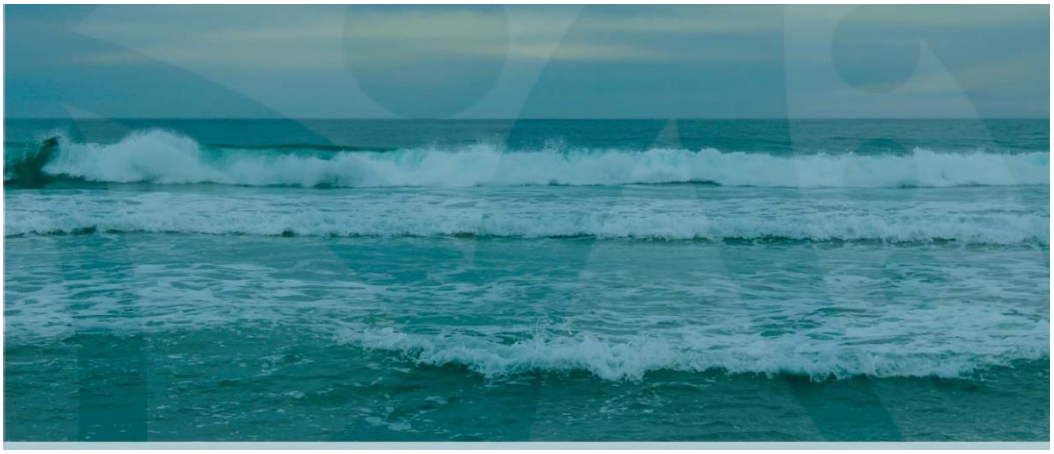
City of Greater Geraldton

# Coastal Planning Community Workshops Report

October 2017



Western Australian Planning Commission

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## Background

The City of Greater Geraldton (the City) is facing the adverse impacts of coastal erosion and inundation on its coastline. The impact of coastal hazards on our coastline is expected to increase due to the effects of sea level rise and climate change. Under projected climate change and sea level rise scenarios, the risks of these hazards occurring is likely to increase in the future, although uncertainty remains about the magnitude and extent of the impacts. Despite the uncertainty, consideration of coastal hazards and the adaptation management of appropriate planning responses can provide economic, environmental and social benefits.

The City has recently completed a suite of Coastal Inundation and Processes Allowances Studies for the coastal zone between Cape Burney and Drummond Cove, which indicate that portions of the coastline are at risk from inundation and erosion over a 100-year planning timeframe. The City has since adopted the State Planning Policy 2.6 – State Coastal Planning Policy (SPP2.6) sea level rise estimate of 0.9m over the 100 year planning timeframe. These studies involve the detailed modelling and assessment of the following:

- Storm surge modelling to determine the potential inundation caused by:
    - Cyclonic events;
    - Non-cyclonic events; and
    - Tsunami events.
- Modelling the potential beach and dune erosion caused by a severe storm event;
- Assessment of historical and potential future shoreline movement caused by the action of natural coastal processes; and
- Assessment of the effects of potential sea level rise on the coastal inundation and erosion.

The three completed studies are available on the City's website at www.cgg.wa.gov.au and include:

- Cape Burney to Greys Beach Inundation and Coastal Processes Allowances Study;
- Point Moore Inundation and Coastal Processes Allowances Study; and
- Town Beach to Drummond Cove Inundation and Coastal Processes Allowances Study.

In accordance with SPP2.6, areas at risk of being affected by coastal hazards require a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP).

## Project Purpose

The purpose of CHRMAP is to utilize both the technical projections in the Coastal Inundation and Processes Allowances Studies and local knowledge to identify key assets and risks, and then use strategic planning, coastal engineering and economic modelling to identify adaptation pathways. The CHRMAP report will identify:

- Potential risks arising from hazards in the coastal zone;
- Key coastal infrastructure and assets at risk within the coastal zone;
- Community and cultural values of the coastal zone; and
- Adaptation pathways and management options that the City and other stakeholders can pursue to address the risks from coastal hazards over time.

Throughout the CHRMAP process, the City will be engaging with key stakeholders and the wider community to provide, share and obtain information required and relevant to the development of the CHRMAP. The engagement activities include a community survey, workshops and a feedback session.

Once completed, the CHRMAP will guide investment decisions by the City in terms of the location and maintenance of coastal infrastructure and provide guidance for the development of statutory planning controls. The CHRMAP will also support the City's risk management and adaptation planning approach to deal with the adverse impacts of coastal hazards. This approach will ensure

these hazards are appropriately factored into decision-making processes regarding assets at risk or potentially at risk, sustainable land use and any future development. The State Coastal Planning Policy SPP 2.6 supports a risk management approach and provides the framework for undertaking risk management and adaptation planning for coastal hazards in Western Australia.

Image: CHRMAP Project area

## Engaging with the Community

The City and the project team developed and implemented a community and stakeholder engagement strategy in accordance with SPP2.6 requirements and under the International Association for Public Participation (IAP2) platform. The initial stages of this engagement process have been captured in this report and include the Coastal Planning Community Survey followed by two Coastal Planning Community Workshops.

### Engagement Promotion

The City undertook extensive promotion of the Coastal Planning Community Survey and Workshops which involved:

- DL Flyer promoting the project and enabling pre-registration was distributed via rates notices;
- More than 350 letters of invitation mailed, emailed or hand delivered to project stakeholders including:
    - Utility/infrastructure providers;
    - Federal Government agencies;
    - State Government departments and agencies;
    - Regional agencies and authorities;
    - Local organisations and agencies;
    - Education and training providers;
    - Culture/art institutions;
    - Local and State Government politicians;
    - Community/sporting groups;
    - Local property developers;
    - Landowners/businesses/residents with houses, buildings or other infrastructure located on the ocean side of coastal roads;
    - Commercial/industry/businesses located at the Port and Fisherman's Wharf; and
    - Community members who had previously engaged with the City on coastal related issues.
- Flyers hand delivered to residents/homeowners residing on the ocean side of coastal roads;
- Workshop promotion in the Coastal Planning Community Survey;
- Posters displayed at various venues across the City;
- Numerous City of Greater Geraldton Facebook posts and targeted social media advertising campaigns;
- Newspaper advertising;
- Everything Geraldton online advertising;
- City website consultation page and CHRMAP page;
- Various media releases; and
- Face-to-face invitations extended by City staff members.

## Community Coastal Planning Survey

The Community Coastal Planning Survey was conducted from 2-23 October 2017 in which 376 responses were submitted. The aim of the survey was to:

- Identify coastal assets of community value (at risk from coastal erosion and inundation);
- Gain a better understanding of how the community values assets which are potentially at risk; and
- Gain an understanding of how the community rates the consequences of erosion and inundation on these assets.

Survey respondents were asked to identify up to six coastal assets that were significant or important to them, state what the assets were used for and to classify assets as either physical/economic, natural or social/cultural. Respondents were then asked to identify the consequence erosion or inundation would have on the asset (using a scale ranging from insignificant to catastrophic), and to explain why they chose that particular consequence. Finally, survey respondents were asked to nominate their most valued asset and explain why it was so valued.

Members of the community had the option of completing the survey via an online survey portal or in a hard copy format. Copies of the survey were available at the Civic Centre and Geraldton Regional Library.

The Community Coastal Planning Survey results will be available soon in a separate report.

## Community Coastal Planning Workshops

Two Community Coastal Planning Workshops were held on Saturday 14 October 2017 in the Upper Hall of the QEII Seniors and Community Centre.

The objectives of the half-day long workshops were to:

1. Identify coastal assets of community value (at risk from coastal erosion and inundation);
2. Determine the coastal hazards scale of consequence for the identified assets;
3. Define risk tolerances for the identified coastal hazard risks; and
4. Provide feedback on proposed adaptation options that could address the risks.

Participants were a mixture of identified stakeholders and self-selectors between nine and 85 years of age. Participants sat together at tables of seven people each. The tables were individually facilitated which ensured all participants were able to contribute to the workshop process.

Workshop 1, which focused on the coastal area from Cape Burney to Town Beach, was held in the morning and was attended by 23 members of the community, three Councillors and the Mayor. Although 30 people registered to attend, only 16 were able to participate on the day and seven people came and participated without prior registration.

Workshop 2, which focused on the coastal area from the Marina to Drummond Cove, was held in the afternoon and was attended by 45 members of the community, three Councillors and the Mayor. Although 56 people registered to attend, only 40 were able to participate on the day and five people came and participated without prior registration.

Both workshops were externally facilitated by CHRMAP project consultants Baird Australia and TPG+Place Match. The City and the external project team provided table facilitators and staff members specialising in the coastal zone were present to assist with the workshop process and answer questions related to the topics under discussion.

## Workshop Agenda

Although the two workshops had different focus areas, both workshops utilised an identical process to achieve the workshop objectives. The agenda for both workshops was as follows:

| **Introductions and Welcome** |
|---|
| Project Introduction |
| Overview of Workshop Agenda |
| Project Background |
| Task One: Coastal Assets Identification |
| Consequence Scale Overview |
| Task Two: Consequence Scale |
| Task Three: Asset Priorities |
| Preliminary Adaptation Options Presentation |
| Task Four: Adaptation Strategy |
| Wrap up and Next Steps |

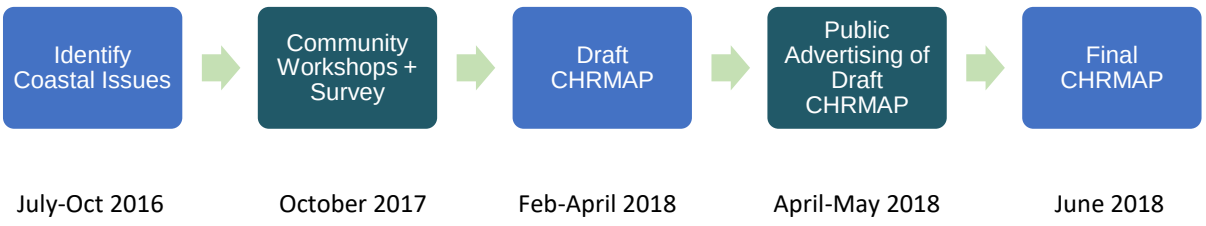
## The Workshop Process

Both workshops began with Mayor Shane Van Styn welcoming members of the community; Acknowledging Country; encouraging participation; and advising participants the results of the workshop would be used to develop the City's CHRMAP. The Mayor's welcome was followed by the first of three workshop presentations and four workshop tasks.

