Coastal climate change impacts - mapping coastal hazard areas

Introduction

- Qld has a long history of coastal specific legislation and policy since 1968
- Management of coastal hazards is a key focus
- Climate change and specifically sea level rise presents new challenges for defining and mapping these hazards for effective policy implementation

Coastal hazards

- Coastal erosion
- Storm tide inundation
- Sea level rise from climate change

Coastal hazards

The Queensland Coastal Plan and coastal hazards

- Business as usual for erosion prone area policy
- Provides more detailed policy on storm tide inundation
- Sets default levels for storm tide inundation areas for planning and development control purposes
- Sets climate change factors to be considered in planning and DA – main element being a SLR of 0.8m by 2100.
- Requirement to provide maps to provide certainty

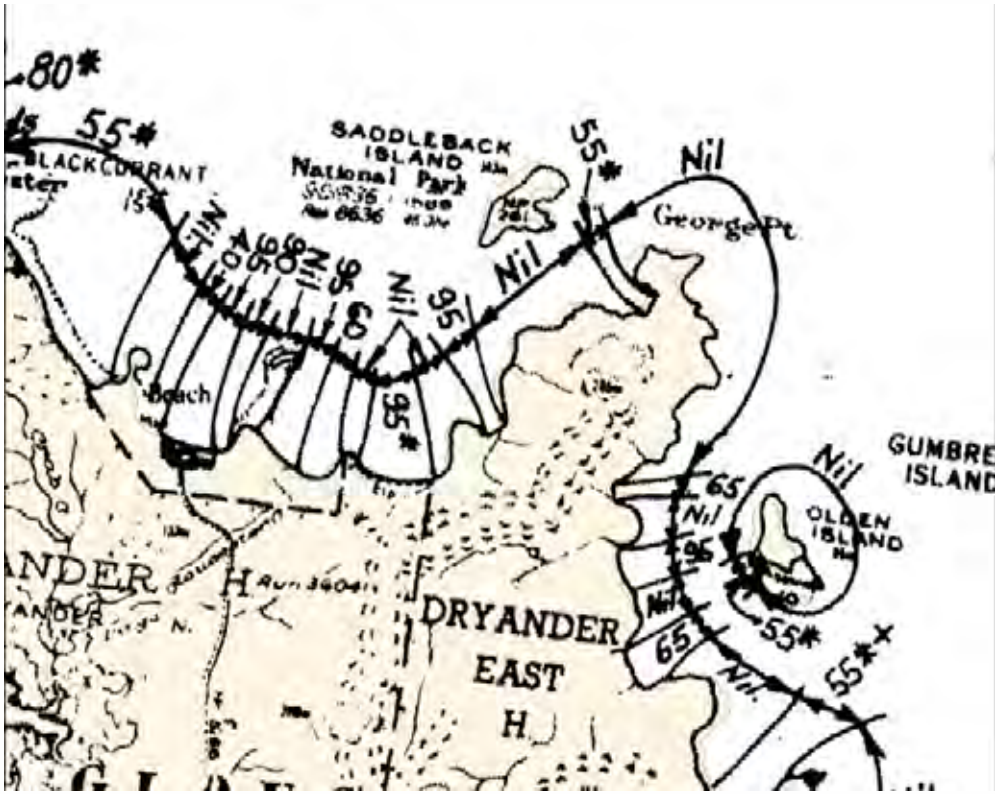
DERMs view on coastal hazards and climate change

Coastal hazards are additive - sea level rise added to coastal erosion and storm tide inundation

Key challenges:

- Interpret what 0.8m SLR means on the ground with erosion and storm tide inundation
- Provide mapping for the entire Queensland coast to improve planning and Das
- Represent plausible impacts

Erosion prone areas



Risks for the entire Queensland coast determined:

