Climate Change Adaptation Case Study: Davistown Landform and Flood Management

29th Annual Coastal Conference

Credit:

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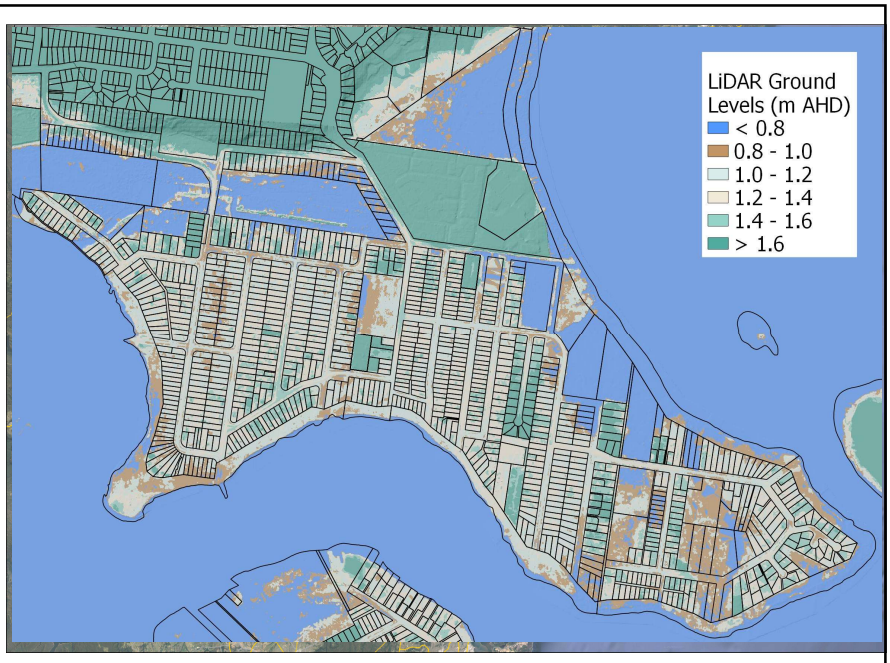
Study Area

- Central Coast LGA
- Approximately 5km from the Entrance to Brisbane Water at Broken Bay
- Primarily residential with environmentally sensitive areas, public access needs and some commercial properties
- Population (2016) = 2,500
- Significant low lying areas



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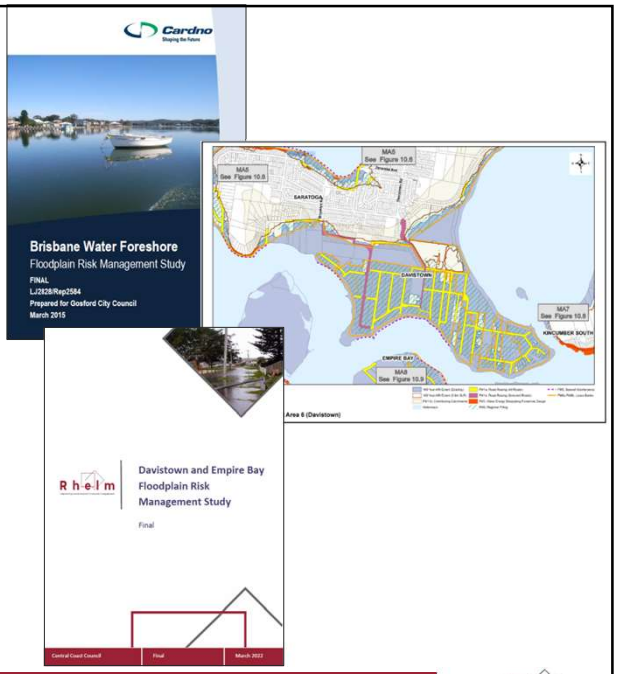
Background

- Brisbane Water Floodplain Risk Management Study and Plan
- Strong community opposition to any consideration of 'managed retreat'
- Management option PM9 recommends regional filling of Davistown
  - Davistown and Empire Bay Climate Change Adaption Study
- Climate Change Adaption Study was included in the Davistown and Empire Bay Floodplain Risk Management Study and Plan



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Defining the Problem

- Three separate sources of existing flooding:
  - High risk from ocean storms
  - Infrequent tidal inundation of low lying areas
  - Drainage issues and localised flooding due to flat terrain and submerged outlets
- Two or three can happen concurrently in one flood event
- All risks increase into the future from rising sea levels

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Ocean Storms

Approximate extent of ocean storm flooding from Brisbane Water Flood Study for existing and sea level rise conditions.