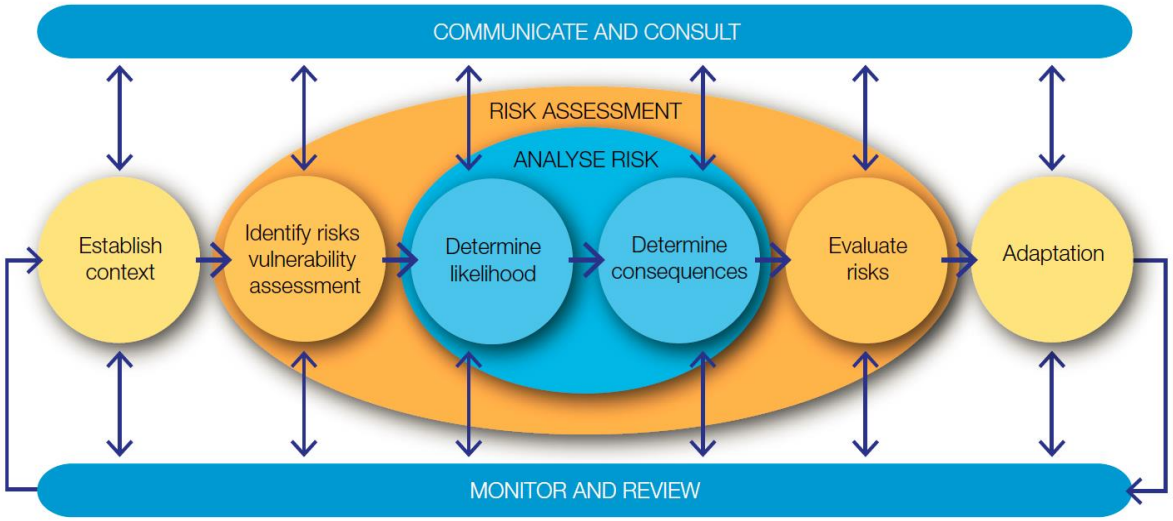
## Presentation 1 – Project Background

The first presentation was made by project consultant Jim Churchill from Baird Australia and included information on:

a) The CHRMAP process as seen below.



b) CHRMAP guidelines developed by the Western Australia Planning Commission.




c) An overview of how organisations generally assess risk.

| Consequence | Risk level | | | | |
|---|---|---|---|---|---|
| 1 Catastrophic | high | extreme | extreme | extreme | extreme |
| 2 Major | high | high | extreme | extreme | extreme |
| 3 Moderate | medium | medium | high | high | extreme |
| 4 Minor | low | low | medium | high | high |
| 5 Insignificant | low | low | low | medium | high |
| | E Rare | D Unlikely | C Possible | B Likely | A Almost certain |
| | Likelihood | | | | |

d) The State Coastal Planning Policy SPP 2.6 coastal planning adaptation strategies hierarchy.

e) An overview of the study area for the two workshops from Drummond Cove in the north to Cape Burney in the south, which had been divided into 12 coastal compartments

f) Key findings of the three Inundation and Coastal Processes Allowances Studies regarding the potential effects of coastal erosion and inundation across three planning horizons 2030, 2070 and 2110 including the recommended setback allowances in foreshore areas for coastal hazard impacts. Maps developed during the three studies were presented. *(See APPENDIX 3: pages 34-36)*

Image: CHRMAP Project area compartments

g) Information on how coastal assets are classified into three categories: natural, social/cultural and economic/physical. *(See APPENDIX 3: pages 36)*

The first presentation was followed by a brief question and answer session where participants were able to seek further clarification on information they had just heard. The question and answer session was followed by the first workshop task.

## Workshop TASK 1 – Coastal Asset Identification

During the workshop's first task, participants were asked to think about coastal assets located within the focus area that were important to them and would be at risk to erosion or inundation. To assist in identifying assets that would be at risk, an enlarged map of the focus area was lying on each table. The map featured a line that indicated the projected setback allowance for 2110 and coloured areas that indicated what parts of the coastline would be inundated in 2110. *(See APPENDIX 1: pages 27 - 28)*

Participants were then asked to determine which of the three categories being either natural, social/cultural or economic/physical their asset could be classified as and to then list each asset on a corresponding sticky note. They also had to state why the asset was important to them. If they believed an asset could be classified in more than one category, (i.e. the beach can be both a natural and social asset), participants were asked to list them again using the corresponding sticky. At the end of Task 1, 315 sticky notes (combined total from both workshops) were filled out by participants and attached to the map on their table in close proximity to the asset's location.

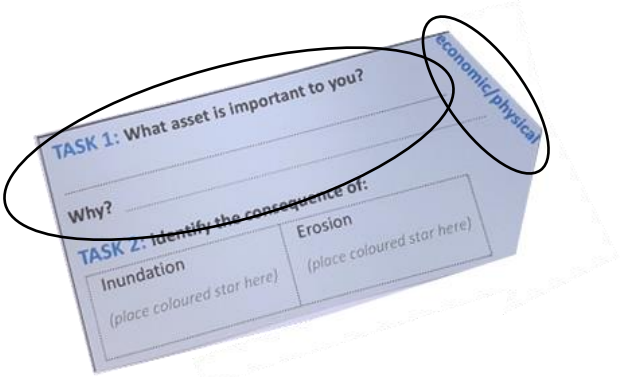


Image: Example of specially designed sticky note

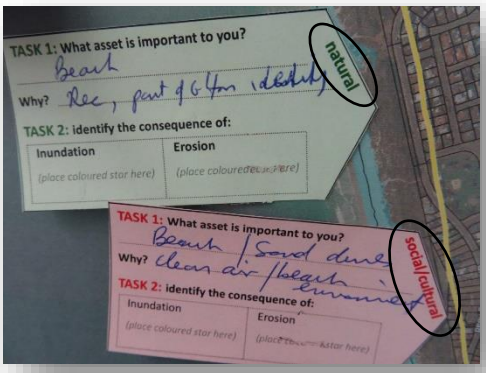


Image: Example of asset identification and its importance

## Common Themes Regarding Assets

Although 315 sticky notes were filled out during both workshops, a number of the same assets were listed more than once. An overview of the feedback provided in Task 1 regarding how many times a particular asset or group of assets was mentioned is provided in Table 1 below. An overview of the reoccurring themes regarding why assets were important or valued is provided in Table 2 below.

Table 1: Overview of asset categorisation.

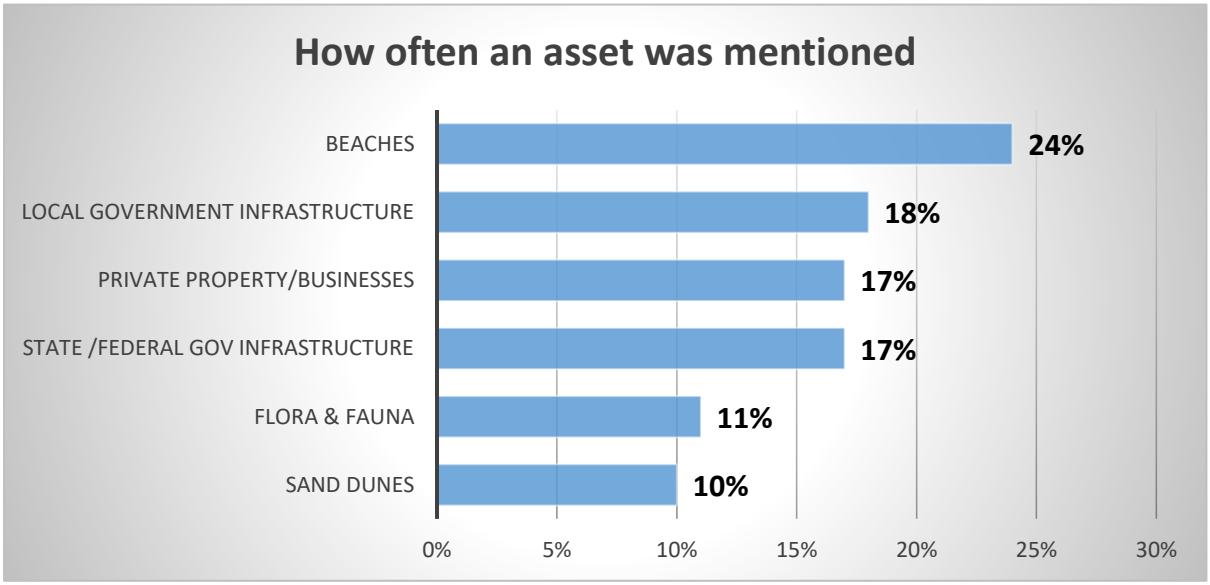
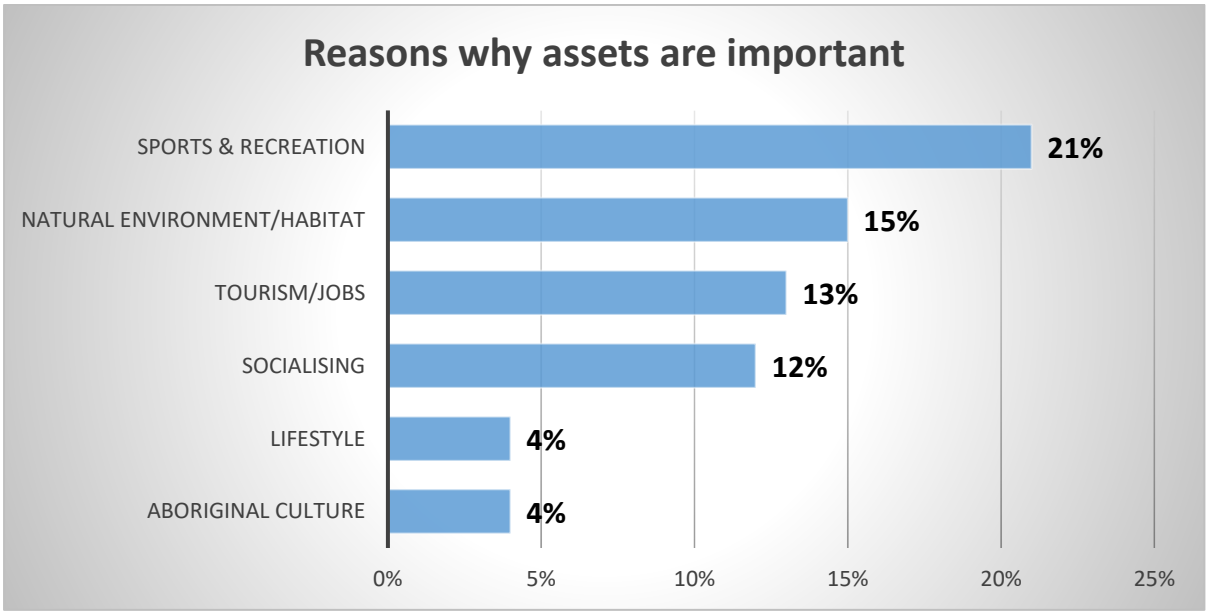



Table 2: Overview of importance or value of assets.