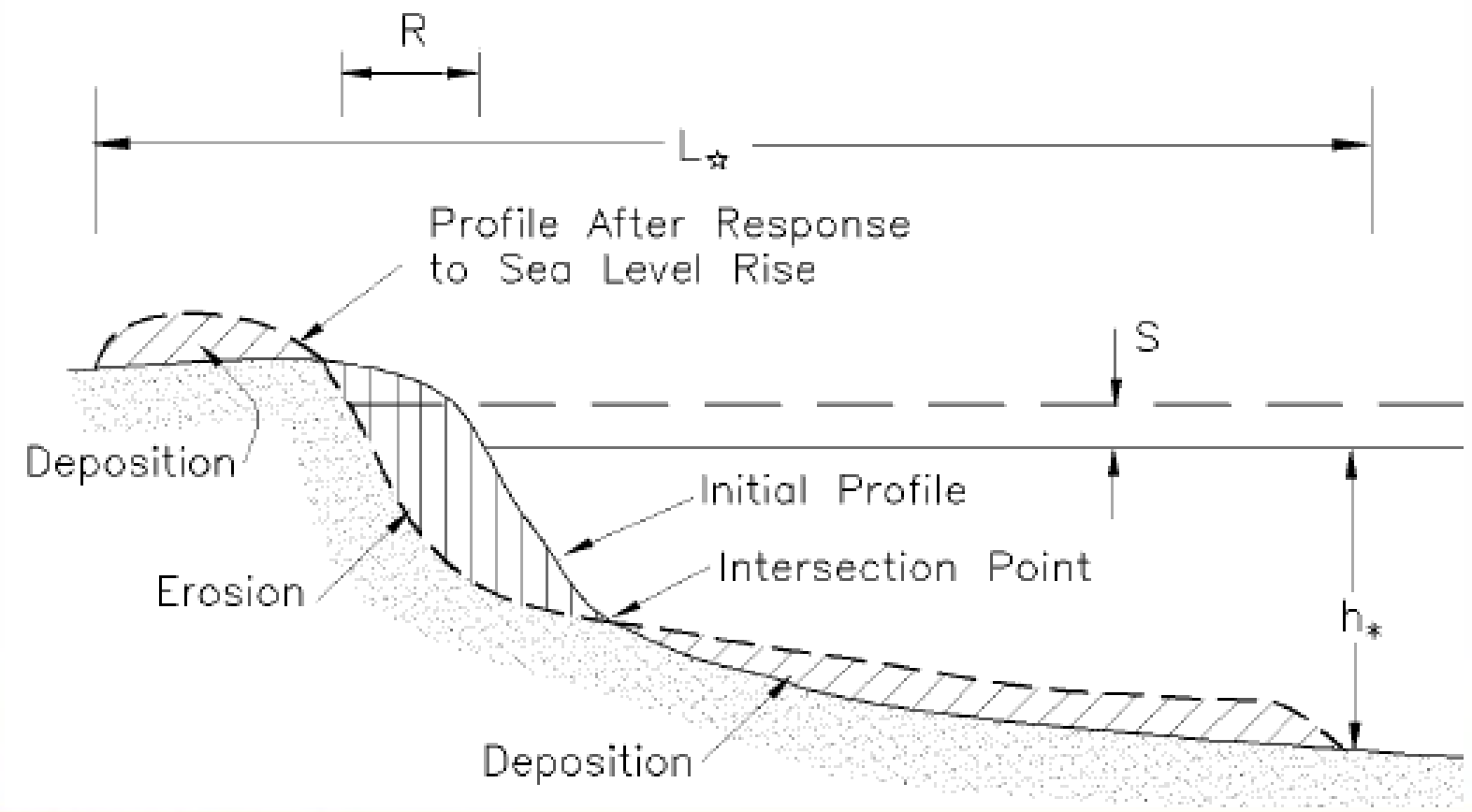
erosion prone area = storm erosion + long term erosion plus sea level rise + safety factor

The buffer zone concept and land surrender

Challenges to defining the SLR footprint

- Inundation only a partial explanation
- Morphological response recognised but models poorly developed to inform decision making
- Disruption of sediment transport processes by SLR and coastal response difficult to quantify

Shoreline response estimated by both inundation and morphological response



How critical is the method?

- Wave dominated coasts – Bruun rule adequate as a component of erosion formula
- Tide modified and tide dominated coasts – 80% of Queensland
- Typical results
  - Inundation only – 15-20m
  - Bruun Rule – 400m
- Up to 25x difference in footprint area depending on method

Tide modified coast

Bruun Rule calculation applied to a tide modified mixed sediment coast


Mixed sediment well
sorted over the profile

Converting 0.8m SLR to an inland distance

Modified Bruun rule for tide modified beaches:

- discounts wide silty to muddy intertidal zone
- results align with historical erosion and sea level rise observations

- Simple inundation – 15m
- Bruun rule calculation – 400m
- Modified Bruun Rule – 47m

Converting 0.8m SLR to an inland distance – sediment supply issues

SLR will trigger changes to the processes which shape our present day coastline

- Sediment delivery to the coast will be slowed or halted
- Sediment trapping in deltas reactivated
- Sand transport along the coast will be slowed or halted
- Development of shoreface evolution models

Storm tide inundation areas

- Many local governments have undertaken storm tide inundation studies
- Historically for emergency management but more recently to inform planning purposes
- Risk is not known for all of Queensland and not consistently dealt with through planning schemes

