

Pages 1 through 3 redacted for the following reasons:

sch3(6)(c)(i) Infringe the privileges of Parliament

RTI DL Release

CTS No. 08327/13

Department of Environment and Heritage Protection
MINISTERIAL BRIEFING NOTE

TO: Minister for Environment and Heritage
Protection

SUBJECT: Northern Bribie Island erosion and risk of an ocean breakthrough to Pumicestone
Passage

RECOMMENDATION

It is recommended that the Minister:

- **note** that northern Bribie Island has been seriously impacted by recent sea erosion and is at high risk of an ocean breakthrough in the next few months if more severe weather events occur;
- **note** that if this occurs it will be highly contentious for the local community and attract strong media attention; and
- **note** that EHP, as lead agency for coastal management, would have significant involvement in resolving complex coastal issues in this area.

BACKGROUND

- Northern Bribie Island is experiencing persistent erosion of the ocean shoreline which has retreated at an average of up to 1 metre per year for the last 6 decades.
- A previous report written by the former Environmental Protection Agency (EPA) on this issue in 2007 is attached (**Attachment 1**).
- Northern Bribie Island forms the sheltered tidal waterway of Pumicestone Passage. Extensive development has occurred at Golden Beach and Pelican Waters on the western side of the passage.
- Bribie Island is a National Park surrounded by Marine Park, zoned as conservation zone on the passage side, habitat protection zone on the ocean side and a declared fish habitat area covering the Caloundra bar and the eastern nearshore zone of Bribie Island.
- The complexity of the issues compelled the Sunshine Coast Regional Council to form the Pumicestone Passage Advisory Taskforce in 2006 which included local government, state government and community representatives. The taskforce undertook a breakthrough impact study, investigative work and produced community information material. The taskforce is no longer active.

CURRENT ISSUES

- New erosion earlier this year has seen the eastern shoreline retreat up to 25 metres and reignited the debate on protection works (see **Attachment 2** for photos and **Attachment 3** for historical shoreline erosion trends).
 - At one location opposite Bells Creek a major over-wash event has occurred destroying the foredune constructed at this location in 2008 by the former EPA.
 - At this location the island is now only 10-15m wide and appears to be experiencing wave over-wash on high tides. (See **Attachment 4** for photos of this site).
 - Investigations by EHP indicate that the erosion trend on northern Bribie Island will continue into the future and as a consequence the island will experience one or multiple ocean breakthroughs and a likely shift of the entrance to Pumicestone Passage several kilometres to the south.
 - Formation of a new entrance south from Bells Creek would increase water levels and wave action in the passage which would adversely impact on the developed western foreshore.
- Furthermore the existing entrance may close over thereby changing the character of the northern Golden Beach and Bulcock Beach.
- In the past there have been repeated calls (including the Honourable Glen Elms MP and the Honourable Mark McArdle MP) for the state government to take action on the matter and for erosion protection works on the eastern coast of Bribie Island, which could cost up to \$20 million.
- However, this solution is complicated by the high conservation value of the area and the uncertainty of the timing and impact of any ocean breakthrough.

Sch 4 - Personal information	
Chief of Staff	OK
Dated	21/5/13
Approved Not Approved Noted	
Further information required	
Minister	
Dated	06/05/13

Author Name: Sel Sultmann Position: Principal Coastal Scientist Tel No: 3330 5768 Date: 8 April 2013	Cleared by Name: Andrew Connor Position: Executive Director, Southern Region Tel No: 3330 6335 Date: 23 April 2013	Cleared by Name: Dean Ellwood Position: DD Sch ESR Tel No: 3330 6328 Date: 24/4/14	Recommended: Name: Andrew Chesterman Position: DG, DEHP Tel No: 3330 6298 Date: 30-4-13
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Rec'd - ODG

- A report on the potential ocean breakthrough prepared in 2007 by the former EPA (**Attachment 1**) recommended that any threat to development on Golden Beach from natural coastal processes be dealt with by site specific works to protect development. This approach is still supported and consistent with current state coastal policy.

CONSIDERATIONS

- *Key Communication Messages:* This issue has attracted significant media attention in the past and calls for action from the state government.

MINISTER'S COMMENTS

Pls arrange a mtg b/n myself, Minister
McArdle and relevant officers *AV*

ATTACHMENTS

- Attachment 1: Report on: Implication of coastal erosion for northern Bribie Island and agreed position on future management
- Attachment 2: Photos of recent sea erosion on Northern Bribie Island
- Attachment 3: Historical erosion trends at 4 potential breakthrough locations
- Attachment 4: Photos of dune over-wash location at site 2 opposite Bells Creek

RTI DL Release

Author Name: Sel Sultmann Position: Principal Coastal Scientist Tel No: 3330 5768 Date: 8 April 2013	Cleared by Name: Andrew Connor Position: Executive Director, Southern Region Tel No: 3330 6335 Date: 23 April 2013	Cleared by Name: Dean Ellwood Position: DDG, ESR Tel No: 3330 5628 Date:	Recommended: Name: Andrew Chesterman Position: DG, DEHP Tel No: 3330 6298 Date:
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Memorandum



Queensland Government
Environmental Protection Agency
Incorporating the
Queensland Parks and Wildlife Service

Enquiries Sel Sultmann
Telephone (07) 3277 6805
Your reference -
Our reference BNE17014

10 March 2008

To: Wolf Sievers, Director Queensland Parks and Wildlife Service.

From: Sel Sultmann, Principal Planner

Through: John Lane, Director Integrated Planning

Subject: EPA Position on Bribie Island Erosion Management

Severe weather conditions since Christmas 2007 has caused extensive erosion on northern Bribie Island. A low area of the island opposite Bells Creek has suffered extensive wave overwash and is at risk of an ocean break-through if further severe conditions are experienced on a spring tide.

A report on the history of erosion on Bribie island and the and the risk of an over-wash event causing a new entrance to develop up to 5 kilometres south of the existing Caloundra Bar is attached.

Formation of a new entrance could cause profound changes to Pumicestone Passage and significantly affect the adjacent communities of Caloundra and Golden Beach. However, management of the issue need to consider the conservation values of Bribie Island National Park.

The attached report details an agreed EPA position on the issue. It also proposes immediate reconstruction of the foredune at the wash-over area to delay any ocean break-through until a Caloundra City Council risk analysis can be completed. This position is summarised below:

1. Present day erosion on Bribie Island National Park is considered a natural process and the Agency is committed to preserving the areas natural condition and dynamic processes.
2. Any threat to development on Golden Beach from natural coastal processes should be addressed by site-specific works to protect the development, rather than interference with coastal processes on Bribie Island and Pumicestone Passage.
3. Decisions and financial responsibility for any development protection works should lies with the development owner.
4. Where it can be clearly demonstrated that any ocean breakthrough will have a significant adverse impact on the socio-economic aspects of the Golden Beach/Caloundra community and which cannot be addressed by site specific works, then a broader solution may need to be investigated.

5. In the short-term while Caloundra City Council is completing a risk assessment study, it would be prudent to minimise the ocean breakthrough risk by undertaking minor dune rebuilding works where necessary to act as a wave over-wash barrier on Bribie Island opposite Bells Creek.

Your agreement is sought on:

1. The EPA position on Bribie island Erosion as described above which will form the basis for future discussions with Caloundra City Council and media responses;
2. Immediate commencement of foredune reconstruction works at the present wash-over area as described in the attached report; and
3. The attached draft Briefing note to the Director-General.

Sel Sultmann
Principal Planner

**ENVIRONMENTAL PROTECTION AGENCY
DIRECTOR-GENERAL'S GENERAL BRIEFING NOTE**

TITLE: Northern Bribie Island Erosion and Ocean Breakthrough

Date: 10 March 2007

1. RECOMMENDATION

- That the Director-General:
 - Note the requirement to undertake foredune reconstruction works on Bribie Island National Park as a precautionary measure to delay an ocean breakthrough at a critical point opposite Bells Creek and
 - approve funding expenditure of \$25,000 for this purpose.

2. ISSUES

- Repeated severe weather events since Christmas has caused up to 15m of erosion on eastern Bribie Island and a section of dune opposite Bells Creek has been severely eroded to the extent that an ocean breakthrough may occur here if further severe weather is experienced.
- EPA officers have investigated this area and finalised a report which describes coastal processes and recommends an agreed EPA position on the erosion issue (Attachment 1).
- Erosion processes on Bribie Island are natural events and the EPA does not generally support any interference with these processes despite the widespread damage to dunes and vegetation and public criticism.
- Formation of a new entrance to Pumicestone Passage at this location may have significant adverse impacts on the adjacent communities of Golden Beach and Caloundra on the western side of the Passage and it would be prudent for EPA to take action now to delay the breakthrough until Caloundra City Council has undertaken a detailed risk assessment study of the impact of a breakthrough on these communities.
- No works need to be undertaken at other vulnerable locations on the island as it is considered that an ocean breakthrough further north would have minor impact on the community.
- Proposed works are expected to cost up to \$25,000 and will require an IPA development approval prior to commencement, which may take up to 4 weeks.

3. BACKGROUND

- A general briefing note on this subject was provided on 7 February 2008.

4. CONSULTATION

- Wolf Sievers, Director, QPWS
- David Robinson, Director Coastal Sciences, Environmental Sciences Division

.....
Tony Roberts
Executive Director

Date:

Executive Director's comment:

Director-General's comments

Action Officer: Sel Sultmann
Position: Principal Planner
Telephone: 32276805

Director: John Lane

Correspondence No: BNE2008/3657
File No.: BNE17014

\\bnefp01\Env\Common\Director-General BN & Corro\2008\DG Briefing Notes\Brief Bribie Is dune

5. In the short-term while Caloundra City Council is completing a risk assessment study, it would be prudent to minimise the ocean breakthrough risk by undertaking minor dune rebuilding works where necessary to act as a wave over-wash barrier on Bribie Island opposite Bells Creek.

Your agreement is sought on:

1. The EPA position on Bribie island Erosion as described above which will form the basis for future discussions with Caloundra City Council and media responses;
2. Immediate commencement of foredune reconstruction works at the present wash-over area as described in the attached report; and
3. The attached draft Briefing note to the Director-General.

Sel Sultmann
Principal Planner

REPORT ON:

Implication of Coastal Erosion for Northern Bribie Island and an Agreed Position on Future Management

Introduction

In 1997 the EPA identified a significant emerging erosion issue on Bribie Island. A long-term trend of erosion of the eastern shoreline was confirmed and, as the island progressively narrowed over time, it was predicted that one or more ocean breakthroughs of the island would occur. It was further predicted that a new entrance would form at the ocean breakthrough and that the existing entrance (Caloundra Bar) would close up due to the relative hydraulic efficiencies of the entrances. A copy of this report is presented as Attachment 1.

At that time, 4 narrow points along the northern 5 kilometres of the island were identified as potential breakthrough points and these locations have been closely monitored (Figure 1).

A series of severe weather events in December 2007 to present has seriously erode Bribie Island again causing a loss of 10m to 15m of dune from sea erosion and widespread wave over-topping events.



Photo 1: Typical wave over-wash and death of tea-tree forest from salt and sand burial on low dunes at Bribie Island.

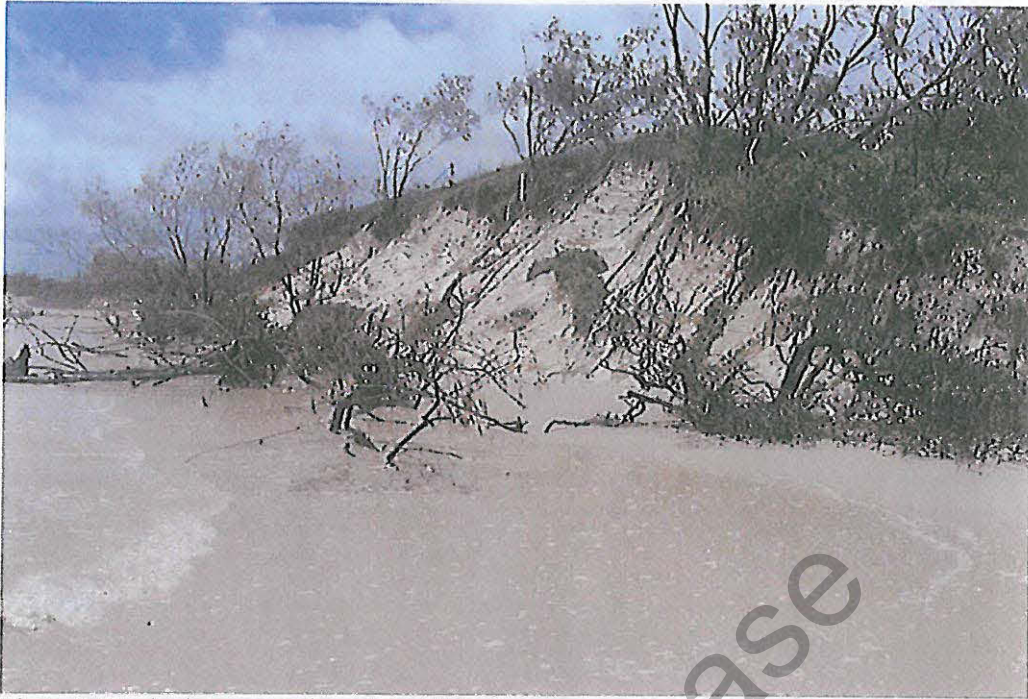


Photo 2: Typical dune erosion along high dunes

Erosion and wave over-wash at a site opposite Bells Creek has lowered and narrowed the dunes to the extent that now has the potential to break-through and form a new entrance.



Photo 3A: Wave overwash area at Site 2. Dune width here is 35m back to mangrove. Note wave foam up to 1m deep.

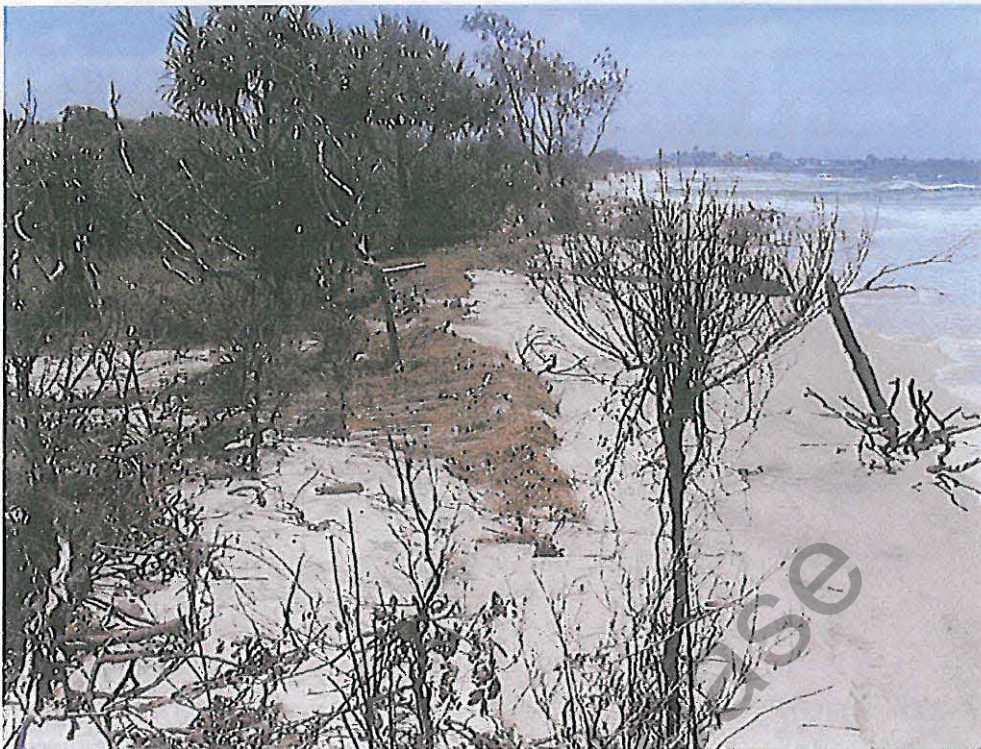


Photo 3B: Wave overwash area at Site 2. Dune width here is 35m back to mangrove.

Report

1. Background

An ocean break-through of Bribie Island is now tangibly real. The island is now less than 40m wide at 2 locations and both have experienced major wave overtopping events over the last 2 years. The local community is becoming increasingly aware of the reality of this emerging event and are concerned at the implications for development and infrastructure on the western side of the passage.

The local media regularly reports on the issue and information in the media confirms that there is a poor understanding of the real impacts of such an event and a strong belief that something has to be done to stop it and done soon. Caloundra City Council has formed the Pumicestone Passage Advisory Taskforce (PATT) to investigate the matter and report to Council. PATT includes 2 local Members of Parliament and the Deputy Mayor, and 2 EPA officer amongst other stakeholders. However, PATT will be dissolved with the upcoming Council amalgamations.

The objective of this report is to present up to date information on the issue and to formalise a whole of Agency position on the issue.

2. Current status of erosion

Annual sand loss has been estimated to be between 30,000 to 144,000 cubic metres per year along the northern 5 kilometres, which has narrowed by up to 100m since 1948 (see Figure 3). The island is not a uniform width and 4 narrow areas have been

identified which, as erosion continues, will be the locations of ocean break-throughs. Progression of erosion at these 4 narrow areas over the last 50 years is shown in Figures 3, 4, 5 and 6. A graph of the erosion trends at all sites is presented as Figure 7.

The trend of island narrowing is clear and unequivocal and will not halt or reverse. A simple explanation of the erosion trend is that:

- it appears to be a long term process measured in the hundreds and perhaps thousands of years.
- northern Bribie Island is a transition point for the direction of longshore transport in the region and sand from here is lost to the north and south along the open coast, and also into Pumicestone Passage by tidal flow (Figure 8).
- there is no riverine or nearshore supply of sand to replenish this loss
- it is a wholly natural process
- it is unrelated to sand extraction from Moreton Bay or to the dredging of shipping channels.

3. Expected changes

Any ocean break-through across Bribie Island will form a new entrance to Pumicestone Passage and it is highly likely that it will become the dominant entrance due to greater hydraulic efficiency. The existing entrance may well close up as sand stored in the ebb tide delta moves onshore as tidal flows reduce with a second entrance. A longer term (20 to 50 years) scenario is for northern Bribie Island to break up into several islands and sand bar complexes, and for these to slowly migrate westward.

The most likely nearterm scenario as the coastline recedes is for a new entrance to form south of the Blue Hole (Scenario 1) or opposite Bells Creek (Scenario 2) and for the existing entrance to close up. These are briefly discussed below:

Scenario 1: (south of the Blue Hole)

At this location any new entrance will be located just south of the most southerly recorded migration of the existing entrance (Figure 1). The area in Pumicestone passage is predominantly sand banks which are regularly reworked by tidal channel migration and strong tidal flows. The western foreshore is 1.2km to the west, has clean sandy beaches and is separated from the possible new entrance by 800m of shallow sand banks exposed at low tide. These will provide a high level of protection to the western foreshore from any oceanic wave penetration. Any new entrance is expected to slowly migrate northward once formed. With an entrance at this location the character and amenity of northern Pumicestone passage will be maintained. Economic, social and recreational impact is rated as low to moderate.

Scenario 2: (opposite Bells Creek)

At this location any new entrance would be immediately opposite Bells Creek (Figure 1) which is the southern limit of urban development on the western foreshore. The passage here is a low energy environment comprising muddy to sandy sediments with mangrove dominating the foreshore and intertidal islands. The western foreshore is generally very low, being typically 0.5m to 1.0m HAT. The western foreshore is narrow sandy beaches with muddy intertidal areas, and with mangrove frequency increasing to the south. Formation of a new entrance at this location is likely to cause a

significant reworking of the existing mangrove landforms, increased tidal flows, development of new channels and an increase in tide height locally which may impacts on the adjacent low lying coast. There may also be significant landform changes to the most northern end of the passage as the existing entrance closes over and tidal flows are significantly reduced. This may well result in an increase in muddy sediment deposition and mangrove colonisation along northern Golden and Bulcock beaches.