## Presentation 2 –Consequence Scale Overview

The second workshop presentation focused on the projected erosion hazard lines and levels of projected inundation indicated on the maps and the consequences these could potentially have on coastal assets. A detailed explanation of what a shoreline erosion hazard is, and how the 'setback allowance' line on the map was derived as well as a clear explanation of how storm surge inundation can impact the coast was presented. *(See APPENDIX 3: pages 37 - 38)*

To assist participants in assessing the consequences of erosion and inundation a Consequence Scale Table was presented. *(See below)* A number of examples followed this on how the table can be utilised to assess whether the consequences of erosion and inundation on coastal assets would be insignificant, minor, moderate, major or catastrophic.

| Consequence | Physical/Economic Impact | Environmental Impact | Social /Cultural Impact |
|---|---|---|---|
| Insignificant | Permanent loss or damage **<$20k** | **Negligible to no loss** of flora and fauna | Minimal short term inconvenience **<5% of community affected** |
| Minor | Permanent loss or damage **$20k - $200k** | **Short term loss** of flora and fauna - strong recovery | Small to medium disruption to function **<10% of community affected** |
| Moderate | Permanent loss or damage **$200k - $2 million** | **Medium term loss** of flora and fauna - recovery likely | Minor long term or major short term loss of function **<25% of community affected** |
| Major | Permanent loss or damage **$2 - $5 million** | **Long-term loss** of flora and fauna limited chance of recovery | Medium term or permanent loss of function **<50% of community affected** |
| Catastrophic | Permanent loss or damage **>$5 million** | **Permanent loss** of flora and fauna - will not recover | Long term or permanent loss of function **>75% of community affected** |

Consequence Scale Table used in in both the Community Coastal Survey and community workshops.

**Examples of assets presented at the Workshops**

**The CBD**

**Economic/Physical Asset**
Erosion: **Catastrophic**
Permanent loss or damage >$5 million
Inundation: **Catastrophic**
Permanent loss or damage >$5 million

**Foreshore Reserves and Beaches**

**Environmental Asset**
Erosion: **Catastrophic**
Permanent loss of flora and fauna - will not recover
Inundation: **Minor**
Short-term loss of flora and fauna - strong recovery

**Social/Cultural Asset**
Erosion: **Catastrophic**
Long term or permanent loss of function >75% of community affected. Loss of recreation space
Inundation: **Insignificant**
Minimal short term inconvenience <5% of community affected

## TASK 2 – Coastal Asset Consequence Scale

Following the second presentation, participants at each table were asked to work together to determine the consequence of erosion and inundation for the assets identified on the sticky notes on their maps. Once they reached consensus on the consequence scale, participants placed a star of the corresponding colour onto the sticky note to indicate their selection. Once completed, participants went directly to task three.

| | |
|---|---|
| Insignificant | ★ |
| Minor | ★ |
| Moderate | ★ |
| Major | ★ |
| Catastrophic | ★ |

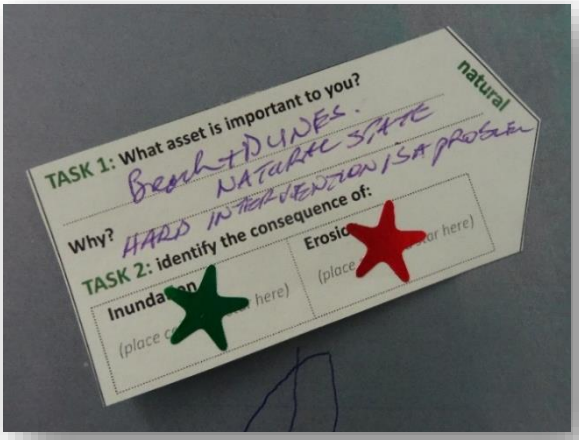



Image: Example of the consequence of erosion and inundation determination

## TASK 3- Prioritising Assets

Once the consequences of erosion and inundation were determined, participants were asked to re-examine the coastal assets identified on the sticky notes attached to the map on their table. Working individually, each participant was given five black dots and asked to stick one dot beside each of the five assets they valued most. However, if they believed one or more assets to be more important than another, they were able to place more than one black dot beside one or more assets until all five dots were used.

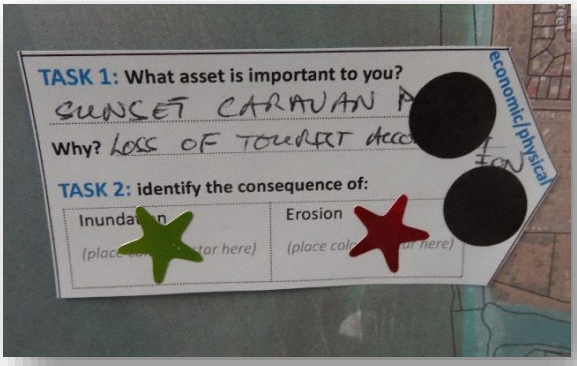



Image: Example of asset prioritisation

## Results of TASKS 1, 2 and 3

At the conclusion of Task 3, workshop participants had completed three of the four workshop objectives. *(See Appendix 2: pages 29-30 to view example maps of Tasks 1, 2 and 3)*

The results of Tasks 1, 2 and 3 are listed on the following pages. Assets identified on sticky notes are listed in the corresponding coastal compartment. Each table contains a number of columns including: the asset name and reason(s) why it is important; the asset classification (economic/physical, social/cultural or natural); the number of times the asset was listed on a sticky note; the total number of priority dots an asset received; and an averaged inundation and erosion consequence score. A thick black border highlights the asset that received the highest number of dots, indicating the priority asset within that compartment.

| Drummond Cove Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Houses and Properties**<br>*Why is it important: investment, lifestyle, social/emotional value of home* | Economic/Physical | 14 | 27 | 3 | 1 |
| | Social/ Cultural | 1 | | 0 | 0 |
| **Beaches - general**<br>*Why is it important: recreation, social gathering space, tourism, natural landscapes, fishing* | Economic/Physical | 1 | 18 | 4 | 3 |
| | Social/Cultural | 6 | | 4 | 2 |
| | Natural | 15 | | 3 | 2 |
| **John Batten Hall and amenity**<br>*Why is it important: social gathering space, recreation (boat ramp)* | Economic/Physical | 5 | 13 | 3 | 2 |
| | Social/Cultural | 6 | | 4 | 2 |
| **Whitehill Road**<br>*Why is it important: access* | Economic/physical | 4 | 2 | 3 | 2 |
| | Social/Cultural | 1 | | 0 | 1 |
| **Watercorp Pumping Station**<br>*Why is it important: important community infrastructure, costly to move* | Economic/physical | 5 | 6 | 4 | 2 |
| **Carparks & Beach Access**<br>*Why is it important: 4WD access, access to an important social/lifestyle asset* | Economic/Physical | 3 | 5 | 4 | 2 |
| | Social/Cultural | 3 | | 3 | 3 |
| **Sand dunes/vegetation**<br>*Why is it important: natural environmental asset, recreation, lifestyle, tourism* | Natural | 3 | 11 | 4 | 1 |
| **The reefs and breakwaters**<br>*Why is it important: natural protection, great for swimming, tourism* | Economic/Physical | 1 | 0 | 5 | 4 |
| | Social/Cultural | 2 | | 4 | 3 |
| | Natural | 1 | | 3 | 3 |
| **Boat ramp/launch**<br>*Why is it important: recreation, access* | Economic/Physical | 1 | 2 | 4 | 1 |
| | Social/Cultural | 2 | | 2 | 4 |
| **Public Open Spaces**<br>*Why is it important: social, environmental, recreation* | Social/Cultural | 3 | 0 | 5 | 3 |
| | Natural | 1 | | 5 | 2 |
| **Aboriginal Heritage middens site**<br>*Why is it important: cultural heritage* | Social/Cultural | 2 | 0 | 4 | 2 |

| Drummond Cove Assets continued | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Utilities along Whitehill Road**<br>*Why is it important: important community infrastructure, costly to move* | Economic/Physical | 1 | 4 | 0 | 1 |
| **Fauna**<br>*Why is it important: natural landscape* | Natural | 1 | 0 | 3 | 1 |
| **Trees (Whitehill Road)**<br>*Why is it important: habitat, recreation, slowing coastal erosion* | Natural | 2 | 0 | 3 | 1 |
| **Rum Jungle bushland**<br>*Why is it important: social, recreation (4WDing)* | Social/Cultural | 1 | 0 | 0 | 0 |
| **The Seacrest Way sump**<br>*Why is it important: no reason provided* | Economic/Physical | 1 | 0 | 4 | 3 |
| **Roads**<br>*Why is it important: access, economically important* | Economic/Physical | 2 | 0 | 4 | 1 |

| Glenfield Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Beach and sand dunes**<br>*Why is it important: natural environment, recreation, wellness, tourism, social gathering, fishing* | Social/Cultural | 3 | 6 | 3 | 1 |
| | Natural | 9 | | 4 | 2 |
| **Wastewater treatment plant**<br>*Why is it important: costly to move, community health* | Economic/Physical | 6 | 6 | 3 | 1 |
| | Natural | 1 | | 4 | 2 |
| **Coastal vegetation**<br>*Why is it important: natural dune protection* | Natural | 5 | 2 | 5 | 1 |
| **Sea grass**<br>*Why is it important: natural ecosystem, fishing, beautiful* | Natural | 2 | 2 | 0 | 1 |

| Glenfield Assets continued | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Parks and gardens**<br>*Why is it important: recreation, social gathering space, buffer* | Economic/Physical | 1 | 6 | 5 | 1 |
| | Social Cultural | 1 | | 4 | 3 |
| **Houses and properties**<br>*Why is it important: existing community* | Social/Cultural | 1 | 13 | 1 | 1 |
| **Running paths**<br>*Why is it important: safe exercise area* | Social/Cultural | 1 | 0 | 0 | 1 |
| **Infrastructure**<br>*Why is it important: costly to move* | Economic/Physical | 1 | 3 | 4 | 3 |
| **Reef**<br>*Why is it important: recreation, protection for beach* | Natural | 1 | 0 | 4 | 3 |

| Sunset Beach Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Beaches - general**<br>*Why is it important: mental health, social gathering space, recreation, tourism, fishing,* | Social/Cultural | 4 | 9 | 2 | 1 |
| | Natural | 6 | | 2 | 1 |
| **Chapman River Mouth**<br>*Why is it important: natural environment, habitat, cultural history, recreation, fishing* | Natural | 8 | 3 | 2 | 2 |
| **Sunset Beach Caravan Park**<br>*Why is it important: homes, tourism, economic, accommodation* | Economic/Physical | 6 | 5 | 3 | 2 |
| | Social/Cultural | 2 | | 5 | 2 |
| **Houses and properties**<br>*Why is it important: family homes, investments* | Economic/Physical | 5 | 14 | 1 | 1 |
| | Social/Cultural | 1 | | 2 | 1 |
| **Sand dunes**<br>*Why is it important: natural environment, beautiful, protection, recreation* | Social/Cultural | 1 | 9 | 0 | 0 |
| | Natural | 3 | | 1 | 1 |

