STOCKTON

…our HAZARD inundation risk

Willow Forsyth

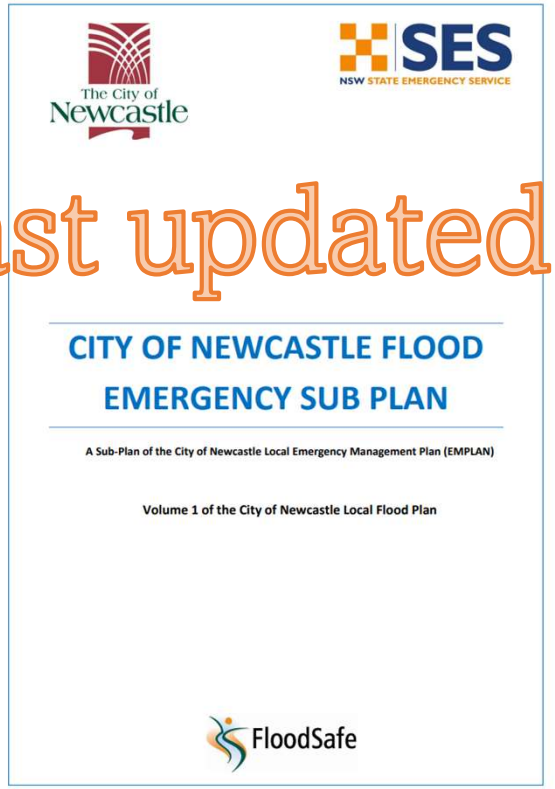
May 2022

NCC is facing a critical question:

To what extent is it possible to provide the SES with the required hazard information to update the Stockton sector emergency management plan?

Hazard	Risk Description	Likelihood Rating	Consequence Rating	Risk Priority	Combat / Responsible Agency
Coastal Erosion (Storm Tide Risk Model)	Major beach erosion certain and dunal recession likely. Potentially dangerous inundation of eastern areas of Stockton, possible building damage or collapse as a result of undermining of foundation or wave action.	Likely	Major	High	Council, NSW SES

Extract from NCC Emergency Management Plan 2019 (amended public version), page 48 of 52



Last updated 2013

Chair, Local Emergency Management Committee

Date: 17/6/13

How do we know *what* the SES needs?

The 'benchmark' is set by the Flood Risk Management Guide EM01 (see picture), with its 7 principles designed to *assist in minimising risk to community safety.*

The relevant **principles** are:

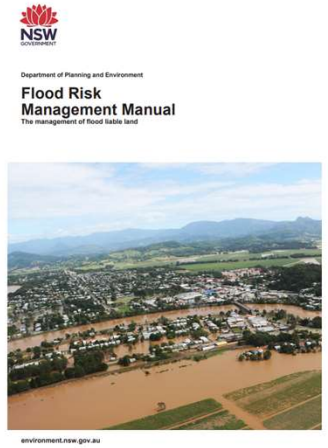
2) Decisions should be informed by understanding the full range of flood EM risks to the community

5) Risks faced by the itinerant population need to be managed

6) Recognise the need for effective flood warning and associated limitations

7) Ongoing community awareness of flooding is critical to assist effective emergency response

Released March 2022



PART of the updated FLOOD RISK MANAGEMENT MANUAL

Why's Principle 2 important?

2) Decisions should be informed by understanding the **full range of flood EM risks** to the community

"The examination of the full range of floods provides a basis for understanding how **flood behaviour, constraints and impacts vary from frequent, to rare and extreme events**. This information can then be considered in decisions on how to manage flood risk…"

Pages 12-13 Flood Risk Management Manual

1. Many different SIZES of inundation events are likely to occur in our lifetimes

Table 1 Chance of encountering a given sized flood one or more times in 80 years

Annual exceedance probability %	Average recurrence interval (1 in x years)	Chance of experiencing in an 80-year period	
		at least once %	at least twice %
20	5	100	100
10	10	99.9	99.8
5	20	98.4	91.4
2	50	80.1	47.7
1	100	55.3	19.08
0.5	200	33.0	6.11
0.2	500	14.8	1.14
0.1	1,000	7.69	0.30
0.01	10,000	0.80	0.003

2. They are gonna behave differently – by depth, extent, and speed of water

Why's Principle 6 important?