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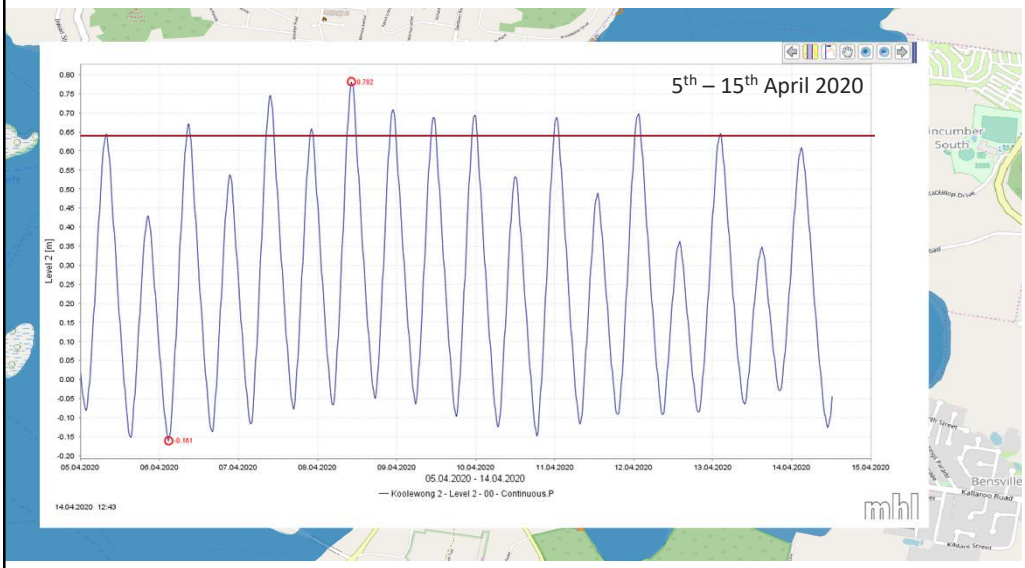

1% PoE Existing

0.64m AHD

Water level is exceeded 1% of the time.

Water level between a regular high tide and a king tide

MHWS 2010

0.33m AHD

Every day tide

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1% PoE 2050

0.84m AHD

0.2m Sea Level Rise

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1% PoE 2070

1.04m AHD

Water level is exceeded 1% of the time

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1% PoE 2100

1.34m AHD

Water level is exceeded 1% of the time

MHWS 2100

1.07m AHD

Every day tide

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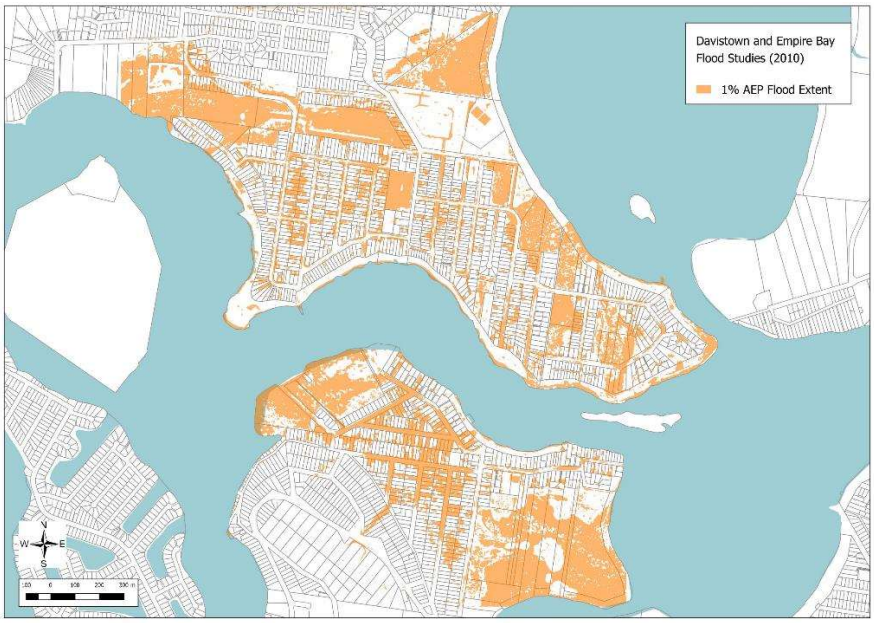
Catchment Flooding

