

3 February 2021

Our ref: 20WOL-16700

Multiplex Constructions Pty Ltd

Site Address: Level 2, 22 Bridge Road Glebe, NSW 2037

Attention: Anthony Toomeh [Anthony.Toomeh@multiplex.global](mailto:Anthony.Toomeh@multiplex.global); Eric Rolls [Eric.Rolls@multiplex.global](mailto:Eric.Rolls@multiplex.global)

Dear Anthony and Eric,

**RE: New Sydney Fish Markets DA Conditions for Marine Ecology**

This letter is to confirm that Eco Logical Australia Pty Ltd (ELA) has been engaged by Multiplex as project ecologists for the aquatic habitat installation at the new Sydney Fish Markets. ELA is the author of the Marine Ecological Assessment report that was submitted and approved for the development application (DA – SSD 8925). ELA made several recommendations in the report to ensure connectivity of aquatic habitat is included around the built structure. The aim is to improve habitat connectivity and variety around Blackwattle Bay. These recommendations are now part of the DA condition B52(d):

**MARINE STRUCTURES**

- B52. Prior to the issue of the relevant Crown Building Works Certificate, the detailed design of all marine structures (public pier, waterfront promenade, wharve structures and pontoons) must be submitted to and approved by TfNSW (Maritime). The drawings and specifications are to:
- a) Comply with NSW Maritime's Engineering Standards for Maritime Structures and NSW Maritime's Guidance Note Documentation, AS 4997-2005 Guidelines for the Design of Maritime Structures and AS 3962-2001 Guidelines for Design of Marinas;
  - b) Fully and clearly describe all new works for land below the Mean High-Water Mark and all their components and interconnections;
  - c) Demonstrate the structural components have been designed by a practising structural Civil Engineer and experienced in the design of maritime structures;
  - d) Include all marine ecological aspects and initiatives within the Marine Ecological Assessment prepared by Ecological Australia dated 2 April 2019, so opportunities to increase marine biology are realised.
  - e) Include all management and mitigation measures within the Navigation Impact Assessment prepared by Royal HaskoningDHV, dated 20 September 2019.

The suggested habitat elements were developed between ELA and the building designers to ensure feasibility in regard to depth, non-obstruction of vessels, materials and attachment zones on the building. The University of NSW and Macquarie University are also undertaking further testing of material types for the prefabricated habitat panels that would attach to the basement/building wall. The exact materials, quantities and locations of habitat elements will be refined over the coming years

within the scope of preliminary design specifications approved in the DA (see attached to this letter). In summary, the habitat elements include:

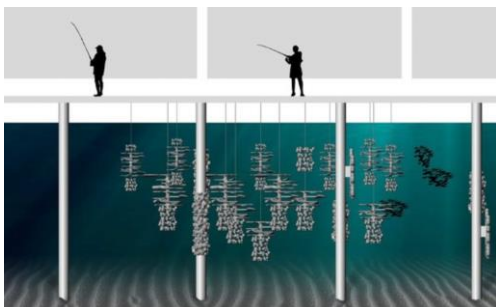
- (A) Rock rubble reef <3 m deep to connect the western shore macroalgae bed to the structure
- (B) Benthic fish aggregation devices placed on substrate <3 m deep within 5 m of the structure
- (C) Hanging fish aggregation devices mounted underneath the promenade or wharf, submerged in the top 1-3 m
- (D) Seawall tiles/panels mounted along the basement/building wall in the intertidal zone.



**Example rock rubble**



**Example benthic modules**



**Example hanging fish aggregation devices**



**Example precast wall mounts**

In addition, the university researchers are trialling a large bio-shelter to incorporate into Blackwattle Bay, likely in an intertidal area along a seawall visually accessible to the public. ELA will coordinate with researchers in regard to future placement of the bio-shelter to address DA condition B103:

#### MARINE ECOLOGY

B103. All recommendations within the Marine Ecology Assessment report (MEA), prepared by Ecological Australia, dated 2 April 2019 shall be implemented, including preparation of an Aquatic Biodiversity Management Plan (ABMP), which shall address OEH guidelines. Further, research from Macquarie University and University of NSW to enhance native habitat-forming organisms shall be included in the ABMP, once proof of the concept phase is completed, where relevant. Prior to the commencement of works, details demonstrating compliance with this requirement shall be submitted to the Planning Secretary and Certifier.



