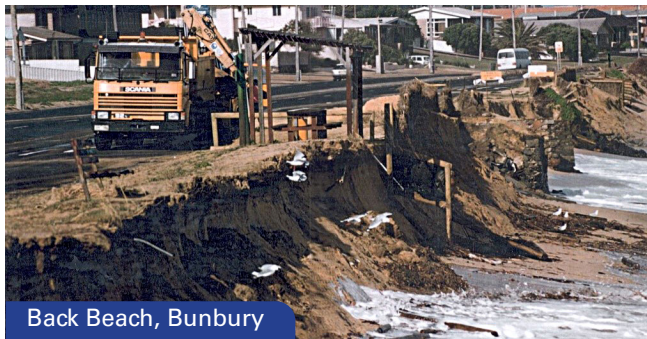


## What is a Coastal Hazard Assessment

Coastal Hazard Assessments (CHAs) identify potential coastal hazards (erosion and inundation) which may impact assets in the coastal zone, including tangible and intangible values. They establish an understanding of the potential impacts on assets, including from coastal physical processes and sea level rise.



Back Beach, Bunbury

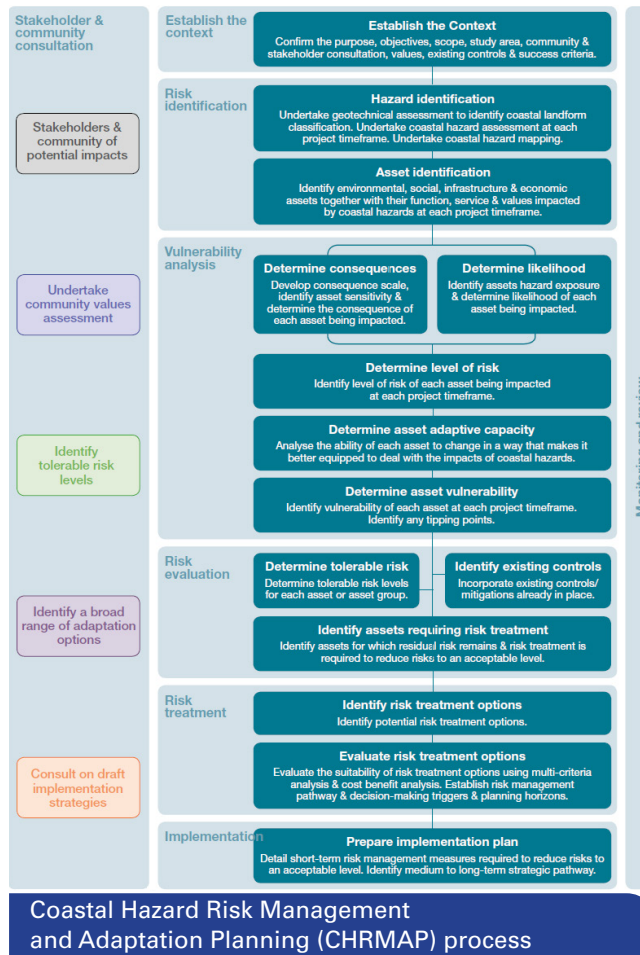
Ultimately, CHAs aim to determine the what, where, when, why and how of coastal hazards and their impacts.

### When is a CHA Needed?

CHAs are required by State Planning Policy 2.6 and are part of the CHRMAP process (Stage 2 Risk Identification).

CHAs are generally required to understand coastal hazards for existing assets or developments or to plan for future developments or planning proposals.

The requirements of the CHA may vary for these different applications.



### Coastal Hazard Assessments

CHAs are completed separately for erosion and inundation. In the context of State Planning Policy 2.6, erosion and inundation storm events have been specified for the required planning horizon.

- Coastal erosion assessments consider 1%AEP or 100 year ARI events.
- Coastal inundation assessments consider 0.2% AEP or 500 year ARI events.

CHAs are completed over a range of timeframes out to 100 years. This allows consideration of present day, medium and long-term hazards.

