PUMICESTONE PASSAGE
ADVISORY TASK FORCE

Erosion fact sheet 03

Northern Bribie Island
What are the potential risks from a tidal breakthrough?

The impacts from a tidal breakthrough of northern Bribie Island on Golden Beach and Pelican Waters has caused some concern among the community.

The *Bribie Island Tidal Breakthrough Risk Assessment Study* was undertaken to gain a better understanding of the risk associated with a tidal breakthrough of northern Bribie Island. This is a summary of the key findings from the study.

The Pumicestone Passage Advisory Task Force was established to identify and prioritise issues impacting on the Pumicestone Passage between Bells Creek and the Caloundra Bar. The advisory task force is made up of representatives from local government, state government and the community and includes the state members for Caloundra and Glass House.

Figure 1
Aerial view of Pumicestone Passage from Caloundra Headland to Bells Creek

What does the term 'tidal breakthrough' mean?

In this instance a tidal breakthrough is when storm waves wash across northern Bribie Island lowering the dunes. As the level lowers tidal flows can then continue to deepen the channel which forms a new deep entrance to Pumicestone Passage. The process may take days or years and is dependent on weather and tide conditions, especially storms and cyclones.

The natural environment — coastal processes

Bribie Island is a sandy barrier island separating Pumicestone Passage from the Coral Sea. Northern Bribie Island is a long narrow dune ridge with a pronounced mass of sand which has accumulated near the Caloundra Bar. Pumicestone Passage is a narrow shallow estuary with approximately 80 per cent of the passage less than two metres deep. Northern Bribie Island is recognised as being highly dynamic and has been evolving over thousands of years.

The northern five kilometres of Bribie Island has narrowed by up to 100 metres since 1948. The Department of Environment and Resource Management (DERM) states that the erosion appears to be a long-term natural process measured in the hundreds and perhaps thousands of years.

As this erosion continues the narrowest areas will become more vulnerable to wave overwash and tidal breakthrough which can create new channels.

This is described in *Erosion Fact Sheet 1*.

PUMICESTONE PASSAGE
ADVISORY TASK FORCE

Erosion fact sheet 03

Areas at risk of a breakthrough on northern Bribie Island

Along the northern end of Bribie Island four locations have been identified by DERM which are considered vulnerable to a breakthrough. The four locations are narrow with low dunes and have experienced major wave overtopping events in the last two years (refer to Figure 2).

The study highlights that a scenario of storm waves occurring with a high tide and/or storm surge event could result in one or several breakthroughs occurring at once.

Recognising the rate of recession of the beach on northern Bribie Island is around one metre per year and the width of the island in some areas is only 30 metres wide, it is highly likely that a tidal breakthrough will occur within the next 20-30 years, although a breakthrough may occur at any time in response to a significant storm event.

What causes these areas to be at risk of a breakthrough?

A breakthrough of northern Bribie Island is dependent on the dynamic balance of:

- oceanic swells and locally generated waves
- tidal currents
- storm surge (increase in water surface level during a storm)
- winds
- fresh water flows.

The primary cause of the erosion in this area is a long-term loss of sand to the north and south and into the passage. Furthermore, there is no modern day source of replenishment to balance this loss. Therefore the island will continue to erode and retreat westward until a shoreline position has been reached which is in balance with the local sand transport processes.

However, a breakthrough may occur from short-term processes that affect the island, such as a major storm event.


Northern Bribie Island looking west over Lamerough canal and Bells Creek


Washover on northern Bribie Island

PUMICESTONE PASSAGE
ADVISORY TASK FORCE

Erosion fact sheet 03

What are the immediate threats from a breakthrough?

The risk assessment study used the scenario of a tidal breakthrough which resulted in the formation of a new entrance with a similar morphology to the existing northern entrance.

Immediate threats identified from a breakthrough included:

- increased tidal range of approximately 15 centimetres from Golden Beach through to Halls Creek i.e. an increase in height between the high and low tide resulting in higher levels of foreshore erosion and a potential increase in local flooding issues
- increased storm tide levels i.e. the sea level rise within the passage during a storm event will be greater
- loss of dune habitat
- shoaling (gradual shallowing) of the existing northern entrance
- sand inflow into the passage creating a new tidal delta
- increased wave propagation into the passage and onto the Golden Beach foreshore i.e. waves penetrate further within the passage.


Erosion on northern Bribie Island

What risks were identified if a breakthrough occurs?

- Risks associated with an increase in tidal range are high and considered a priority to be addressed.
- Risks associated with increases in mean sea level (associated with climate change) are considered more significant however would develop over time.
- Risks associated with increased storm surge is moderate.


Northern Bribie Island looking north to Caloundra

The following five preferred risk treatment options were identified by the study:

Treatment options	
1	Monitoring and rehabilitation including surveys and restoration.
2	Remedial works following storm events such as site specific nourishment on northern Bribie Island.
3	Dredging and foreshore nourishment along designated areas of Golden Beach to provide additional erosion buffering.
4	Shore protection works for the foreshore area to the west of the island.
5	Improved policy and regulation to control development in areas potentially affected by sea level rise and climate change risks and/or risks associated with a breach in northern Bribie Island.

PUMICESTONE PASSAGE
ADVISORY TASK FORCE

Erosion fact sheet 03

Pumicestone Passage looking west to Golden Beach

Erosion on northern Bribie Island

Pumicestone Passage looking north towards Bulcock Beach

The following additional steps were recommended by the study to determine which treatment options are suitable:

Actions
Develop a monitoring plan to determine 'where' and 'what' should be monitored including identifying roles and responsibilities for monitoring activities on Golden Beach and northern Bribie Island.
Develop a shoreline erosion management plan to identify the areas that require protection and nourishment and the type of protection appropriate.
Undertake a review of the existing policy and planning tools available to council to adequately control development in areas potentially affected by sea level rise and climate change risks and/or risks associated with a breach on northern Bribie Island.

Where to from here?

DERM and Sunshine Coast Regional Council are moving forward with the following actions identified:

Actions
DERM will coordinate an erosion monitoring plan for northern Bribie Island with support from council.
Council has commenced the development of a shoreline erosion management plan for the area between Caloundra Bar and Bells Creek to further understand the shoreline erosion issues along the passage and identify an agreed framework and management strategy for responding to the current and potential erosion issues.
Council intends to develop new policies and planning tools as part of its new regional planning scheme to reflect vulnerable coastal areas.

For further information on general coastal management and development control on the coastal zone visit:
www.epa.qld.gov.au

For further information on the Pumicestone Passage Advisory Task Force visit:
www.sunshinecoast.qld.gov.au

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