**Prototypes being tested by the university. The final product will be approximately 5 x 3 m and placed in the intertidal zone along a seawall.**

I confirm, as lead aquatic ecologist on this project that ELA will be preparing an Aquatic Biodiversity Management Plan to document the habitat design, installation and associated inspection reports. ELA will work with Multiplex and their team to select suitable products, and will be present on site to provide advice during installation.

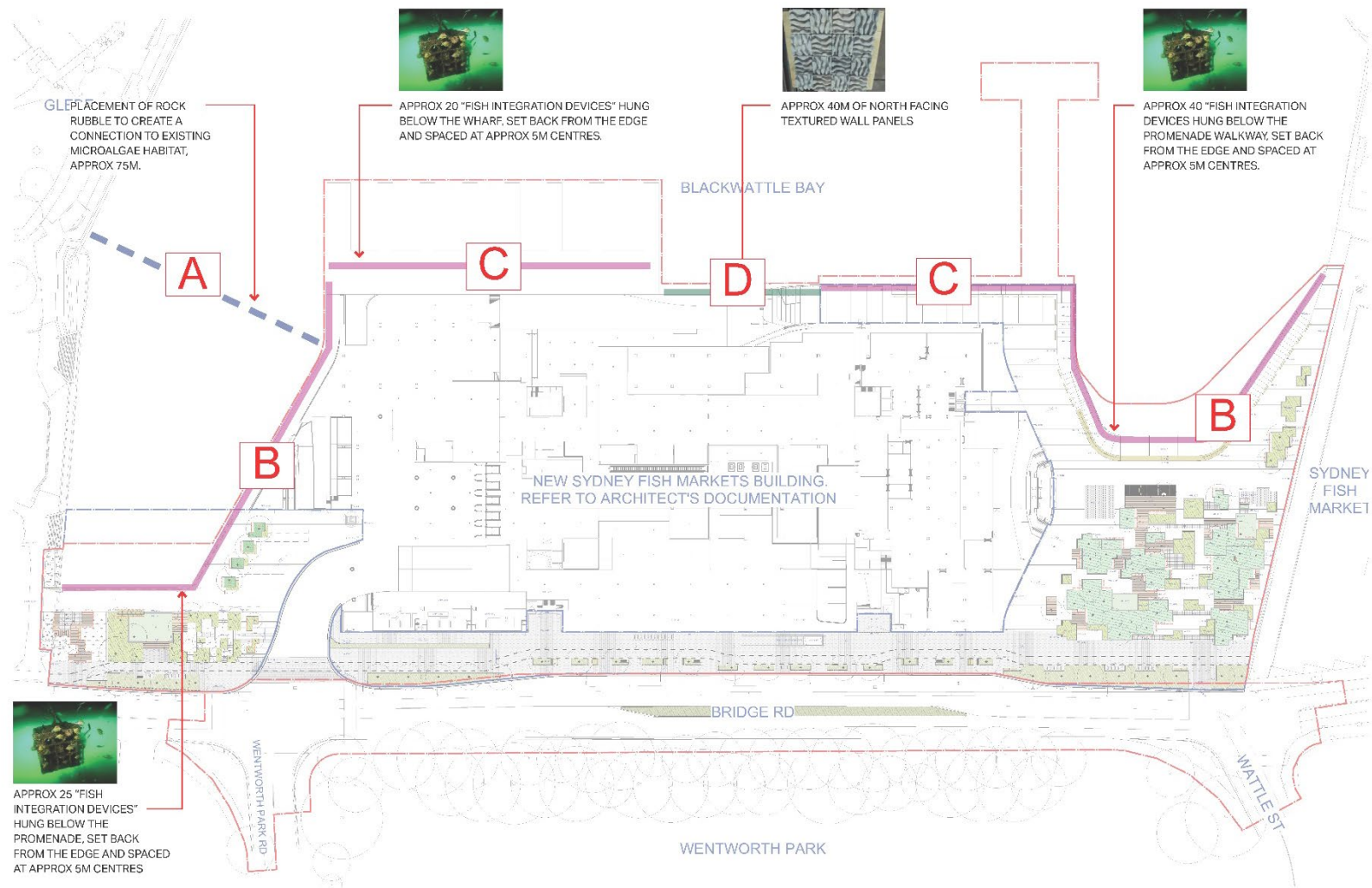
Please contact me on the number below should you have any questions.

