

Coastal erosion hotspots in Western Australia

July 2019

Information Sheet

Much of the Western Australian coast is subject to coastal erosion and the consequences of inundation from storm events, which have increased with the global rise in sea levels and population growth along the coast. While State planning policy requires new coastal developments to avoid coastal hazards, there are locations where existing coastal facilities and assets are vulnerable.

The WA Coastal Zone Strategy provides a whole-of-government integrated framework for collective action to manage and adapt to threats and pressures along the coast. Coastal foreshore reserves are generally vested in local government which are responsible for their care, control and maintenance. The State provides significant support through the allocation of grant funding and the provision of data, information, in-kind expert advice and assistance.

The State Government commissioned Seashore Engineering Pty Ltd to undertake a study to evaluate the scale and extent of coastal erosion in Western Australia. This information sheet provides an overview of the study.

Study scope and overview

A total of 55 locations (15 Perth metropolitan and 40 regional) were identified as 'hotspots', where coastal erosion is expected to impact on public and private physical assets and require management and adaptation action within 25 years (see Figure 1). A hotspot typically has the following characteristics:

1. *Proximity*: infrastructure close to the existing shore, or landward of progressively and rapidly eroding coast
2. *Instability*: typically, subject to progressive or episodic erosion
3. *Mitigation cost*: costs of likely forms of erosion mitigation are high
4. *Transfer*: limited capacity to manage future erosion using existing coastal protection measures or extension of existing coastal protection is likely to exacerbate erosion transfer
5. *Community*: highly valued by the community.

A detailed profile has been prepared for each of these locations, which span 29 local government areas, and include three under State management responsibility (the Department of Biodiversity, Conservation and Attractions (DBCA), Fremantle Ports and the Southern Port Authority). An additional 31 locations (8 Perth metropolitan and 23 regional) were placed on a watch-list for possible future consideration. Hence, a total of 86 locations, within 34 local government areas, identified as potentially vulnerable to coastal erosion in the longer term.

The study confirms the need to plan for coastal erosion hazard risk management and adaptation. It is a high-level assessment that allows for comparison between hotspots. The options presented for each hotspot are only a guide and do not replace the need for more detailed investigations with implementation plans at local scale as part of comprehensive coastal hazard risk management and adaptation planning.

The nature of erosion

Erosion is a natural coastal process that creates hazards and may threaten coastal assets and/or values. The cause of erosion and its impacts varies between locations, influencing possible management solutions.

The dominant causes of erosion hazard risk along Western Australia's identified coastal hotspots are:

- man-made coastal structures changing natural patterns of sand movement along the coast
- inherently unstable landforms due to underlying geology or geographic location
- landforms which become unstable under naturally-changing sand supply, extreme or long-term changes in weather and wave conditions
- facilities and assets built close to the coast that cannot withstand erosion
- coastal response to rising sea level.

