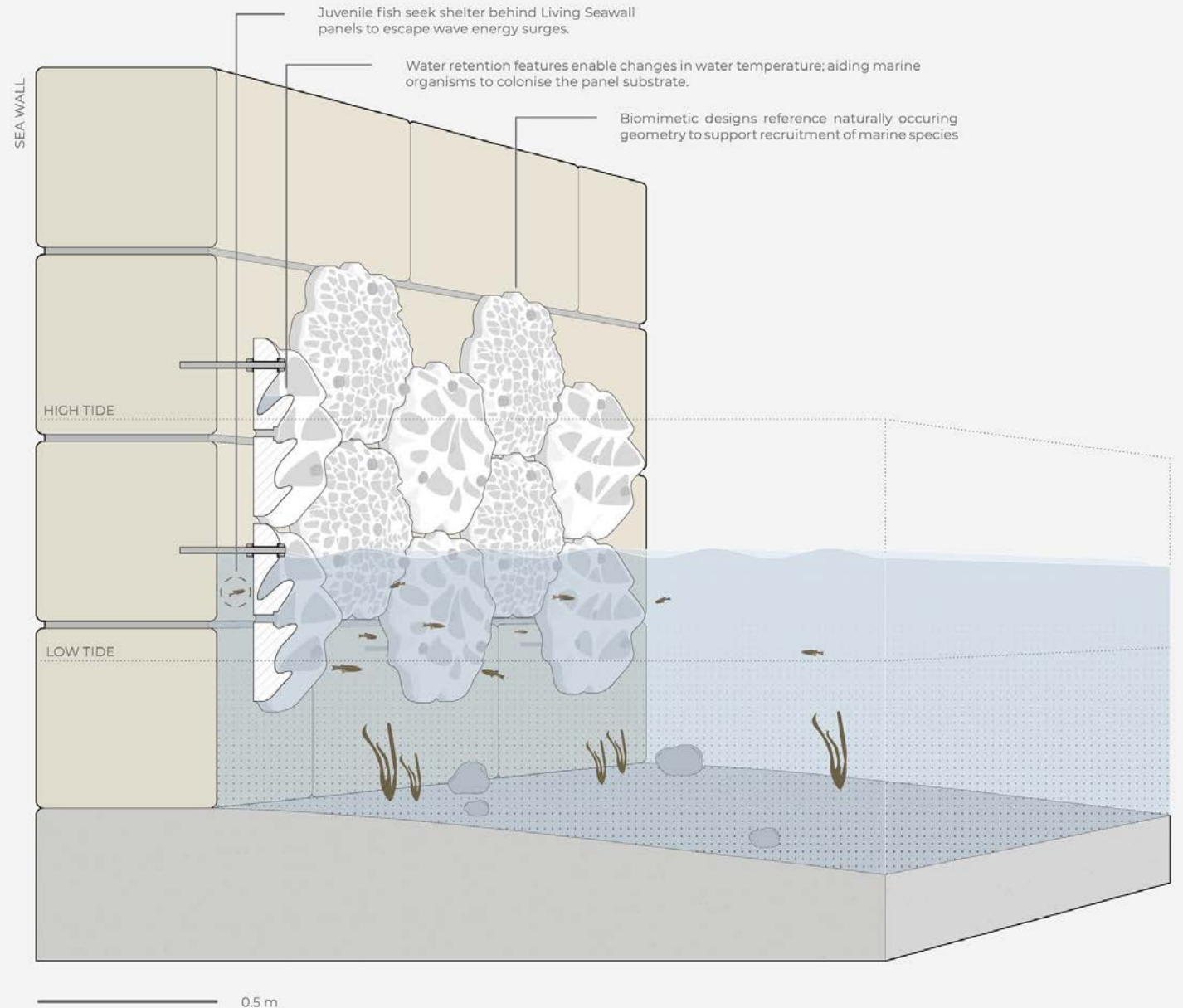


Bespoke Design.



## A Vertical Range.

Living Seawalls panels can be placed within the intertidal zone and subtidal areas. Living Seawalls habitat panels can enhance the communities of organisms inhabiting different tidal heights of the structure.







*Milford Haven, Wales*

## A Worldwide Solution.



*Balmain East, Sydney, Australia*

Over 1500 Living Seawalls habitat enhancement panels have been installed in over 20 sites worldwide, including in i.e. Australia, Gibraltar, Singapore and Wales. In 2023, Living Seawalls will be installed in Peru and USA.

Many of these projects were research collaborations with Universities and research institutions to evaluate the efficacy of Living Seawalls solutions in different geographic locations.