4. Management Options

Provided below are a range of management options for the erosion on Bribie Island. These are presented as **technical solutions only** and are dealt with superficially to give a first pass view of the scale and cost of management.

(i) Do Nothing

This option is consistent with the EPA's view that natural processes in National Parks continue uninterrupted, and recognises that the widespread dune erosion and destruction of vegetation is part of the process of sand island morphological change over time. This is not perceived by the EPA as an "environmental loss" or a destructive process.

(ii) Minimise human activity which may accelerate breakthrough processes.

Human activity including pedestrian impact, camping, and 4WD use in vulnerable areas can destroy vegetation, lower dune level and trigger wind erosion. These impacts can then accelerate wave over-wash and ocean breakthrough processes. QPWS has recognised this and has previously taken action including closure of the area to vehicle traffic. Further works including pedestrian control fencing and signage may be needed if human impact becomes a problem. Cost of such works is probably less than \$5,000/year and installed only as required.

(iii) Delay any ocean break-through by constructing wave over-wash barriers at vulnerable locations.

The first stage of an ocean break-through and development of a new entrance is wave overtopping of the dunes with wave over-wash flowing across the island into Pumicestone Passage. Wave over-wash can be prevented by reconstructing a dune ridge from locally derived sand and revegetation the area. Required sand volumes are up to 500 cubic metres and an indicative construction and revegetation cost is \$20,000. Technical details of this are presented in Attachment A.

(iv) Prevent breakthrough at locations south of Lamerough Canal by constructing significant dunal barriers.

This option recognises that the formation of a new entrance north of Lamerough Canal would be "business as usual" in terms of geomorphological, social and economic changes, but south of Lamerough Canal, the adverse impacts could be significant. Constructing a dunal barrier at the narrow points would effectively widen the island and delay any breakthrough for 10 to 20 years. Required sand volumes are in the order of 3000 - 6000 cubic metres and an indicative construction and revegetation cost of up to \$100,000

(v) Halt erosion on northern Bribie Island and rebuild the dunes on the eastern beach by sand pumping

The long term rate of sand loss from this area has been variously estimated at between 50,000 to 144,000 cubic meters per year. A beach nourishment campaign to replace 10 years of sand loss would cost in the order of \$5M to \$15M and require an annual provision of \$0.5M to \$1.5M to replace lost sand.

(vi) Halt erosion on Bribie Island by construction of hard protection works on the eastern beach.

Hard protection works such as rock walls would be required over some 4km of eastern Bribie Island to stop shoreline recession and would cost an estimated \$20M. Construction of protection works only at the narrow points would not be a success.

5. EPA interests and policy position

Bribie Island National Park was gazetted under the Nature Conservation Act and is managed to –

- (a) *As the cardinal principle*, provide, to the greatest possible extent, for the permanent preservation of the area's natural condition and the protection of the area's cultural resources and values; and
- (b) present the area's cultural and natural resources, and their values; and
- (c) ensure that the only use of the area is nature based and ecologically sustainable.

Specifically, Principle 2 of the document "Master Plan for Queensland's Park Systems" provides:

as far as practicable and unless specifically decided otherwise in relation to particular areas, conservation will aim for the maintenance of the dynamic landscape and vegetation system of an area in its "natural state", which might be as it was when acquired or as it was before the influence of European settlement (recognising the changes through time and space in natural systems).

Principal 5 of this document also provides that Parks will be managed in the context of surrounding landscapes with consideration of local community needs and aspirations. To uphold this principle, QPWS aims to ensure that issues and problems between Parks and neighbouring properties are considered in park management.

With respect to the erosion on Bribie Island, EPA should view this as an entirely natural process and allow such processes to continue, irrespective that some in the community may view this as massive destruction of the natural environment. Similarly, managing such natural processes to avoid impact on the developed western foreshore of Golden Beach, or to maintain the status quo in the passage, should not be considered a responsibility of the EPA.

The EPA may need to acknowledge that where the scale or extent of any changes on Bribie Island/Pumicestone Passage will have a significant adverse impact on the adjacent community, and where this cannot be dealt with by a site specific management, a broader solution including the National Park need to be investigated as a last resort.

6. North Bribie Island Erosion Issue – Agreed Agency Position

The EPA adopts the following position for managing erosion on Bribie Island.

- (i) Present day erosion on Bribie Island National Park is considered a natural process and the Agency is committed to preserving the areas natural condition and dynamic processes.
- (ii) Any threat to development on Golden Beach from natural coastal processes should be addressed by site-specific works to protect the development, rather than interference with coastal processes on Bribie Island and Pumicestone Passage.
- (iii) Decisions and financial responsibility for any development protection works should lie with the development owner.
- (iv) Where it is clearly demonstrated that any ocean breakthrough will have a significant adverse impact on the socio-economic aspects of the Golden Beach/Caloundra community and which cannot be addressed by site specific works, then a broader solution may need to be investigated.
- (v) In the short-term while Caloundra City Council is completing a risk assessment study, it would be prudent to minimise the ocean breakthrough risk by undertaking minor dune rebuilding works where necessary to act as a wave over-wash barrier on Bribie Island opposite Bells Creek (see Figure 1 and Attachment A).

The above position is consistent with the State Coastal Management Plan – Queensland Coastal Policy and the QPWS document “Master Plan for Queensland’s Park Systems”. Moreton Bay and Pumicestone Passage are within the Moreton Bay Marine Park. Consideration would need to be given to the requirements of the Moreton Bay Marine Park Zoning Plan for any works or activities in the Marine Park.

Recommended Actions

- 1. The EPA adopt the above position for managing erosion on Bribie Island
- 2. The foredune at the over-wash area on Bribie Island opposite Bells Creek be reconstructed as soon as possible to form a wave over-wash barrier and delay any possible ocean break-through as per Attachment A.
- 3. QPWS monitor wave over-wash areas and take action to prevent damage by pedestrian or recreational activities.
- 4. EPA continue to support the Pumicestone Passage Advisory Taskforce as the primary entity progressing a management strategies for coastline change in Pumicestone Passage and public education and awareness of the issue.

Sel Sultmann
Principal Planner
Strategy and Policy Division

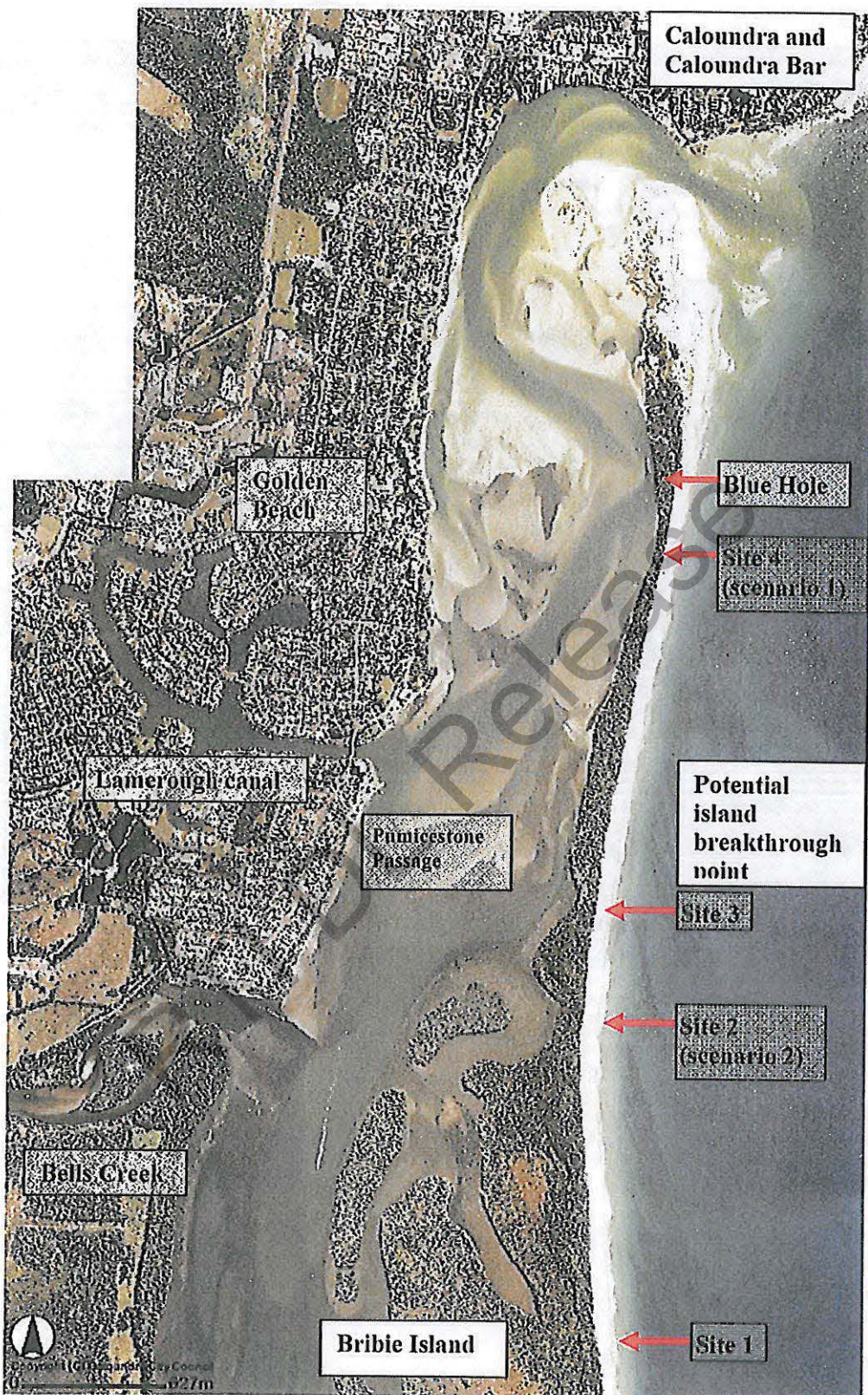


Figure 1: Location Plan -Northern Bribie Island, Caloundra

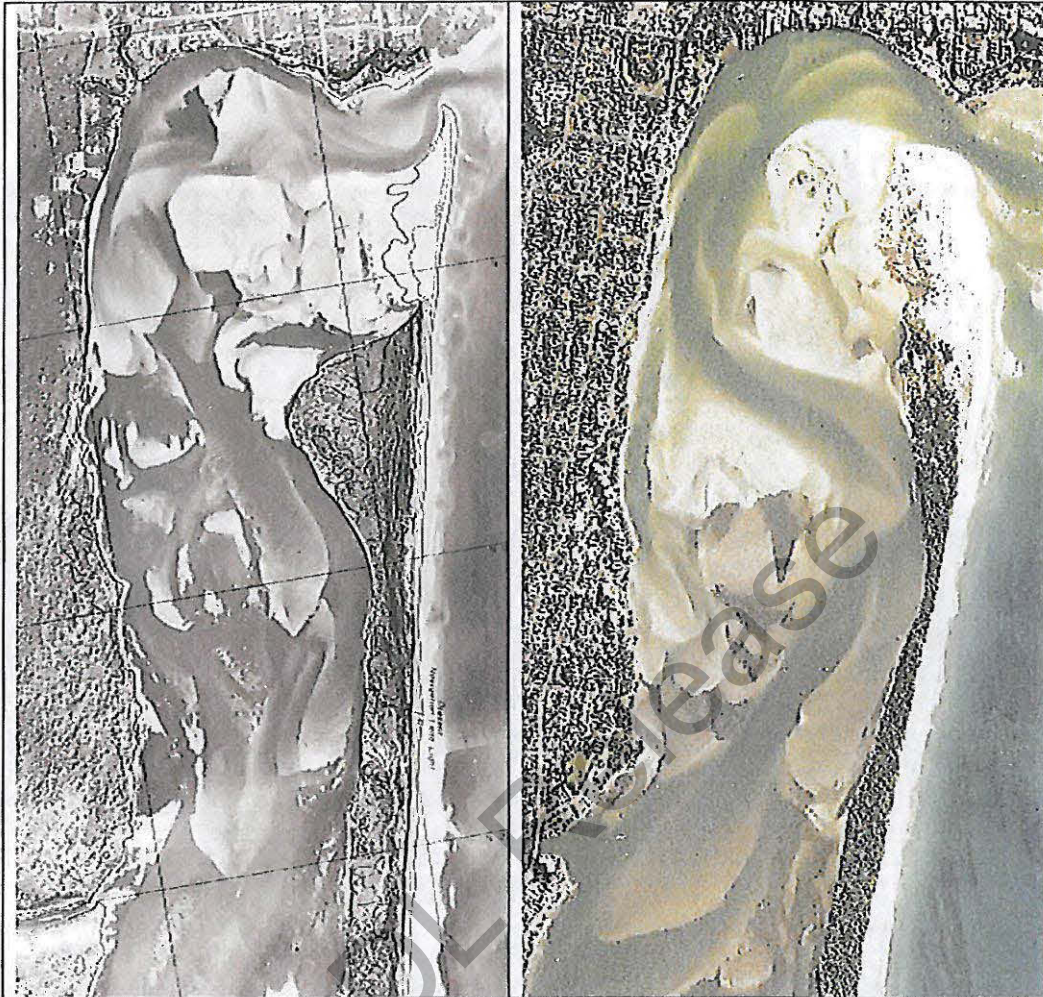
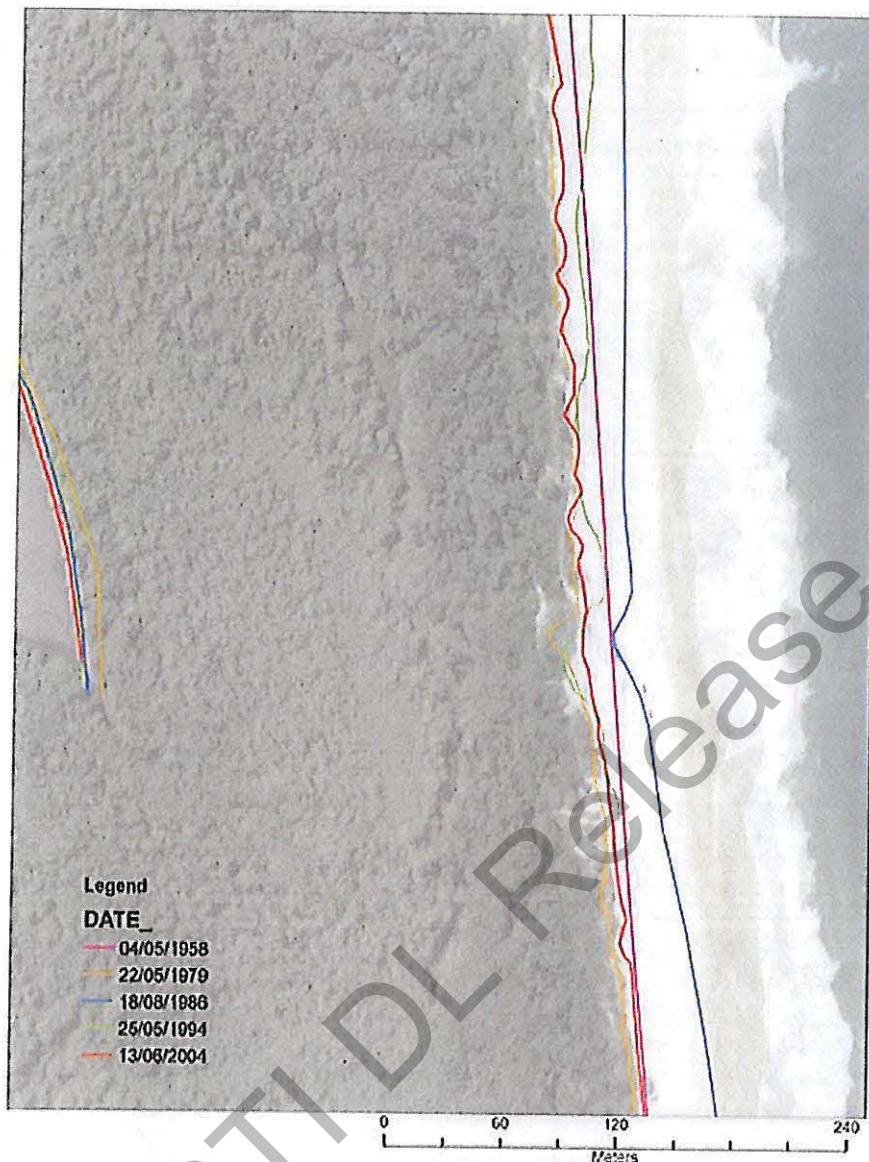


Figure 2: Comparison of Bribie Island size in 1948 and 2007 to demonstrate island narrowing by erosion.