Coastal erosion hotspots in Western Australia

Information Sheet

Page 2

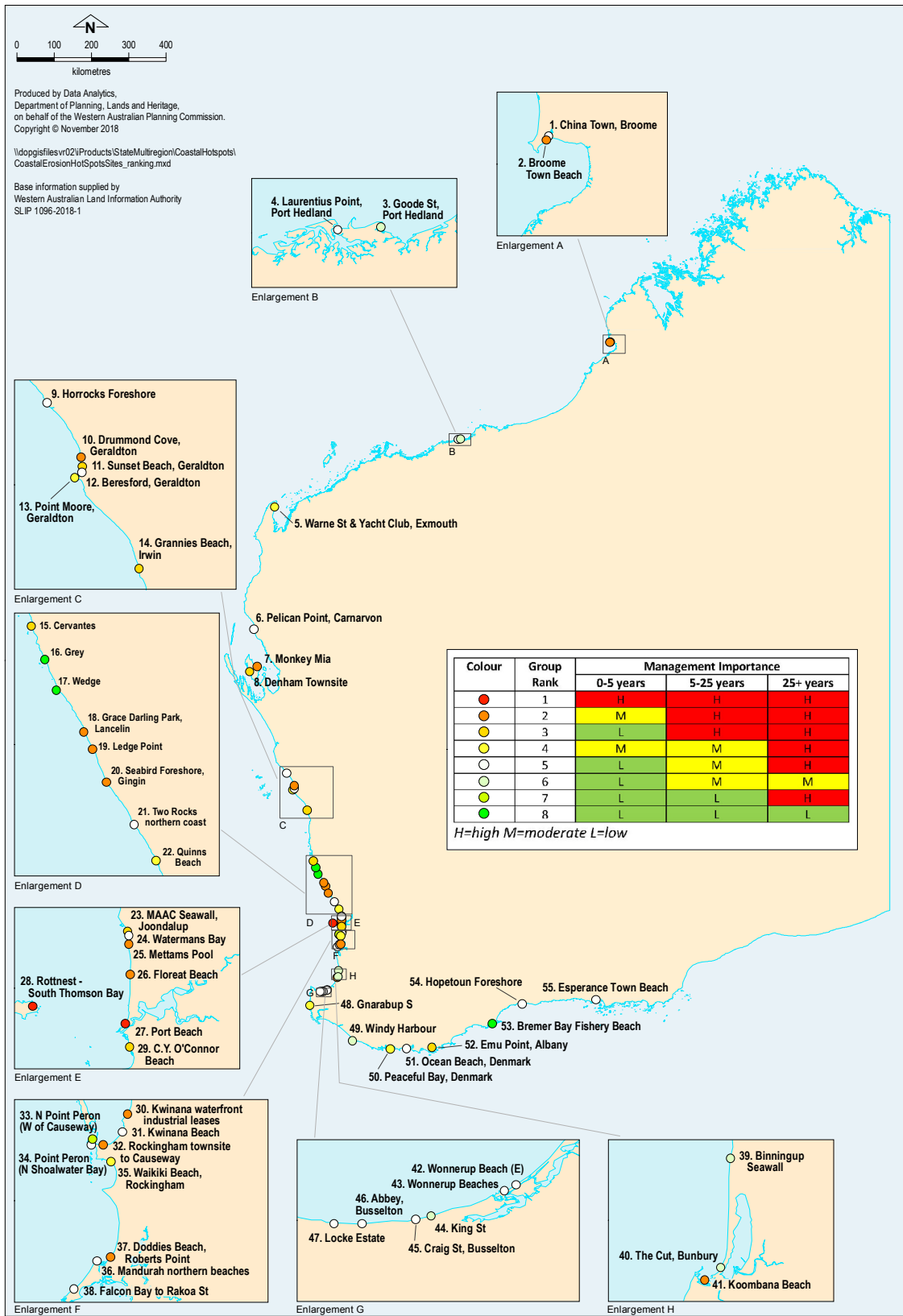


Figure 1 - Coastal erosion hotspots and management importance

Coastal erosion hotspots in Western Australia

Information Sheet

Assets at risk

Three timeframes were used to assess potential erosion hazards and to allow for progressive decision-making, from present-day risk management to longer-term adaptation:

- Imminent (0 to five years)
- Expected (five to 25 years)
- Projected (> 25 years)

Assets and recreational activities threatened by erosion for each of the three timeframes were identified at each hotspot.

Table 1 shows the asset classes susceptible to erosion. Key findings include:

- 80 per cent of hotspots have recreational assets susceptible to erosion in the next five years.
- Five hotspots have private property at risk in the next five years, increasing to 10 hotspots within five to 25 years, and 26 hotspots projected beyond 25 years.
- 49 per cent of hotspots have road and/or rail infrastructure at risk in the five-to-25-year timeframe, increasing to 76 per cent projected beyond 25 years.
- 36 per cent of hotspots have leasehold property susceptible to erosion in the five-to-25-year timeframe.

Table 1: Summary of hotspots with asset classes susceptible to erosion

| Asset class | Number (per cent) of hotspots | | |
|----------------------------|-------------------------------|------------|-----------|
| | 0-5 years | 5-25 years | 25+ years |
| Private | 5 (10%) | 10 (18%) | 26 (47%) |
| Leasehold | 9 (16%) | 20 (36%) | 22 (40%) |
| Road/rail | 5 (9%) | 27 (49%) | 42 (76%) |
| Services | 8 (15%) | 18 (33%) | 36 (65%) |
| Recreation | 44 (80%) | 46 (84%) | 46 (84%) |
| Boating | 13 (24%) | 17 (31%) | 17 (31%) |
| SLSC/rescue | 1 (2%) | 6 (11%) | 6 (11%) |
| Sand beach access | 39 (71%) | 39 (71%) | 39 (71%) |
| Sand boat launching | 12 (22%) | 18 (33%) | 18 (33%) |

Management importance

To facilitate a strategic approach to coastal erosion management efforts, a framework for comparing the relative importance of managing erosion for each hotspot was developed by considering the number and monetary value of public assets subject to erosion, coupled with potential loss of recreational uses and private or leasehold property. Figure 1 shows the location of the 55 hotspots and their relative management importance.