| Sunset Beach Assets continued | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Chapman River (TEC)**<br>*Why is it important: birds, natural environment* | Natural | 3 | 4 | 4 | 2 |
| **Roads**<br>*Why is it important: access* | Economic/Physical | 2 | 0 | 4 | 2 |
| **Parks/recreation**<br>*Why is it important: recreation, social gathering* | Economic/Physical | 1 | 0 | 0 | 0 |
| | Social Cultural | 1 | | 5 | 3 |
| **Whole coast aesthetic value**<br>*Why is it important: tourism, economy* | Economic/Physical | 1 | 2 | 3 | 1 |
| **Fauna**<br>*Why is it important: no reason provided* | Natural | 1 | 5 | 4 | 1 |
| **Cray fishing industry**<br>*Why is it important: no reason provided* | Economic/Physical | 1 | 0 | 0 | 1 |
| **Aboriginal burial site Chapman River**<br>*Why is it important: burial sites* | Natural | 1 | 0 | 4 | 0 |

| Bluff Point Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **St Georges Beach**<br>*Why is it important: recreation, relaxing, social gathering, tourism, conservation* | Economic/Physical | 1 | 2 | 4 | 3 |
| | Social/Cultural | 6 | | 3 | 2 |
| | Natural | 5 | | 4 | 2 |
| **Nazareth House**<br>*Why is it important: nursing home, elderly care, community asset* | Economic/Physical | 3 | 2 | 3 | 4 |
| | Social/Cultural | 1 | | 4 | 4 |

| Bluff Point Assets continued | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Rundle Park**<br>*Why is it important: tourism, social gathering, active recreation (triathlons)* | Social/Cultural | 2 | 3 | 5 | 3 |
| | Natural | 1 | | 4 | 2 |
| **Coastal cycle/footpath**<br>*Why is it important: community use, recreation* | Social/Cultural | 3 | 3 | 3 | 1 |
| **Aboriginal Heritage Site**<br>*Why is it important: rare cultural heritage* | Social/Cultural | 3 | 1 | 3 | 1 |
| **Roads**<br>*Why is it important: transport* | Economic/Physical | 2 | 2 | 4 | 2 |
| **Pipes/infrastructure**<br>*Why is it important: no reason provided* | Economic/Physical | 2 | 1 | 5 | 1 |
| **Houses**<br>*Why is it important: no reason provided* | Economic/Physical | 2 | 0 | 4 | 1 |
| **Swan Drive Carpark**<br>*Why is it important: windsurf/kitesurf area – tourism* | Natural | 1 | 0 | 4 | 3 |
| **Surf Breaks**<br>*Why is it important: recreation* | Natural | 1 | 0 | 4 | 5 |
| **Businesses**<br>*Why is it important: attitude to investment in Geraldton* | Economic/Physical | 1 | 0 | 4 | 2 |
| **Navigation grids**<br>*Why is it important: no reason provided* | Economic/Physical | 1 | 0 | 5 | 4 |

| Beresford Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **The Museum**<br>*Why is it important: financial and cultural asset* | Economic/Physical | 4 | 2 | 1 | 1 |
| **The boat ramp**<br>*Why is it important: safe boat ramp* | Economic/Physical | 4 | 2 | 1 | 1 |
| **The Marina**<br>*Why is it important: financial and cultural asset, safe storage of boats, tourism* | Economic/Physical | 3 | 0 | 3 | 1 |
| **Houses**<br>*Why is it important: valuable assets, homes* | Economic/Physical | 2 | 1 | 2 | 1 |
| | Social/Cultural | 1 | | 1 | 1 |
| **Beach/Foreshore**<br>*Why is it important: social* | Social/Cultural | 1 | 4 | 4 | 1 |
| | Natural | 1 | | 5 | 2 |
| **Midalia's Beach**<br>*Why is it important: tourism, sheltered swimming spot* | Social/Cultural | 1 | 0 | 5 | 1 |
| | Natural | 1 | | 5 | 5 |
| **Coastal cycle/footpath**<br>*Why is it important: exercise, social, transport* | Social/Cultural | 1 | 2 | 4 | 2 |
| | Natural | 1 | | 5 | 4 |
| **Businesses**<br>*Why is it important: tourism* | Economic/Physical | 1 | 1 | 4 | 1 |
| | Social/Cultural | 1 | | 2 | 0 |
| **Donor Memorial**<br>*Why is it important: community memorial, meeting spot* | Social/Cultural | 1 | 3 | 5 | 3 |
| **Heritage cottage and well**<br>*Why is it important: heritage* | Economic/Physical | 1 | 1 | 2 | 3 |

| Geraldton Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **CBD/businesses**<br>*Why is it important: keep the town alive, heart of the city, asset value, major asset* | Economic/Physical | 5 | 9 | 1 | 1 |
| | Social/Cultural | 2 | | 1 | 1 |
| **The Port**<br>*Why is it important: economic asset, imports, employment* | Economic/Physical | 5 | 12 | 1 | 1 |
| | Natural | 1 | | 4 | 1 |
| **The Foreshore**<br>*Why is it important: social gathering* | Social/Cultural | 3 | 3 | 4 | 1 |
| | Natural | 1 | | 4 | 2 |
| **Fishing boat harbour**<br>*Why is it important: economic asset, employment* | Economic/Physical | 3 | 1 | 2 | 1 |
| **The jetty**<br>*Why is it important: fishing* | Social/Cultural | 1 | 1 | 5 | 5 |
| **The rocks**<br>*Why is it important: natural habitat - sea lions* | Natural | 1 | 1 | 4 | 2 |
| **The railway**<br>*Why is it important: employment* | Economic/Physical | 1 | 1 | 1 | 1 |
| **Silos**<br>*Why is it important: employment* | Economic/Physical | 1 | 1 | 1 | 1 |
| **Industrial site**<br>*Why is it important: NA* | Natural | 1 | 1 | 4 | 0 |
| **Schools**<br>*Why is it important: oldest continuing primary school in WA* | Economic/Physical | 1 | 1 | 2 | 0 |
| **Houses**<br>*Why is it important: economic value* | Economic/Physical | 1 | 0 | 0 | 1 |

| West End/Point Moore Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Marine Terrace**<br>*Why is it important: access* | Economic/Physical | 6 | 2 | 4 | 2 |
| **Lighthouse**<br>*Why is it important: unique structure and heritage listed asset, tourism, employment opportunities, cultural heritage* | Economic/Physical | 3 | 11 | 3 | 1 |
| | Social/Cultural | 3 | | 4 | 1 |
| **Sand dunes**<br>*Why is it important: helps preserve the point, high value to the community* | Social/Cultural | 2 | 12 | 4 | 1 |
| | Natural | 2 | | 4 | 1 |
| **Point Moore area**<br>*Why is it important: unique, fishing, recreation, cultural heritage (canals)* | Economic/Physical | 3 | 5 | 3 | 1 |
| | Social/Cultural | 1 | | 2 | 1 |
| **Point Moore Beach**<br>*Why is it important: high value to community* | Social/Cultural | 1 | 1 | 4 | 1 |
| | Natural | 1 | | 0 | 0 |
| **The caravan park**<br>*Why is it important: accommodation* | Social/Cultural | 1 | 0 | 5 | 2 |
| **Pages Beach**<br>*Why is it important: local beach* | Natural | 1 | 1 | 4 | 1 |
| **Southern transport corridor**<br>*Why is it important: economic asset, expensive to replace* | Economic/Physical | 1 | 3 | 3 | 1 |
| **Volunteer Marine Sea Rescue Facility**<br>*Why is it important: clear radio signal from the location at Point Moore to nearby authorities* | Social/Cultural | 1 | 0 | 3 | 3 |
| **Beach eco system**<br>*Why is it important: local asset* | Social/Cultural | 1 | 0 | 4 | 1 |

| Beachlands Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Separation Point**<br>*Why is it important: natural attraction, fishing, recreation, social gathering* | Economic/Physical | 1 | 1 | 0 | 4 |
| | Social/Cultural | 2 | | 3 | 4 |
| | Natural | 1 | | 0 | 1 |
| **Batavia Coast Maritime Institute**<br>*Why is it important: marine education, recreation* | Economic/Physical | 3 | 1 | 3 | 2 |
| | Social/Cultural | 1 | | 3 | 1 |
| **Greys Beach**<br>*Why is it important: tourism, walking* | Natural | 1 | 0 | 5 | 2 |
| **Coastal dunes**<br>*Why is it important: beach access* | Natural | 1 | 1 | 3 | 2 |
| **Beach eco system**<br>*Why is it important: survival of native species* | Natural | 1 | 2 | 4 | 2 |
| **Wetland Aboriginal heritage site**<br>*Why is it important: cultural heritage* | Natural | 1 | 3 | 3 | 1 |
| **Coastal cycle/footpath**<br>*Why is it important: social, exercise, health, lifestyle* | Social/Cultural | 1 | 1 | 5 | 1 |
| **Marine Terrace**<br>*Why is it important: access to the lighthouse* | Economic/Physical | 1 | 2 | 3 | 2 |

| Mahomets Flats Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Surf Life Saving Club Building**<br>*Why is it important: public safety, recreation, community events, social gathering* | Economic/Physical | 2 | 5 | 3 | 1 |
| | Social/Cultural | 3 | | 1 | 1 |
| **Beaches - general**<br>*Why is it important: recreation, lifestyle, social gathering, best surf beach* | Social/Cultural | 3 | 4 | 3 | 2 |
| | Natural | 1 | | 3 | 1 |
| **Houses**<br>*Why is it important: society* | Economic/Physical | 1 | 1 | 0 | 1 |
| **Beach eco system**<br>*Why is it important: survival of native species* | Natural | 1 | 2 | 4 | 1 |

| Tarcoola Beach Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Back Beach**<br>*Why is it important: man made sand dunes, recreation, community health/exercise, important part of Geraldton, it is in its natural state* | Social/Cultural | 3 | 8 | 2 | 2 |
| | Natural | 5 | | 3 | 2 |
| **Sand dunes**<br>*Why is it important: natural barrier for erosion, recreation, health, natural environment* | Natural | 1 | 5 | 4 | 1 |
| **Birds**<br>*Why is it important: shorebird habitat* | Natural | 1 | 2 | 4 | 1 |
| **Glendinning Road**<br>*Why is it important: only access to housing* | Economic/Physical | 1 | 2 | 4 | 1 |

| Southgate Dunes Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **The sand dunes**<br>*Why is it important: reservoir sands, important part of Geraldton, protection, land supply, recreation (4WDing), natural environment* | Economic/Physical | 1 | 10 | 0 | 0 |
| | Social/Cultural | 2 | | 5 | 4 |
| | Natural | 6 | | 3 | 1 |
| **Beaches - general**<br>*Why is it important: wild feel (not developed), social gathering, recreation, public safety* | Social/Cultural | 2 | 3 | 4 | 2 |
| | Natural | 2 | | 4 | 1 |
| **Beach eco system**<br>*Why is it important: natural species survival* | Natural | 2 | 1 | 5 | 3 |
| **Aboriginal heritage**<br>*Why is it important: rare vegetation, cultural heritage* | Natural | 1 | 1 | 3 | 1 |
| **Local ecosystem**<br>*Why is it important: local species survival* | Natural | 1 | 0 | 3 | 1 |

| Cape Burney Assets | Asset Classification | No. of sticky notes | No. of Dots | Average Inundation Score | Average Erosion Score |
|---|---|---|---|---|---|
| **Greenough River mouth**<br>*Why is it important: community amenity, natural fauna, fishing, recreation, social* | Natural | 3 | 5 | 4 | 2 |
| **Cape Burney Area**<br>*Why is it important: recreation, fishing, relaxation* | Social/Cultural | 2 | 0 | 4 | 2 |
| | Natural | 1 | | 0 | 1 |
| **Beach**<br>*Why is it important: lifestyle* | Social/Cultural | 1 | 2 | 5 | 3 |
| | Natural | 1 | | 5 | 1 |
| **Flora and Fauna**<br>*Why is it important: biodiversity, reduction in erosion* | Natural | 1 | 1 | 0 | 0 |
| **Caravan Park**<br>*Why is it important: no reason provided* | Social/Cultural | 1 | 0 | 5 | 2 |

## Presentation 3 – Adaptation Strategies

In the final workshop presentation, the SPP 2.6 coastal planning adaptation strategies hierarchy (see page 6) was reviewed and included the following additional information:

a) **Avoid**: Refraining from building anything in the area is the least expensive strategy to implement, however, this is difficult to apply to existing or historical developments.
b) **Planned/managed retreat**: Focuses on using planning controls, changes in land use when the threat or trigger is realised or the physical removal of assets when they become at risk.
c) **Accommodate**: Focuses on planning controls such as implementing minimum floor level heights, building design using flood resistant materials, modifying buildings so they can be relocated.
d) **Protect**: Focuses on building infrastructure such as rock walls, groynes, and flood protection sea walls.

