

NOOSA SPIT EROSION PROTECTION

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PURPOSE

The purpose of this report is to seek Council's endorsement for the transfer of funds within the Coast and Canals capital works program to fund the long term shoreline protection of the Noosa Spit and Dog Beach. The report will also address concerns raised by Noosa residents in a petition requesting Council take action to reduce the rate of erosion at the Dog Beach

EXECUTIVE SUMMARY

A man made peninsula of the Noosa Spit which protects Noosa Sound from impacts of the sea is eroding at a rapid rate. If allowed to continue unabated, the erosion of this peninsula will expose Noosa Sound properties to currents and wave action that were not included in its original design.

A section of this peninsula known as The Dog Beach, a very popular swimming and recreational area for locals and tourists alike, is also being severely impacted by this shoreline erosion.

As a result, International Coastal Management were engaged by Council to model and design long term erosion mitigation measures.

Following in depth internal and external consultation, this report recommends that a staged construction of channel training walls using sand filled geotextile mega containers in combination with beach renourishment be implemented during the winter months of 2011.

OFFICER RECOMMENDATION

That Council:

(a) note the report titled "Noosa Spit Erosion Protection";

- (b) **adopt option E which is the Combination option outlined in the International Coastal Management Report to protect the Dog beach with geotextile sand filled mega containers, namely**
- (i) **a revetment wall at the upstream end of Noosa Spit to control ongoing erosion;**
 - (ii) **an upstream training wall approximately 80 metres long;**
 - (iii) **a submerged “closure” in the vicinity of Dog Beach;**
 - (iv) **two groynes; and**
 - (v) **foreshore nourishment; and**
- (c) **note a proposed reallocation of funds in the indicative 2011/2012 Capital Works Program of \$950,000 from the construction of a rock wall between Alex and Maroochy surf lifesaving clubs to fund the forecast budget shortfall for the Noosa Dog Beach erosion protection works; and**
- (d) **note that the full financing of the rock wall between Alexandra Headland and the Maroochy Surf Life Saving Club will be included in the development of the future five year Capital Works Program for the 2012/2013 year.**

FINANCE AND RESOURCING

Capital Budget 2010/2011 (carry over)	\$650,000.00
External Government funding	\$161,850.00
Spent to date including commitments	\$164,932.00
Current available funding	\$646,918.00
Cost of stage 1 including administration, permits etc	\$1,600,000.00
Funding shortfall (for 2011/2012)	\$953,082.00

It is recommended that the \$950,000 required to fund the short fall be transferred from construction of the Alex SLSC to Maroochy SLSC Sea Wall which is scheduled for delivery in 2011 - 2012.

Details of this project are still being finalised in the Shoreline Erosion Management Plan for Point Cartwright to Mudjimba which is scheduled for delivery in December.

From recent experience which includes the project at hand, delaying this project 12 months will allow extensive public and State Government consultation and an opportunity to thoroughly scope and accurately budget for the implementation of this significant project in the 2012/2013 financial year and allow a more accurate expenditure profile.

Delaying the wall project may also provide a better opportunity to seek State Government funding as Alexandra Parade, which the wall will protect, is a State Government asset.

Funding of the wall would then be sought at the next review of the Coasts and Canals Capital Works 5 year program in 2011.

CORPORATE PLAN

Corporate Plan Theme: *Robust Economy*

Emerging Priorities: 1.4 A sustainable tourism industry

Strategies: 1.4.1 In partnership with industry review the nature, purpose and governance of Sunshine Coast peak tourism entities to better market the region and its destinations

Corporate Plan Theme: *Ecological Sustainability*

Emerging Priorities: 2.4 Healthy waterways and foreshores

Strategies: 2.4.2 Maintain and improve the quality of beaches, waterways, lakes, rivers, canals and wetlands

