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# Water Research Laboratory

## Tomago Wetlands Tidal Inundation Modelling

Never Stand Still

Faculty of Engineering

School of Civil and Environmental Engineering



The Hunter Estuary Wetlands Ramsar site is located in the lower Hunter River estuary, along the central coast of New South Wales. Tomago Wetland lies immediately to the west of Fullerton Cove. As part of the Williamstown - Long Bight - Tomago Drainage Scheme, the levee bank, ring drain and other internal drains were enlarged by the NSW Public Works Department between 1968 and 1980 (MacDonald et al. 1997). These engineering works, including the installation of floodgates at the tidal boundary, ensured that tidal waters are excluded from Tomago Wetlands (i.e. the site drains via one-way tidal floodgates).

The drainage and exclusion of tidal waters within Tomago Wetland degraded the salt marsh ecosystem and fostered the growth of non-salt marsh species. Lowering of the groundwater table also oxidised sub-surface acid sulfate soils causing soil acidification. Grazing and other users of the site further degraded the previous ecosystem and reduced migratory wading bird habitat.

Tidal inundation was restored to the western portion of the site in 2007, with a culvert restricting exchange between the eastern and western sides installed as part of these works. As such the western half of Tomago Wetlands remains in an unrestored state. This study aimed to determine the impact of restoring tidal exchange at the eastern floodgates of Tomago Wetlands. Benefits of tidal restoration would include increased fish habitat, reduced weed growth, increase salt marsh habitat, improved bird roosting and feeding conditions and minimise acid sulfate soil impacts.

Two-Dimensional (2D) numerical modelling hydrodynamic tools were used to simulate the reintroduction of tidal exchange at the site and to determine the optimal configuration of on-ground structures. The existing restored inundation conditions in the western section of Tomago Wetlands were used to verify the model. To best simulate the hydrologic conditions onsite, a 1D model created of the large internal drains was linked to a 2D model of the overland wetland area using the MIKE Flood modelling software. Model simulations were undertaken to determine what on-ground works would be required to limit the extent of tidal inundation and maximise saltmarsh growth. Further, a range of tests were undertaken to ensure that tidal inundation does not increase inundation depths on the previously restored western section or negatively impact upland stakeholders.

A range of modelling scenarios were undertaken to investigate different on-ground work options based on economic restraints, from relatively minor modification to higher cost levee bank and culvert construction options. The modelling scenarios investigated a full range of tidal water levels with particular attention given to design level heights. The results from the model are now being used to finalise on-ground structure design and proceed with Stage 2 and Stage 3 remedial works.

Further information can be obtained from Dr William Glamore at: [w.glamore@wrl.unsw.edu.au](mailto:w.glamore@wrl.unsw.edu.au) or (02) 8071 9800.



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