

GUIDELINES FOR INSTALLING MULTI-USE AND ECO-FEATURES DURING BREAKWATER UPGRADES

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BREAKWATERS IN NEW SOUTH WALES

Many breakwaters along the New South Wales (NSW) coastline that train river entrances or form armoured harbours were designed and built more than 100 years ago. They were built to support coastal shipping, transport and trade which was important in European settlement along coastal NSW prior to the construction of rail and road networks. Breakwater construction was undertaken without rigorous environmental impact assessment and often caused unintended, and lasting, estuary-wide hydrological impacts and interruptions to sand movement. The structures themselves also replaced and fragmented natural ecosystems.

A SHIFT FROM ORIGINAL PRIMARY PURPOSE

Today, the original primary purpose for some of these century-old structures is far less relevant. Instead, these breakwaters now deliver a range of social, cultural, economic and environmental values. Some structures are critical for protection of reclaimed land that is used for housing and commercial development. Other structures have heritage value. Built elements within breakwater structures such as a smooth crest surface (Figure 1D) can provide valued access for pedestrians and maximise other recreational opportunities including fishing. Despite broader impacts, some structures have ecological features that add environmental value.

Maintenance and upgrading of existing breakwaters increasingly needs to employ techniques and designs that improve structural integrity, manage sea level rise and minimize environmental impact, while accommodating or enhancing the multiple uses that local and holidaying communities have opportunistically developed around breakwater infrastructure.

GUIDELINES FOR MAXIMISING VALUES

A decision-making framework (Mamo et al, 2022) and guidelines (Dwyer and Dengate, 2021) have been developed to inform the planning of upgrade works. The framework and guidelines promote adoption of elements that can maximise multi-use opportunities and incorporate eco-features to add environmental value. They can inform decision-making for an individual breakwater or an organization's portfolio of structures. The framework and guidelines were developed in close consultation with asset owners and managers, design and coastal engineers, hydrologists, biologists and government agency staff involved in environmental impact assessment.

AUDIT OF STRUCTURES

The framework and guidelines were informed by the first comprehensive audit of the NSW coastline documenting 134 breakwater structures and their multi-use and eco-features. A summary report and three illustrated volumes describe the primary purpose of each structure and their multi-use and eco-features. Using historical photos, the guidelines are an engaging way of sharing the extent of change in some areas. They show why change to river entrances was identified by scientists, stakeholders and the broader community as one of the highest threats and risks to environmental values in the NSW marine estate.



Figure 1 - Accessibility of breakwater crest surfaces: A) not a walking surface, B) accessible to some, C) accessible to most, and D) accessible to all.

IMPROVED MANAGEMENT

The audit, framework and guidelines provide the baseline information and tools needed to better manage the portfolio of breakwaters in ways that align with the vision for the NSW marine estate: a healthy coast and sea, managed for the greatest well-being of the community, now and into the future.

REFERENCES

Dwyer and Dengate (2021). Breakwater maintenance and upgrades: multi-use and eco-features: guidance for asset owners, designers and project managers. NSW Government.

Mamo, Dwyer, Coleman, Dengate, Kelaher (2022): Beyond coastal protection: A robust approach to enhance environmental and social outcomes of coastal adaptation, Ocean and Coastal Management, ELSEVIER, vol. 217, article 106007.