Storm tide inundation areas

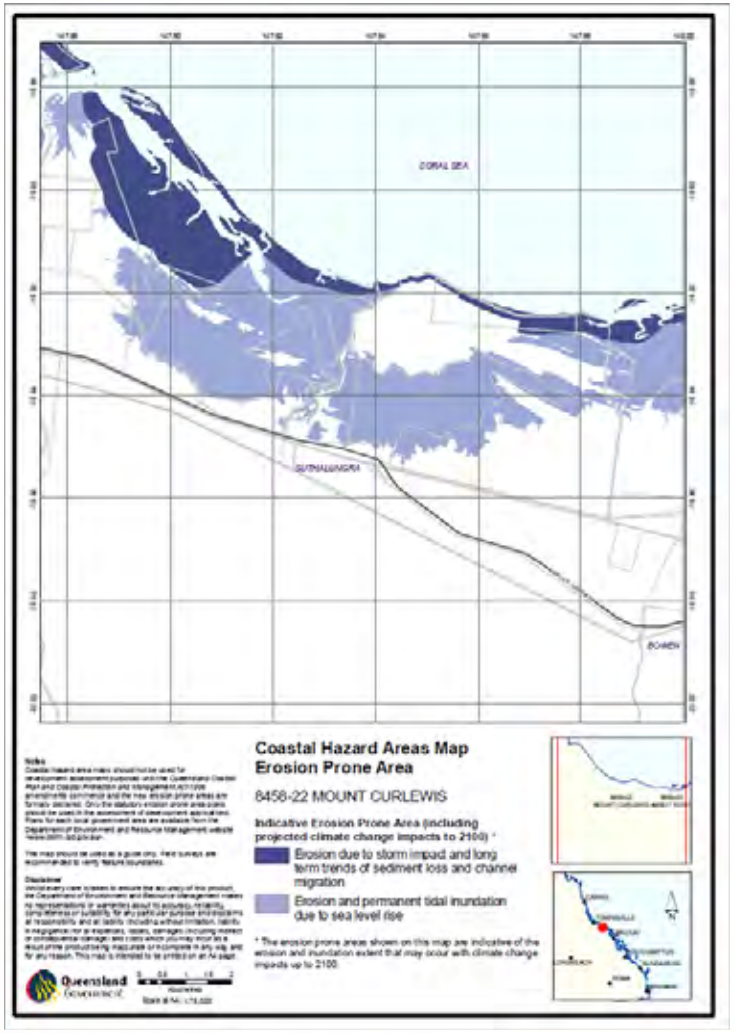
Default distances were chosen based on recent state-wide assessments of storm tide level

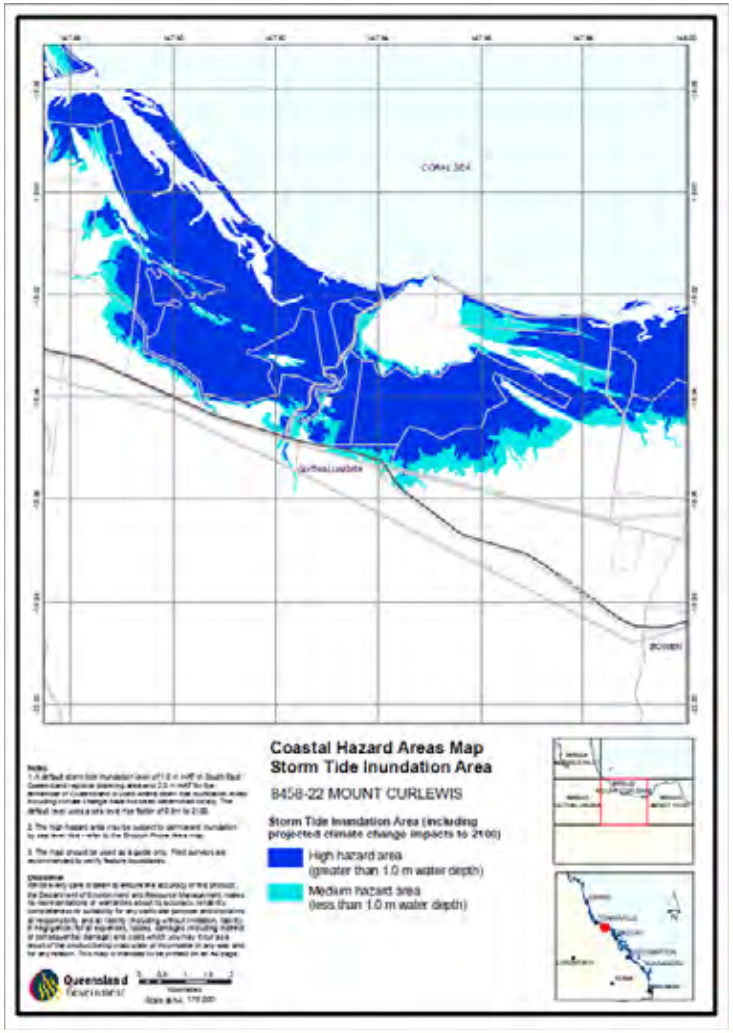
- 1.5m HAT for southern QLD – incl. 0.8m
- 2.0m HAT for central and northern QLD – incl. 0.8m
- Intention to replace default distances with existing or new information
- Desirable for a cooperative approach with local governments and Australian government on mapping

Development of mapping products

- Recent capture of 66,000km^2 of coastal LiDAR at a cost of about $7M - Vertical accuracy of +/- 15cm
- Production of a 5m grid digital elevation model for coastal QLD corrected to HAT
- Storm tide including sea level rise inundation generated for Coolangatta to Ingham
- Erosion prone areas AND sea level rise permanent inundation plotted.

Coastal hazard maps including sea level rise





Availability

- DERM website as PDFs and lot on plan search
- As GIS layers by request

Conclusion

- DERM is well advanced on production of coastal hazard maps including climate change impacts up to 2100
- Mapping will support policy in the draft Queensland Coastal Plan
- Mapping will be publicly available, locally relevant
- Intention to refine and improve the mapping through QCCCE/cooperative arrangements