Mitigation options for each strategy, potential adaptation options and adaptation options, which have already been locally implemented, were also presented. *(See APPENDIX 3: pages 40 – 41)*

## TASK 4 – Priority Areas Adaptation Ideas

The final workshop task involved developing adaptation strategies and preferred options for prioritised assets. The first step was for participants at the table to identify the priority asset (the one with the most black dots) and then come to a consensus on which of the four adaptation strategies they wanted to implement to mitigate the risk of erosion and inundation. They then had to identify an adaptation option or idea they preferred be implemented. They could either choose one of the options presented or develop their own.

In Workshop 1, participants were asked to focus first on identifying their preferred adaptation strategy and options regarding inundation in the CBD. Once completed, and if time allowed, they could then repeat the process with the asset on their maps with the most black dots. *(See APPENDIX 3: page 42)*

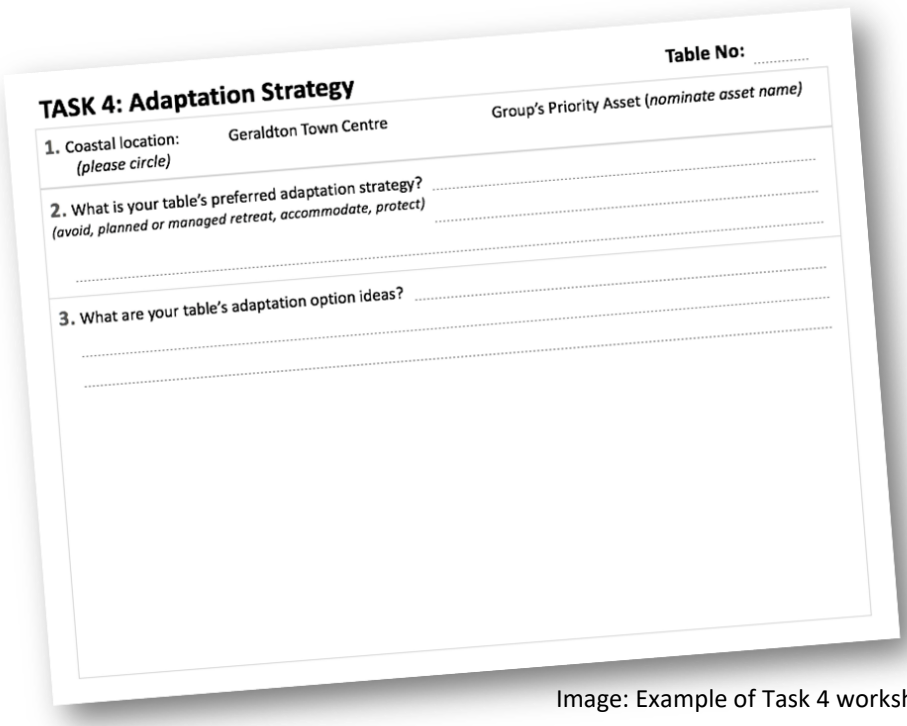

**TASK 4: Adaptation Strategy**

Table No: .....

1. Coastal location: *(please circle)* Geraldton Town Centre — Group's Priority Asset (*nominate asset name*)

2. What is your table's preferred adaptation strategy? *(avoid, planned or managed retreat, accommodate, protect)*

3. What are your table's adaptation option ideas?

Image: Example of Task 4 worksheet

## Localised Adaptation Ideas

Participants submitted the following 17 adaptation strategies and mitigation options or ideas for assets located between Drummond Cove and Greys Beach.

**Coastal Location:** Drummond Cove - Surfside Terrace to Drummond Cove Road Carpark
**Preferred Adaptation Strategy:** Accommodate/Protect
**Adaptation option ideas:**

- Aggressive sand nourishment with revegetation.
- Putting sand dunes back that were previously there.
- Buried sea wall with sand nourishment and revegetation.
- Groynes at northern end to keep sand from moving north.
- Geotextile Sand Containers preferred option.
- Offshore-submerged wall - offers protection similar to a reef.
- Sea wall using Geotextile Sand Containers.
- The proposed marina.
- Minimal and controlled access to the beach by vehicles.

**Coastal Location:** Drummond Cove – Marina and Beaches
**Preferred Adaptation Strategy:** Managed Retreat/Accommodate
**Adaptation option ideas:**

- Vehicle control.
- Offshore reef structure.
- Revegetation.
- More beach nourishment.
- Create/build up sand dunes.
- Sand- bypassing via pipes.
- Sacrifice Glenfield (undeveloped land) to protect developed area.

**Coastal Location:** Drummond Cove – Whitehill Road Coastal Reserve (north)
**Preferred Adaptation Strategy:** Managed Retreat/Protect
**Adaptation option ideas:**

- Living shorelines not structure- no rocks in the ocean.
- Soft engineering to strengthen dunes etc…
- Or a boat ramp.

**Coastal Location:** Drummond Cove – Whitehill Road (south)
**Preferred Adaptation Strategy:** Protect
**Adaptation option ideas:**

- Dune rehabilitation via eco-engineering.

**Coastal Location:** Drummond Cove – Houses and Infrastructure
**Preferred Adaptation Strategy:** Protect
**Adaptation option ideas:**

- If you protect Drummond Cove, it can still be used as a residential estate:
    - Rock wall similar to Beresford Beach/buried seawall.
    - Breakwater/artificial reef (concrete mesh blocks to form a reef out from beach/break water force).
    - Groyne -or 'mini' marina and boat ramp and protected beach.
- Wooden pilings to reduce effects of current.

**Coastal Location:** Drummond Cove – John Batten Community Hall
**Preferred Adaptation Strategy:** Managed Retreat/Accommodate
**Adaptation option ideas:**

- Remove rocks.
- Let hall fall into the ocean.
- Build new hall further back.
- Accommodate risk in building design (higher first floor levels or on stilts).
- Floating building (on jetty).

**Coastal Location:** Drummond Cove – John Batten Community Hall and Recreation Precinct including Whitehill Road
**Preferred Adaptation Strategy:** Protect
**Adaptation option ideas:**

- Hard engineering solution.
- Boat ramp/small marina.

**Coastal Location:** Sunset Beach - All beaches and sand dunes
**Preferred Adaptation Strategy:** Protect (level of protection according to population + priority)
**Adaptation option ideas:**

- Protect:
    - Sunset beach and the Caravan Park.
    - Artificial reef (not hard).
    - City of Greater Geraldton's (engineering solution).
    - To reduce waves on beaches.
- Also, deal with side effects of port and shipping channel.

**Coastal Location:** Sunset Beach – Volute Street Houses (waterfront properties)
**Preferred Adaptation Strategy:** Protect
**Adaptation option ideas:**

- Seawall and/or artificial reef (inundation).

**Coastal Location:** Sunset Beach – Housing on west side of Volute Street and recreational assets
**Preferred Adaptation Strategy:** Protect
**Adaptation option ideas:**

- Sand entrapment i.e. St Georges Geotextile Sand Containers.
- Extension of Beresford sand re-nourishment.
- Natural or soft approach to protector.
- Dune rehabilitation (existing).
- Regular or consistent monitoring.

**Coastal Location:** Sunset Beach (outside of existing reef channels)
**Preferred Adaptation Strategy:** Protect
**Adaptation option ideas:**

- Creating all artificial reef, tourism opportunities – snorkeling, diving, fishing – economic benefit from scientific international to domestic data, jobs.
- Coastal location Sunset Beach to Drummond Cove.
- Maintaining (protect) a healthy dune system, in order to restore/protect flora and fauna.
- Managed access, temporary jetty to promote other activities in order to move people away from at risk areas.

**Coastal Location:** St Georges Beach and associated houses
**Preferred Adaptation Strategy:** Protect
**Adaptation option ideas:**

- Buried sea wall to protect St Georges Beach.

**Coastal Location:** Midalia's Beach
**Preferred Adaptation Strategy:** Accommodate/protect
**Adaptation option ideas:**

- Recycling glass – job opportunities, tourism, protect the beaches by re-nourishing sand.
- Glass would be 'pebbalised' on the beach, from recycled beer bottles and other household glasses. The process this would create jobs, be a tourist attraction "Beers for the Beach" and utilise local resources.

**Coastal Location:** Geraldton Town Centre
**Preferred Adaptation Strategy:** Accommodate – identify areas to protect
**Adaptation option ideas:**

- Two-storey businesses – move essential infrastructure to first floor.
- One-storey businesses – retrofit power/shop fitments to higher points in building.
- Flood barriers that can be installed over shop front doors.
- Allocated areas for floodwater (sumps + pumps) and/or flood pathways.
- Plastic/resilient siruvums that can be flooded – does not corrode.
- Seaweed/artificial bunds installed for innovation.
- Temporary (Austrian style) inundation barrier.
- Drainage solution to pump or direct storm surge water away from the Town Centre as quickly as possible. Pumps, swales, sumps, potential lake. Either pump back to Ocean or direct to drainage reserve.
- Hydro scheme (power) to positively generate income to offset cost of construction.
- Public open space that could be used in meantime and could accommodate piped storm surge water in an event.
- Drainage system for storm surge may work against us in a storm surge event as it has not been designed to accommodate rain inundation and storm surge. Backflow could occur, single valve shut off to be considered.
- Fuel storage area on Port Way Road may need a bigger bund to protect in storm surge event.
- Sumps and pumps to clear water faster. CBD inundation + emergency response plan in place.
- Affect our sight of existing zoning.
- Planning and building codes.
- Emergency/evacuation strategy.
- Engineering drainage (effective outflow):
    - New designs to accommodate sustainable use of water – not ion water.
- Look at (houses with floaties).
- Modem materials – sustainable and more easily replaceable.
- Review LIDAR data targeted areas 'Dike'.
- Undertake detailed analysis to identify weak / Low-level areas (intervene here only).
- To reduce overall physical intervention (incorporate into recreational/urban design).
- Look at forgotten/temporary solutions.

