

HOW MUCH LONGER CAN AN OLD SEAWALL LAST? DESIGN, CONSTRUCTION AND MAINTENANCE LESSONS TAUGHT BY NORTH CRONULLA'S PRINCE STREET SEAWALL

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QUICK HISTORY

Within the traditional lands of the Dharawal people, the headlands, beaches and sandy dunes of Gunnamatta / Cronulla are long recognised as important regional environmental, social and economic assets. With early settlers holding large tracts of land, once connected to Sutherland by a steam train from 1911, the seaside holiday village of Cronulla was quickly subdivided and became a permanent town, with increasingly expensive infrastructure built along the foreshore.

COASTAL EROSION & PROTECTION

The sandy beach and dunes of North Cronulla, where the main settlement was established, has a well-documented history of being impacted by coastal erosion events over the past 100 years. Modification of the foreshore started around 1919, using dune sand to infill the low-lying swamp in the hind-dune, creating more 'useable' land. Feeling the impacts of erosion not long after, between 1922-24 a stepped seawall was built around Cronulla, the headland and 21 metres along North Cronulla. From 1936-41 the stepped seawall was extended by some 350m to the north, protecting the elevated foreshore of Prince Street (approx. 16m AHD). However the seawall collapsed following storms in 1949 (Fig. 1), the SLSC was relocated, and the seawall rebuilt.

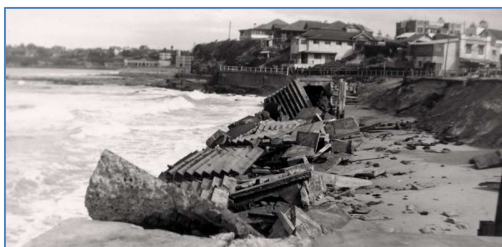


Figure 1: Storm damage at North Cronulla Beach, collapse of stepped seawall, circa 1949 (source: Sutherland Shire Council)

Significant storms in 1967 and 1974 caused extensive erosion and damage, including complete collapse of the Prince Street seawall. In 1985-86 Council decided to invest in a 360m "Seabee" coastal protection structure at Prince Street; a sloping gravity stack wall of hexagonal concrete blocks (internal holes for wave dissipation), (Fig. 2), however the gabion toe soon failed. (Fig. 3).

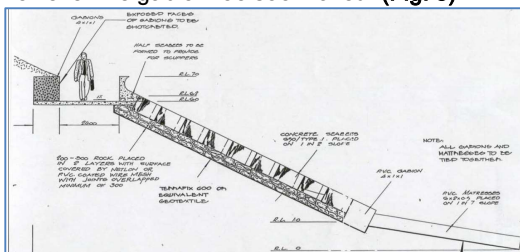


Figure 2: Cross-section of the original Prince Street Seabee Seawall



Figure 3: Original Prince Street seawall with failed rock gabion mattress

Rectification works were undertaken in 2008, comprising the installation of contiguous bored piles with concrete capping beam and permanent ground anchors in place of the gabion toe and reno mattress.

Unfortunately, construction of the 'contiguous bored piles' was not supervised as well as it could have been, resulting in significant gaps between piles. When the beach level is lowered due to loss of sand in front of the piles, ongoing tidal and wave action through the gaps undermines and erodes the sand fill beneath the Seabee units. The removal of the sand fill creates voids beneath the rock underlayer (and geotextile) and Seabee units, into which some units have subsided.

Treatment measures such as infilling gaps and voids with expanding foam have been trialled, but were found to be unsatisfactory. Ongoing loss of subbase material has resulted in subsidence of the Seabee units (Fig. 4), creating a safety hazard.



Figure 4 Undermined Seabee units at Prince Street Seawall, 2020

Sutherland Shire Council engaged Royal HaskoningDHV in 2020 to advise on interim works to address existing hazards, resulting in pumping approximately 320m³ of 4:1 stabilised sand to infill cavities.

As an action item within the recently completed Bate Bay Coastal Management Program, Council have engaged RHDHV to investigate options to extend the useable life of this asset, while planning for replacement at the appropriate time.

The recommendations and forward plan to prolong the life of the Prince Street Seabee seawall will be the subject of this presentation.