CONSULTATION

Internal Consultation

- Division 4 Councillor – “understands the need to prioritise coastal projects”
- Division 8 Councillor – “vehemently opposes the transfer of funds from Division 8”
- Division 11 Councillor – “supports the project”
- Coastal Management Working Group
- Executive Director Infrastructure Services
- Manager Parks and Gardens

External Consultation

- Department of Environment and Resource Management
- Department of Employment, Economic Development and Innovation
- Noosa Parks Association
- Sunshine Coast Environment Council
- Noosa Integrated Catchment Association
- Noosa Biosphere Ltd
- Noosa Biosphere Association Inc.
- Australian Volunteer Coast Guard Association
- Department of Queensland Fisheries
- Tourism Noosa
- The Hastings Street Association
- Noosa River Community and Industry Advisory Committee
- Noosa Residents and Ratepayers Association

Separate meetings have been held with Department of Employment, Economic Development and Innovation and Department of Environment and Natural Resources who have both given

their support in principle for the need to reinforce the Dog Beach in order to protect Noosa Sound from damaging wave and current action

Community Engagement

Two meetings were held at Tewantin office in which the stakeholders listed above were invited to attend a presentation of the history and the proposed shoreline protection measures as well as a forum by Bobbie Corbett of International Coastal Management and Professor Rodger Tomlinson of Griffith University.

Input received from these meetings has been considered in the body of this report.

PROPOSAL

Background

For many years the main channel of the Noosa River has frequently been tending to migrate south (towards the river mouth location prior to 1978) putting erosion pressure on the river foreshore of Noosa Spit.

Up to 2003 the problem was addressed by maintenance dredging which kept the main channel clear of the foreshore. Once maintenance dredging ceased, serious erosion commenced.

Concerns were raised in a report to Noosa Council in 2006 regarding the rate of erosion which was undermining vegetation and Council pathways and which potentially posed a threat to Claude Batten Drive. Various options were addressed for resolving the problem.

Initially, emergency construction of rock revetment walls was carried out near the river entrance in 2006 and 2008.

Erosion however continued upstream of the rock revetment wall and on 6 March 2008 the following petition was presented to the then Noosa Council supported by 1045 signatures:

Background of Petition

“The Noosa River beach previously known as Dog or Doggie beach has been completely lost due to erosion by the tidal stream.

This was a very popular beach for the community. The erosion is continuing unabated and is further eroding into the landform known as ‘The Woods’.

There have been many previous attempts by members of the community to bring this problem to the notice of firstly, the Noosa Council and secondly, the Environmental Protection Agency. Maritime Safety Queensland is involved with any safety aspect of boating in the area.

This petition is aimed at collecting tangible support for the restoration of this area as a safe public beach. The Council and other government bodies must be shown that there is a sufficient level of community support to restore and maintain this beach before funding would be made available.

Petition:

We, the undersigned, call on the Noosa Council, the EPA and Maritime Safety Queensland, to coordinate the restoration of the Noosa River beach known previously as Dog or Doggie beach.”

As a result, Council subsequently allocated \$650,000 in its 2009/2010 budget for shoreline protection works to be implemented. In addition, Council was also successful in obtaining a grant for \$161,850 under the Queensland Government’s Environmental Infrastructure Programme to

assist in funding these works. These works included the construction of a rock protection wall and geotextile groynes for the purpose of protecting the Noosa Spit from further erosion.

Coastal Impacts Study and Report

Coastal Engineering specialists International Coastal Management (ICM) were engaged in August 2009 to undertake a coastal impact study and report on erosion mitigation measures. Their brief included preparation of detailed designs to:

1. Alleviate serious erosion of Noosa Spit at the Noosa River Estuary.
2. Re-establish a beach (known as Dog Beach)

The study methodology included:

- Define problem:
 - Review historical aerial photo – trends
 - Data collection:
 - Site Inspection
 - Hydrographic survey
 - Aerial photo
 - Current & water level measurements
- Generate options to be investigated
- Numerical modelling (short term system response) “*snapshot*”
- Historical aerial analysis (longer term system response)
- Determine preferred option – design, construction, costing etc

The Final ICM Report entitled “Option Review – Noosa River Spit” is Attachment 1.

