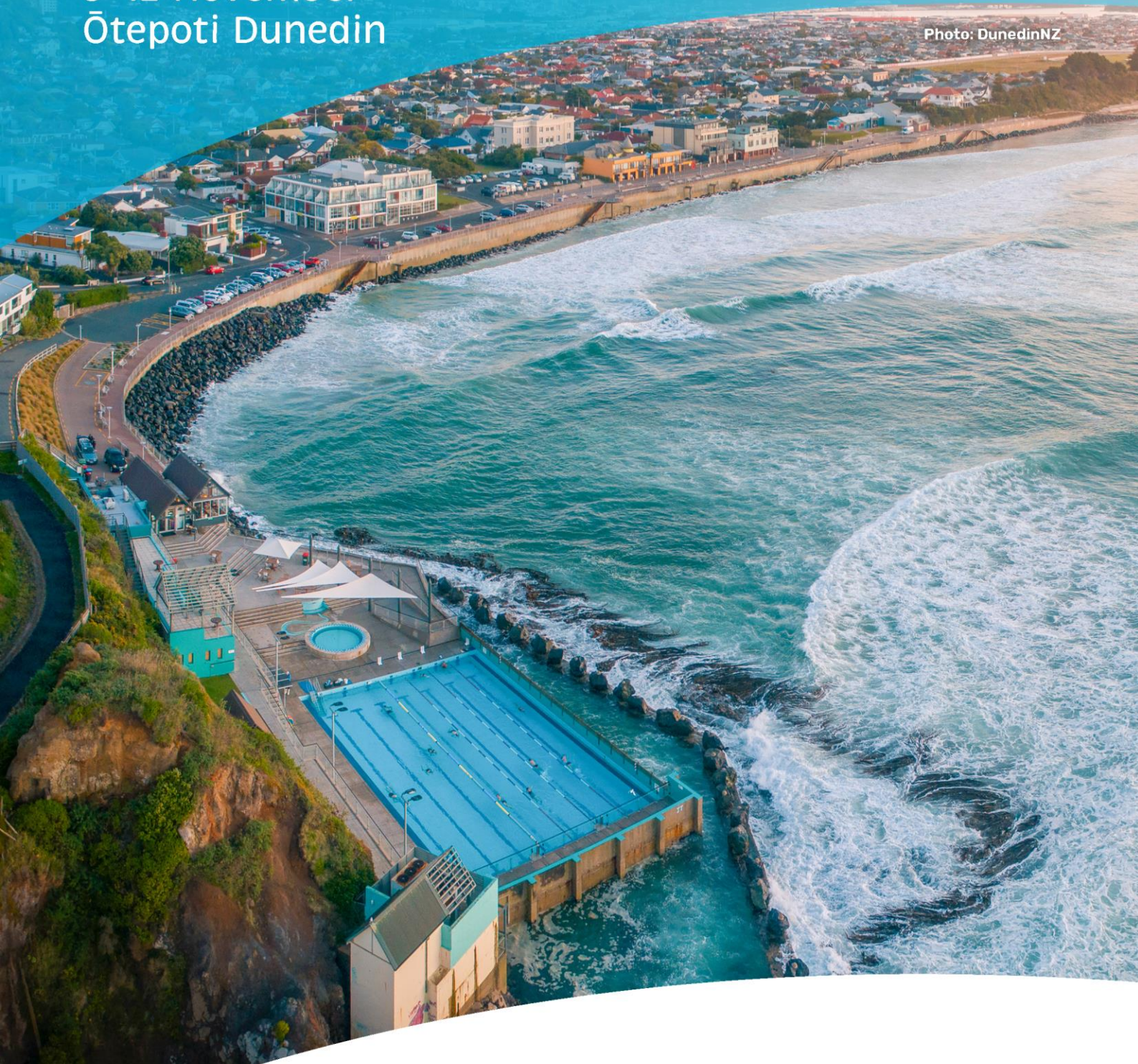




Conference 2026

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Upgrading coastal roading infrastructure to accommodate coastal hazards and climate-change: SH16 Causeway Upgrade Project

As sea-level rises, coastal-road causeways will increasingly be exposed to higher frequencies of storm-tide inundation and wave over-topping, compounded in some areas by historic subsidence of the causeways, especially estuary crossings. Recent advances in assessing the joint-probability of coastal inundation hazards, from the combination of tides, storm surges, monthly mean sea-level variability and wave run-up, and new thinking on adaptive-management approaches to adapting to climate change, were applied to a case-study for the design of the upgraded Causeway section of the Northwestern Motorway in Auckland. The NZ Transport Agency's Waterview Causeway Upgrade Project is now under construction by the Causeway Alliance to raise and widen 4.8 km of SH16 in Auckland, from Great North Road west to the Whau River bridge at Te Atatu. This will alleviate issues in recent years from storm-tide and wave inundation of the Causeway across the Waterview Estuary leading to occasional short-period closures, especially the adjacent cycleway.

Coastal engineering design of the project by Aurecon NZ Ltd. commenced in 2007, with NIWA as a sub-contractor providing inputs on coastal hazards and sea-level rise. The presentation covers these latter aspects of the project design and assessment of effects of the proposed works leading up to the Board of Inquiry hearing on the consent applications and notices of requirement for the entire Waterview Connection Project, with the final decision notified on June 2011.

Some of the generic learnings from the Causeway Upgrade project include:

a) the historic sedimentation effects of causeways across estuarine inlets, which now become part of the existing environment for assessing effects of the upgrade works; b) optimising the combined occurrences of storm-tide and waves in harbours, where storm-tide dominates more than on open coasts; c) wave overtopping and associated safety thresholds for levels of operability are empirical and require careful analysis and understanding of the limitations; d) role of modelling versus heuristic assessment (based on the historic analogue of the present Causeway); e) adaptation to sea-level rise by raising the causeway can be accomplished in stages or all in one single project – the latter was the optimal case for the Causeway Upgrade project where it will be raised 1.5 m.



Te Hunga Takutai o Aotearoa
**NEW ZEALAND
COASTAL SOCIETY**

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