6) Recognise the need for effective flood warning and associated limitations

"Establish or improve EM arrangements and planning for floods to assist in managing the continuing risk that remains after FRM and land-use planning measures are implemented…"

Pages 15 Flood Risk Management Manual

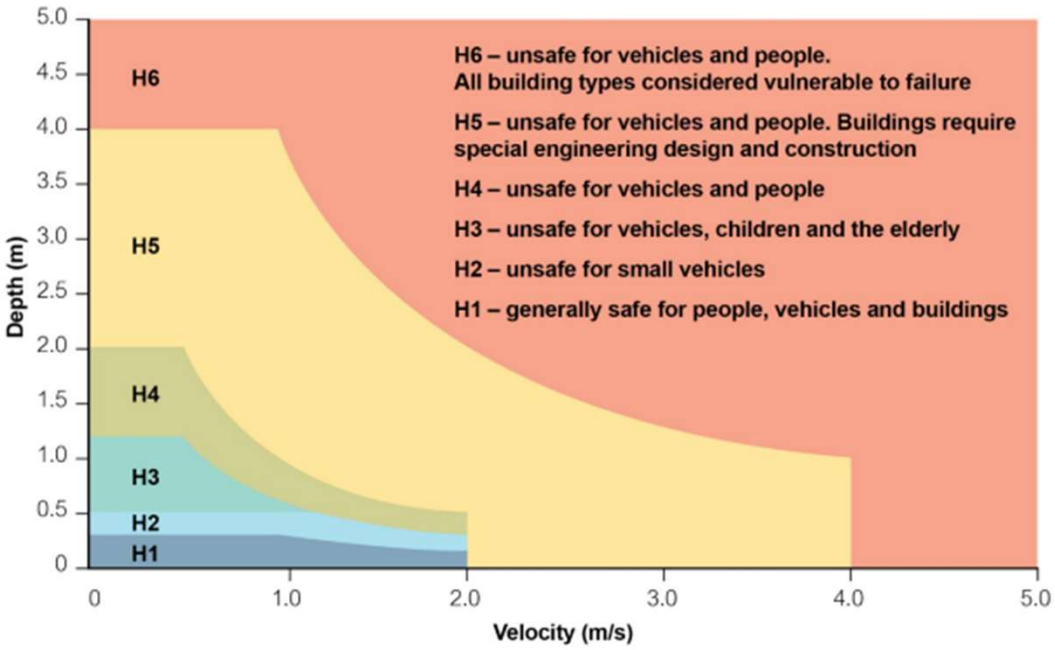


Figure 1 General flood hazard vulnerability curve
Source: Figure 6 AIDR 2017b

What SIZE of event – 20%, 10%, 5% or 1% AEP event – will be deeper than 0.3m OR faster than 2.0m/s?

Why are Principles 5 & 7 important?

5) Risks faced by the itinerant population need to be managed

7) Ongoing community awareness of flooding is critical to assist effective emergency response

Definition of **Flood Awareness** taken from Flood Risk Management Manual, page 48

Flood awareness	An appreciation of the likely effects of flooding, and a knowledge of the relevant flood warning, response and evacuation procedures facilitating prompt and effective community response to a flood threat	In communities with a low degree of flood awareness, flood warnings may be ignored or misunderstood, and residents confused about what they should do, when to evacuate, what to take with them and where to go

So, what report could provide the Information needed by the SES?

The Bluecoast Hazard Inundation Model and Report (HIMR) is an inundation assessment.

?

bluecoast
CONSULTING ENGINEERS

Technical Note – Stockton Beach Coastal Inundation Assessment

To:	City of Newcastle
From:	Bluecoast Consulting Engineers
Author(s)	Heiko Loehr and June Gainza
Reviewer:	Evan Watterson
Reference:	2020/194Q
Date:	8 December 2021
Subject:	Addendum to Stockton Beach Erosion Hazard Assessment

1 Introduction

In line with the Coastal Management Act 2016 and the NSW Coastal Management Manual Part B (the Manual - NSW Government, 2018), a coastal inundation hazard assessment for Stockton Beach has been undertaken. The City of Newcastle (CN) engaged Bluecoast Consulting Engineers (Bluecoast) to complete the coastal inundation assessment. This assessment follows on from the *Stockton Beach Coastal Erosion Hazard Assessment* (Bluecoast, 2020a) completed as part of Stage 2 of the Stockton Coastal Management Program (CMP) 2020 as well as the Stockton Bight Sand Movement Study (Bluecoast, 2020b). Due to a time constraint imposed by Ministerial direction to complete a Stockton CMP by 30 June 2020, these studies had been fast-tracked with this inundation assessment completed as an addendum to the coastal erosion assessment.