- 1% AEP flood extent from Davistown and Empire Bay Flood Studies (2010)
- Generally shallow nuisance flooding
- Opportunity to improve this with planned filling



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Solution

Suburb scale land raising!

- *Minimum protection level of 1.5mAHD*
- *Existing 1% AEP Brisbane Water Flood Level*
- *2090 King Tide (HHWSS)*

Objectives

- *Ongoing livability of the suburb*
- *Incremental adaptation*
- *Equitable approach*
- *Address existing issues*
- *Flood risk management measures*
- *Open space planning*
- *Implementation strategy*

- *Inundation kept to acceptable level and frequency*
- *Raise what needs to be raised when possible*
- *Those most at risk take on the most cost*
- *Opportunity to fix drainage issues*
- *Include in the FRM process*
- *Guidance on how open space can be utilised*
- ***Conceptualise how this will work in practice***

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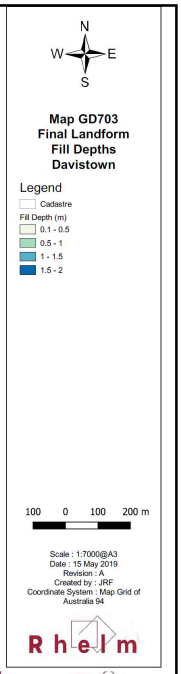
Designed Landform

- Minimum design road gradients now achieved
- Some swales located below 1.5mAHD – tidal in the future
- Majority of filling around 0.5m, with max of 1.5m
- Flooding from 1% AEP rainfall contained in the road reserves



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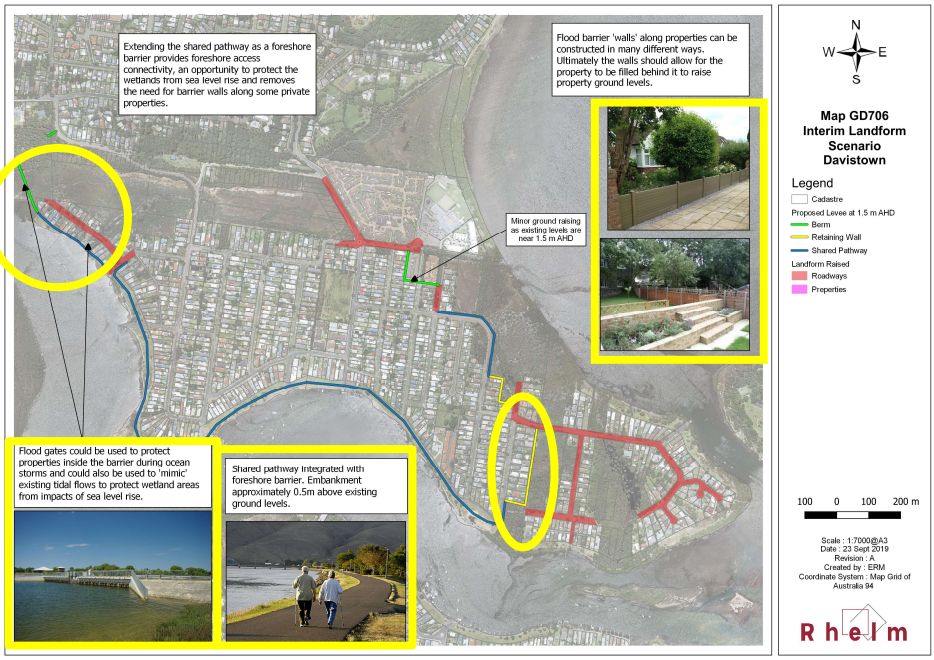
Foreshore Barrier