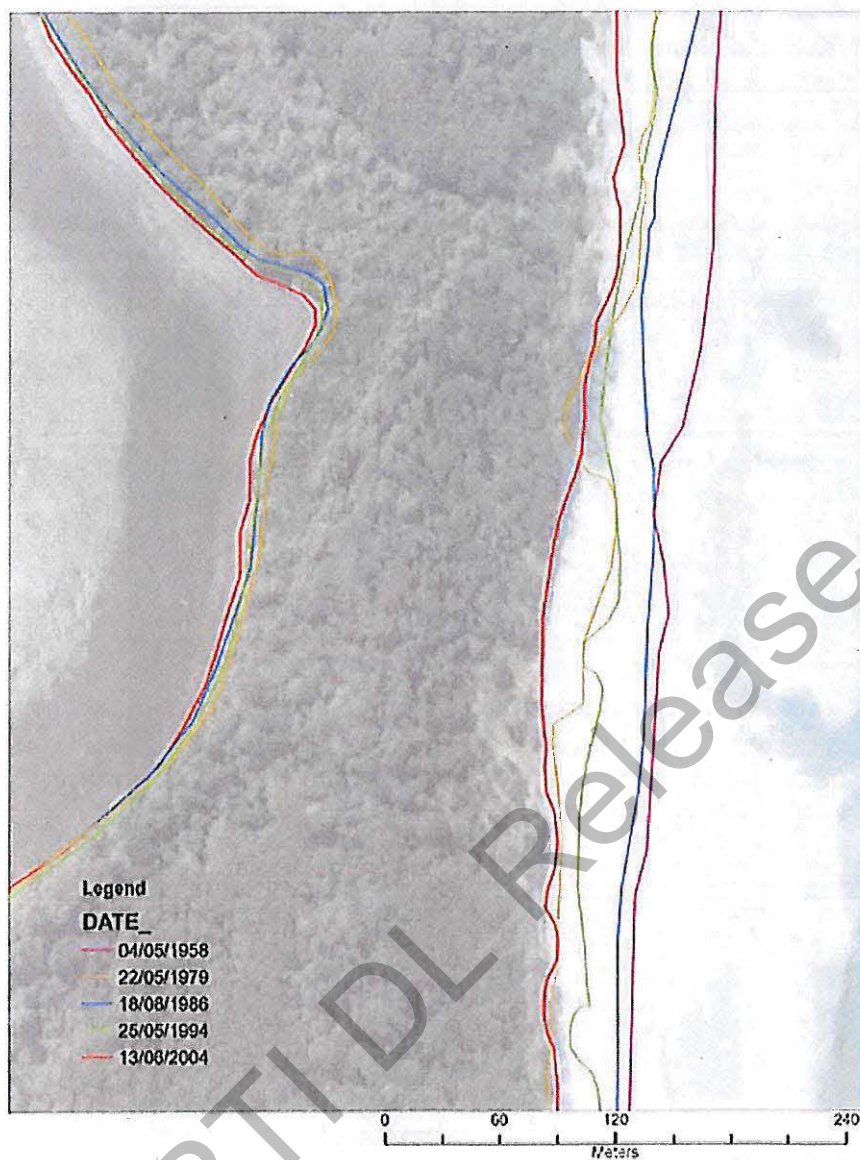
Data Source: Environmental Protection Agency

Produced June 2006

Site: North Brice Island - Site 1



Figure 3: Shoreline position changes at Site 1



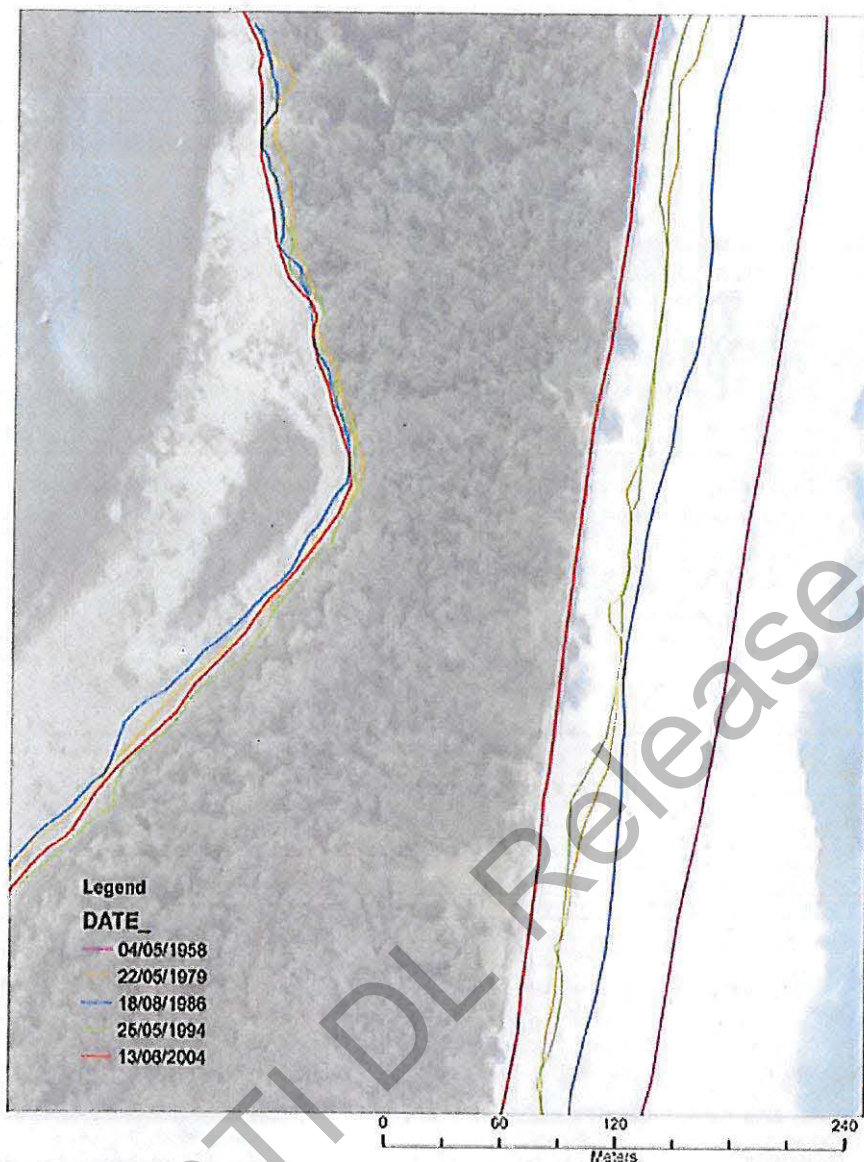
Data Source: Environmental Protection Agency

Produced: June 2000

Site: North Brice Island - Site 2



Figure 4: Shoreline position changes at Site 2



Data Source: Environmental Protection Agency

Produced June 2005

Site: North Dribble Island - Site 3

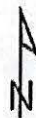
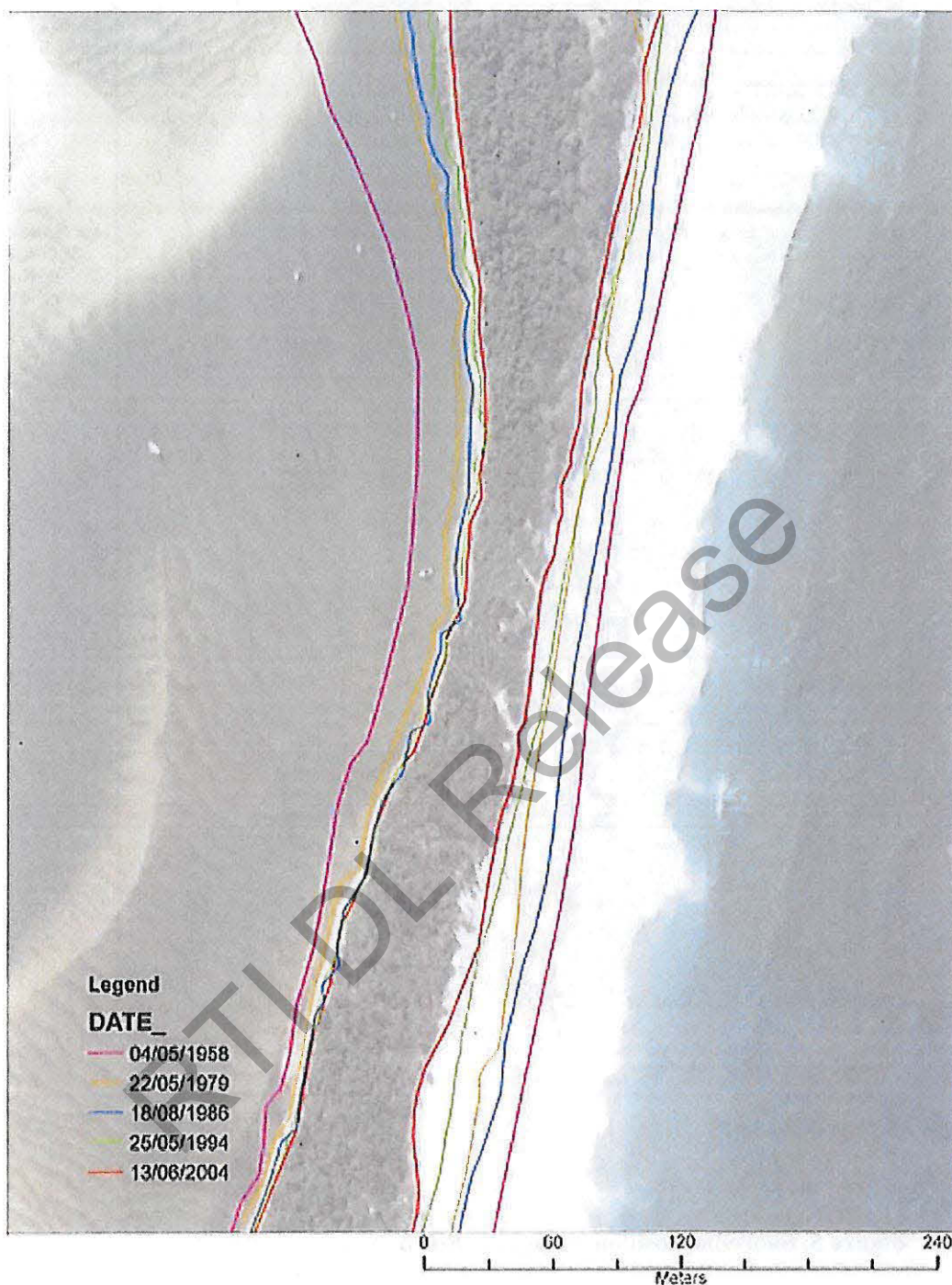


Figure 5: Shoreline position changes at Site 3



Data Source: Environmental Protection Agency

Produced: June 2006

Site: North Drabie Island - Site 4



Figure 6: Shoreline position changes at Site 4

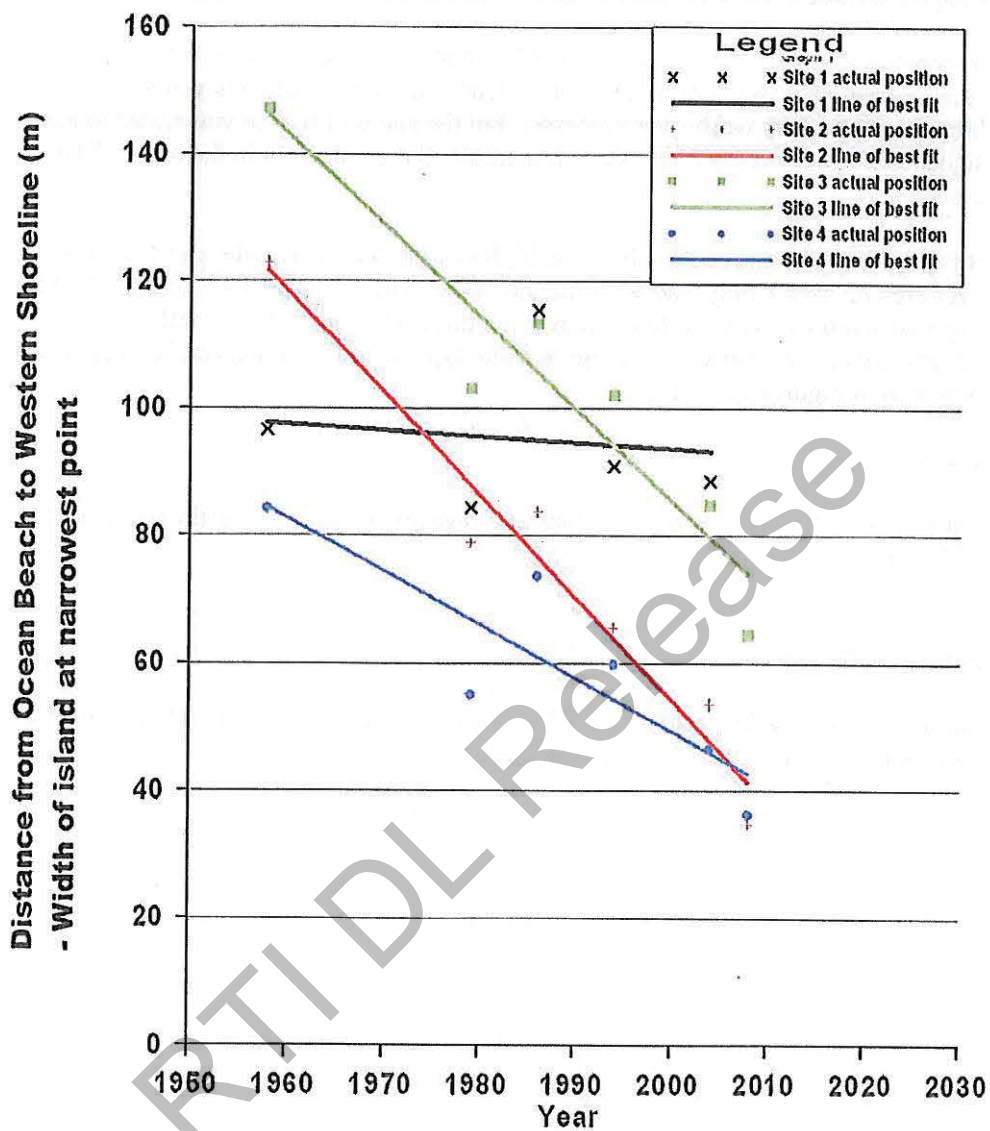


Figure 7: Shoreline erosion trends at the 4 narrow areas

Attachment A

Proposed dune reconstruction works – Site 2 northern Bribie Island

Reconstruction of the foredune at Site 2 is proposed to act as a wave over-wash barrier during future storm events (refer Figure 1). This should delay any ocean break-through from wash-over processes, but the site will still be vulnerable to any significant storm events where there is a substantial erosion cut in the order of 10-20m.

It is proposed to remove sand from the high dune to the immediate south of the wash-over area by excavating sand from the toe of the dune (see photo 5). Slumping of the exposed scarp face is expected to retreat the dune by up to 1.5m. Details of the proposed works are provided in Figure 8 and typical cross-sections and a long-section is shown in Figures 9 and 10.

Costs

Estimated costs to reconstruct the dune and revegetate the area is estimated at up to \$20,000.

Approval Requirements

An Integrated Development Act 1097 development permit is required before works can commence. This may take up to 4 weeks.

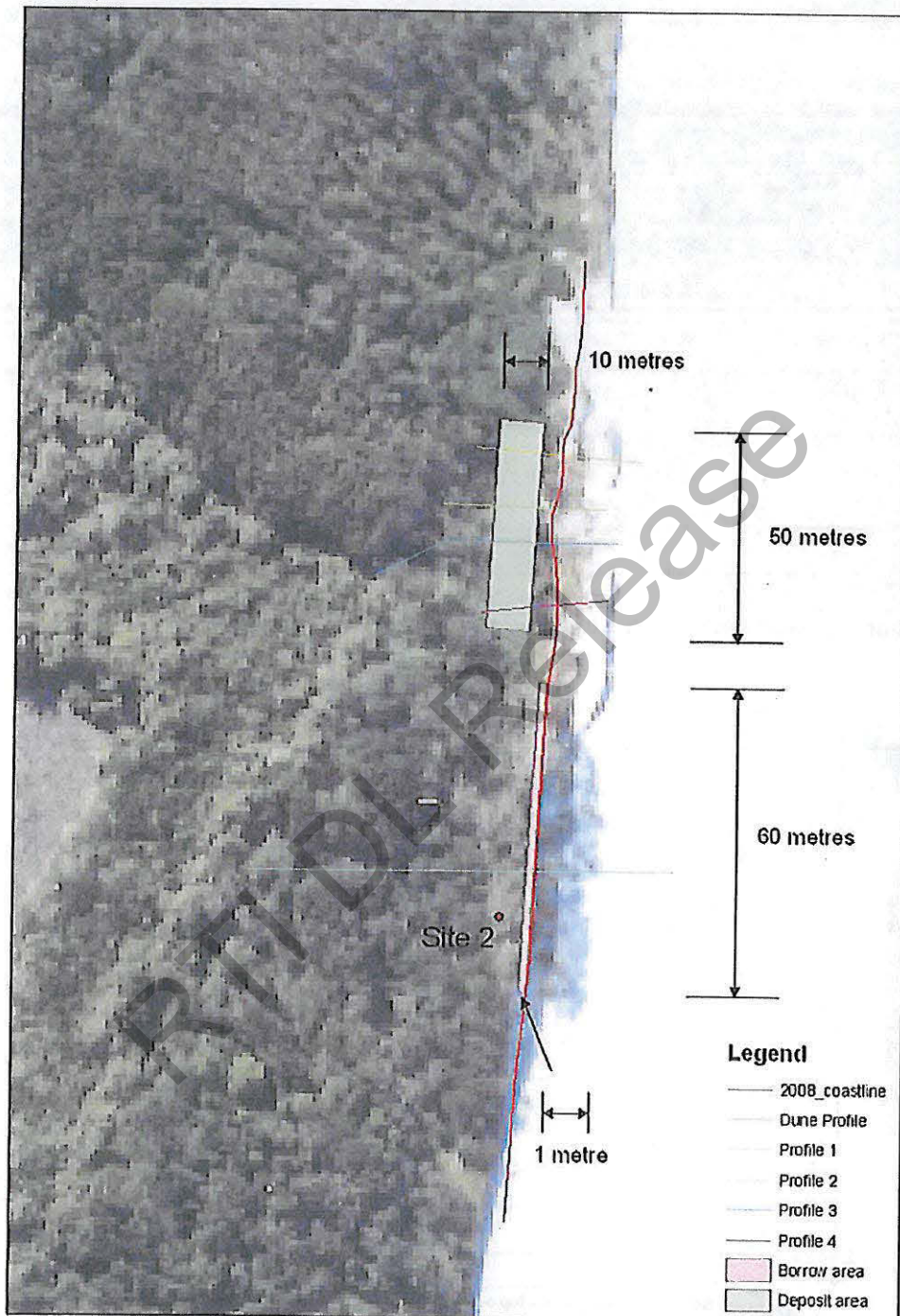


Figure 8: Plan view of the foredune reconstruction site at Site 2.



Photo 5: Sand borrow area to the immediate south of wash-over.

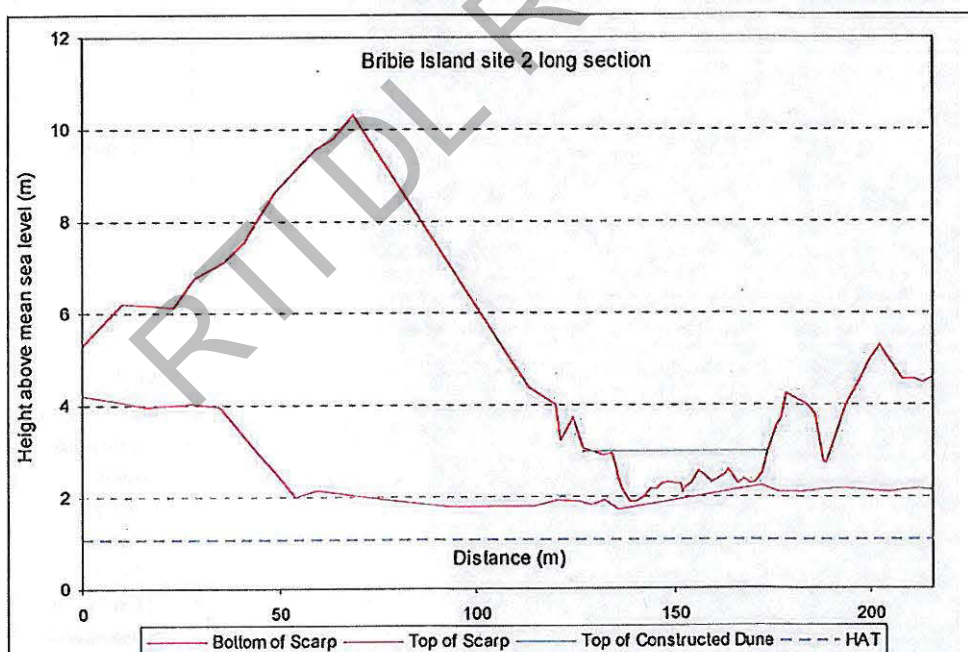


Figure 9. Dune cross-sections at Site 2

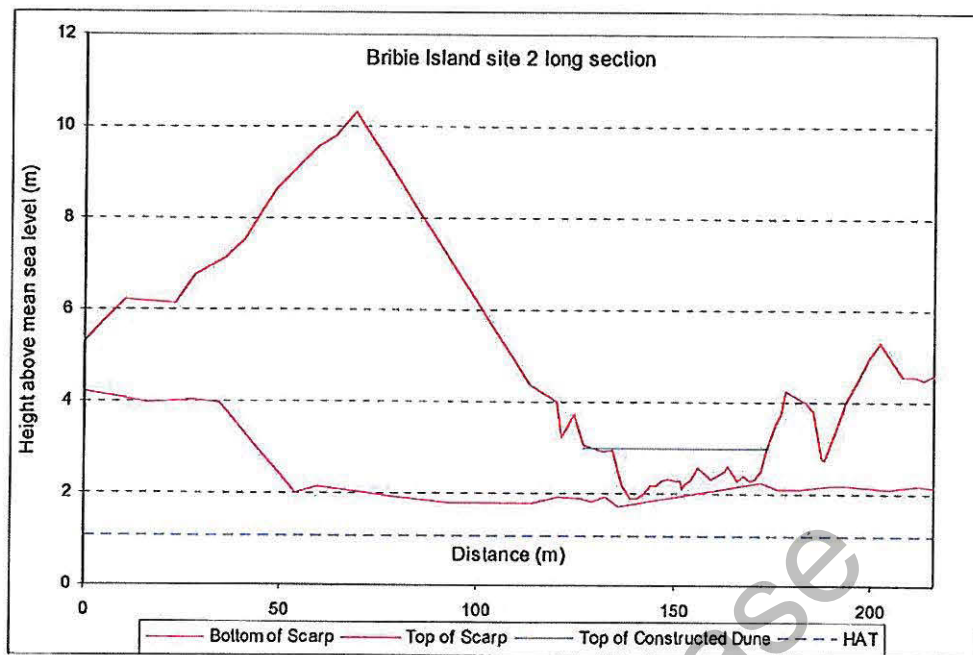


Figure 10: Dune long-section at Site 2.