### How is a CHA Used?

The CHAs may be used to

- Understand risk for existing assets.
- Plan for a managed retreat pathway.
- Understand risks to new developments.
- Determine foreshore reserves for new developments.

Coastal processes and hazards are only one of the considerations for determining coastal foreshore reserve widths and other factors such as biodiversity, recreation values and public access are also important.

The outcomes of the CHA are a key input to determining coastal adaptation requirements and timing.

## Coastal Hazard Assessment Outputs

CHAs can include detailed and technical assessments of the potential coastal hazards. The outputs would generally consist of the following:

- Technical report on the development of the CHA, including data and methodology.
- Coastal Erosion Hazard Maps.
- Coastal Inundation Hazard Maps.

The maps are prepared separately for erosion and inundation. They can be presented in many different ways, but will ultimately identify potential areas or zones of impact of coastal hazards.

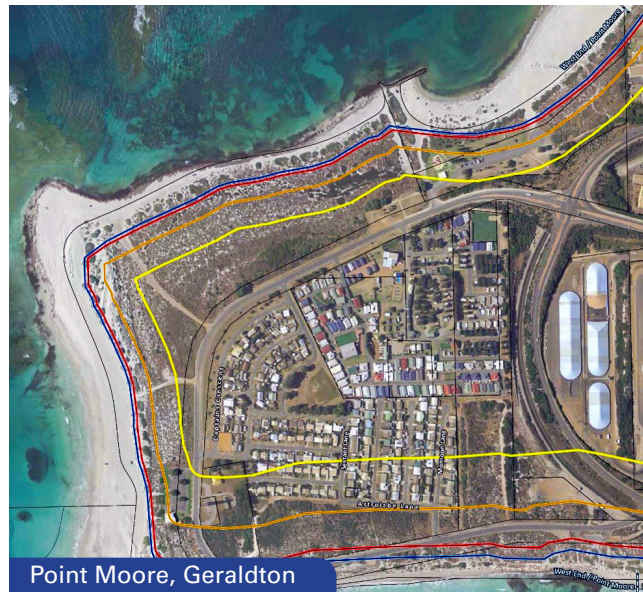
Maps generally show different scenarios or timeframes, to present current day and future hazards. These may include short, medium or long term horizons, out to 100 years.

Importantly, maps do not predict future coastline positions or flooding areas, but identify zones that may be vulnerable to coastal hazards.

The nature of the shoreline, coastal geomorphological feature stability and geotechnical conditions can also be reflected in the coastal hazard mapping.

### Coastal Erosion Hazard Mapping

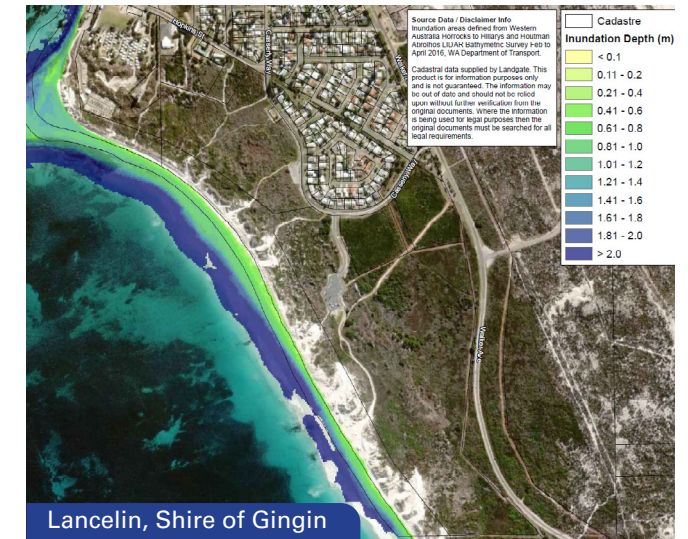
Coastal erosion hazard maps present lines or areas showing the potential extent of coastal erosion for varying timeframes. The lines are determined through summing the various coastal erosion allowances, including a storm bite with 1 per cent probability of occurring, long term trends, recession due to sea level rise and an allowance for uncertainty.



