REALISTIC DISASTER SCENARIO ANALYSIS: NORTH QLD CYCLONE

bushfire&natural HAZARDSCRC

R. J. Krupar III[1], and M. S. Mason[1]

[1] School of Civil Engineering, The University of Queensland, St. Lucia, QLD 4072 Australia

A MODIFIED SEVERE TROPICAL CYCLONE MARCIA (2015) LANDFALL EVENT WAS GENERATED. THE MODIFIED CASE STUDY CREATES A WORSE CASE WIND AND FLOOD SCENARIO FOR THE TOWN OF YEPPOON, QUEENSLAND, WITH ADDITIONAL WIND AND FLOOD IMPACTS TO RESIDENTIAL, COMMERCIAL AND INDUSTRIAL BUILDINGS THAN EXPERIENCED DURING THE EVENT.

YEAR 3 SCENARIO OVERVIEW – MODIFIED TROPICAL CYCLONE MARCIA (2015)

Severe Tropical Cyclone Marcia (2015) was selected as the base case study to perturb. This cyclone was selected because it was the southernmost Category 5 cyclone to make landfall in the Bureau of Meteorology historical tropical cyclone database. In order to produce the worse case scenario for both wind and flood at landfall, the original track was shifted east and the forward motion was slowed to allow the wind field to expand and enough water to pile up along the Central Queensland Coast near Yeppoon,(Figure 1).

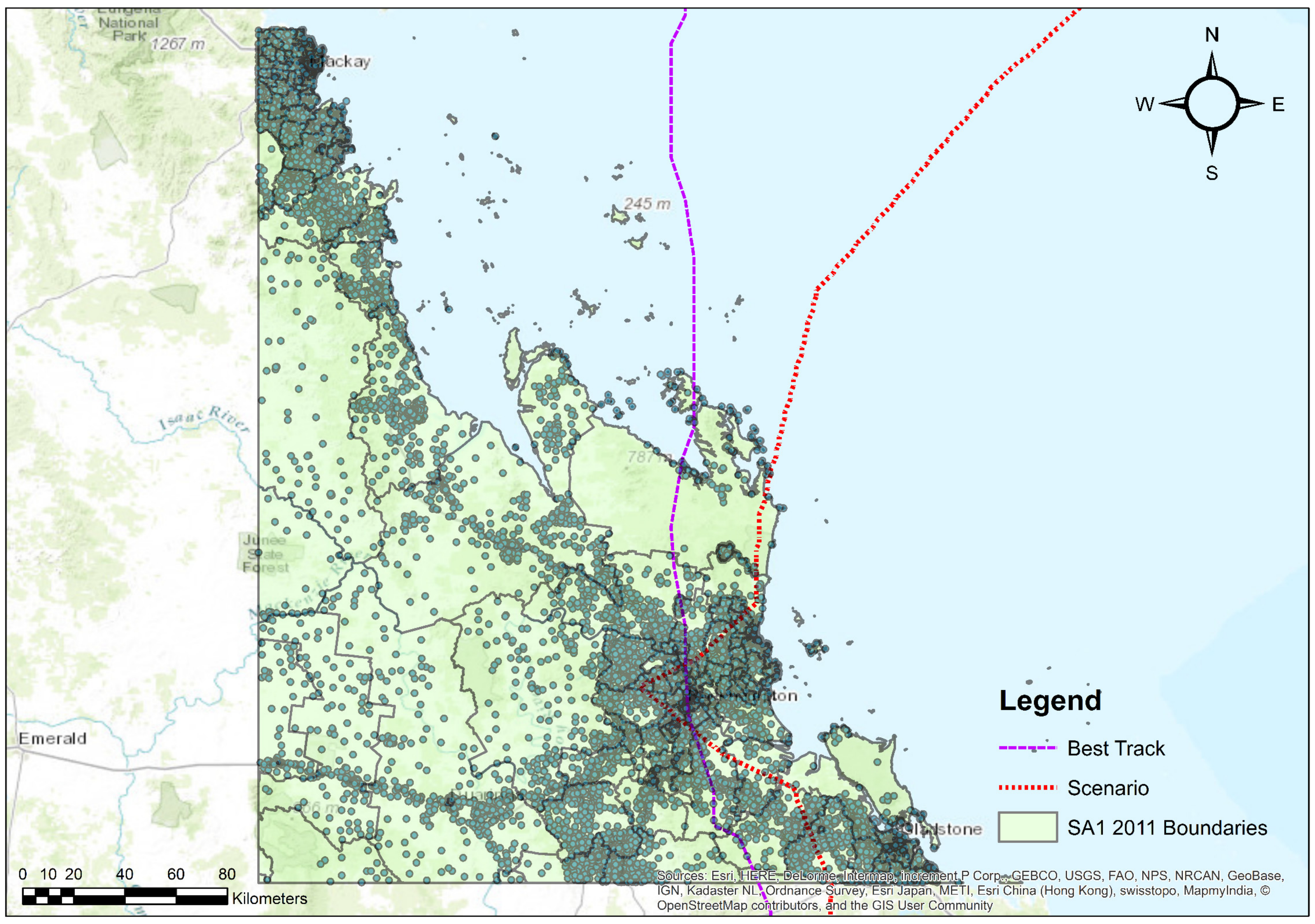

Figure 1. Best track and modified scenario track for Tropical Cyclone Marcia (2015). Circles represent geocoded addresses of residential, commercial and industrial buildings in the study region.