Attachment 2:
Photos of recent sea erosion on northern Bribie Island.



Photo 1: World War 2 bunkers exposed by sea erosion with shoreline retreat into tea-tree swamps.

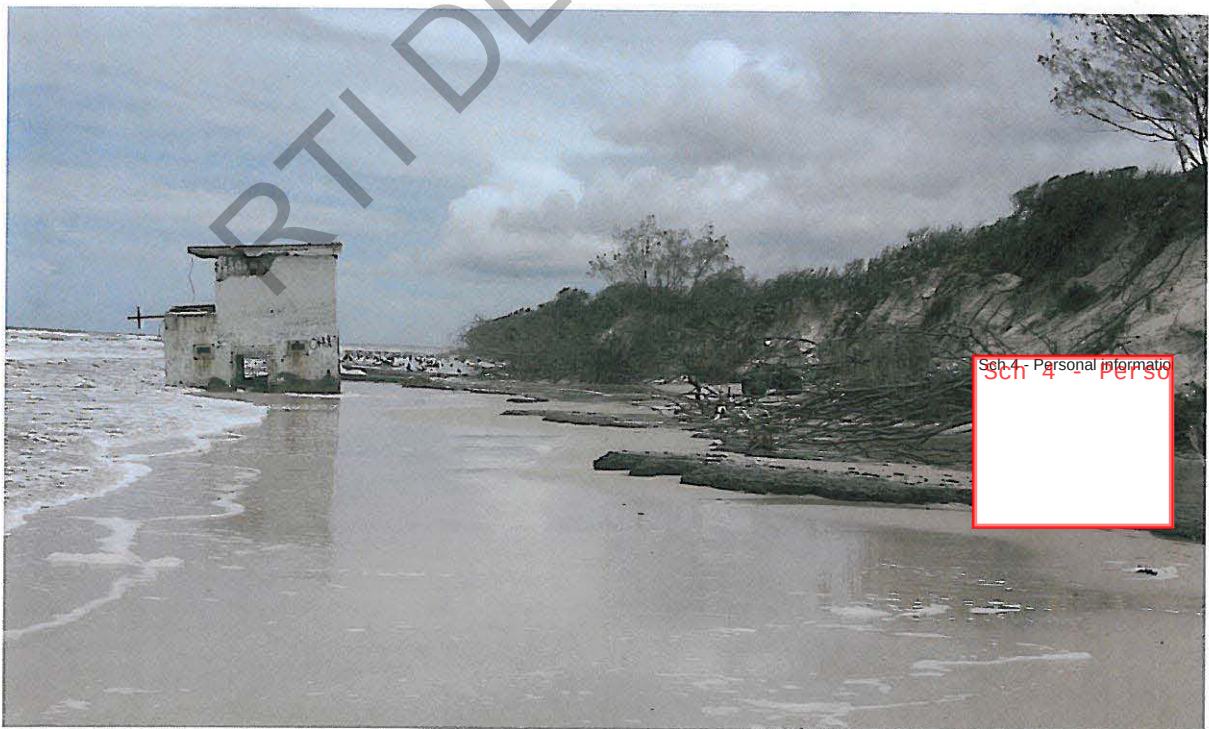


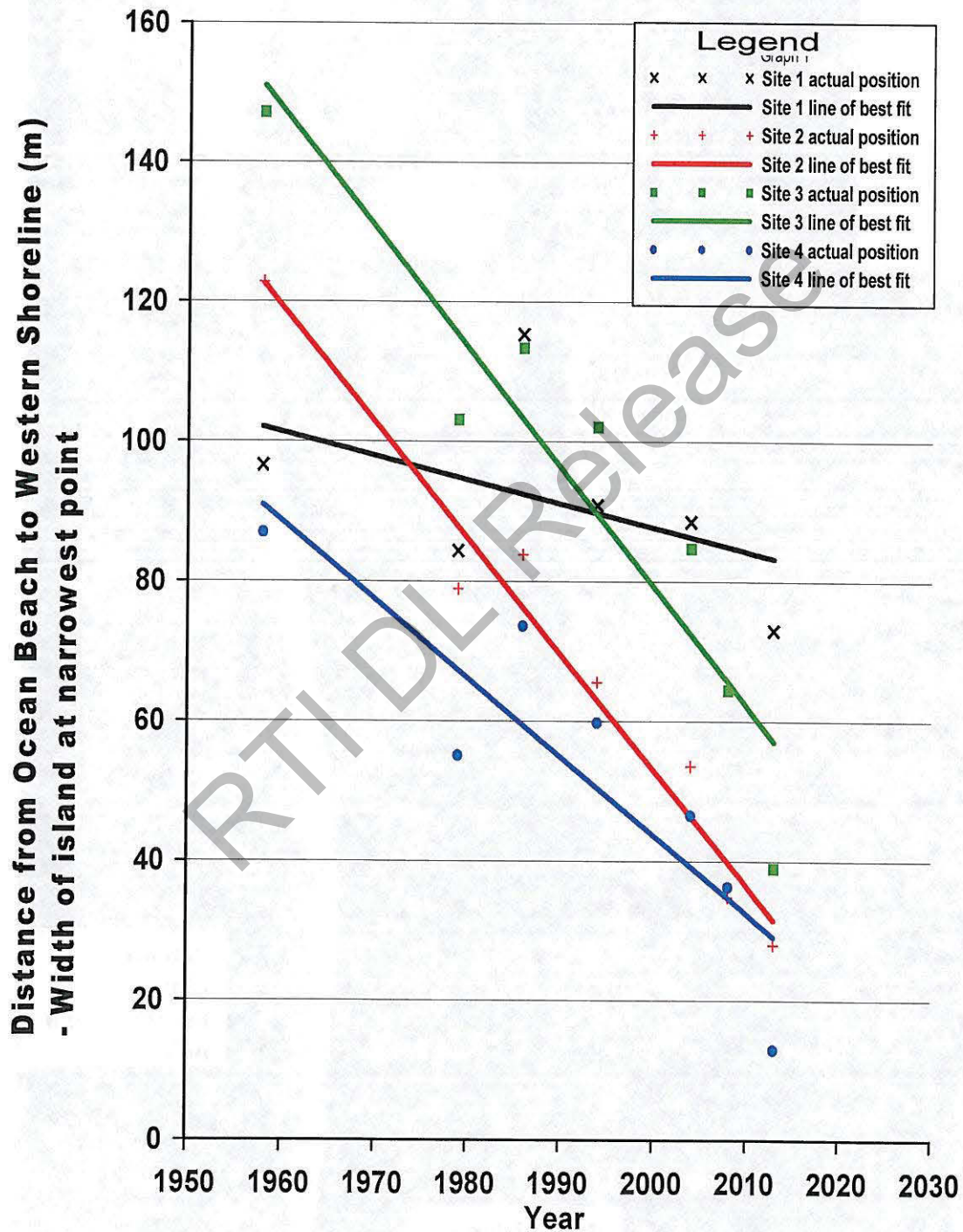
Photo 3: Expose World War 2 bunker showing extent of shoreline recession into high dunes.

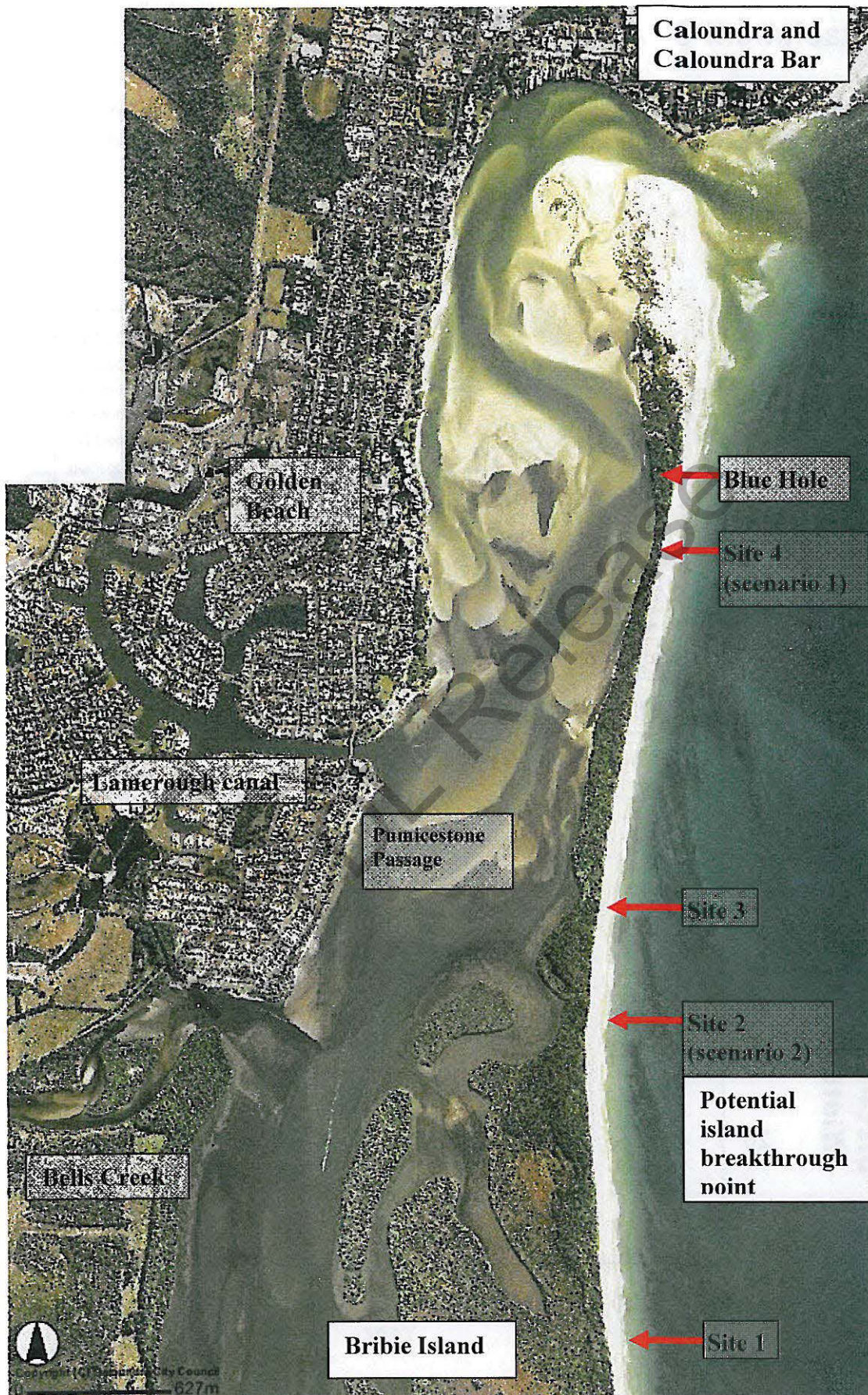


Photo 3: Typical conditions at site 4 at high tide.

Attachment 3

Historical erosion trends at 4 potential ocean breakthrough locations on Bribie Island – refer to second page for site locations.





Location Plan -Northern Bribie Island, Caloundra

Attachment 4:
Photos of recent sea erosion on Northern Bribie Island.



Photo1: Bribie Island at its narrowest point at site 2 following erosion by cyclone Oswald in February 2013– dune some 30m wide

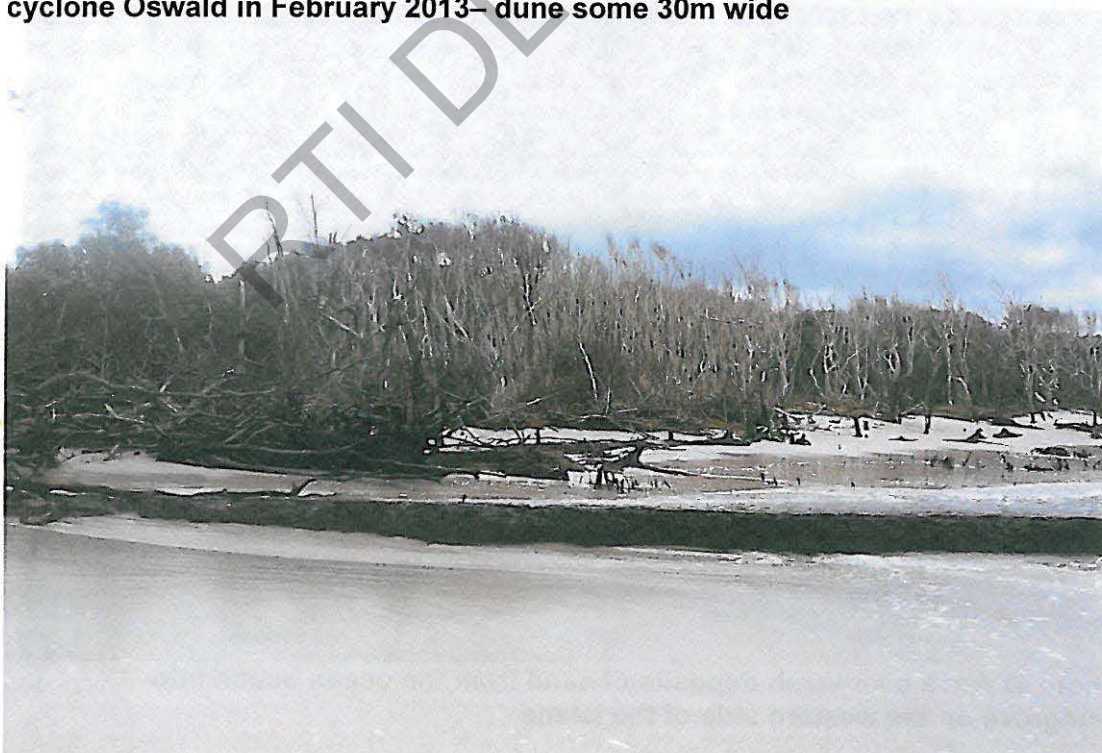


Photo 2 : Site 2 above in April 2013 showing complete destruction of the foredune ridge and beach level drop exposing ancient peat beds.



Photo 3: View of site 2 from the high water mark on the eastern beach looking into mangrove in Pumicestone Passage.



Photo 4: Wave over-wash deposits of sand from the ocean beach into mangrove on the western side of the island



Hon Andrew Powell MP
Minister for Environment and Heritage Protection

Ref CTS 05181/13

2 APR 2013

The Honourable Jann Stuckey MP
Minister for Tourism, Major Events,
Small Business and the Commonwealth Games
GPO Box 1141
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Dear Minister 

Thank you for your letter received on 15 March 2013 concerning the erosion problems of the Gold Coast's beaches.

The Department of Environment and Heritage Protection has a long history of providing technical advice to the Gold Coast City Council and other councils to manage coastal erosion issues and will continue to do so. For example, the department is currently represented on the steering committee overseeing the preparation of the Palm Beach Shoreline Project Feasibility Study. However, over the years the council has established considerable in-house coastal management expertise and has also entered into knowledge share arrangements with Griffith University and partnered with the university to form the Griffith Centre for Coastal Management. This centre undertakes important research and provides high level technical and engineering advice about coastal management to the council.

In 1973, the government and the council agreed on a scheme of works for the restoration and management of erosion on Gold Coast beaches which is still applicable today. This scheme of works is a plan for reconstructing beaches and dunes with dredged sand to recreate a natural dunal buffer zone to protect development adjacent to the coast located in high erosion risk areas, and to preserve beaches for public use. However, the scheme of works originally agreed to is still well short of completion. Government policy on coastal management has ensured that more recent urban development in places like the Sunshine Coast, Hervey Bay and Agnes Water has been set back outside of declared erosion prone areas to ensure such problems are avoided in the future.

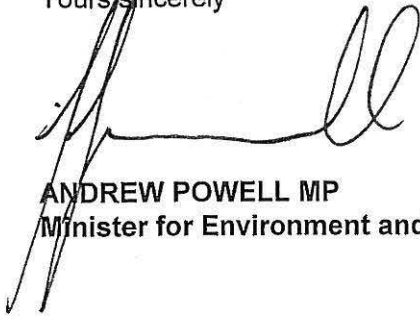
With respect to your query as to whether the department is able to examine the feasibility of works to mitigate impacts of extreme weather events, the department considers this a responsibility of local government and the affected property owners. Council has developed a sophisticated approach to coastal management as evidenced in its recently released Gold Coast Shoreline Management Plan. To progress the implementation of this plan, the 'Gold Coast Ocean Beaches Strategy 2012-2022' is soon to be released for public comment.

Again, I reiterate that the department can assist the council in development of shoreline erosion management plans for beaches under threat especially with respect to regulatory requirements. However, the department only has three coastal management experts and, given the demand for such expertise, prioritises this assistance to less resourced councils which also face major coastal management issues; for example, the communities of Torres Strait and Cassowary Coast.

Unfortunately, the department does not have a fund to support the implementation of beach protection works on the Gold Coast or elsewhere. To date, councils have generally been required to meet the costs of coastal erosion management.

I hope this information is of assistance. Should you have any further enquiries, please contact my Chief of Staff, Mr Troy Collings on 3239 0844.

Yours sincerely

A handwritten signature in black ink, appearing to read 'A. Powell', with a long horizontal stroke extending to the right.

ANDREW POWELL MP
Minister for Environment and Heritage Protection

RTI DL Release

MINISTER FOR ENVIRONMENT AND HERITAGE PROTECTION

ACTION SHEET

MINISTER'S OFFICE USE

- ☒ Minister Reply
☐ Chief of Staff Reply
☐ Briefing Note

- ☐ Departmental Response
☐ Department Action
☐ Department Information

☐ Refer to: _____

☐ No Further Action Required

- ☐ Copy to
 ○ Director-General

Comments:

Signature: GS Date: 15/3/13

MECU USE

TO: _____ Dept Ref: CTS _____/____ Due Date to MECU _____/____/____

RELATED CORRESPONDENCE: _____

DEPARTMENTAL OFFICER COMMENTS:



Minister for Tourism, Major Events,
Small Business and the Commonwealth Games

Level 26
111 George Street Brisbane 4000
GPO Box 1141 Brisbane
Queensland 4001 Australia
Telephone +61 7 3224 2001
Facsimile +61 7 3003 0229
Email tourism@ministerial.qld.gov.au

The Honourable Andrew Powell MP
Minister for Environment and Heritage Protection
GPO Box 2454
Brisbane QLD 4001

Dear Minister,

As you are no doubt aware, recent weather conditions have had a significant impact on the state of Gold Coast beaches. This has resulted in ongoing negative media coverage, with the Gold Coast Bulletin initiating a daily campaign for the State Government to contribute financially to addressing the issue.

As Mayor Tom Tate has acknowledged, responsibility for the maintenance, clean-up and restoration of the beaches lies with Gold Coast City Council. That is a position I have emphasised in the many media interviews I have conducted over the past 2-3 weeks.

However, immediate beach replenishment and restoration is just one aspect of the issue. Gold Coast beaches are regularly subject to erosion, most often during the summer cyclone season which generates high seas and extreme weather conditions.