**Coastal Location:** Point Moore
**Preferred Adaptation Strategy:** Managed Retreat/Accommodate/Protect
**Adaptation option ideas:**

- Artificial reef to slow erosion process. (pick somewhere to trial a reef) Possibly more cost effective if using sand tubes – no massive downside.
- Possible reef locations:
    - South coast of Point Moore.
    - Back Beach.
- Bunds on tracks in event.
- Build up dunes and vegetation.
- Reconstruct homes on stilts (Queenslander).
- Resilient materials.
- No vehicles on beach.

**Coastal Location:** Greys Beach – Aboriginal Heritage Wetland
**Preferred Adaptation Strategy:** Protect
**Adaptation option ideas:**

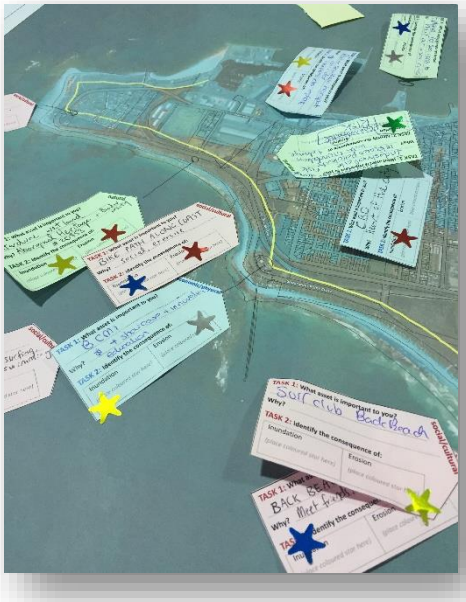
- Incorporate into protection works for key port infrastructure rock walls or concrete walls.

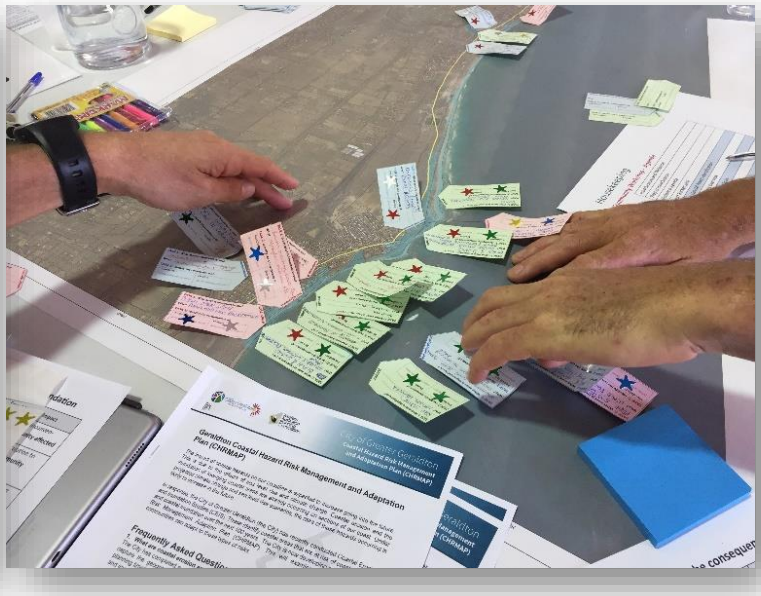
**Coastal Location:** Greenough River mouth to the Port – Coastal Dunes
**Preferred Adaptation Strategy:** Avoid
**Adaptation option ideas:**

- Enhance natural systems:
    - Sand trapping.
    - Revegetation.
- Soft options preferred as opposed over hard options.
- Maintain Southgate dunes – green sediment source for the Tarcoola Beach.

## Workshop Conclusion

The workshop concluded by reiterating the CHRMAP process *(see page 5)* and inviting participants to visit the City's website for project updates.





# APPENDIX 1: Workshop Focus Area Maps

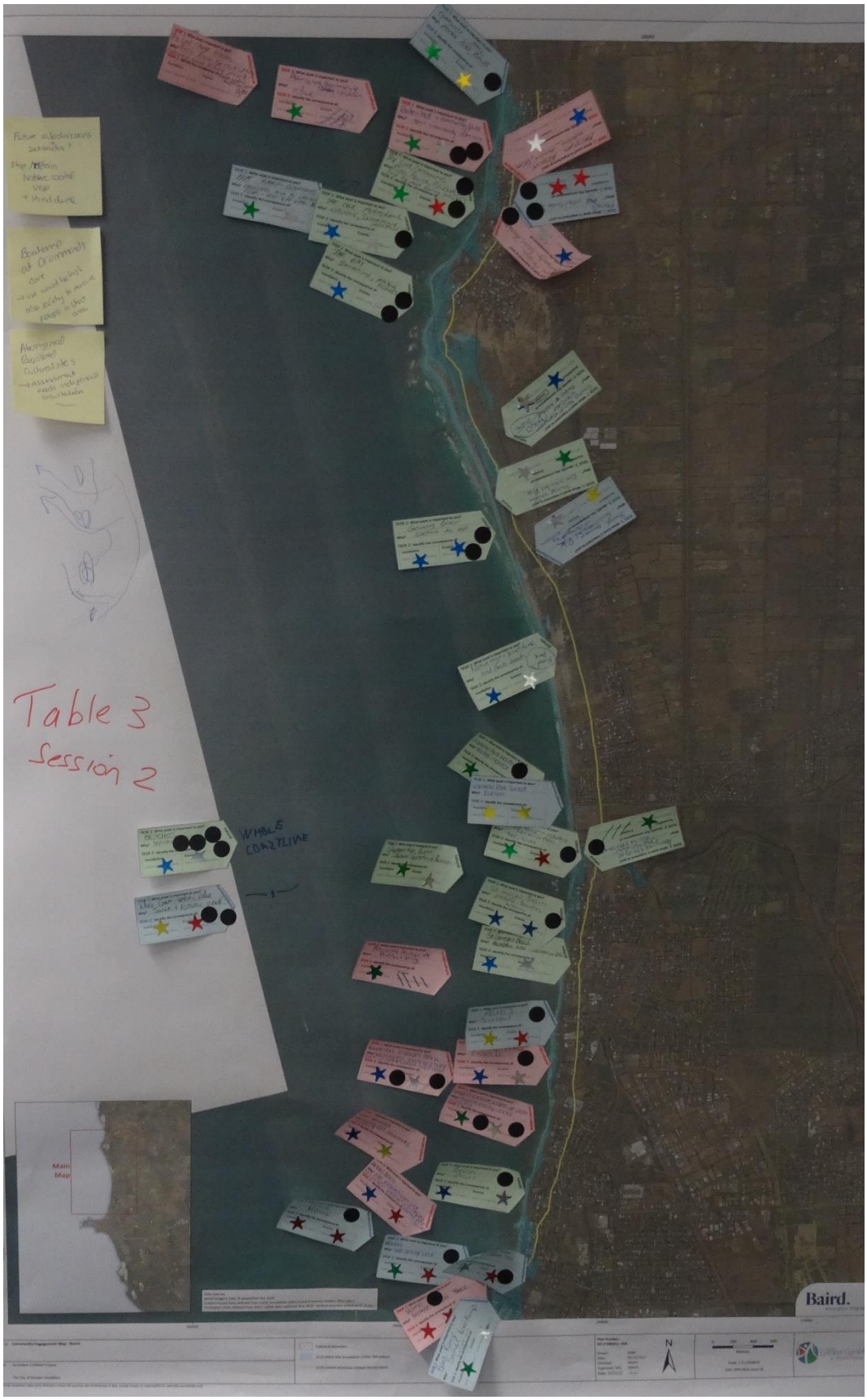
## Workshop 1 Map: Cape Burney to Town Beach

## Workshop 2 Map: The Marina to Drummond Cove

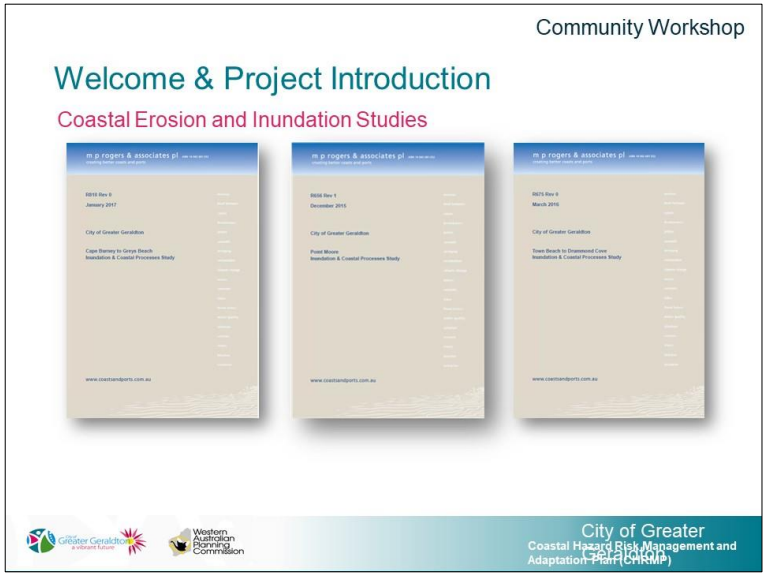
# APPENDIX 2: Sample Results of Tasks 1, 2 and 3

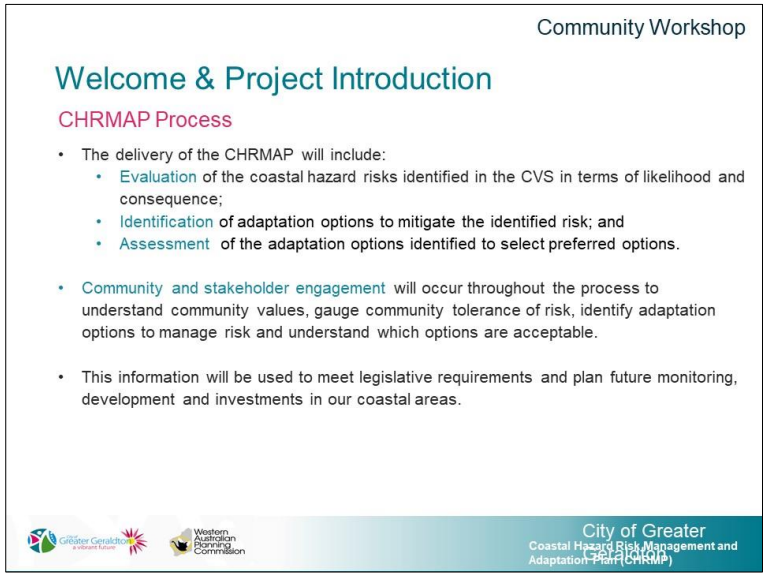
## Workshop 1 Map: Cape Burney to Town Beach