Regards,



Ian Dixon  
Senior Aquatic Ecologist

0409 494 146




# MARINE HABITAT OPPORTUNITIES NEW SYDNEY FISH MARKETS

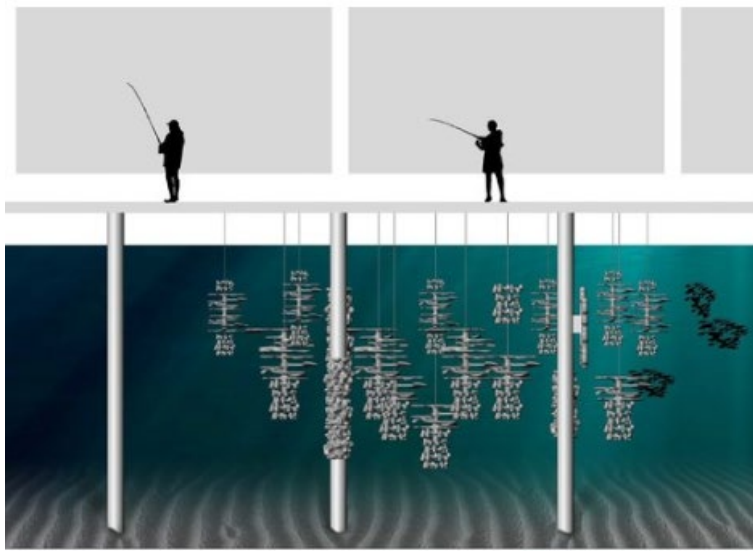
Figure 1: Key to habitat types described below

Table 1: Description of habitat types and design criteria

Key	Habitat type	Material and size	Quantity	Design criteria
A	Rock rubble	Sandstone irregular cut (free from fines) Dominant target size 500-700 mm (longest dimension), with other pieces minimum 300 mm to maximum 900 mm.	450 m <sup>3</sup>	<p>20 m wide x 75 m long placement of single layer of rock (approx. 0.5 m high average). Rock placed with random spacing between rocks or clusters of rock, but spaced no greater than a single rock length with the aim to provide structure for seaweed growth and shelter for fish movement in water shallower than 3 m. Therefore, estimated 60% rock coverage in this area. Total minimum quantity is calculated as 60% x 20 m x 75 m x 0.5 m = 450 m<sup>3</sup>.</p> <p>Suggested method is to lower from excavator on barge. No compaction is required. Rough placement is ideal, with minor repositioning required if rocks pose an obstruction to small boats.</p>
B	Fish Aggregation Device Type 1	Seafloor module. Minimum 600 x 600 mm base, approx. 1000 mm tall hard-surfaced, rigid, complex habitat. Suitable materials are marine concrete with irregular aggregate, ceramic, recycled oyster shell or marine-suitable metal. No plastic or degradable products.	45	<p>Structures are to be placed on the seafloor under the promenade/wharf (within 5 m from the edge) or immediately adjacent to this in open water to allow placement at any time during construction. The majority of the structure should be no deeper than 3 m to allow sufficient light to reach the unit for plant growth. Complex shapes are encouraged to increase surface area and provide a variety of fish shelter. Structures should be lowered gently to the seafloor by barge-mounted crane. Depending on weight and shape, structures may need to be pinned or slightly embedded into the substrate to improve balance. Purpose-built commercial modules are recommended as they have been tested and designed to maximise habitat.</p> <p>Example design: <a href="https://www.reefdesignlab.com/easy-drop-range">https://www.reefdesignlab.com/easy-drop-range</a></p>