The purpose of this technical note is to identify and map the present (immediate) and future coastal inundation hazard at Stockton Beach. A vulnerability assessment of natural and built assets in the study area was not undertaken. The inundation assessment is limited to the storm-related flooding by seawater due to elevated ocean water levels (storm surge) and wave processes. Coastal inundation, as an action of the sea, is distinguished from more traditional definitions of flooding which are typically associated with rainfall and runoff. Flooding from runoff or from the Hunter River side of the Stockton peninsula is not included in this assessment and has been previously assessed in the Newcastle City-wide Floodplain Risk Management Study and Plan (BMT WBM, 2012).

This technical note is to be read as an addendum to the Stockton Beach Coastal Erosion Hazard Assessment within Supporting Documentation C - Stage 2 Reports - Sand Movement Study and Probabilistic Hazard Assessment Summary.

How does the Bluecoast assessment work?

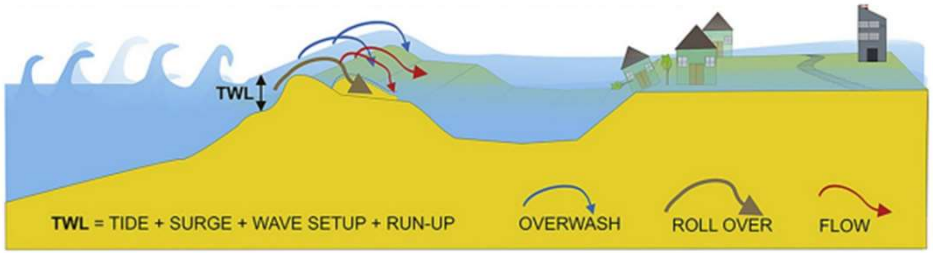


Figure 2: Study area and 2018 LiDAR (DPIE) Digital Elevation Model.

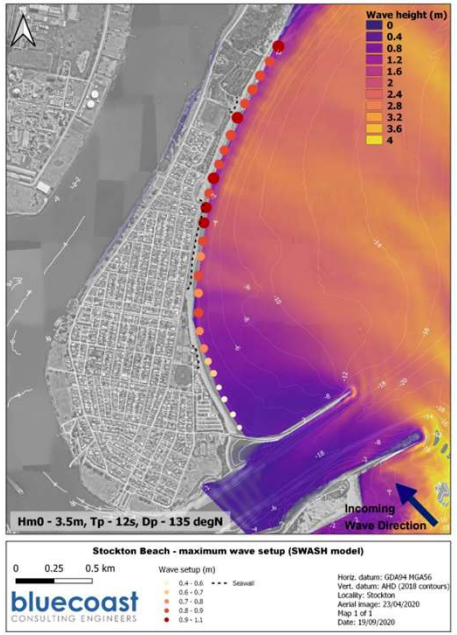


Figure 6: Spatial variation in simulated wave heights and inshore wave setup using the SWASH model for a large south-easterly wave condition.