A peer review on the ICM report has since been provided by Professor Rodger Tomlinson from Griffith University (Attachment 2). Professor Tomlinson advised in his summary that the strategy developed in the report is robust and recommended its adoption by Council.

ICM Report Outcomes

A brief summary of issues covered in the ICM report and outcomes from the public consultation process is as follows:

Defining the Problem

The state of the foreshore following major erosion over recent years is shown on Attachment 3 which also shows a 2006 photo of the beach known as Dog Beach.

Attachment 4 shows the alarming erosion that has occurred between 2006 and 2009 as follows:

- 30m erosion at Dog Beach
- 45m erosion at the upstream end of Noosa Spit

Options Considered

Option A – Do Nothing

The potential impacts if no maintenance works are carried out have been pointed out by ICM as follows:

- Breach of the Noosa River Spit through to Noosa Sound which may result in:
 - Potential for substantial changes to the entrance dynamics
 - Probable development of a dominant channel through Noosa Sound
 - Possible wave penetration into Noosa Sound
 - Undermining of Noosa Sound
 - Loss of Noosa Sound as an anchorage
 - Complete loss of Noosa River Spit
- Reduced opportunities for beach recreation and safe swimming
- Safety issues, for example, unstable banks in such a popular area which will require the need for signage, safety barriers and continual maintenance
- Loss of Council pathways and established vegetation
- Adverse public perception
- Increased wave penetration into the estuary, particularly at Munna Point (increased erosion)
- Narrowing of Noosa Spit between the middle groyne and the training wall which may result in:
 - Loss of Council roads, paths, facilities, etc
 - Flanking and subsequent failure of rock retaining wall
- Breaching of the Noosa Spit to beach which may cause:
 - Isolation and possible undermining of the training wall
 - Complete loss of Noosa Spit and beach from training wall back to Hastings Street
 - Impact on amenity of Noosa Main Beach
- Possible detrimental impacts on Fish Habitat Area if the northern channel becomes dominant
- Detrimental impact on navigation within the entrance

The upstream leg or peninsula of Noosa Spit was originally constructed in 1978 to separate the main body of flow of the Noosa River from Hay's Island (now known as Noosa Sound).

Should the main channel continue to migrate south, the potential ultimate impacts are extremely serious to Noosa Sound as shown on Attachment 5.

Prior to 1977, the southern channel had developed to such an extent that it carried almost the entire flow of the river. Severe erosion was then occurring along the Hayes Island revetment walls.

The relocation of the river mouth in 1978 was undertaken principally to protect Hay's Island from undermining of revetment walls due to strong river currents as well as from possible wave attack.

It follows that maintenance of the upstream leg of Noosa Spit is required to prevent these serious problems from re-occurring.

An external pier review by Professor Tomlinson advised that:

A Do Nothing option in my opinion would ultimately lead to erosion of the Noosa River Spit to an extent where it would be breached, allowing channel scour and possibly wave attack along the foreshore of Noosa Sound, and even a breakthrough to the ocean at Noosa Woods.

This would be unacceptable from a number of points of view and consequently it is necessary to manage the impact of the natural tendency of dominance of the southern channel.

Given the dynamic nature of the entrance, it would also not be acceptable to rely on natural re-alignment of the channel (as appears to be happening now), as the history of the entrance shows that the configuration changes regularly, and somewhat unpredictably.

Other Options

The initial options considered during the modelling process are shown on Attachment 6.

Option B involves construction of a rock wall on the existing foreshore alignment. Modelling results are similar to model results for the existing situation.

Option C involves stabilising the present channel location and beach with an embayed beach and groyne field.

Option D involves relocating the main channel away from the beach using submerged upstream and downstream closures and an upstream training wall.

As a result of C and D modelling scenarios, a preferred Option E was developed as shown on Attachment 7.