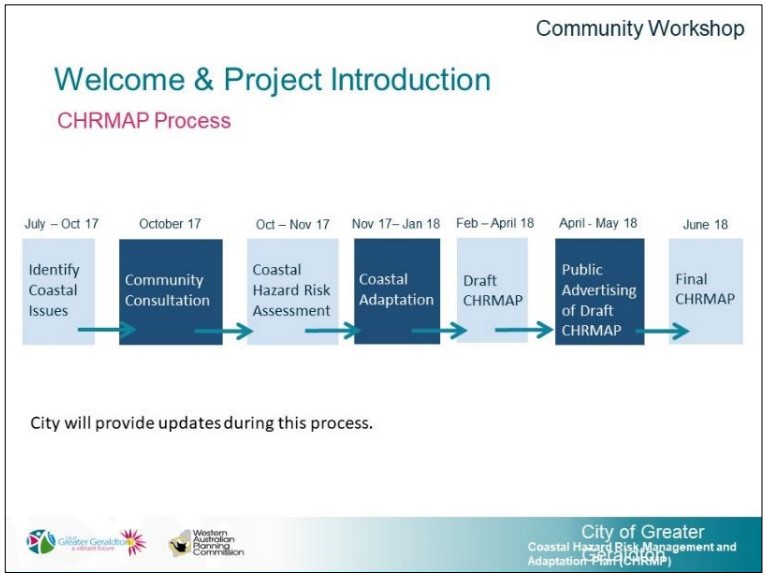
## Workshop 2 Map: The Marina to Drummond Cove



# APPENDIX 3: Workshop Power Point Presentation

## Welcome & Project Introduction

### CHRMAP Workshop Goals

1. **Identification of key coastal infrastructure/assets** that hold economic, social and environmental value;
2. **Consequence scale** for the identified coastal hazards;
3. **Define risk tolerances** to the identified coastal hazard risks; and
4. Feedback on **proposed adaptation options** that could address the risks *(and identify additional)*.





## Welcome & Project Introduction

### CHRMAP Workshop Goals

Workshop One (9am – 12pm)
Coastal zone from Cape Burney to Town Beach.


Workshop Two (1pm – 4pm)
Coastal zone from the Marina to Drummond Cove.


**Survey**
The deadline to complete the survey is 8am, Monday 23 October 2017.
www.surveymonkey.com/r/GeroCAP





## Housekeeping

### Community Workshop - Agenda

| |
|---|
| Introductions and Welcome |
| Project Introduction |
| Workshop Agenda |
| Project Background |
| Task One: Coastal Assets Identification |
| Consequence Scale Overview |
| Task Two: Consequence Scale |
| *Short Break* |
| Task Three: Asset Priorities |
| Preliminary Adaptation Options Presentation |
| Task Four: Adaptation Strategy |
| Wrap up and Next Steps |

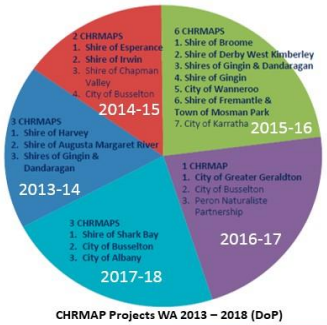




## Background Information

### Context

- Coastal Hazard Risk Management and Adaptation Planning (CHRMAP) a key focus for Western Australian coastal communities.




**CHRMAP Projects WA 2013 – 2018 (DoP)**


Hembsby, Norfolk UK 2013 (www.bbc.com/news)


Hurricane Sandy, NJ, US 2012 (www.businessinsider.com)


Sydney ECL2016 (www.abc.net.au/news)

# Background Information

## State Planning Policy SPP2.6

- Key guiding document for coastal planning in Western Australia
- Policy Objectives
  - sustainable development which recognises the need to balance competing economic, social and environmental demands.
  - Places of unique landscape, scientific and cultural significance should be conserved and managed.
  - Ensuring future generations can enjoy the same access to the coast as the present day.
- Coastal Hazard Definition for Future Planning

Erosion of the Coastline

Whitehill Rd Drummond Cove

Storm tide Inundation



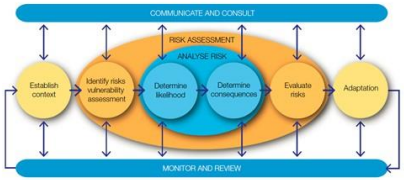


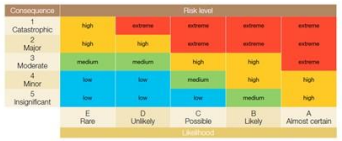

# Background Information

## Coastal Hazard Risk Management and Adaptation Planning

Guidelines developed by Western Australian Planning Commission (WAPC)

- Risk Management approach to manage coastal hazard risk
- Consult and involve key stakeholders and wider community
- Consider impacts of Coastal Hazard - Economic, Environmental, Social, Cultural.




Adaptation Hierarchy






# Background Information

## Inundation and Coastal Processes Allowances Studies

Three studies completed by CoGG for Geraldton Shoreline areas:

1. Point Moore
2. CBD to Drummond Cove
3. Cape Burney to Greys Beach

Studies determine the potential effects of coastal erosion and inundation based on SPP2.6 requirements.

Coastal hazard assessed across 3 planning horizons - 2030, 2070 and 2110.

Recommend allowances in foreshore areas for coastal hazard impacts.


Drummond Cove: Coastal Erosion Setback Lines





# Background Information

## Inundation and Coastal Processes Allowances Studies

Application of Results

- CHRMAP uses the findings from the studies to define the coastal hazard for the City of Greater Geraldton's coastal foreshore.
- Coastline assessed within 12 coastal compartments for CHRMAP.
- Coastal inundation and erosion considered separately.

## Focus Area

Cape Burney to Geraldton






## Focus Area

Beresford to Drummond Cove






## Background Information

### Inundation and Coastal Processes Allowances Studies

Key Findings

- Coastal Erosion and Inundation hazard will impact a range of coastal assets at different time scales (Now, 2030, 2070, 2110)
- Key locations for **coastal erosion**:
  - Beresford Foreshore;
  - Sunset Beach;
  - St Georges Beach
  - Point Moore (Greys Beach);
  - Drummond Cove; and
  - Point Moore.
- Key locations for **coastal inundation**:
  - Geraldton Town Centre;
  - Beachlands;
  - Point Moore;
  - Chapman River South; and
  - Drummond Cove.





## Background Information

### Inundation and Coastal Processes Allowances Studies

Coastal Erosion Hazard Findings

Community Workshop

## Background Information

Inundation and Coastal Processes Allowances Studies

Coastal Erosion Hazard Findings




Community Workshop

## Background Information

Inundation and Coastal Processes Allowances Studies

Coastal Inundation Hazard Findings




Community Workshop

## Background Information

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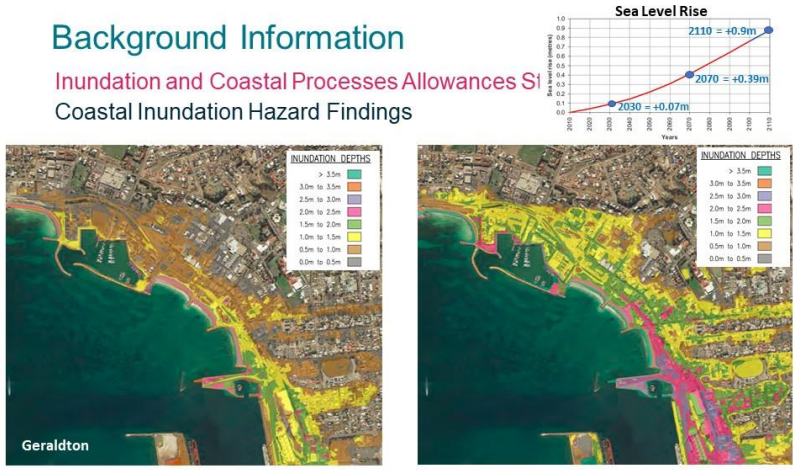
Coastal Inundation Hazard Findings



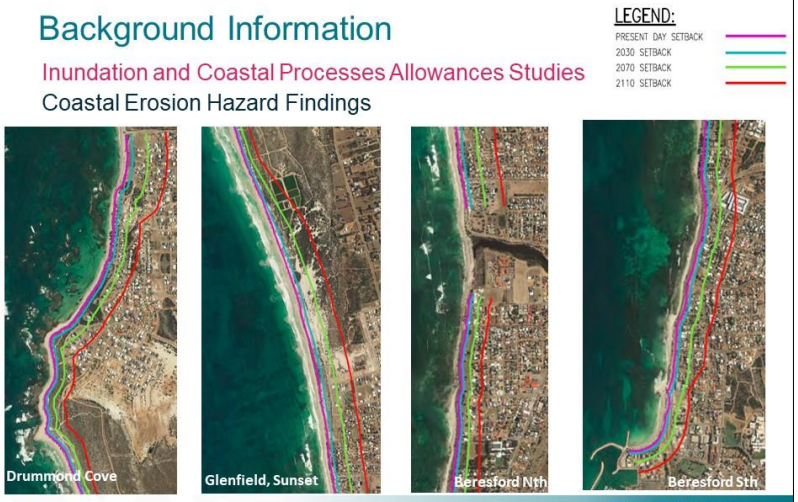



Community Workshop

## Background Information

Inundation and Coastal Processes Allowances Studies

Coastal Erosion Hazard Findings



# Background Information

## Inundation and Coastal Processes Allowances Stu

Coastal Inundation Hazard Findings – 2110 500yr ARI Event

INUNDATION DEPTHS

| | | | |
|---|---|---|---|
| 1.5m to 2.0m | | > 3.5m | |
| 1.0m to 1.5m | | 3.0m to 3.5m | |
| 0.5m to 1.0m | | 2.5m to 3.0m | |
| 0.0m to 0.5m | | 2.0m to 2.5m | |






# Background Information

## Coastal Asset Types

| Assets | Functions/services and values |
|---|---|
| Natural | |
| Foreshore reserves and beaches | Coastal access, recreation and conservation. Tourist drawcard. Habitat for flora & fauna. Supports biodiversity. Important geo-morphological feature of the area. Buffer to other 'higher value' assets. |
| Rivers and wetlands | Recreation and conservation. Tourist draw card. Habitat for flora & fauna. Supports biodiversity. |
| **Social/Cultural** | |
| Surf Life Saving Club | Strong community attachment and service. |
| Foreshore reserve, shared paths, toilet/picnic facilities | Ongoing access and recreation |
| Residential existing and future development | Provides housing for resident population and future population |
| Lighthouse | Important historical structure. Tourist drawcard. |
| Caravan park | Provides local employment. Tourist drawcard. Contributes to local economy. |
| Schools, aged care facilities | Provides essential services, local employment |
| **Economic/Physical** | |
| Roads, railway | Provides transport services |
| Stormwater outlets and utilities | Provides essential services |
| Commercial/industrial/institutional development & infrastructure | Provides employment and contributes to the economy |
| Fisherman's harbour, jetties and boat ramps | Provides recreational facilities, employment. Contributes to the local economy. |