Gold Coast City Council is exploring longer term options which could mitigate against the effects of extreme weather, and provide a level of protection for the region's beaches which are an important part of the Coast's tourist appeal.

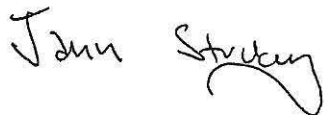
These suggested measures – such as artificial reefs – fall outside of the responsibility of my department. There have been calls by the Mayor of Gold Coast City Council in recent weeks for the State Government to assist in a joint exercise to consider long term solutions.

As this is going to be a recurring problem in coming years I am enquiring as to whether the State Government is able to examine the feasibility of structural works that could mitigate against damage caused by future extreme weather conditions and minimise potential impacts on these beaches.

Accordingly, I write to you to request that your department investigate what role, if any, it might potentially be able to play in assisting Gold Coast City Council to implement future preventative actions.

If you require any further information from my office, please contact my Chief of Staff, James Martin on (07) 3224 2003.

Kind regards,

A handwritten signature in black ink, appearing to read "Jann Stuckey". The signature is written in a cursive, flowing style.

HON JANN STUCKEY MP

Minister for Tourism, Major Events,
Small Business and the Commonwealth Games

RTI DL Release

Department of Environment and Heritage Protection
DIRECTOR-GENERAL BRIEFING NOTE

TO: Director-General

Approved	Not Approved	Noted
Further information required		
DG	<i>[Signature]</i>	
Dated	8 13 13	

SUBJECT: Release of updated indicative Erosion Prone Area mapping for Queensland.

TIMEFRAME

- Action required in the short term so that revised maps can be provided with the release of the draft single State planning policy by the Department of State Development, Infrastructure and Planning (date to be advised, but may be late March 2013).

RECOMMENDATION

It is recommended that the Director-General:

- agree to the release of revised indicative mapping that spatially describes the statutory Erosion Prone Area;
- note that the declared Erosion Prone Area is not being changed but the new indicative mapping will provide a more accurate depiction of the statutory area;
- note that letters to all coastal local governments will be forwarded advising of the revised mapping and that it will be available on the department's website, with the data available from the Queensland Government Information Service;
- note that new coastal hazard mapping for Torres Strait Islands will be released within 3 months following consultation with the Torres Strait Regional Authority.

BACKGROUND

- Areas of the Queensland coast considered vulnerable to sea erosion, tidal inundation and sea level rise are identified in Erosion Prone Areas (EPA) declared under s.70 Coastal Protection and Management Act 1995.
- EPAs were first declared for the Queensland coast in 1984 and a revised area was declared in January 2012. The revised EPA was calculated to include an increased factor for sea level rise to 2100. An example of an EPA is presented as Attachment 1.
- EPAs are used primarily to define coastal areas requiring protection and management and these are used to create coastal management districts (CMD) for land-use planning and development assessment purposes under the Sustainable Planning Act 2009 (SPA).
- EPA documents are difficult to interpret on-ground as they are a combination of textual definitions and specified distances. To assist interpretation of the document the department has published indicative maps of the EPA to show their footprint on-ground. An example of an EPA indicative map is presented as Attachment 2.

CURRENT ISSUES

- EPA indicative maps have been further refined to remove areas not intended to be captured, including land within approved canals, non tidal artificial waterways and rocky headlands, and to better define vulnerable areas using the latest aerial photography and digital elevation models, especially in far north Queensland.
- It is proposed to release this new version of indicative maps to coincide with release of the draft single State Planning Policy by the Department of State Development, Infrastructure and Planning and then to publish it on the department's website.
- EPA indicative maps for the Torres Strait region are also proposed for release shortly, however consultation with the Torres Strait Regional Authority is required before this occurs.
- While the declared EPA plans have a statutory declaration process, the indicative maps are simply an interpretative tool to assist local government, state agencies and development proponents. Therefore the EPA indicative maps can be released at any time.

CONSIDERATIONS

Author Name: Sel Sultmann Position: Principal Coastal Scientist Tel No: 3330 5768 Date: 8 March 2013	Cleared by Name: John Lane Position: Director Environmental Planning Tel No: 33305864 Date: 11 March 2013	Recommended: Name: Tony Roberts Position: Deputy Director-General Environmental Policy and Planning Tel No: 33305990 Date:
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Sch 4- Part 4

14/3/13

Rec'd - ODG
13 MAR 2013

- **Budget:** There are no budgetary considerations
- **Legislation:** EPAs are declared under s.70 of the *Coastal Protection and Management Act 1995*. The mapping product only indicates the footprint of the EPA and do not replace the statutory plans.
- **Key Communication Messages:** It is expected that most Local Government planning schemes will include this EPA mapping as a natural hazard layer, hence all Local Governments need to be notified of the new mapping.

DIRECTOR-GENERAL'S COMMENTS

ATTACHMENTS

- Attachment 1: Example of an erosion prone area plan – Sunshine Coast Regional Council local government area.
- Attachment 2: Example of erosion prone area indicative mapping – Maroochydore.

RTI DL Release

Author Name: Sel Sultmann Position: Principal Coastal Scientist Tel No: 3330 5768 Date: 8 March 2013	Cleared by Name: John Lane Position: Director Environmental Planning Tel No: 33305864 Date: 11 March 2013	Recommended: Name: Tony Roberts Position: Deputy Director-General Environmental Policy and Planning Tel No: 33305990 Date:
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Erosion Prone Area

Sunshine Coast Region Local Government Area

Erosion Prone Area Definition

1. Erosion prone areas are deemed to exist over all tidal water to the extent of Queensland Coastal Waters and on all land adjacent to tidal water.
2. Erosion prone areas include areas subject to inundation by the highest astronomical tides (HAT) by the year 2100 or at risk from sea erosion.
3. On land adjacent to tidal water the landward boundary of the erosion prone area shall be defined by whichever of the following methods gives the greater erosion prone area width:
 - a. a line measured 40 metres landward of the plan position of the present day HAT level except where approved revetments exist in which case the line is measured 10 metres landward of the upper seaward edge of the revetment, irrespective of the presence of outcropping bedrock;
 - b. a line located by the linear distance shown on Table 1 and measured, unless specified otherwise, inland from:
 - i. the seaward toe of the frontal dune (the seaward toe of the frontal dune is normally approximated by the seaward limit of terrestrial vegetation or, where this cannot be determined, the level of present day HAT); or
 - ii. a straight line drawn across the mouth of a waterway between the alignment of the seaward toe of the frontal dune on either side of the mouth
 - c. the plan position of the level of HAT plus 0.8 m vertical elevation.

Except:

- i. where the linear distance specified in 3b is less than 40 metres, in which case section 3a. does not apply and the erosion prone area width will be the greater of 3b and 3c; or
 - ii. where outcropping bedrock is present and no approved revetments exist, in which case the line is defined as being coincident with the most seaward bedrock outcrop at the plan position of present day HAT plus 0.8m; or
 - iii. in approved canals in which case the line of present day HAT applies, irrespective of the presence of approved revetments or outcropping bedrock.
4. Erosion prone areas defined in accordance with the above are deemed to exist throughout all the local government areas, irrespective of whether the entire local government area is depicted on erosion prone area plans for the area.

Notes to clarify the definition

1. The specific location along the coast to which each erosion prone area linear distance applies (a segment) is shown in Table 1.
2. A map indicating the approximate location along the coast of each linear distance segment is shown on Maps 1 to 6.
3. Each erosion prone area segment is located on the coastline between 2 points defined by latitude and longitude. A projection of each point to the nearest actual coastline and continuing inland perpendicular to the coast defines the erosion prone area segment.
4. "Present day HAT" in the definition is always taken to be the present day level of HAT for the coastline as defined in the Queensland Tide Tables for that year or as defined by empirical methodology at the site.
5. The extent of the erosion prone area where it is defined by "HAT plus 0.8m" is the HAT coastline at the year 2100 and includes sea level rise to that time. It is determined by the area of land inundated to the level HAT of the nearest adjacent open coast or river tide gauge plus 0.8m vertical elevation. Site based HAT is not to be used as present day attenuation of inland HAT level due to flow constraints may not persist to 2100 with coastline response to sea level rise. For further explanation see the Coastal Hazard Guideline.
6. Where noted on Table 1 (and the map) the specified linear distance applies except where a revetment has been constructed and maintained to the approved design in which case the landward boundary of the erosion prone area is at the upper seaward edge of the revetment (A-line).
7. The approximate erosion prone area footprint is shown on Coastal Hazard Area Maps available on the Department of Environment and Resource Management's website at www.derm.qld.gov.au. These footprints are indicative only and the definition in this plan prevails for any inconsistency between the two.
8. This erosion prone area plan may be updated from time to time and a new revision created. Please check with the Department of Environment and Resource Management or the local government that this copy is the current version prior to using the contained information in any way.

Date of Erosion Prone Area Declaration: 26 January 2012 CTS18073/11

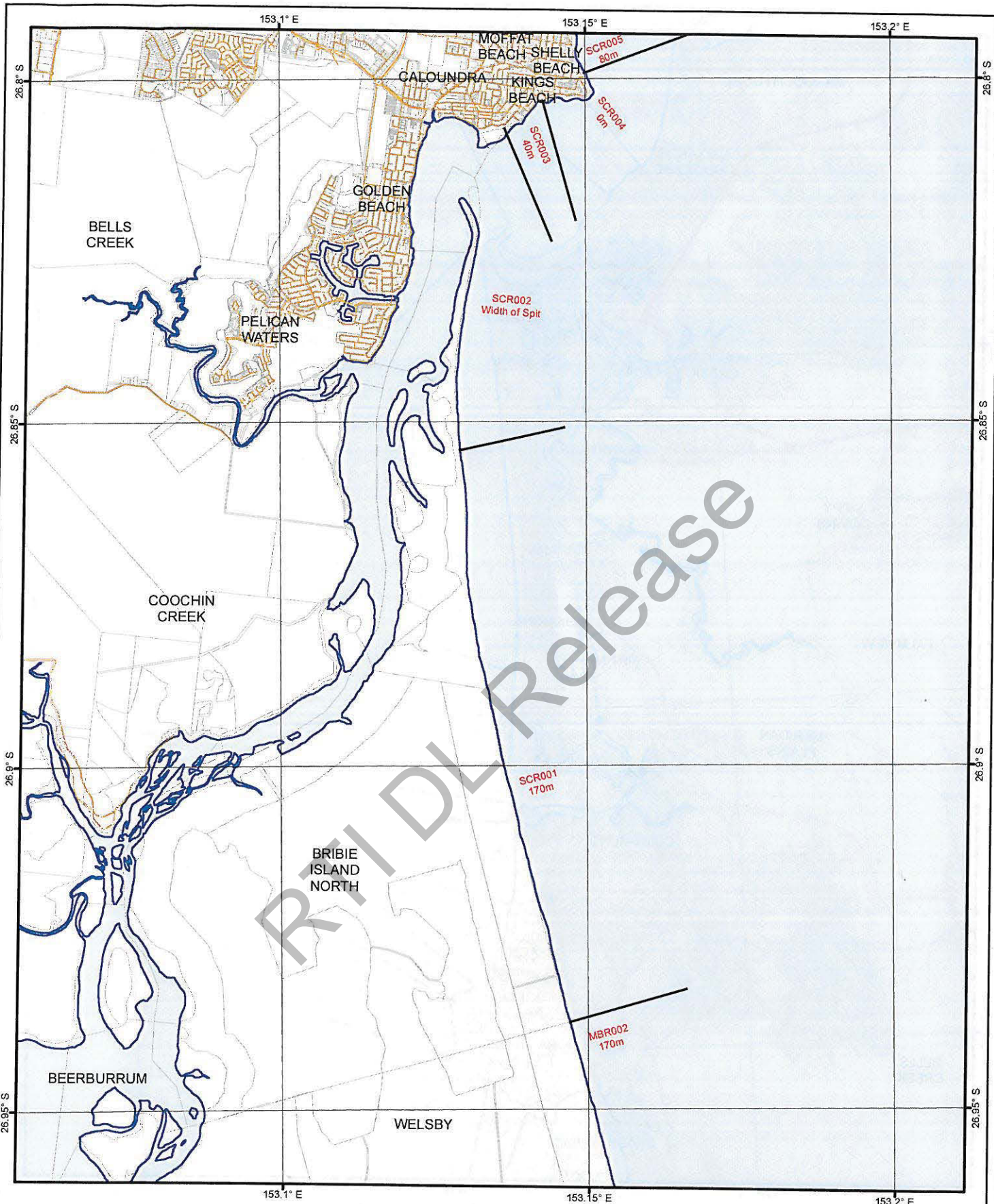
Date of Erosion Prone Area Amendment:

Plan No:

SCR 1A

SCR1A Table 1: Linear distances for the erosion prone area and the specific location of each segment

Erosion prone area segment number	Segment start latitude (degrees)	Segment start longitude (degrees)	Segment end latitude (degrees)	Segment end longitude (degrees)	Erosion prone area linear distance (Width in metres)
SCR001	-26.93736	153.14683	-26.85417	153.12929	170m
SCR002	-26.85417	153.12929	-26.80709	153.13682	Width of Spit
SCR003	-26.80709	153.13682	-26.80308	153.14305	40m
SCR004	-26.80308	153.14305	-26.79924	153.14969	0m
SCR005	-26.79924	153.14969	-26.79149	153.14852	80m
SCR006	-26.79149	153.14852	-26.79002	153.14402	0m
SCR007	-26.79002	153.14402	-26.77795	153.13803	155m
SCR008	-26.77795	153.13803	-26.76591	153.13671	185m
SCR009	-26.76591	153.13671	-26.76328	153.13652	400m
SCR010	-26.76328	153.13652	-26.74432	153.13558	185m
SCR011	-26.74432	153.13558	-26.68119	153.13821	170m
SCR012	-26.68119	153.13821	-26.68167	153.13409	0m
SCR013	-26.68167	153.13409	-26.67566	153.11559	145m
SCR014	-26.67566	153.11559	-26.67162	153.11021	0m
SCR015	-26.67162	153.11021	-26.65082	153.10118	205m
SCR016	-26.65082	153.10118	-26.63613	153.10186	Width of Spit
SCR017	-26.63613	153.10186	-26.54672	153.10267	140m
SCR018	-26.54672	153.10267	-26.54237	153.09857	0m
SCR019	-26.54237	153.09857	-26.53732	153.09565	170m (Possible bedrock)
SCR020	-26.53732	153.09565	-26.53416	153.09393	0m
SCR021	-26.53416	153.09393	-26.39564	153.11592	170m
SCR022	-26.39564	153.11592	-26.39008	153.11680	0m
SCR023	-26.39008	153.11680	-26.38011	153.11683	170m
SCR024	-26.38011	153.11683	-26.38643	153.09334	0m
SCR025	-26.38643	153.09334	-26.38486	153.08646	85m
SCR026	-26.38486	153.08646	-26.37729	153.07629	Width of Spit
SCR027	-26.37729	153.07629	-26.31662	153.06147	195m (Possible bedrock)
SCR028	-26.31662	153.06147	-26.24845	153.07141	195m (Possible bedrock)
SCR029	-26.24845	153.07141	-26.22580	153.07655	160m (Possible bedrock)
SCR030	-26.22580	153.07655	-26.15480	153.09658	230m



Erosion Prone Area Linear Distances and their Locations for Sunshine Coast Region Local Government Area

Note:
This map is a representation of the erosion prone area segment locations provided in Table 1 and should be used as a guide only.

Disclaimer:
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SCR1A Map 1



SCR006 Segment number and linear distance for erosion prone area

— EPA segment start/stop location

— Freeways / highways

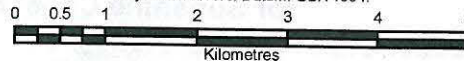
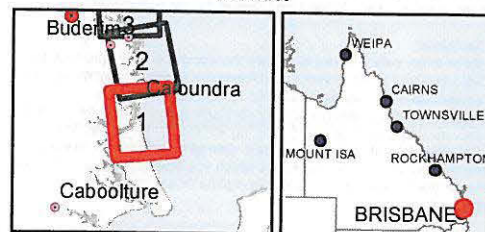
— Streets

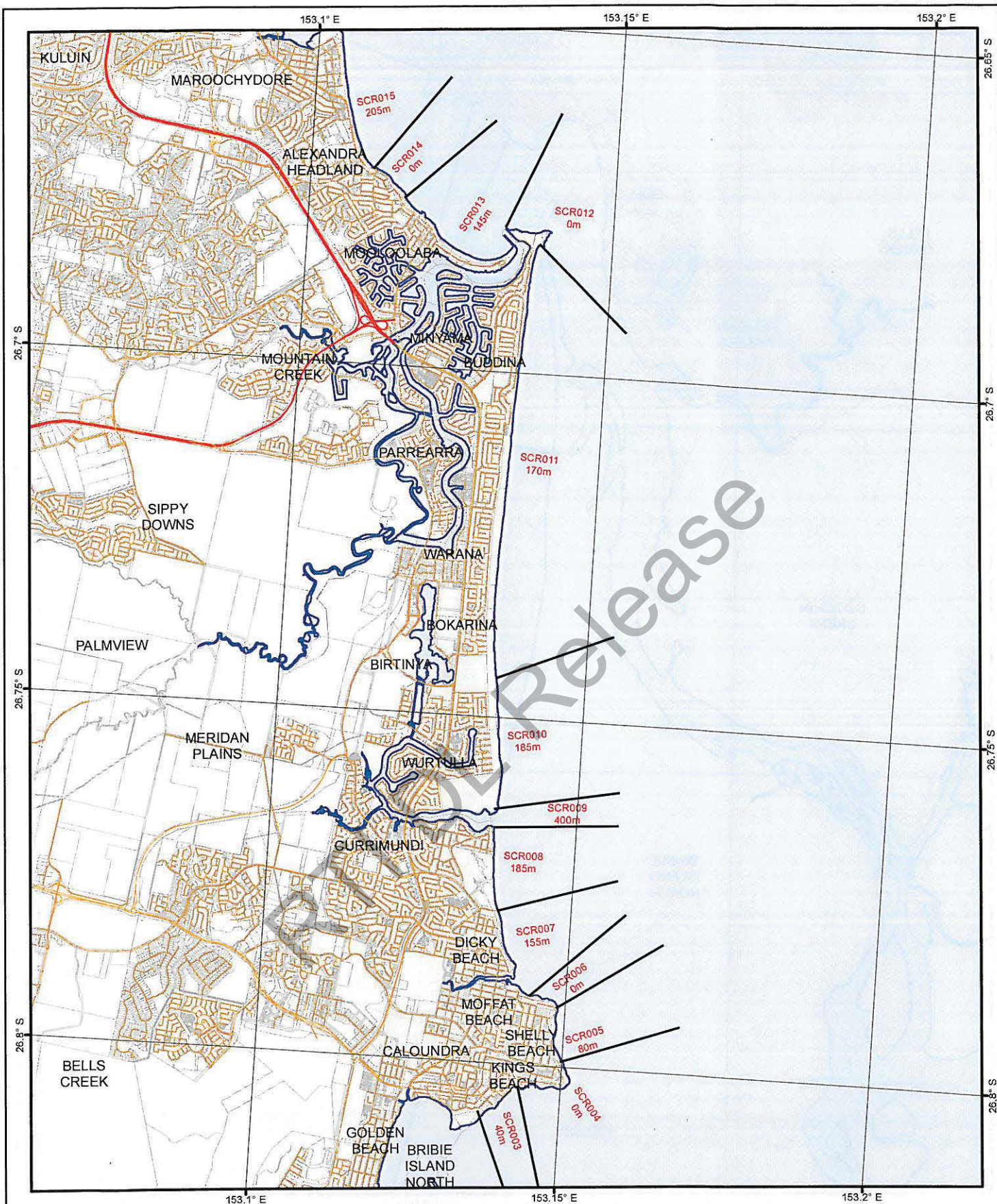
— Cadastral boundaries

— Queensland State Boundary



Projection: Albers, Datum: GDA 1994.