- Provide interim protection if not all areas are filled before threshold levels are reached. Literally buying time!
- Opportunity for integrated pathway
- Potential for wetland protection from sea level rise



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Benefit Cost Analysis

- Two scenarios (Landform with Levee, Landform no Levee) compared against "business as usual", which would result in most of Davistown becoming unliveable.
- Business as Usual:
  2050 – 2% of properties retreated
  2075 – 25% of properties retreated
  2100 – 84% of properties retreated
- Both scenarios assume that properties would fill (or at least raise floor levels for the base case) as DAs are submitted.
- Adaptation scenarios assume redevelopment of older buildings by 2050 plus redevelopment when affected by 1%PoE.
- Retreat under the business as usual case is assumed when 1%PoE exceeds the average ground level of a lot (and hence surround roads and services).

Davistown			
Masterplan - no levee		Masterplan - with levee	
NPV	BCR	NPV	BCR
$4.95M	1.5	$13.27M	1.7

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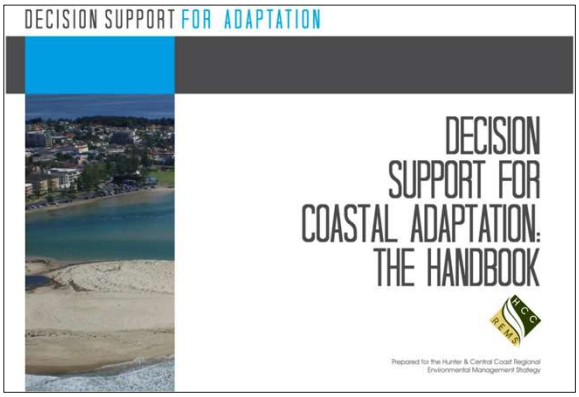
Adaptative Planning Implementation

- Assisted by the Decision Support for Coastal Adaptation: The Handbook (HCCREMS, 2012)
- Triggers and Thresholds
- Adaptation Pathways



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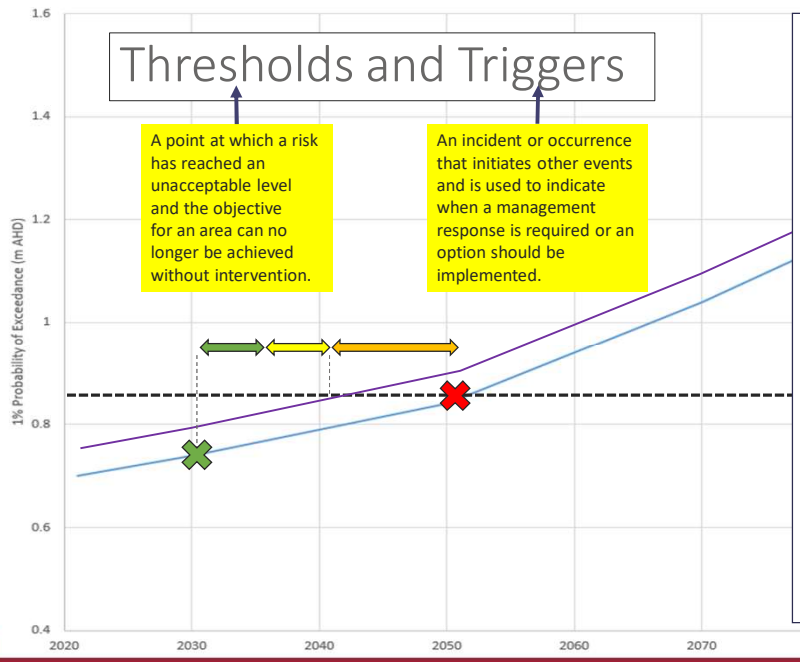
Thresholds and Triggers

A point at which a risk has reached an unacceptable level and the objective for an area can no longer be achieved without intervention.

An incident or occurrence that initiates other events and is used to indicate when a management response is required or an option should be implemented.



1% PoE under RCP 8.5

Threshold. To be determined by Council and the community. Assumed to be PoE = 0.85m AHD.