The lines are referenced to a Horizontal Shoreline Datum (HSD) which is determined as part of the CHA. The HSD is defined as the active limit of the shoreline under storm activity. This is taken as the contour representing the peak steady water level in the design storm.

### Coastal Inundation Hazard Mapping

Coastal inundation hazard maps show contours or areas potentially impacted by the 500 year ARI event. The maps typically present current day inundation hazards, along with future inundation hazards, including storm tide with wave action and an allowance for sea level rise.



Inundation maps can show depths of inundation and include areas which may be both temporarily or permanently inundated.

## How are Coastal Hazard Assessment Outputs Developed?

CHAs are developed in line with the requirements of Schedule One of State Planning Policy 2.6. This provides a methodology for calculation of the impacts of coastal processes and provides guidance on the standard cases, variables and allowances.

The methodology has been developed largely for an open coast and varies for locations such as estuaries, harbours and different shoreline classifications and types.

### Coastal Classification

The calculation of coastal processes varies for different coastal classifications including:

- Sandy coast.
- Rocky coast.
- Mixed sandy and rocky.
- Coastal lowlands.
- Estuaries (tidal reaches).
- Islands.

The relevant site should be classified at the commencement of the CHA.



Limestone coast at Marmion

### Study Area

The study area for a CHA is determined based on the local geomorphology. The study area needs to consider the context of movements and change across an entire sediment cell. The sediment cell is a length of coastline, where sediment movement is largely self contained.

The methodology for calculation of allowances will vary depending on location.

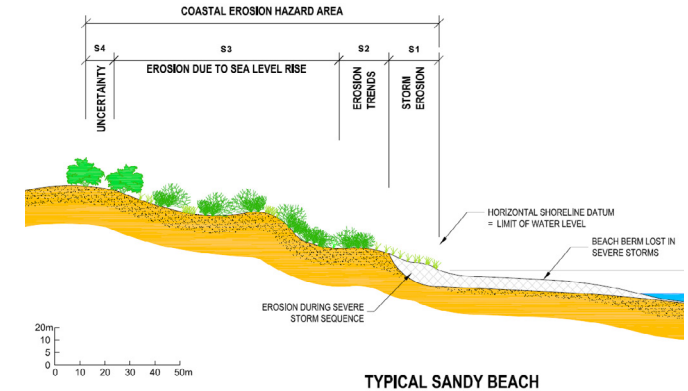
### Coastal Erosion Hazard Assessment

Calculated by summing individual allowances:

- S1: Allowance for the current risk of storm erosion.
- S2: Allowance for historic shoreline movement trends.
- S3: Allowance for erosion caused by future sea level rise.
- Additional allowance for uncertainty.

Along with the standard allowances, the assessment should consider features such as potential longshore transport in storm events, existing shoreline controls, landform stabilities and slope stability.

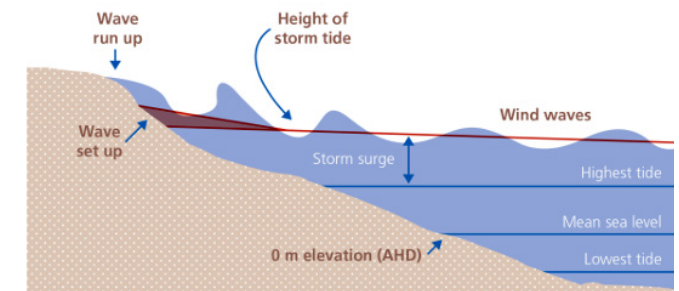
The methodology for determining coastal erosion hazards will vary for different classifications, in cyclone prone areas, estuaries and other varying landforms.



### Coastal Inundation Hazard Assessment

Coastal inundation assessments are calculated similarly for all locations. They calculate an allowance for the current risk of inundation from the 500 year ARI event, plus the potential future sea level rise over the timeframe.

Calculations of inundation need to consider nearshore setup, wave runup, wave overtopping and potential dune breach.