Erosion Prone Area Linear Distances and their Locations for Sunshine Coast Region Local Government Area

Note:
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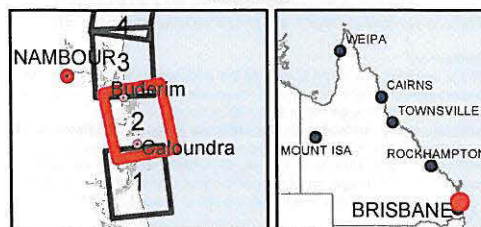
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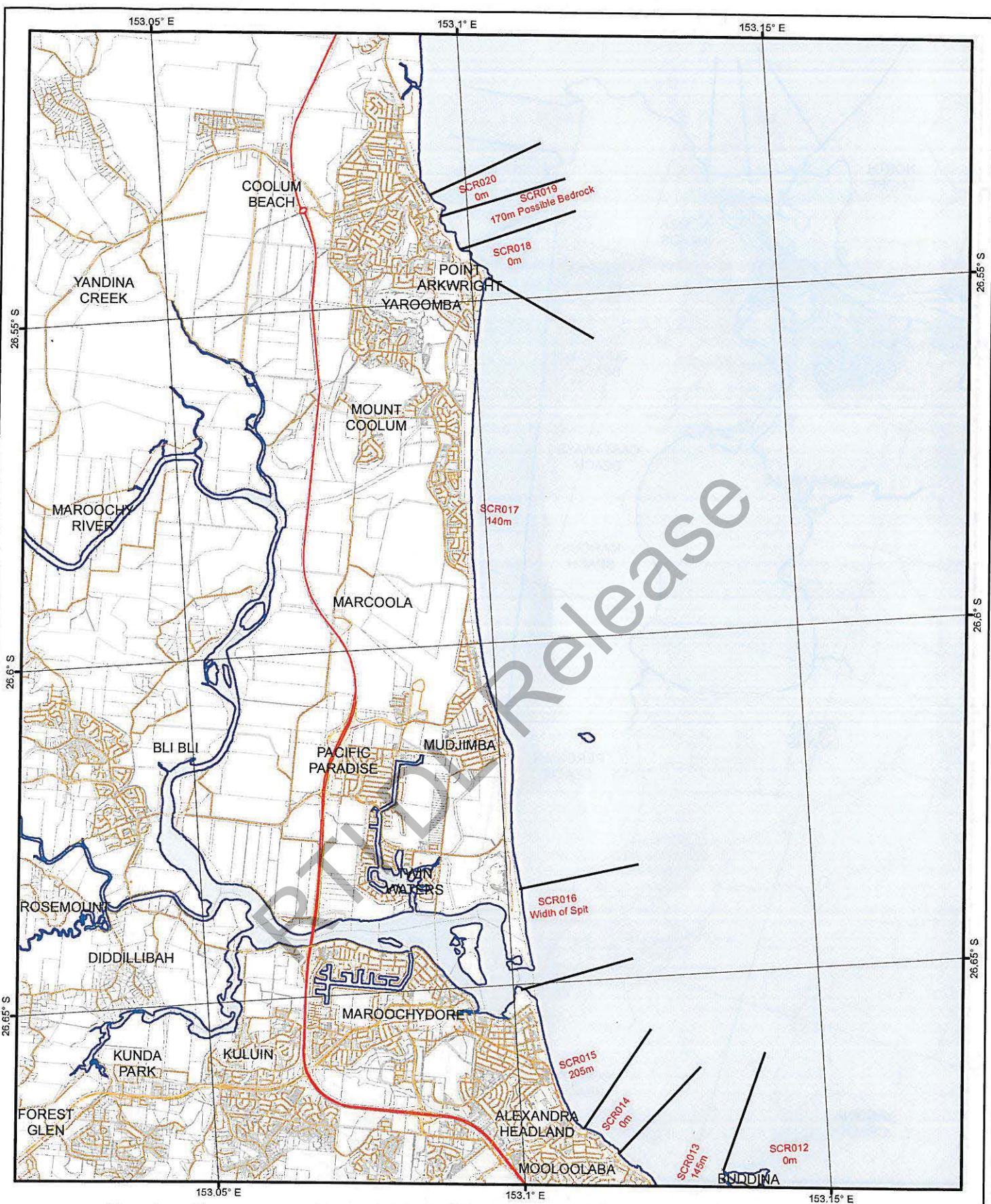
SCR1A Map 2 Queensland Government

- SCR006** Segment number and linear distance for erosion prone area
- EPA segment start/stop location
- Freeways / highways
- Streets
- Cadastral boundaries
- Queensland map



13-004 DL File B Pg 44 of 68





Erosion Prone Area Linear Distances and their Locations for Sunshine Coast Region Local Government Area

Note:
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SCR1A Map 3  **Queensland Government**

SCR006 Segment number and linear distance for erosion prone area

 EPA segment start/stop location

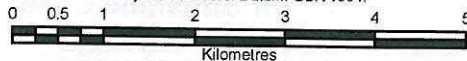
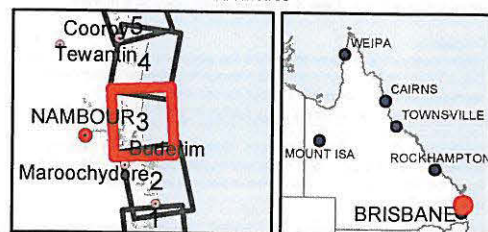
 Freeways / highways

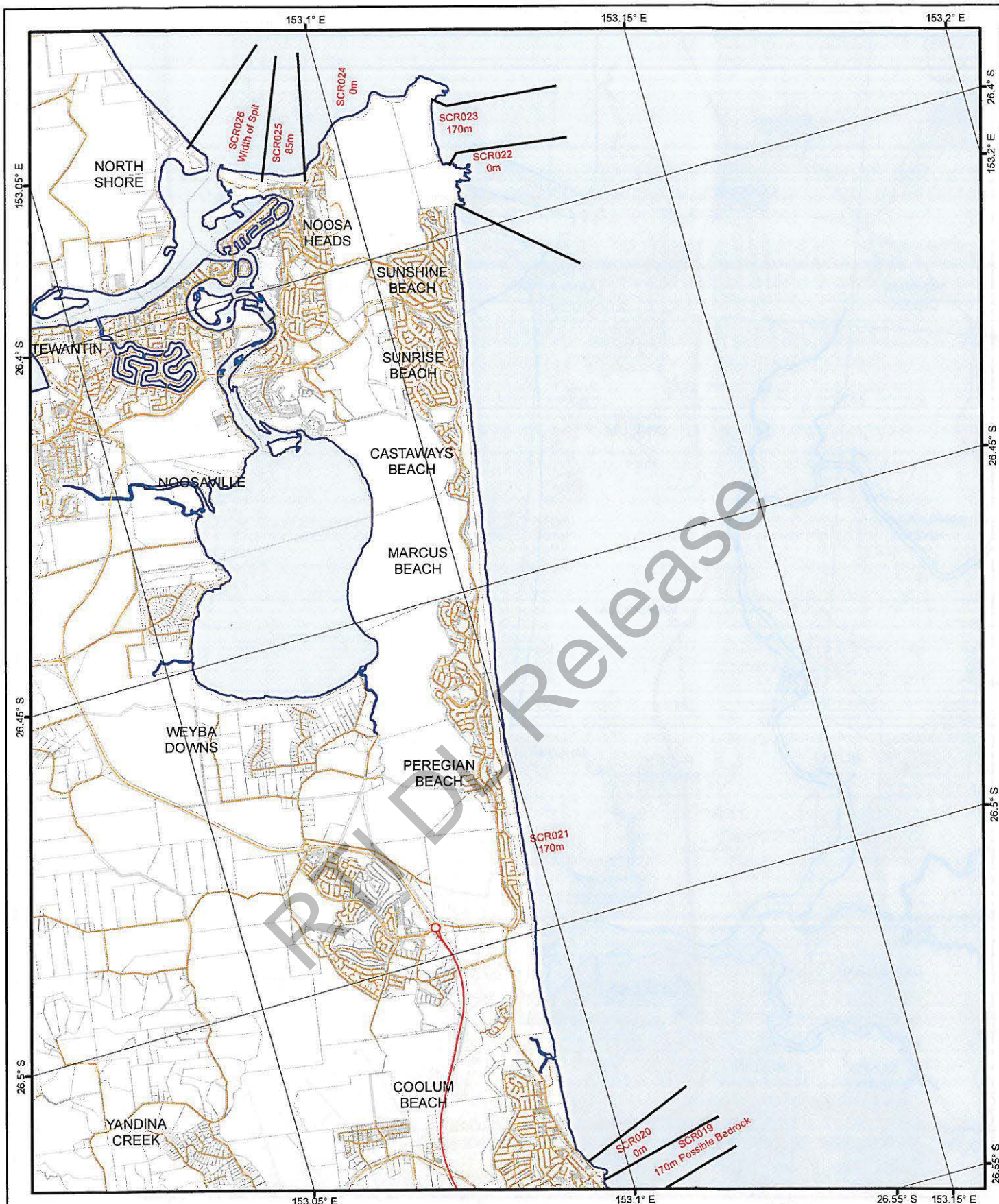
 Streets

 Cadastral boundaries

 Queensland File B Pg 45 of 68

Projection: Albers. Datum: GDA 1994.





Erosion Prone Area Linear Distances and their Locations for Sunshine Coast Region Local Government Area

Note:
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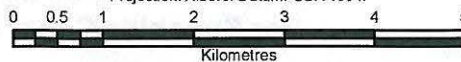
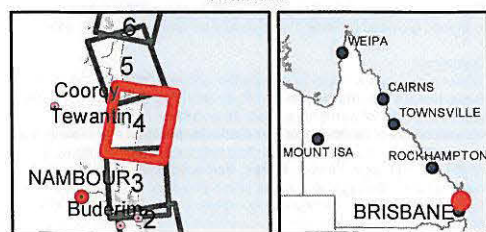
SCR1A Map 4

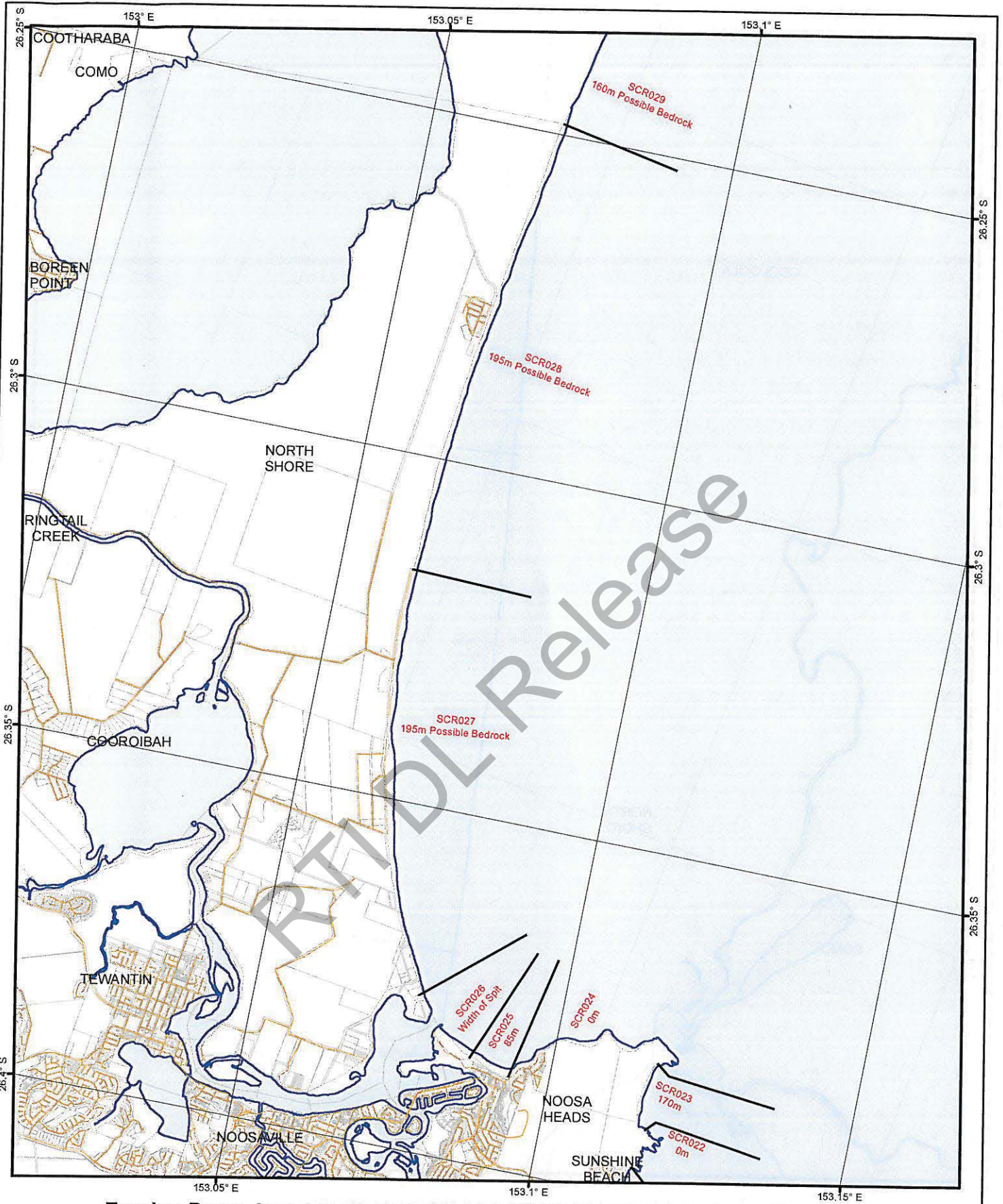
- SCR006** Segment number and linear distance for erosion prone area
- EPA segment start/stop location
- Freeways / highways
- Streets
- Cadastral boundaries
- Queensland map



13-004 DL File B Pg 46 of 68

Projection: Albers. Datum: GDA 1994.





Erosion Prone Area Linear Distances and their Locations for Sunshine Coast Region Local Government Area

Note:
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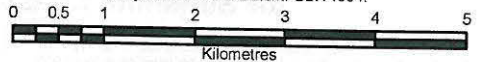
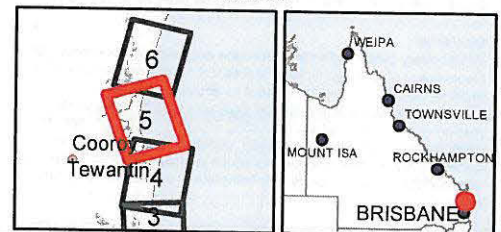
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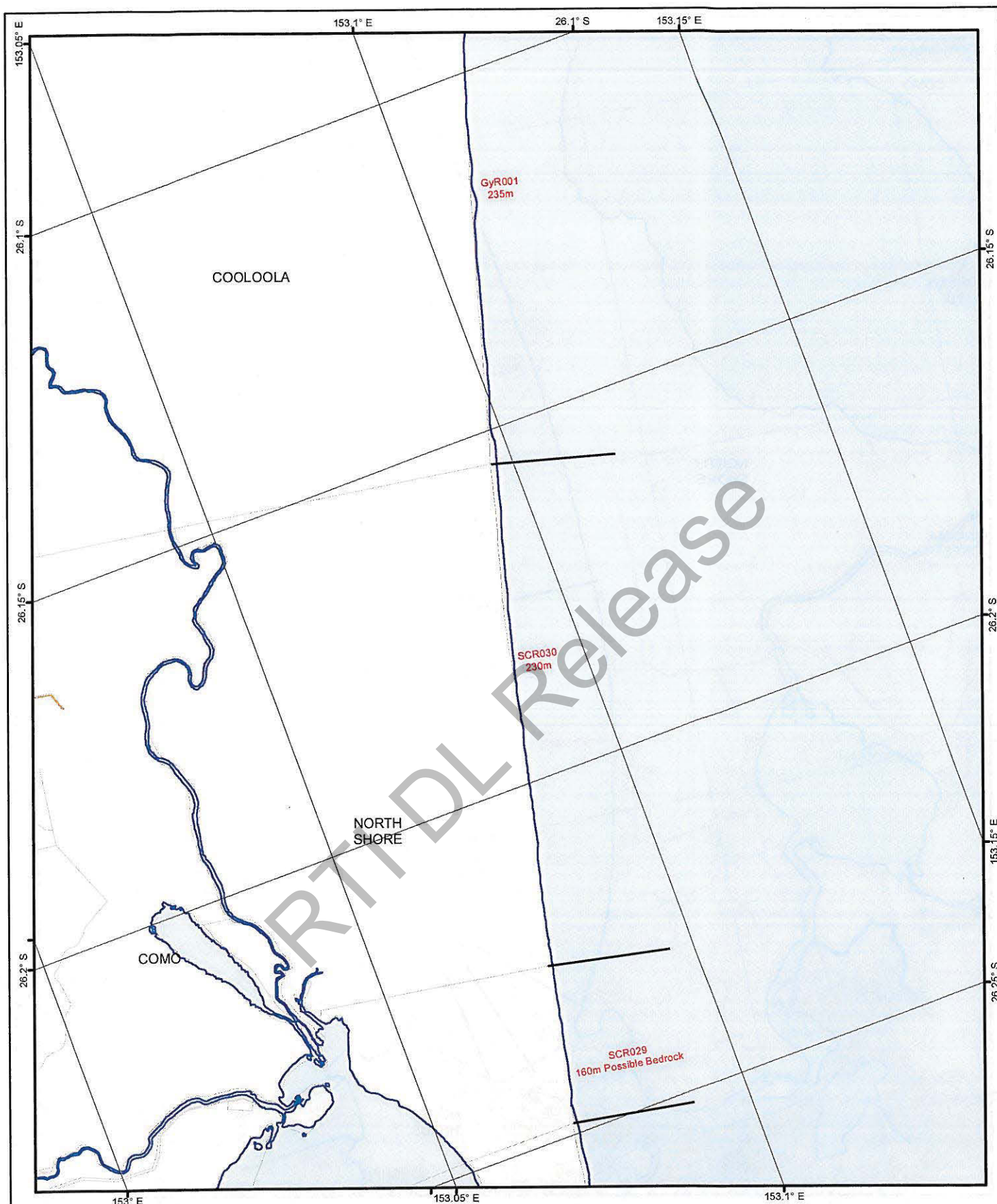
SCR1A Map 5 Queensland Government

- SCR006** Segment number and linear distance for erosion prone area
-  EPA segment start/stop location
-  Freeways / highways
-  Streets
-  Cadastral boundaries
-  Queensland coastline



Projection: Albers. Datum: GDA 1994.