Date threshold is reached (approximately 2050).

1% PoE under RCP 8.5, **plus 50mm**

Safety Buffer. Allowance for variation in the rate of sea level rise. In this case 50mm is used but could increase to 100mm in the latter half of the century.

Response time. Time taken to implement policy and planning guidance. Assumed five years.

Monitoring period. Track rate of sea level rise to determine if threshold is on track. Typically five years.

Date Trigger is reached. Approximately 2030, or when PoE = 0.75m AHD.

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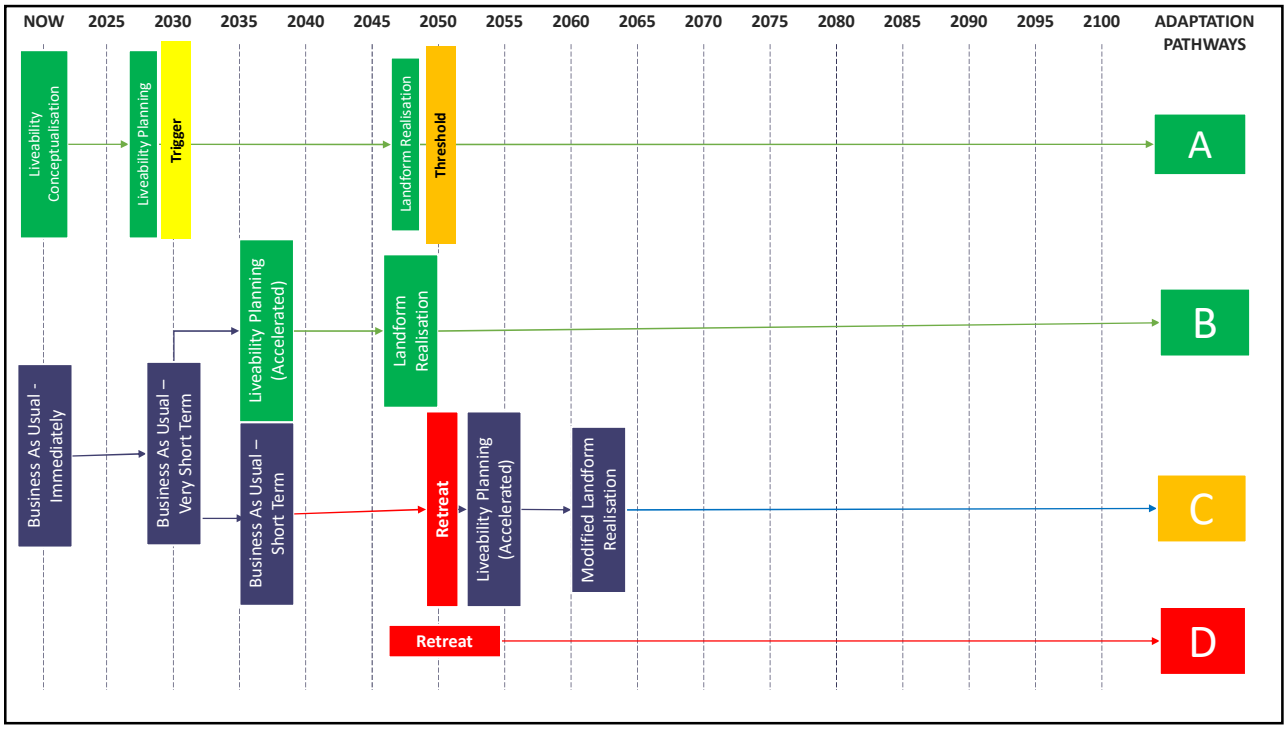

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Further Issues to Address

- Private development filling may occur at slower than expected rates. Enforce filling or acquire lots to enable road raising.
- Catchment flood impacts from lot and road raising.
- Easement establishment.
- Residual risk and sea level rise beyond 2100.

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What's Next:

- The Adaptation Study was on Public Exhibition as part of a FRMSP. Adoption of this Adaptation Study is recommended.
- Consideration for modification to the DCP for filling within the suburbs.
- Consideration for the progression of interim measures
  - Levees
  - Easements

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