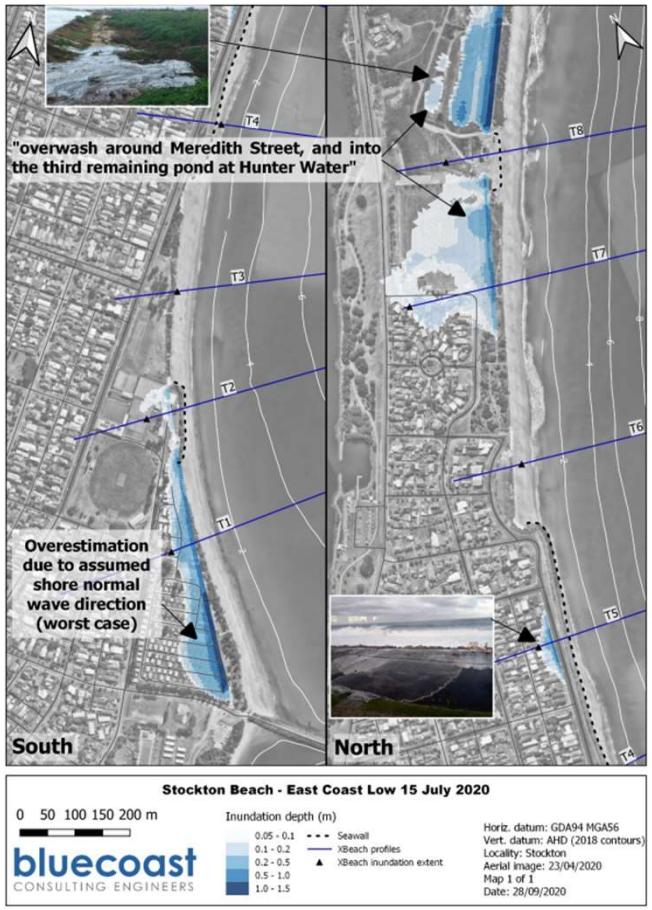


Figure 10: Validation of coastal inundation approach against photographs and anecdotal evidence (photograph source: Brian Hunt).

Extracts from Bluecoast Engineers' Stockton Coastal Inundation Assessment December 2021

What does the Bluecoast report suggest?

Figure 11: Coastal inundation hazard for 1%AEP in 2020 (immediate).

Figure 12: Coastal inundation hazard for 1%AEP in 2040 (0.13m SLR).

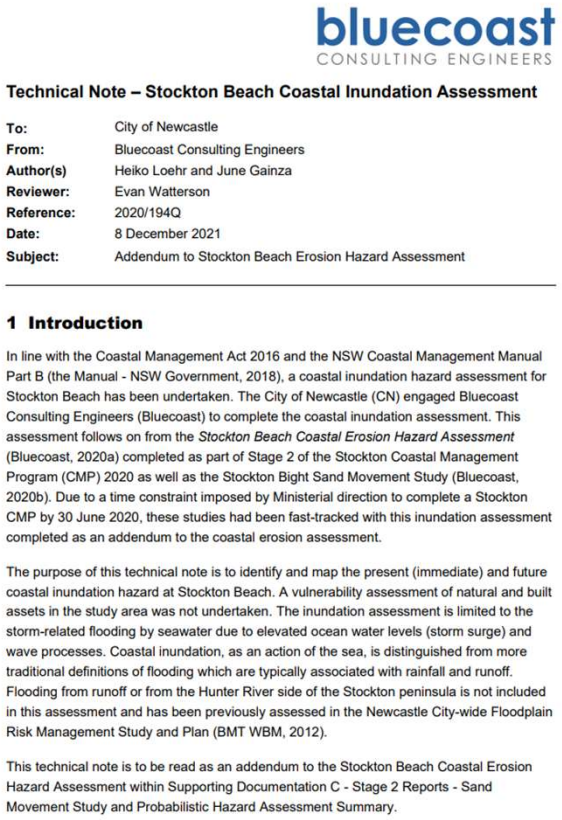
Figure 13: Coastal inundation hazard for 1%AEP in 2060 (0.30m SLR).

Extracts from Bluecoast Engineers' Stockton Coastal Inundation Assessment December 2021

So, is the current report fit-for-purpose for the SES's flood plan?

After reviewing the Hazard Inundation Model and Report (HIMR) – what are the gaps?

- ❑ Assesses ONLY the **1% AEP** event
- ❑ Technical approach – uses an <u>average</u> of the top 33% of wave sizes, not the **PEAK** wave size
- ❑ HIMR provides only depth and extent, not **VELOCITY** (and only for 1% AEP event)
- ❑ Uses LIDAR from 2018 for the coastal bathymetry (shape, height etc) – since then significant loss of DUNE STRUCTURE & offshore underwater SAND BANKS – **the materiality of change is unknown**
- ❑ Model calibrated off smaller events – simpler approach is comparing Stockton's inundation risk today to 1974 Sygna storm



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STOCKTON

…our community response…

REDLINE RALLY 2

(date TBA for a weekend in June or July)