Erosion Prone Area Linear Distances and their Locations for Sunshine Coast Region Local Government Area

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SCR1A Map 6 Queensland Government

SCR006 Segment number and linear distance for erosion prone area

— EPA segment start/stop location

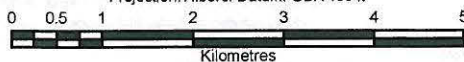
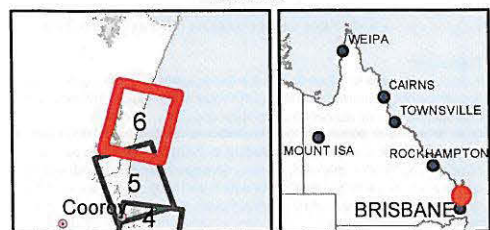
— Freeways / highways

— Streets

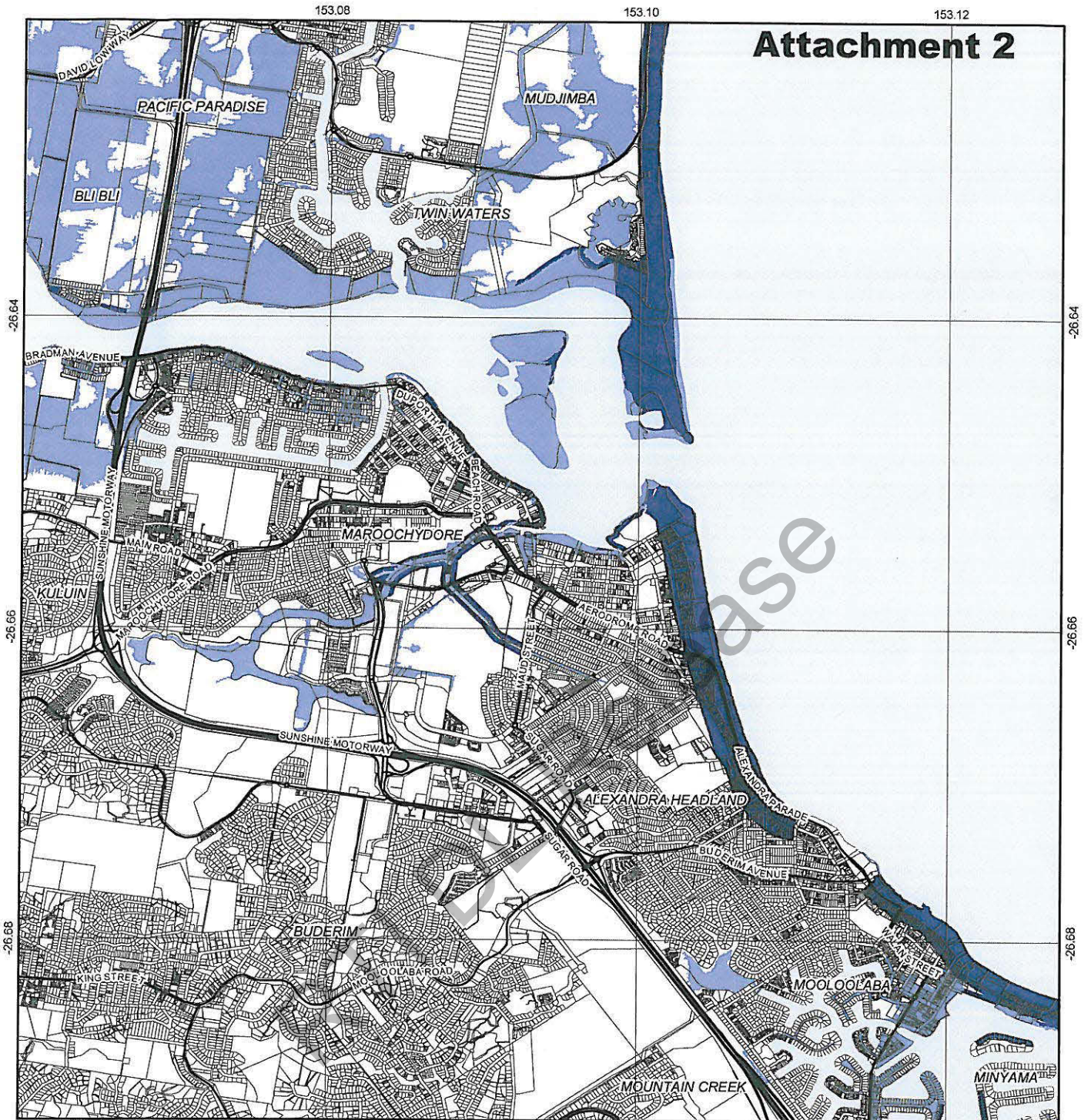
— Cadastral boundaries

— Queensland Coastline

Projection: Albers. Datum: GDA 1994.



Attachment 2



Notes

The areas shown on this map are indicative of the extent of erosion and permanent inundation defined by erosion prone area plans declared under the *Coastal Protection and Management Act 1995*. Only the declared erosion prone area plans should be used for development assessment. To determine the actual position of the erosion prone area a registered surveyor or geotechnical consultant may be required if there is any doubt.

Erosion prone area plans for each local government area and a comprehensive description of their determination are available from the Department of Environment and Heritage Protection website at www.ehp.qld.gov.au

Disclaimer

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Coastal Hazard Areas Map Erosion Prone Area

Version 2 - Feb 2013

9544-431 MAROOCHYDORE

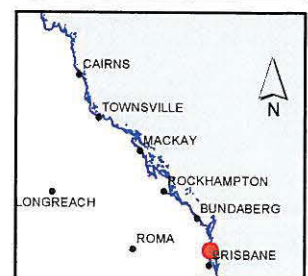
Indicative Erosion Prone Area (including projected climate change impacts to 2100)*

- Erosion due to storm impact and long term trends of sediment loss and channel migration
- Erosion and permanent tidal inundation due to sea level rise.

The erosion prone areas shown on this map are indicative of the erosion and tidal inundation extent that may occur with climate change impacts up to 2100.

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9544-443 DUNETHIN	9544-442 MUDJIMBA
9544-434 BUDERIM	9544-424 POINT CARTWRIGHT
9544-431 MAROOCHYDORE	9544-423 BUDDINA
9544-432 MOOLOOLAH	



Pages 50 through 51 redacted for the following reasons:

sch3(6)(c)(i) Infringe the privileges of Parliament

RTI DL Release

DRAFT REPORT

1. Background

The western beach on sand spit on Great Keppel Island was inspected on 24 July 2013 to gain a better understanding of erosion processes affecting Putney Beach and the Great Keppel Island Hideaway (the tourist facility). The tourist facility owners and local residents are concerned about the extent and severity of the erosion. Given the close proximity of the buildings to the erosion scarp much of the centre infrastructure is under imminent threat of loss from erosion. A rational and informed view of the erosion processes and future trends are essential to inform sound decision making for this area.

Attendees at the inspection were:

Sel Sultmann, Principal Coastal Scientist

Chris Small, Scientist (wetlands)

Angela Hendy, Principal Environmental Officer

2. Regional setting and geomorphology

Great Keppel Island is a continental island located about 15 kilometre east of Yeppoon. The coastline is a complex of rocky headlands with pocket beaches in between. The western side consists of a large sand spit or 'tail' with Fishermans Beach on the southern side and Putney beach on the northern side. The tourist facility is located on Putney Beach as a shore parallel linear development extending over some 200m. This site consists of a low, beach ridge plain orientated general parallel to the modern day beach. Great Keppel Island is shown on Photo 1.



Figure 1: Great Keppel Island with the subject spit on the western side of the island

The western foreshore is relatively protected from the prevailing south easterly and north easterly winds and waves. Given the relative long fetch to the mainland, south westerly winds and locally generated waves over the winter months can be significant but typically not over 0.5m. Wave exposure and direction is complicated by refraction and diffraction caused by nearby continental islands and shallow subaqueous sand deposits.

The beach ridge plain forming the spit is constructed of fine siliceous sand deposits emplaced primarily by wave action. However the height of some ridges indicates wind deposition is also a significant contributor to growth. Great Keppel Island has dunefields of significant size and pocket beaches appear well supplied with sand. The sand source is interpreted as Fitzroy river sediments deposited on the nearby continental shelf to the east during the Pleistocene period when sea levels were significantly lower than present. Sea level rise during the Holocene period has moved significant volumes of this sediment westward and up the profile to its present day emplacement on and around the island.

Sand arriving from the east appears to be transported around the island to the western foreshore by wave refraction and longshore drift processes. Emplacement of this sand as beach ridges probably occurs during periods of extreme wave and high water level conditions where sediment from the beach and nearshore is carried landward by wave over-wash processes and builds the land higher. Wind transport of the sand off the beach and into the dunes is also a significant contributor on the Fishermans Beach side. The 'tail' shaped sand spit is interpreted as the result of reasonable even sand transport around each side of the island with the tail being the convergence of the two wave trains.

The intertidal area appears to be a relatively wide sandy low tide terrace.

3. Local coastal processes

3.1 Sand transport processes and patterns

The dominant sediment transport pattern appears to be the movement of sand from the eastern northern and southern shorelines around to the western shoreline by wave processes. Sand supply to the 2 beaches appears to be low and is estimated at about 1000 cubic metres per year. Sand delivered to the spit contributes to spit growth but also appears to be transported further westward to a large subaqueous spit where transport further westward into deeper water and northward driven by tidal flows is also occurring. Figure 1 demonstrates these processes.

Local spit growth and reworking is also driven by waves generated by south westerly winds and occasional cyclonic influence. (GKI EIS). Under present day conditions the combination of coastal processes result in sand being actively being eroded from Putney Beach and transported to Fisherman's Beach where it is building new dunes.

3.2 Historical beach behaviour and future trends.

The onsite inspection provided the opportunity to look for evidence of long term erosion or accretion trends in vegetation patterns or sediment deposits. However this can be difficult where long term human use has modified the landscape and observations must be used cautiously.

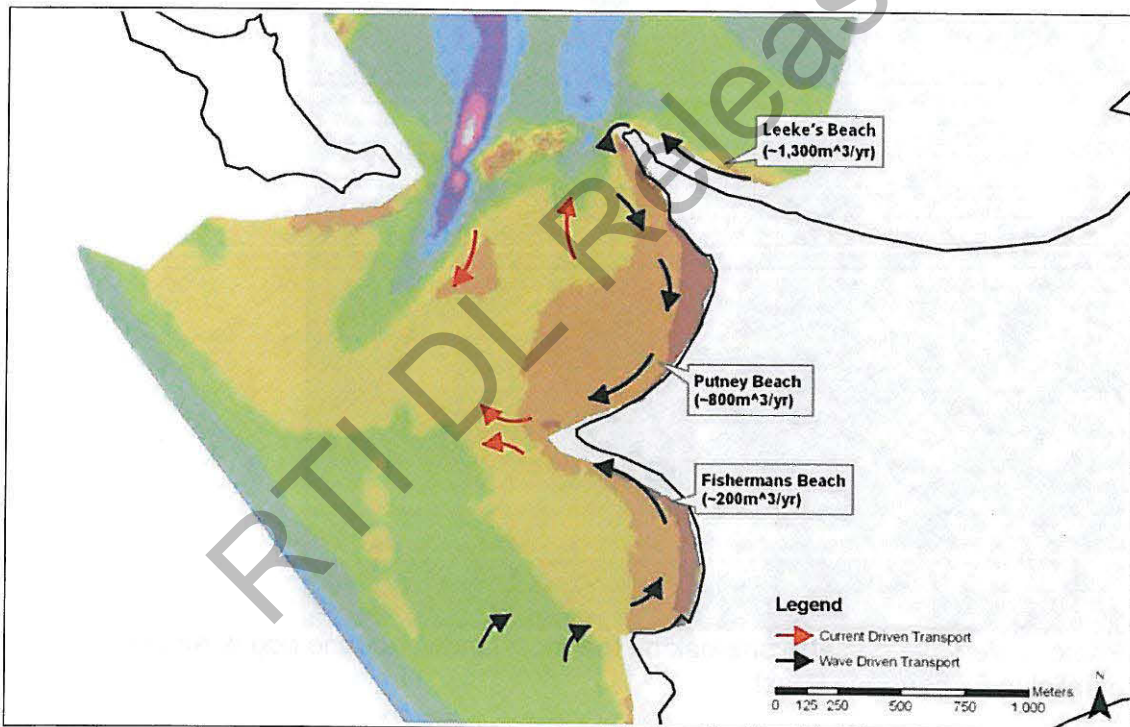


Figure 1: Overview of sediment transport processes on the western side of Great Keppel Island (Source GKI EIS)

Fisherman's Beach is characterised by a wide zone of windblown sand accumulation colonised by herbaceous pioneer dune species (Photo 2). Young horsetail she-oak (*Casuarina equisetifolia* var *incana*) estimated at up to 4 years old occur at the back of this zone (Photo 1). Moving inland successive dunes are colonised by progressively older horsetail she-oak are observed, the oldest and most landward being estimated at 50-100 years old (Photo 3). Horsetail she-oak are an important indicator of dune age and coastal processes as they are the first pioneer tree species to colonise dunes stabilised by pioneer grasses and usually do not regenerate in old dune area, but die out and are replaced by tertiary species such as eucalypts, tea

tree and beach scrub species. This dune and vegetation sequence represents a clear trend of dune growth and shoreline advancement going back at least 100 years.



Photo 2: Broad zone of dune accretion backing Fishermans Beach. Note the horsetail she-oak trees colonising the older parts of the dune.



Photo 3: Very old horsetail she-oak on the most landward dune ridges running parallel to Fishermans Beach.

Putney Beach is characterised by high steep erosion scarps progressively reducing in height eastward towards the base of the spit. The tourist facility is a collection of buildings and infrastructure now located on the dune crest now only metres from the scarp face (Photo 4). Buildings along 180 of beachfront are considered as being under imminent threat and building along a further 80m of beachfront, but setback further from the scarp face is under a moderate threat of loss from erosion. Vegetation on the scarp edge is characterised by eucalypts, tea-tree and beach scrub species typical of older areas with little exposure to marine conditions. At the central section of this coast a tea-tree swamp consisting of many large and very tall trees is now exposed on the beach by long-term erosion (Photo 5). The age of these trees and the expectation that a large, well vegetated dunal barrier would have existed seaward of this swamp strongly points to a long-term trend of shoreline recession. Old soil profiles are observed in the modern scarp face and the depth of the organic rich A-horizon (Photo 6) indicates a relatively old soil. No shell material was observed in the soil profile. Shell dissolves out over time from organic acids and

its absence may indicate that the dune was emplacement very old. Evidence suggests that erosion has not retreated a scarp face to the current location of at least 100 years and maybe much longer.



Photo 4: Exposure of Tourism Centre buildings on the edge of the erosion scarp. Note the extensive sand bagging.



Photo 5: Tea-tree forest exposed on the beach by erosion of the seaward dune (looking east towards the base of the spit).

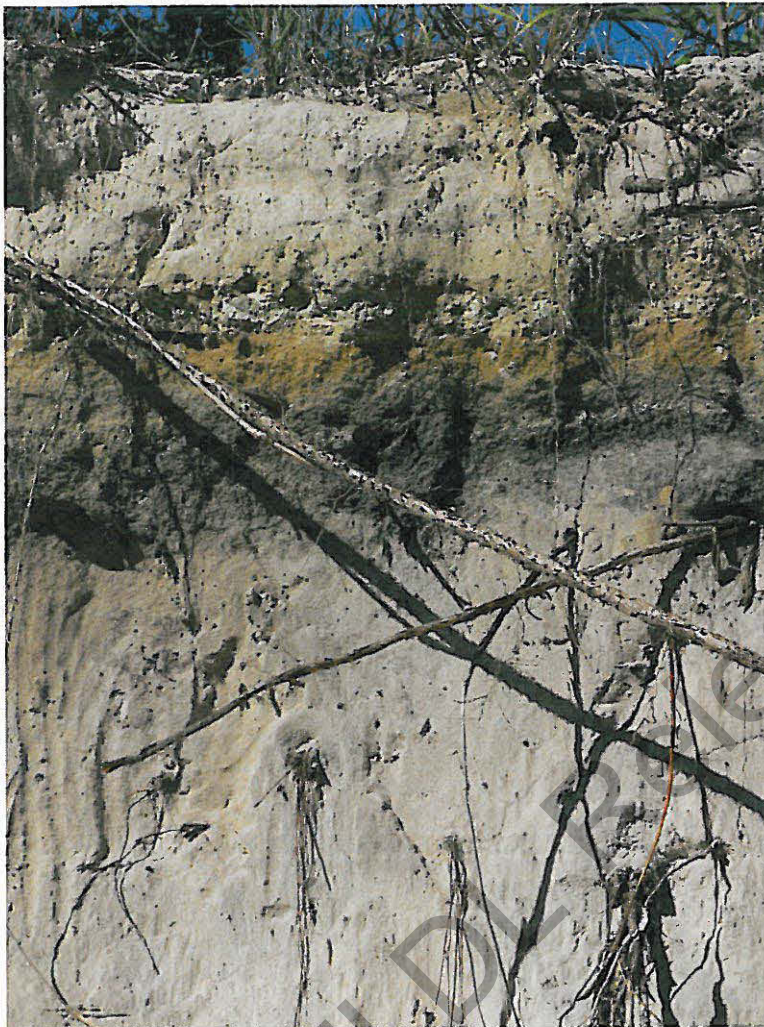


Photo 6: Exposure of dark soil A horizon in the erosion scarp on Putney beach.

Examination of a digital elevation model (DEM) of this site indicate that the spit is predominantly a wide low beach ridge plain built by a series of successively accumulating north facing ridges, and that the spit prograded to the northwest. During this phase of growth Putney Beach was strongly accretionary. The DEM also reveals 3 higher dune ridges backing the south facing Fisherman's Beach. These ridges truncate the beach ridge plain and are interpreted as youngest in the depositional sequence.

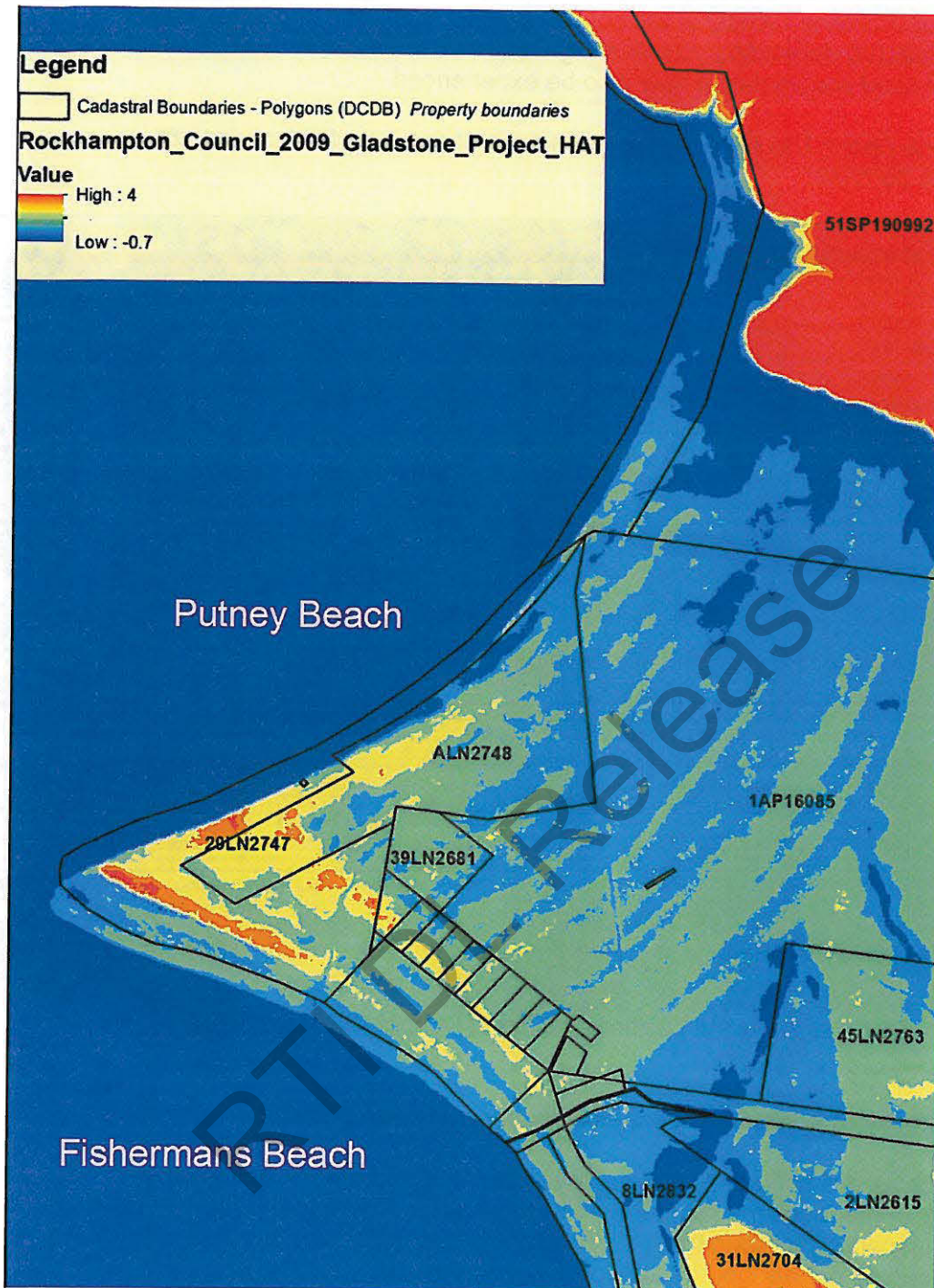


Figure 2: Digital elevation model of the sand spit on the western side of great Keppel Island.