A total of 21 of the 55 hotspots have high management importance within the next 25 years (Table 2). Of these, in the next five years:

- two hotspots have high and pressing management importance: Port Beach and South Thomson's Bay in Rottnest Island
- 12 hotspots have moderate management importance: Broome Town Beach, Monkey Mia, Drummond Cove, Grace Darling Park (Lancelin), Ledge Point, Seabird, Mettams Pool, Floreat Beach, Kwinana waterfront industrial leases, Rockingham Town Beach to Causeway, Mandurah northern beaches and Koombana Bay (Bunbury)
- Seven hotspots have low management importance: Denham townsite, Sunset Beach Geraldton, Grannies Beach, Cervantes, MAAC Seawall Joondalup, C.Y. O'Connor Beach and Emu Point Albany.

While there is a focus on hotspots with high management importance within the next 25 years, appropriate management of coastal assets is required at all hotspots.

Table 2: Summary of hotspot management importance

| Group rank | Number of hotspots | | | | | Management importance | | | |
|--------------|--------------------|------|--------------|--------------|----------|-----------------------|------------|-----------|---|
| | Total | | Metropolitan | Regional | | 0-5 years | 5-25 years | 25+ years | |
| 1 | 2 | = 21 | 2 | = 8 (38%) | 0 | = 13 (62%) | H | H | H |
| 2 | 12 | | 4 | | 8 | | M | H | H |
| 3 | 7 | | 2 | | 5 | | L | H | H |
| 4 | 6 | | 2 | | 4 | M | M | H | |
| 5 | 19 | | 4 | | 15 | L | M | H | |
| 6 | 5 | | 0 | | 5 | L | M | M | |
| 7 | 1 | | 1 | | 0 | L | L | H | |
| 8 | 3 | | 0 | | 3 | L | L | L | |
| Total | 55 | | 15 (27%) | | 40 (73%) | | | | |

Management and adaptation pathways

A high-level assessment of erosion management options and adaptation pathways was undertaken for each location.

State Coastal Planning Policy (SPP2.6) requires that adequate coastal hazard risk management and adaptation planning is undertaken where existing or proposed development is at risk of being affected by coastal hazards. SPP2.6 outlines a hierarchy of adaptation measures in the following order: avoid, planned or managed retreat, accommodate and protect.

Protection is currently the main strategy used by coastal managers to manage coastal erosion. While this is expected to continue over the next five years, it is not always a complete solution due to erosion transfer and the potential loss of socio-economic values of the beach. Over the next five to 25 years, planned or managed retreat – which includes relocation of assets, removal of assets and landward movement of a reserve boundary – becomes a more important adaptation measure.

Recommended actions

The study recommends the following actions to address issues associated with governance and management of hotspots:

1. State Government to provide integrated coastal planning and engineering support to local coastal managers.
2. Local coastal managers to prepare detailed hotspot-specific Coastal Hazard Risk Management and Adaptation Plans (CHRMAP) to address the risk to public and private assets from coastal hazards.¹
3. Prepare a community education strategy to raise awareness about coastal processes and coastal hazard risk management and adaptation planning.*
4. Undertake a State-wide comprehensive review of lease agreements to support coastal management and adaptation pathways.
5. Review and clarify management arrangements and responsibilities for all hotspots containing unallocated Crown land.
6. Determine the socio-economic value of coastal foreshores to assist in assessing adaptation options.
7. Develop a more accurate methodology of predicting coastal change for developed coasts to better inform short to medium-term adaptive management.*

1. This recommendation has been shortened from the original which has 7 specific matters to be addressed – see the study for detail.

* These recommendations have been shortened – see the study for detail.

The study also recommends the following additional actions to address information gaps for coastal erosion assessment and management:

- i. Acquire coastline movement data for all hotspots and watch-list locations (or maintain acquisition where data is currently collected).
- ii. Collect information on local coastal dynamics to better understand sand movement, landform stability and shoreline response at hotspot specific scale.
- iii. Commission geotechnical investigations for specific hotspots, starting with those where private, leasehold, road/rail and services are susceptible to erosion hazard within 25 years.
- iv. Review the demand for, cost and availability of, basic raw materials for coastal protection, including coarse sand for renourishment and rock for construction of erosion mitigation structures.
- v. Develop improved hotspot management histories to refine projected coastal trends and use as a basis for recording ongoing maintenance.*
- vi. Prepare low-cost monitoring programs for each region to assist local coastal managers in understanding their foreshore and determine when a change in management is triggered.
- vii. Identify long-term and regional variations of meteorological and oceanographic data (mainly collected by Department of Transport and the Bureau of Meteorology) to support better interpretation of coastal trends.
- viii. Review the hotspot and watch-list locations on a five-yearly basis, to determine if any watch-list locations should be considered as hotspots or if any additional locations should be added to the watch-list. For any new hotspot locations, management and adaptation plans should be developed following identification.
- ix. Prepare material illustrating retreat case studies previously undertaken by local coastal managers in Western Australia to be considered when assessing retreat as an option for private property and leaseholds.



* These recommendations have been shortened – see the study for detail.