# Coastal Hazard Assessment Considerations and Challenges

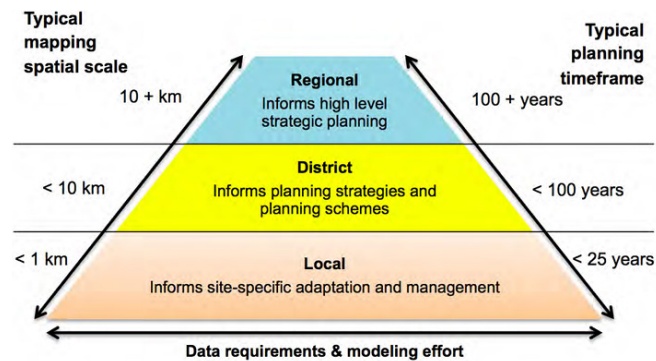
Coastal conditions, context and uses vary greatly around Western Australia. CHAs and their requirements for CHAs also vary with these differences.

There are a number of additional factors which need to be considered in developing CHAs.

## Levels of Accuracy and Effort

The required level of accuracy and effort involved in developing a CHA will be different depending on the application and scale.

Often, local assessments require increased accuracy due to the site specific detail and outcomes required. Regional assessments inform high level planning and first-pass, less detailed assessments may suffice.



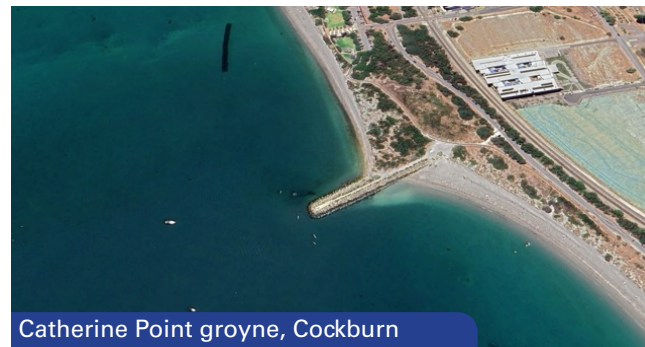
The objectives and proposed use of the CHA should dictate the level of effort.

For short to medium term (<25 years) timeframes over small scale areas, the Department of Transport has developed a Generic Scope for a Local Coastal Hazard Assessment, which may be suitable for use by responsible management authorities.

## Considering Existing Controls

CHAs may include sections of coast which have existing controls in place. Existing controls can include coastal protection structures (eg seawalls) or management actions (eg sand nourishment). The CHA needs to consider these existing controls and the influence they may have on the potential coastal hazards. In particular, the CHA needs to consider whether these structures or actions will be maintained over the planning timeframe.

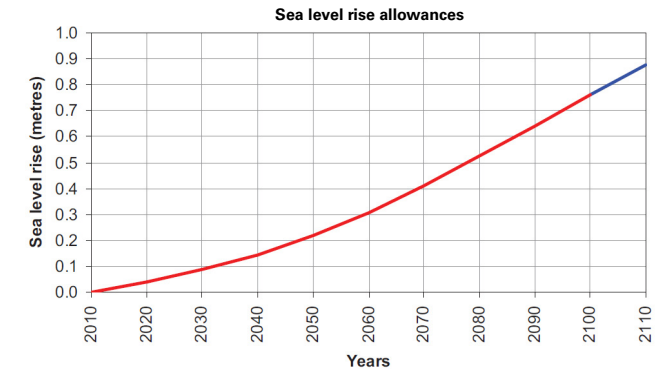
Often CHAs may be completed with and without existing controls being in place, to assess their impact.



## Typical Challenges

CHAs present areas of potential risk, are developed through technical calculations and can cover long timeframes. As a result, they can be difficult to understand and communicate. This can result in misconceptions around their intent and meaning.

One common misconception is that coastal erosion hazard lines present predictions of future shorelines. This is not the case. Coastal hazard maps present potential hazard areas only and are intended to be inherently conservative.



Increasing sea level rise allowances in longer planning horizons also result in increased recession in longer-terms. These large recessions can be difficult to explain in areas where erosion is not currently being experienced.

Regular coastal monitoring, CHA updates (10 yearly intervals) and public consultation and education minimises these misconceptions.