# Background Information

## Coastal Asset Types

**Natural / Environmental Assets**
eg Beaches, dune, flora, fauna

**Social / Cultural Assets**
eg heritage, meeting places

**Economic / Physical Assets**
eg roads, buildings, structures





# Questions?

| |
|---|
| Introductions and Welcome |
| Project Introduction |
| Workshop Agenda |
| Project Background |
| Task One: Coastal Assets Identification |
| Consequence Scale Overview |
| Task Two: Consequence Scale |
| *Short Break* |
| Task Three: Asset Priorities |
| Preliminary Adaptation Options Presentation |
| Task Four: Adaptation Strategy |
| Wrap up and Next Steps |

# TASK ONE: Coastal Assets Identification

1. What are the coastal assets that are important to you?
2. Why is it important to you?

Categorise as:

- Physical/Economic (road, building)
- Natural/Environmental (vegetation or a reserve)
- Social/Cultural (eg walking, meeting place)

work individually 20min






# TASK ONE: Coastal Assets Identification

1. What are the coastal assets that are important to you?
2. Why is it important to you?

Coastal Asset Types

| Assets | Functions/services and values |
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work individually 20min





# Coastal Assets: Consequence Scale

## Lines/Tones On Your Map – What Do They Mean?



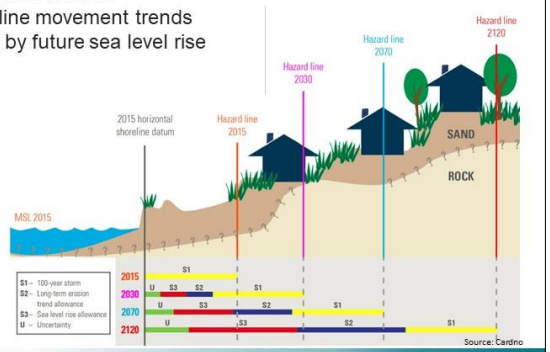


# Coastal Assets: Consequence Scale

## What is Coastal Erosion?

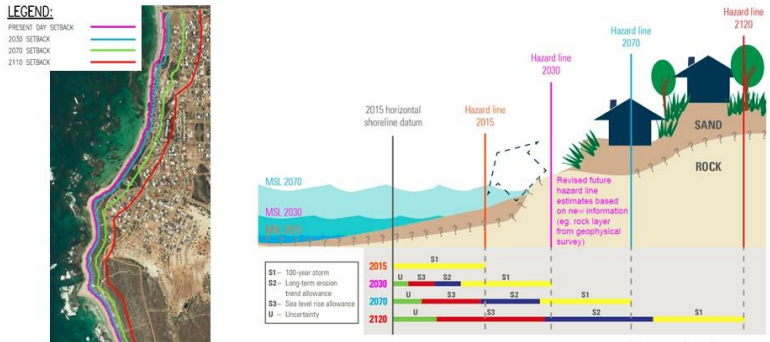
Shoreline **erosion** hazard – 'Setback' allowance:

- S1 - current risk of storm erosion
- S2 - historical shoreline movement trends
- S3 - erosion caused by future sea level rise
- Uncertainty



## Coastal Assets: Consequence Scale

### What is Coastal Erosion?




Drummond Cove: Coastal Erosion Setback Lines

Source: Cardno

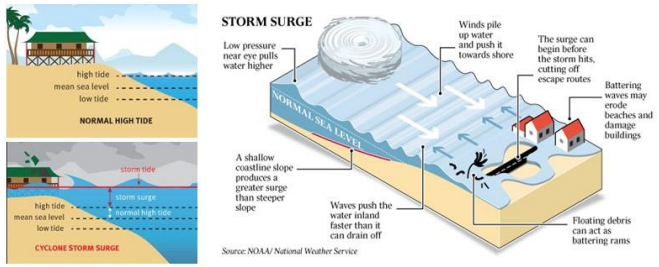




## Coastal Assets : Consequence Scale

### What is Storm Surge Inundation?

Storm surge is the rise in the level of the ocean, over and above the regular astronomical tide, caused by a severe storm such as a tropical cyclone.













## Coastal Assets : Consequence Scale

### Consequence Scale

| Consequence | Physical/Economic Impact | Environmental Impact | Social /Cultural Impact |
|---|---|---|---|
| Insignificant | Permanent loss or damage **<$20k** | **Negligible to no loss** of flora and fauna | Minimal short term inconvenience **<5% of community affected** |
| Minor | Permanent loss or damage **$20k - $200k** | **Short term loss** of flora and fauna - strong recovery | Small to medium disruption to function **<10% of community affected** |
| Moderate | Permanent loss or damage **$200k - $2 million** | **Medium term loss** of flora and fauna - recovery likely | Minor long term or major short term loss of function **<25% of community affected** |
| Major | Permanent loss or damage **$2 - $5 million** | **Long-term loss** of flora and fauna limited chance of recovery | Medium term or permanent loss of function **<50% of community affected** |
| Catastrophic | Permanent loss or damage **>$5 million** | **Permanent loss** of flora and fauna - will not recover | Long term or permanent loss of function **>75% of community affected** |





## Coastal Assets : Consequence Scale

### Asset Example No.2 Foreshore Reserve and Beach

**Environmental Asset**
Erosion: **Catastrophic**
Permanent loss of flora and fauna - will not recover
Inundation: **Minor**
Short term loss of flora and fauna - strong recovery

**Social Asset**
Erosion: **Catastrophic**
Long term or permanent loss of function >75% of community affected. Loss of recreation space
Inundation: **Insignificant**
Minimal short term inconvenience <5% of community affected

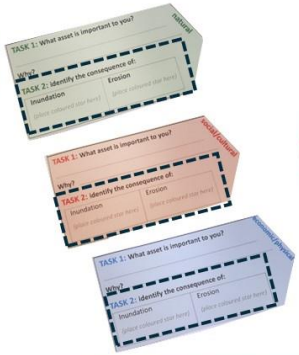




## TASK TWO: Coastal Assets Consequence Scale

Examine the coastal assets you identified in Task 1.

For each asset, determine a consequence of erosion and inundation.


Group Work
40min





## TASK THREE: Priority Assets

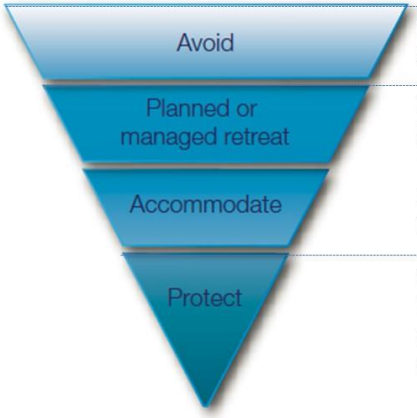
Re-examine your table's coastal assets from Task 1.

Use your 5 sticky dots to identify priority assets.

You can spread your dots over five individual assets or place more than one dot on a single asset.

work individually
10min

## Adaptation Options




Locate assets in areas not at risk
Avoid foredune / low lying areas

Retreat over time as coastal hazard realised
Planning Controls

Building design
Emergency Evacuation Planning

Seawalls and Flood Walls
Beach nourishment
Groynes
Offshore Breakwater





## Adaptation Options: Avoid

### Planning Control Examples

Development planning approvals take into consideration

- Coastal Erosion setbacks; and
- 500yr ARI inundation extents.

No new developments on the shoreline side of the identified coastal hazard extent.

Avoid isn't applicable to existing or historical developments that are at risk.





## Adaptation Options: Planned/Managed Retreat

### Planning Control Examples

Eg. notification on title, control of further development, apply easement or planning zones to allow for rolling change of land use as coastal hazard is realised.

- Time based structures
- Leave assets unprotected

**City Asset/Value**
Removal of the Triton Place toilet block

**Tourism Asset/Value**
Two part lease to take into account land at risk





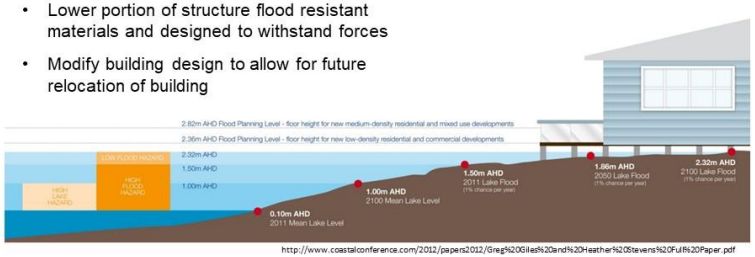
## Adaptation Options: Accommodate Inundation

### Planning Control Examples

- Set minimum floor levels based on structure type (Dome Café, Batavia Marina Development)
- Locate development on least hazardous portion of site

### Building Design Examples

- Lower portion of structure flood resistant materials and designed to withstand forces
- Modify building design to allow for future relocation of building




http://www.coastalconference.com/2012/papers2012/Greg%20Gilles%20and%20Heather%20Stevens%20Full%20Paper.pdf

## Adaptation Options: Accommodate/Protect - Erosion

### Beach Nourishment/ Geo Textile Containers Example

Whitehill Road in Drummond Cove, St Georges Beach

- Maintains beach amenity
- Mitigates further erosion
- Requires sediment source
- Temporary or short term measure





## Adaptation Options: Protect - Erosion

### Groynes Example

- Midalias Beach
- The Foreshore





## Adaptation Options: Protect - Erosion

### Erosion Protection - Seawall Example

Beresford Foreshore





## Adaptation Options: Protect - Inundation

### Flood Protection Sea Walls

- Many different types, can be permanent or temporary
- Engineered Rock Seawalls
- Dikes or Levy Banks

www.ukflooddefencealliance.com


www.elitereaders.com/mobile-flood-walls-austria-machlanddamm/

# TASK FOUR: Priority Areas Adaptation Ideas

Adaptation Strategies


First Focus on:

Geraldton Town Centre
(Coastal Hazard – Inundation)

Then: Your Table's Priority Location / Asset
*(if time allows)*

Workshop 1

Group Work
20min





# TASK FOUR: Priority Areas Adaptation Ideas

Adaptation Strategies


First Focus on:

Your Table's No.1 Priority Location / Asset

Then: Your Table's No.2 Priority Location / Asset
*(if time allows)*

Workshop 2

Group Work
20min





# TASK FOUR: Priority Areas Adaptation Ideas

**TASK 4: Adaptation Strategy** Table No: _____

1. Coastal location: *(please circle)* Geraldton Town Centre Group's Priority Asset *(nominate asset name)*
2. What is your table's preferred adaptation strategy? *(avoid, planned or managed retreat, accommodate, protect)*
3. What are your table's adaptation option ideas?

Group Work
20min





# Next Steps

## How Can I Be Involved?

Please watch the City's Webpage for regular project updates.

**Survey**
The deadline to complete the survey is 8am, Monday 23 October 2017.
www.surveymonkey.com/r/GeroCAP