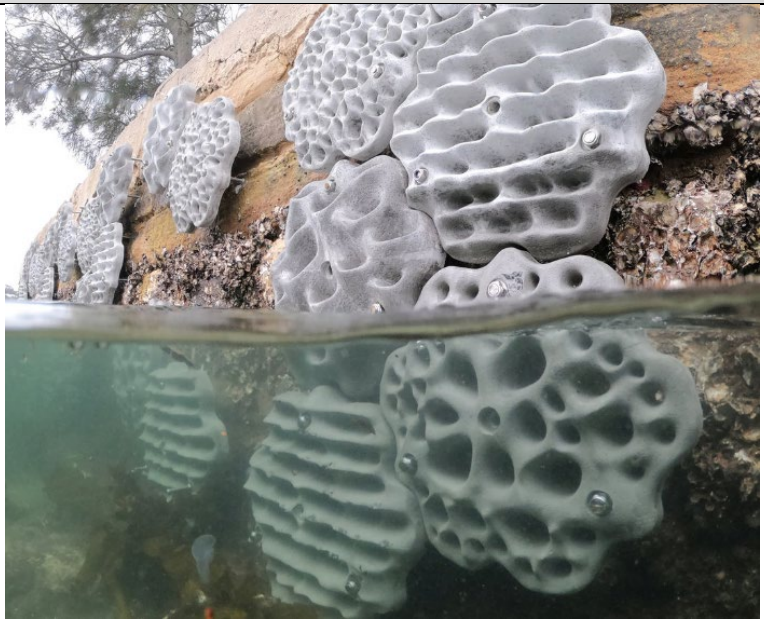


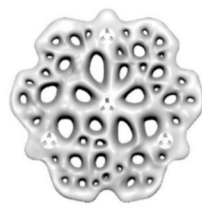
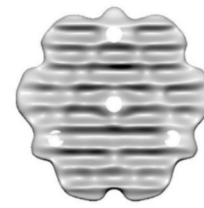


Key	Habitat type	Material and size	Quantity	Design criteria
				
C	Fish Aggregation Device Type 2	<p>Suspended module. 600-1000 mm cube or irregular shaped complex polygon or similar with crossbars or panels to maximise surface area and voids.</p> <p>Suitable materials are marine-suitable metal rods (cage-like), ceramic panels and prefabricated marine-concrete. A lightweight design is preferable. Suspension cable and mounts to be marine-</p>	40	<p>Structures are to be suspended from the promenade/wharf so they are located 1-3 m below the water surface (lowest tide), and no further than 5 m from the edge to allow sufficient light to reach the unit for plant growth. Complex shapes are encouraged to increase surface area and provide a variety of fish shelter. Suspension cabling and mounts must be built to hold at least six times the weight of the unit to allow for future growth of organisms and minor turbulence from boat wash and tidal motion. Purpose-built commercial modules are recommended as they have been tested and designed to maximise habitat.</p> <p>Example designs: <a href="https://www.reefdesignlab.com/hangingfloating">https://www.reefdesignlab.com/hangingfloating</a></p>

Key	Habitat type	Material and size	Quantity	Design criteria
		grade stainless steel or equivalent. No plastic or degradable products.		
D	Seawall tiles/imprint	40 m long x 2 m tall. Either 'living seawall' tiles bolted onto wall or prefabricated panels imprinted with similar patterns.	80 m <sup>2</sup>	<p>'Living seawall' tiles aim to maximise micro-habitat and provide wet and cool refuge for small marine organisms. If prefabricated panels are used, the imprint must mimic the design intent of the tiles.</p> <p>Placement should cover the maximum to minimal tidal range, or centred around the average range.</p> <p>Example designs: <a href="https://www.reefdesignlab.com/seawalls">https://www.reefdesignlab.com/seawalls</a></p>

Key	Habitat type	Material and size	Quantity	Design criteria
				 <p><a href="https://www.reefdesignlab.com/living-seawalls">https://www.reefdesignlab.com/living-seawalls</a></p>



Key	Habitat type	Material and size	Quantity	Design criteria
				 <p><a href="https://www.sims.org.au/page/130/living-seawalls-landing">https://www.sims.org.au/page/130/living-seawalls-landing</a></p> <div> <div>Honeycomb</div>  </div> <div> <div>Rockpool</div>  </div> <div> <div>Swimthrough</div>  </div> <div> <div>Crevice</div>  </div> <p>Current designs of the Living Seawalls habitat panels.</p>