

COCOS (KEELING) ISLANDS STORM SURGE RISK ASSESSMENT STUDY



PROJECT DESCRIPTION

Systems Engineering Australia were commissioned to undertake a particularly sophisticated numerical modelling study designed to provide statistical estimates of the tropical cyclone storm tide threat at the Cocos (Keeling) Islands - an Australian Government Territory in the Indian Ocean (12°10'S, 96°50'E). The client was Gutteridge Haskins and Davey Pty Ltd (Perth) on behalf of the Commonwealth Department of Transport and Regional Services.

The Cocos (South Keeling) Island group is a relatively small isolated mid-oceanic atoll comprising 26 islands surrounding a shallow lagoon. The atoll is located in a region of significant tropical cyclone activity during October through to March. The lagoon is 10 km E-W and 12 km N-S and shallow (<10 m) with the principal openings to the north and north-west but with smaller openings to the south and east. The inhabited islands (pop. 600 in total) are low lying (typically + 6m MSL) and heavily vegetated with coconut palm.

The study involved the creation of a number of numerical models to simultaneously represent all of the various components which make up the combined storm tide level during the close approach of a severe tropical cyclone. Wind, surface pressure and wave models were all developed and verified where possible against data from the island. A statistical model was then created to provide estimated probabilities of exceeding a range of critical water levels.

The models show that the effects of breaking wave setup on the outer reefs are the dominant process causing a rise in local water levels during tropical cyclones. The study results are being used to ensure safe havens are provided for the island population.



CLIENT:

GHD Pty Ltd for
Commonwealth Department
of Transport and Regional
Services; 2001.

LOCATION

Cocos (Keeling) Islands,
South Indian Ocean.

SEA PERSONNEL PROVIDED

- An assessment of the regional tropical cyclone climatology
- Numerical modelling of winds, waves, wave setup, currents, tides and storm surge
- Statistical models allowing the estimation of the probability of extreme water levels occurring throughout the island group



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