Features of the preferred Option E include:

- A revetment wall at the upstream end of Noosa Spit to control ongoing erosion.
- An upstream training wall approximately 80 metres long.
- A submerged "closure" in the vicinity of Dog Beach.
- Two groynes.
- Foreshore nourishment.

All of these works may not be required. The proposal is to construct those parts of the overall project considered to be essential in Stage 1 and then monitor the situation.

The proposed Stage 1 works are shown on Attachment 8 and include:

- The revetment wall at the upstream end of Noosa Spit.
- The upstream training wall.
- A section of the submerged closure at Dog Beach to act as a channel closure.
- Some foreshore nourishment.

Demonstrated Benefits of Preferred Option E from Modelling Outputs

Attachment 9 shows the modelling results for the existing situation and Attachment 10 shows the modelling results for the preferred Option "E".

With the proposed works in place, higher current speeds (indicated in yellow and red) are eliminated along the foreshore.

Advantages of Preferred Option E in Terms of Impact on Estuary

Option E is designed to minimize impacts on the estuary as follows:

- Compatibility with natural channel alignment.
Attachment 11 shows how the submerged closure aims to work with the river and follow a "natural" channel alignment.
- Containment within previous Noosa Spit landform.
Attachment 11 also shows how (apart from a section of the upstream training wall) the proposed works are contained within the original landform of Noosa Spit.

Modelling results show that it is very unlikely that the works will have any significant impact on other parts of the estuary or river as current velocities only changed by less than 0.3m/s at the upstream limit of the modelling.

Precedents for Concept of Submerged Closure

David Heckendorf has advised that there are precedents for semi-submerged closures (training walls) to be used on other rivers to separate the main river flows from boat harbours and the like.

Attachment 12 shows this concept at Yamba in New South Wales.

Consultation with Community Groups

Bobbie Corbett from ICM gave a presentation on technical investigations at the first meeting of the Noosa Spit Erosion Study Reference Group held on 15 July 2010.

A number of issues were raised for Council's further consideration as follows:

- Was the upstream leg of Noosa Spit intended to be sacrificial when it was originally constructed?
- If Noosa Spit is stabilised, where does the sacrificial zone shift to?
- What are the anticipated consequences for upstream areas from any of the options listed in the PowerPoint presentation?
- Further modelling is required showing the effects to Noosa Sound of increased wave penetration should erosion break through the Spit at the narrowest point.
- If a breakthrough of Noosa Spit occurred, how could waves turn 90⁰ to cause a problem?
- What are the effects of erosion at the end of the training wall if it were built?
- Consideration of funding options (levies on protected properties / Grants).
- Wider community involvement in discussions (especially Noosa Sound residents).

- Has Council considered removing the rock walls constructed in 2006 and 2008? (NPA predicted erosion would just shift).
- Public debate to put cost of works into context (ie, amenity vs property protection)
- How certain are we that outcomes will be as predicted by the modelling?

At the second meeting held on 8 September 2010, Bobbie Corbett together with Professor Tomlinson responded to these queries in some detail.

The second meeting was attended by David Heckendorf and other Noosa residents supportive of the action requested through the petition.

During discussion there were major differences of opinion as to whether intervention works in the estuary should be undertaken.

Grounds for support included:

- Long term protection of Noosa Sound
- Maintenance of the recreational amenity to the community provided by Dog Beach
- Loss of open space
- The threat to Noosa Sound properties
- Hazard created by the fallen trees and concrete paving along the foreshore

Grounds for opposition included:

- Consequences for upstream areas from any of the options considered have not been sufficiently tested. The erosion problem could be transferred somewhere else e.g. Munna Point or Gympie Terrace Foreshore
- Public consultation should have been undertaken before consultants were engaged. The brief given to consultants is too limited.
- The estuary does not change quickly and there is still the possibility that the channel will change and very drastic works will not be necessary.