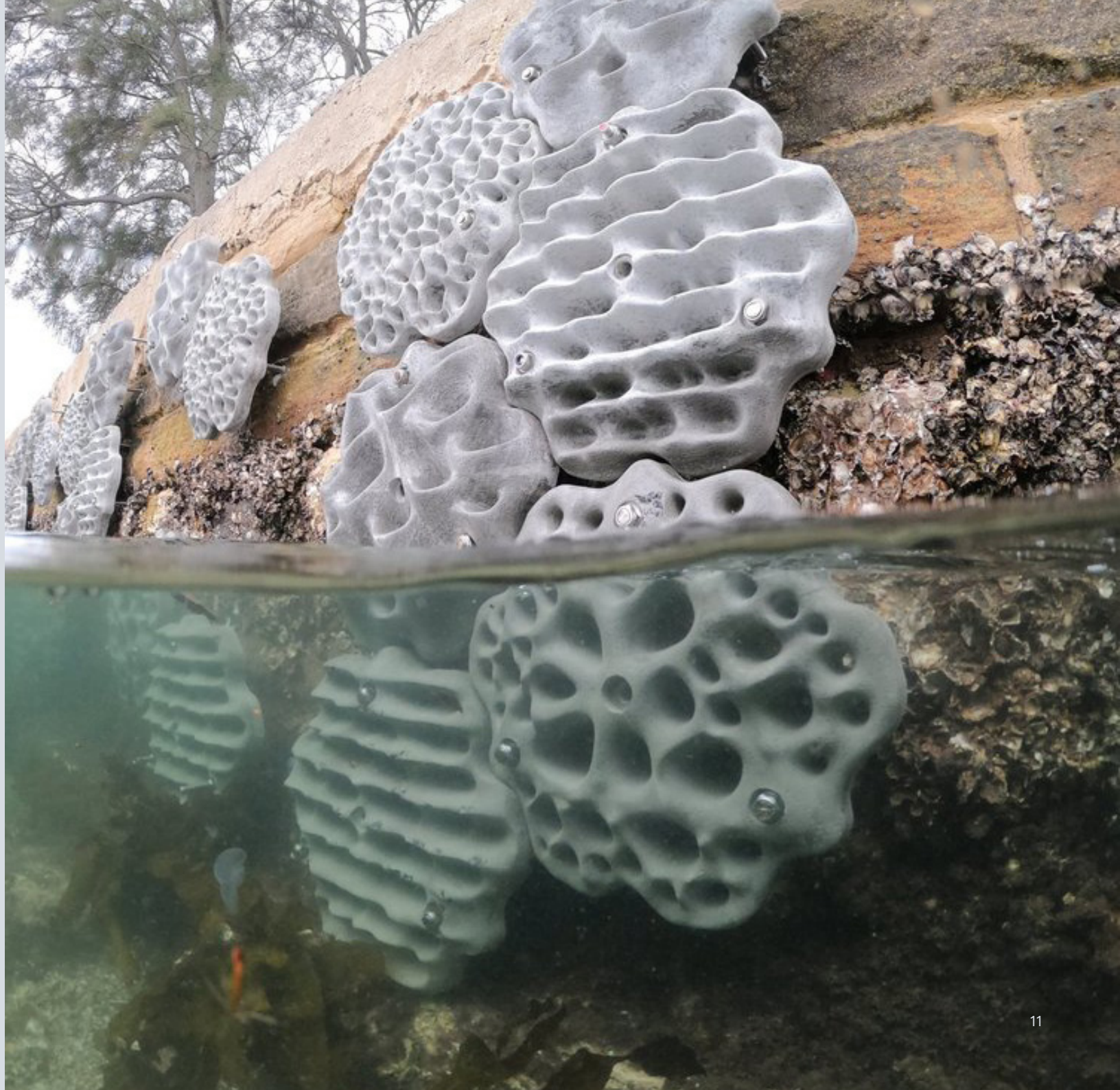




## Habitat Enhancement.

Living Seawalls habitat enhancement panels are made using 3D printing technology and manufactured in reinforced concrete. When co-located, habitat units of differing design can be used to achieve multiple outcomes at one site. The design, size and shape can be tailored to the needs of specific locations.





## Retrofit Seawalls.

The majority of Living Seawalls installations to date have been habitat enhancements of existing structures. For intertidal locations, works can be completed during low tide times. Three or four attachment points per panel can be used, depending on the local wave energy.

When retrofitting, panels can be offset from the wall by 100mm. This prevents the need to remove existing growth before installation, preserving the marine life in the area.





## Install on New Seawalls.

For new constructions, mounting rods or frames can be integrated into the construction. The panel can be attached flush to the wall using epoxy. Depending on local wave energy, fewer rod attachment points per panel can be used.





## Mount Panels to a Frame.

The Living Seawalls habitat panels can be mounted to frames before in-water installation. This method was used at Barangaroo, Sydney. 384 panels were fixed to stainless steel frames. Frames were then installed at 3 different depths beneath a boardwalk. The frames were attached to the boardwalk piles.







## Expected Install Duration.

Costs and duration of installation will vary depending on local conditions and contractor fees.

As a guide, installation of the above 72 panel configuration, retrofitted to an intertidal seawall, takes a team of 3-4 people 3-4 days to install during low tide times.







# LIVING SEAWALLS

Contact.

For more information, please get in contact.

[info@livingseawalls.com.au](mailto:info@livingseawalls.com.au)

or visit our website

[www.livingseawalls.com.au](http://www.livingseawalls.com.au)