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Tweed-Byron Coastal Creeks Flood Study

Draft Report

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EXECUTIVE SUMMARY

The coastal creeks of northern New South Wales between Brunswick Heads and Tweed Heads have a long history of flooding, with a major flood event occurring recently in June 2005. Flood behaviour in this area is complex due to the multitude of creeks and hydraulic connections between major floodplains, including the Mooball Creek catchment in Tweed Shire and the Yelgun and Marshalls Creek catchments in Byron Shire. Both Councils have therefore jointly undertaken a new flood study covering the Cudgen, Cudgera, Mooball, Yelgun and Marshalls Creeks.

This Coastal Creeks Flood Study is the first key stage in the floodplain management process as outlined in the New South Wales *Floodplain Development Manual*. The key outputs of the study, including a 1D/2D hydrodynamic TUFLOW model, design flood levels, depths, velocities and flows across the floodplains, will form the basis for the subsequent Floodplain Risk Management Studies and Plans for each of the coastal creeks.

The study area covers approximately 300 km^2, including 110 km^2 of the Mooball Creek catchment, 100 km^2 of the Cudgen Creek catchment, 40 km^2 of the Marshalls Creek catchment, and 35 km^2 of the Cudgera Creek catchment. These catchments are bisected in a north-south direction by the Pacific Highway, with predominantly agricultural and forested areas upstream and a mixture of agricultural land, sugar cane farms, forested and urban areas downstream. Cudgen, Cudgera and Mooball Creeks flow to the ocean, and Marshalls Creek flows into the Brunswick River approximately 1.2km from the mouth.

The townships of Bogangar/Cabarita Beach, Hastings Point, Pottsville, Burringbar, Mooball, Wooyung, Crabbes Creek and Billinudgel all have frequently experienced inundation from floodwaters, originating from two typical sources: heavy rainfall over the catchments and/or high tailwater levels in the ocean due to storm surge or exceptional tidal conditions. A major flood event occurred across all catchments in June 2005, which resulted in above floor level flooding of a significant number of buildings across the study area. Other significant flood events occurred in May 1987 and March 1974, although these events were more localised (mainly Cudgen and Mooball Creek in 1987 and Marshalls Creek in 1974).

A Digital Elevation Model was developed for the whole study area based on 2007 Aerial Laser Survey data together with bathymetric surveys of the lower sections of the main creeks. RAFTS-XP hydrologic and TUFLOW 1D/2D hydraulic models were developed and jointly calibrated to the June 2005 flood event, and verified against the May 1987 and March 1974 floods. The models were then used to simulate a range of design events for the existing catchment conditions. The 5, 10, 20, 50, 100 and 500 year ARI, as well as the PMF event, were simulated for three selected duration storms: 6 hours, 24 hours and 36 hours. These durations were defined as being the most critical in terms of peak flood levels across the study area. Catchment inflow and runoff were combined with downstream ocean and storm surge levels adopted in consultation with DECC, TSC and BSC staff. The 100 year ARI design flood for the study area was adopted as the maximum envelope of two scenarios: a catchment dominated event (i.e. 100 year ARI rainfall event and 20 year ARI storm surge) and an ocean dominated event (i.e. 10 year ARI rainfall event and 100 year ARI storm surge).

The impacts of climate change on the 100 year ARI design flood levels and behaviour were also assessed as part of the Flood Study, based on two scenarios selected in consultation with DECC,