Noosa Biosphere Association offered another alternative including:

- Creating a sandy foreshore by clearing existing vegetation and shifting the concrete pathway.
- Pumping sand into an area in Noosa Inlet to reinforce the buffer provided by the upstream leg of Noosa Spit (this concept is shown in Attachment 13).

The Noosa Parks Association has submitted a letter confirming its concerns. Refer to Attachment 14.

Construction Method

It is proposed to construct all the structures using large sand-filled geotextile containers known as mega containers. This is a relatively soft option which gives flexibility to allow modifications should unforeseen problems occur.

It was originally proposed that the initial works be constructed from a mixture of large sand-filled geotextile containers and rock. During the consultation process, concerns were raised about transportation of the rock to site by barge and by truck and their impacts on Hastings St, upstream loading facilities and vegetation in the Noosa Spit zoned Koala Habitat.

The proposed structures are shown in Attachment 15.

Life of Geotextile Containers

A supplier, Geofabrics Australia Pty Ltd has advised that the expected life is 15 years for the standard material and 25 years for the vandal resistant material recommended for structures with UV exposure. The vandal deterrent material would be specified.

Proposed Stage 1 Works

The recommended Stage 1 works is a combination of Stages 1A, 1B and 1C in the International Coastal Management report.

Cost estimates are as follows:

Geotextile Containers and Beach Renourishment	\$1,345,000.00
Project Management Including Design, Survey, Geotechnical and Supervision	\$90,000.00
Council Administration	\$30,000.00
Monitoring and Regulatory Approvals	\$40,000.00
Contingencies	<u>\$95,000.00</u>
	\$1,600,000.00
Less Available Funds	\$646,918.00
Additional Funds Required	\$953,082.00

The estimated cost of the full project, which will depend on the construction method adopted, is over \$3M, however, as previously outlined, it is proposed to stage the project and monitor the effectiveness of the first stage before proceeding further.

Legal

There are no legal implications to this report.

Policy

There are no policy implications to this report.

Risk

The risks involved with any proposal to "do nothing" are as follows:

The exposure of infrastructure to wave and current action on Noosa Sound will:

- result in potential structural failure from erosion and undermining of private residents' revetment walls.
- have a detrimental effect on peoples' livelihoods, lifestyles and tourism.

The risks involved with protecting The Spit with rock armour:

- There will be a detrimental effect on existing vegetation with the construction of a road along the Spit.
- Noise and amenity with the transportation of thousands of tonnes of rock along Hastings Street.
- The cost of triple handling rock from quarry, to barge to site.
- The visual effect of rock in a green environment.

The risks involved with reinforcing The Spit with sand filled mega containers are as follows:

- The vandal proof containers may leak sand from damage from boat anchors.
- Mega containers may subside from current action.
- Additional costs will be required to install additional containers at maximum depth.
- The mega containers may pose a navigation hazard to boats.

Limitations of the Modelling

The modelling undertaken is based on a “snapshot” in time when the hydrographic survey was undertaken at the Noosa River estuary which is very mobile.

Erosion at End of the Structures

Erosion could occur at the end of the structures, particularly at the end of the revetment wall.

Risk to Swimmers by the Downstream Submerged Closure

Currents on the river side of the submerged closure could result in a potential hazard for swimmers.

Signage will be required to address this risk.

Critical Dates

As there is a substantial channel in the middle of the estuary which alleviates excessive velocities in the proposed protection zone, construction sooner rather than later is necessary before the hydraulic dynamics change for the worse.

Implementation

The full project as modelled will not be constructed initially.

Rather than outlaying the full cost up front, it is considered preferable to construct stage 1 and then monitor the results.

As specialist equipment and materials are required to install the mega containers, this project will go to public tender. Works are proposed to commence around April 2011.

Whole of life costing will require the structure to be replaced after 25 years. A maintenance program including ongoing monitoring and repairs shall be included in Council's asset management system and funded accordingly.

The general public and stakeholders will be kept informed of progress through Council's website, media releases and representation at the invitation of stakeholders at formal meetings.