Observation of historical shoreline positions over the last 30 years (Figure 3) confirm a consistent trend of shoreline erosion at Putney Beach and accretion at Fishermans Beach over the last 21 years. This trend in the vicinity of the tourist facility **main building** indicates a shoreline recession of 42m since 1992 giving a long term rate of shoreline recession of 2m per year. 180m to the east the erosion is slower at 27m since 1992, giving a long term rate of recession of 1.3m per year. Over the last 5 years the respective rates of recession for the western and eastern ends were both 3.4m per year which indicated acceleration. A shoreline recession of about 6m was recorded for the site in the first 7 months of 2013. There is certainly no evidence of a slowing or reversal of the erosion trend.

The rate of shoreline recession will not be constant over time and large variations can be expected depending on prevailing weather conditions. A trend reversal and periods of sand accumulation may also be experienced.

Fishermans Beach has experienced strong accretion since 1992 of up to 80m, or almost 4m per year.



Figure 3: Historical shoreline positions on Great Keppel Island since 1992

3.4 Summary of coastal processes affecting the tourist facility.

Spits such as this commonly undergo cyclical shifts to the north and south or 'wagging' in response medium term shifts in weather conditions. Observations from this site inspection indicate that present day erosion is not part of a cyclical process often observed on this type of land form, but is most likely to be a long term process. This is evidenced by erosion back into old land forms. The vegetation patterns and the DEM indicate a new phase of dune building on Fishermans Beach which is different to that which had constructed the spit. This phase of dune building relies on sand being supplied from the older Putney Beach.

No evidence was observed indicating that this trend is or likely to reverse in the near future. Therefore, continuing erosion of Putney Beach can be expected in the next 5 years at least.

Variations to the long-term erosion trend and even periodic reversals are possible but dependent on weather patterns and especially cyclonic impact. Such a reversal appeared to occur around the early 1990 associated with cyclones. Conversely, short term erosion cuts of up to 10m over a time period of days could be experienced at Putney beach from severe storm and cyclone events and this will be heavily dependent on wind and wave direction. As a recent example the spit on the western

side of Dunk Island was eroded back about 15m on the northern beach as a result of cyclone Yasi, disconnecting the jetty from the island as severely damaging the newly constructed café and reception centre.

Much of the infrastructure is now under imminent threat of loss from erosion during a single event and also faces a long term erosion threat of up to 2.8m per year.

4. Additional risks

The onsite inspection indicated an additional risk for the tourist facility. Behind the frontal dune where much of the infrastructure sits the land form is relatively low, having an elevation of about 1m above the highest astronomical tide. The risk is that as the high frontal dune is eroded the lower inland areas become vulnerable to wave over-wash and storm tide. This is a critical issue for considering where assets may be relocated to. A more detailed examination of land levels and storm tide inundation water levels is necessary to define this risk.

5. Management options.

Putney Beach lies within a declared erosion prone area declared under s.70 of the *Coastal Protection and Management Act 1995*. The erosion prone area width at this location is 110m from the seaward toe of the frontal dune. The site is also within a coastal management district and development in the site and adjacent tidal water is subject to development assessment provisions within the *Sustainable Planning Act 1999*.

Erosion management actions for Putney Beach can be divided in three approaches:

1. Retreat of assets

Retreat of assets involves moving the assets at risk further landward to reinstate a buffer zone between the assets and the beach. A decision on retreat is complex but fundamentally depends on the value of the asset relative to protection works and availability of a site for retreat if continuation of the land use is appropriate. Retreat also ensures a sandy beach for recreational purposes will be maintained. Retreat of assets would need to consider the design life of the asset and the long term erosion rate.

In this case lease boundaries would need to be examined to determine suitable sites or the lease location itself shifter if more suitable land is available.

Retreat also must include consideration of abandonment of the site and surrender of the lease if a risk assessment and benefit cost analysis indicates a high certainty of a negative outcome for the current scale and type of land use.

2. Increasing the resilience of the coast to erosion – beach nourishment

This approach relies on strengthening the beach and dune area as the natural defense to sea erosion by bringing in sand from a source external to the subject coastal compartment. This can only be achieved by adding additional sediment to the system which is of a similar type and grading. While no calculations of a suitable volume has been calculated, I would suggest that a minimum of 10 thousand cubic metres of sediment would be required to materially lessen the erosion vulnerability of the tourist facility section of the coast. This sediment would need to be brought in

from areas outside of the active beach system and a suitable borrow area would need to be identified.

Offshore or onshore sediment sources could be considered for this exercise and appear to be available. The Marine Park Zoning of this area will need to be considered for this option. Any proposal would need to be based on the long term rate of loss from the area and the volumetric loss likely in a short term erosion event to provide some certainty of benefit.

3. Increasing resilience of the coast to erosion - local redistribution of sediment

Local redistribution of sediment requires sediment to be moved from one location to another within a beach compartment, often from the intertidal zone. An example of this type of work is shown in Photo 7. It is generally not a recommended approach as sediment is often quickly moved back to 'fill' the borrow area and is often only of short term benefit.

In the case of Putney Beach, the concept is applicable in that sediment from Putney Beach is accumulating on the adjacent Fisherman's Beach and on the subaqueous spit to the west. In this case material could be moved relatively simply from one area to the other without adverse consequences. Any proposal would need to be based on the long term rate of loss from the area and the volumetric loss likely in a short term erosion event to provide some certainty of benefit.



Photo 7: Scraping sand from the intertidal zone at Toogum to reinforce the eroded dune. The sand only persisted for a few weeks and was moved back down the beach slope by a storm event.

4. Seawalls.

Hard protection works such as seawalls' whether constructed of rock, concrete or geotextile bags should be considered as a last resort as these structures can both accelerate erosion seaward of the wall and at the terminal ends and cause loss of the beach. Additionally they can have a significant adverse impact on beach use and visual amenity.

To provide the required level of protection the wall would need to be designed by a Registered Professional Engineer Queensland and meet the requirements of the Prescribed Tidal Works Code. This requires the wall to be designed to withstand a 1 in 50 year storm event with armour units (rock or geotextile bags) typically from 1.5 – 5 tonnes in size depending on wave climate of the area. Such defences can be expensive, ranging from \$3,000-\$10,000 per lineal metre of coast, depending on

design, material availability and transport and equipment costs. A seawall of 180 – 260m is indicated from the erosion assessment plus end return works to prevent erosion at the terminal ends.

Erosion management at this site is complicated but the fact that 2 types of erosion must be considered in the design, short term severe storm attack and a gradual long term loss of sand which will reduce the beach level in front of the wall, undermining the toe and exposing the remainder of the wall to greater wave energy propagated across deeper water.

Small seawall or sand bag defences built on the upper beach scarp provide little real protection and are usually severely damaged by severe storm events. During severe events small walls can have the shallow toe undermined, can be over washed and scoured out in behind and the bags themselves can be moved by wave action, all of which can cause failure of the wall and continued erosion of the coast. An example of this is from Cairns is shown in Photo 9. However, sand bagging as a temporary measure could be supported in an emergency situation as the bags are easily removed if damaged by wave action.

It is critical to understand that the current sandbag wall could only be expected to provide short term protection against king tides and small storm events. Such walls can provide a false sense of security against erosion events and can very rapidly fail under attack from large waves and the erosion scarp continues to retreat landward.

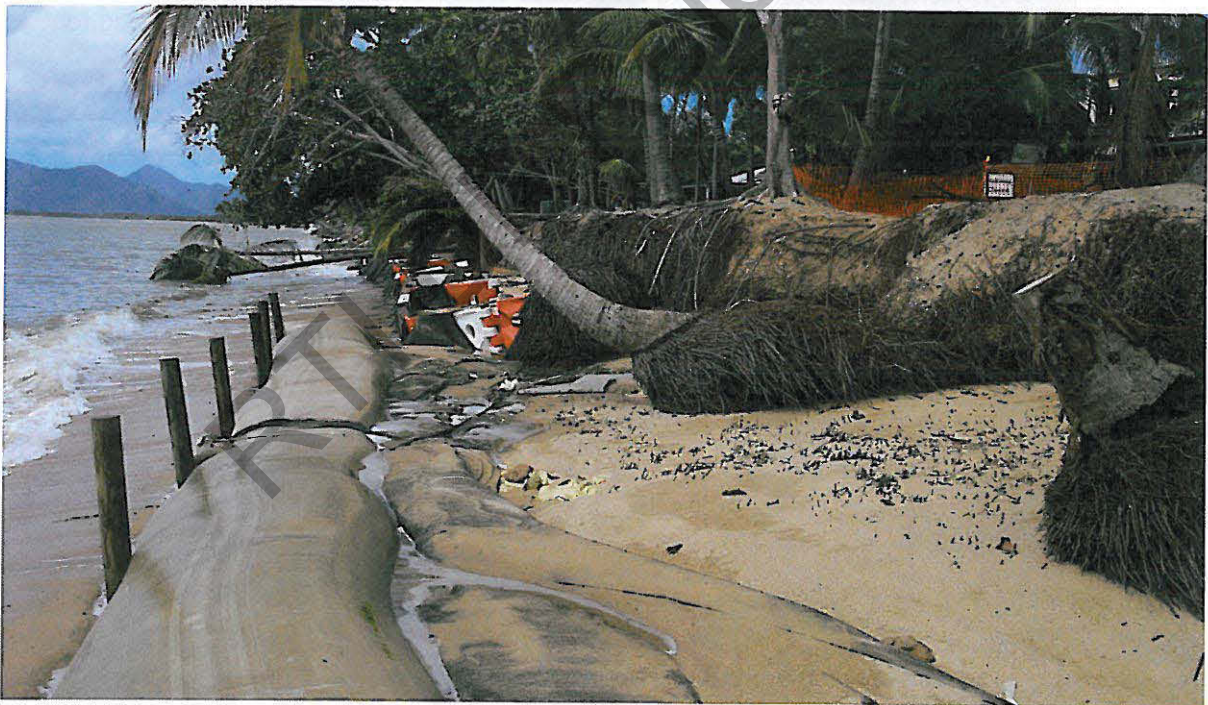


Photo 9: Example of a failed substandard seawall built from geotextile bags and other materials – Holloways beach, Cairns.

The **GET REFERENCE** report states that 'The dive shop (now the tourist facility) was moved back into the dunes away from high water mark in 1993 as the business was under threat from the encroaching erosion. The business is once again under threat from erosion and may need to be moved if protection methods are not implemented. The report also recommends:

- Develop a Shoreline Erosion Management Plan specific to Putney Beach.
- Investigate options for planned retreat of infrastructure at immediate threat from erosion.

6 Conclusions

- The tourist centre owners face a prospect of ongoing erosion of this coast while much of the infrastructure now close to the erosion scarp and at imminent threat of loss from a single severe event such as a cyclone or a persistent period of large swell waves combined with spring tides.
- Erosion at Putney Beach is assessed as a long term trend at a typical rate of 1.8m per year, but with the likelihood of pauses or accelerations of this rate dependent on future weather conditions. There is no evidence of a cessation or reversal of the current process.
- The current approach of sand bagging will be of little benefit in protecting assets from moderate to large erosion events and rapid progress needs to be made to a more durable solution.
- In my view retreat should be considered as the preferred solution given the very high erosion vulnerability of this site and this type of landform, and low lying land behind the most seaward dune ridge.
- Sand nourishment with sand from Fishermans Beach would provide some short term relief but as a long term solution it would need to be ongoing. Detailed calculations of long term volumetric sand loss would be needed to develop this solution.
- Construction of a seawall, while a feasible but expensive solution for this site, would most likely result in permanent loss to the sandy beach in the vicinity of the resort. Impact on the public uses of this area would need to be considered.
- Further investigative work would be required to more clearly define the problems and develop and cost solutions. A benefit cost analysis should also be considered to inform decision making.

7. References

To be completed

Sel Sultmann
Principal Coastal Scientist
Department of Environment and Heritage Protection
9 August 2013

Report on: Barubbra Island Erosion Assessment

Background:

Barubbra Island is located approximately 16 kilometres north of Bundaberg at the mouth of the Burnett River (refer Figure 1). The Island has formed from a sand spit extending north from the Burnett River. A small community of 26 dwellings, known as Skyringville, is located on a narrow section of the Island approximately 2.5 kilometres north of the Burnett River mouth.

Figure 1: Location of Barubbra Island and Skyringville



The mouth of the Burnett River has been extensively altered over the last 100 years. The historic development of Barubbra Island has been previously documented by the Beach Protection Authority (BPA, 1989) in the *'Hervey Bay Beaches Report'* (refer Attachment 1).

The BPA (1989) identified that the construction of the entrance training walls and dredging in the river mouth has significantly reduced the supply of sediment to Barubbra Island. The reduced sediment supply has resulted in a long history of erosion with the BPA (1989) identifying up to 80 metres of shoreline recession between 1956 to 1982 at the northern end of Skyringville. This erosion trend has continued and in more recent years the western section of the Island has begun to fragment following a breakthrough of the island.

The dwellings at Skyringville are located on leases that are now up for renewal and the Department of Natural Resources and Mines has requested an assessment of the erosion risks associated with this site.

Analysis of Aerial Photography:

Analysis of shoreline recession has been undertaken by comparing the seaward vegetation extents using aerial photography from 2001 and 2010 (refer Figure 2). Analysis was undertaken using the Digital Shoreline Analysis System (DSAS) which is an add-on to the ArcGIS system.

Figure 2: Vegetation lines overlayed on 2010 aerial photography



The shoreline position adjacent to Skyringville Passage has remained relatively stable over the 10 year period assessed. This is expected as the erosion issues are associated with the reduced supply of sediment from the Burnett River which should impact on the oceanside beach.

The analysis found that the vegetation line on the oceanside of the Island has continued to recede. The following summarises the findings of this analysis:

- At the southern end of the leases the shoreline has receded approximately 8 metres (i.e. 0.9m/year). The shoreline at this location is now approximately 14 metres from the seaward lease boundary and 41metres from the dwelling;
- At the northern end of the leases the shoreline has receded approximately 30 metres (i.e. about 3.3m/ year). However the dwellings at the northern end of the leases are setback about 88m from the 2010 shoreline
- The dwelling on Lot 20 on CP905339 is the closest to the shoreline is now approximately 30 metres back based on the 2010 photography and the erosion rate near this lot is approximately 0.9m/ year.

The aerial photography shows the Island is beginning to fragment quite rapidly as indicated by the higher rate of erosion at the northern end of the leases and the changes to the orientation and extent of the sand spit further to the north-west. Extrapolation of the historic erosion rates indicates that the leases will be at significant risk of erosion sometime within the next 15 years. This assumes the climatic conditions experienced between 2001-10 continue.

In the event of a cyclone crossing the coast or passing nearby that the storm surge generated could overtop the island. Under such a scenario, the elevated water levels combined with large waves would result in significant recession of the shoreline. At the narrowest point (near the southern extent of the leases) the island is only 60m wide and when exposed to storm surge and waves a breakthrough of the Island is a real possibility.

RTI DL Release

Attachment 1 –

Extract from page 310 of the *'Hervey Bay Beaches Report'* by Beach Protection Authority (1989)

12.6.3.1 Barubbra Island

This area was first surveyed by Bedwell in 1870. This survey showed the main body of Barubbra Island with a long narrow spit extending in a north-westerly direction for about three kilometres and another one extending in a south-easterly direction towards the Burnett River for about one kilometre. The general coastline of the main body of the island was up to 300 metres seaward of its present position (Figure 12.23).

By 1924 the north-westerly spit had been breached, leaving a sand island north-north-west of Barubbra Island. The earliest aerial photography in 1948 shows what appears to be remnants of this sand island attached to the mainland and the northwest spit beginning to reform as a series of stubby recurved spits. Subsequent photography indicates that this new spit has extended progressively north-north-westward by 2.3 kilometres between 1948 and the present.

Over this same period large changes also occurred at the south-eastern end of the island. The tip of the south-eastern sand spit was known as North Head in 1885. A training wall was built at the mouth of the Burnett River in 1900/01 and Department of Harbours and Marine charts show that North Head had eroded back some 200 metres by 1902, then a further 100 metres between 1902 and 1905. By 1941 North Head had disappeared and a new point, called Clark Point, was shown on the charts some 600 metres westward of the original North Head. This point subsequently eroded a further 200 metres in a northerly direction by 1955.

Between 1956 and 1959 most of the training walls in the Burnett River were constructed. From this time the Clark Point area has undergone periods of accretion and erosion but, in general, has not changed significantly. In addition, the area between the training walls and the Skyringville Passage has infilled.

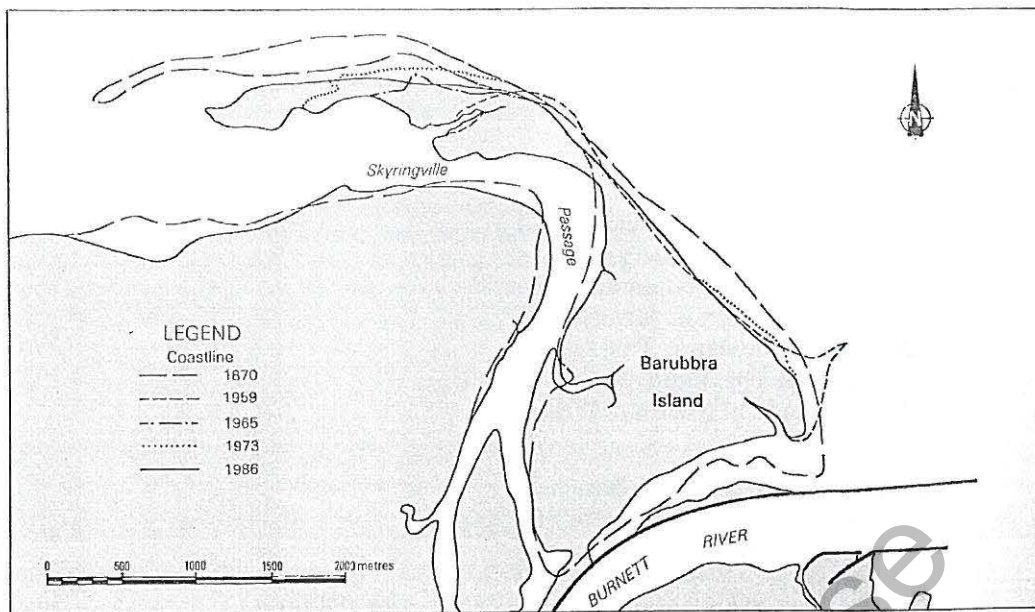


FIGURE 12.23
COASTAL MOVEMENTS—BARUBBRA ISLAND