Hazard model framework update

The following improvements have been made to the hazard modelling framework since the first Tropical Cyclone scenario:

- Addition of surface background wind, gust factor model and Geoscience Australia national wind multipliers to the wind hazard model.
- Implementation of the Tropical Rain Measurement Mission (TRMM) Rainfall Climatology and Persistence (R-CLIPER) model for rain rate modelling (Tuleya et al. 2007).
- Implementation of BMT WBM TUFLOW Finite Volume (FV) hydrodynamic model for storm surge modelling.

Exposure framework update

In order to simulate wind and flood impacts at building level. Geocoded National Address File (G-NAF) and National Exposure Information System (NEXIS) 2011 data were coupled to generate a synthetic exposure dataset (Figure 1). G-NAF categories were assigned to each point location (e.g. house, shop, office, etc.) based on the percentage breakdown of residential, commercial and industrial buildings in each Statistical Area 1 (SA1) boundary (Figure 1).

Vulnerability model framework update

Flood impacts to residential buildings were modelled using total loss ratio (building and contents damage combined) versus inundation depth curves (Figure 2). The curves were developed by Mason et al. (2012) for four simplified building types (SBTs) using insurance loss data following the 2011 Queensland floods.

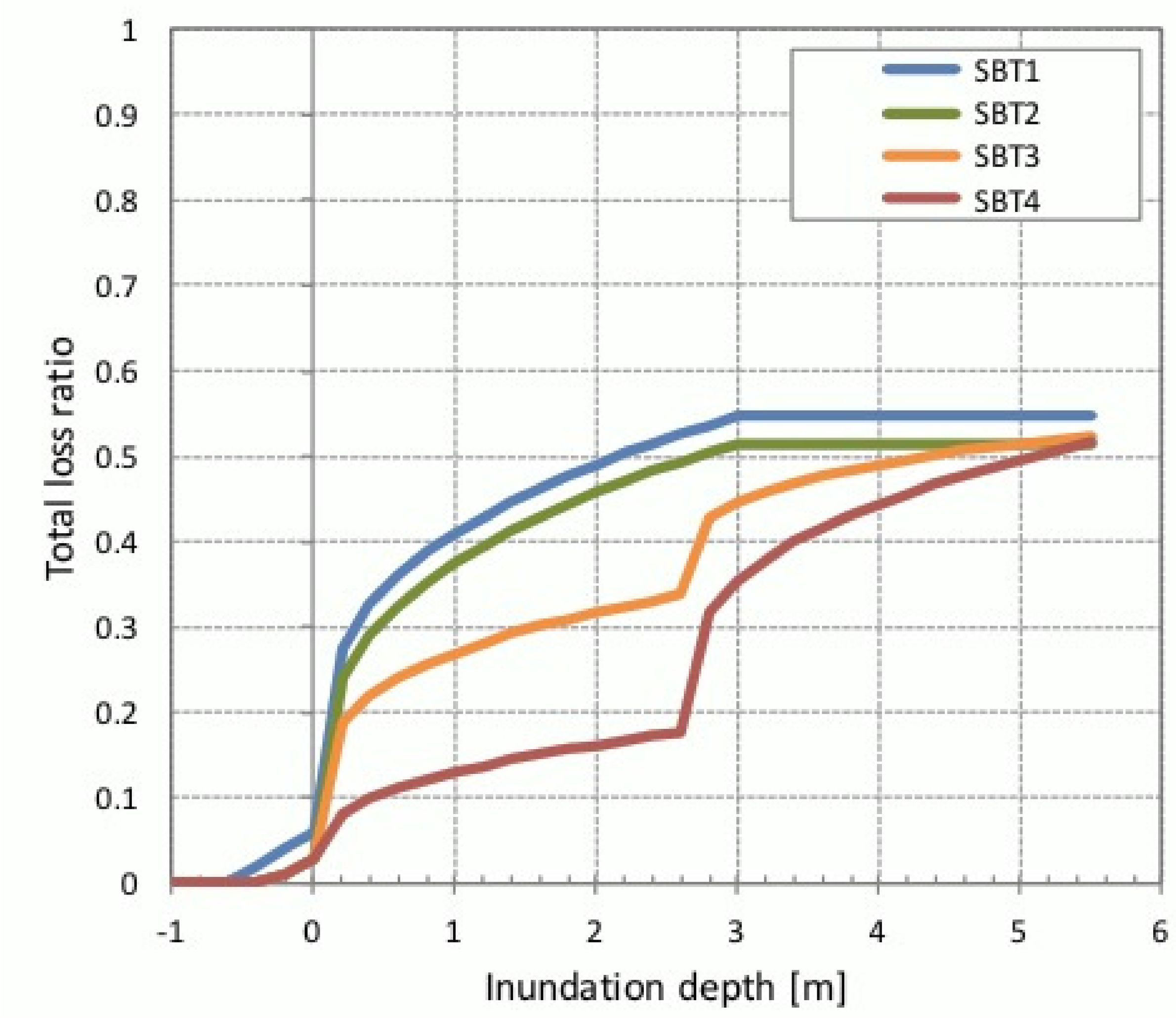

Figure 2. Total loss ratio versus inundation depth curves for different SBTs (Mason et al. 2012).

REFERENCES

Mason, M., E. Phillips, T. Okada, and J. O'Brien, 2011: Analysis of damage to buildings following the 2010– 2011 Eastern Australia Floods. Australia: National Climate Change Adaptation Research Facility. Gold Coast. 1–95.

Tuleya, R. E., M. DeMaria, and J. R. Kuligowski, 2007: Evaluation of GFDL and simple statistical model rainfall forecasts for U.S. landfalling tropical storms. *Wea. Forecasting*, **22**, 56–70.

Australian Government Department of Industry, Innovation and Science | Business Cooperative Research Centres Programme

RISK FRONTIERS

THE UNIVERSITY OF QUEENSLAND AUSTRALIA