



**East Beach Coastal Erosion
Engineering and Feasibility
Study**

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Peer Review

**Department of Sustainability
and Environment**

aurecon

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Executive Summary

Background

In 2007, BMT WBM undertook a detailed investigation of the East Beach erosion issues under the direction of a Steering Committee established specifically to oversee the study. Moyne Shire Council received the BMT WBM study report in December 2007, on the basis that a peer review would be conducted.

Victoria's Department of Sustainability and Environment (DSE) has engaged Aurecon to undertake a peer review of the BMT WBM study report. The peer review is required to provide State Government and Moyne Shire Council as the appointed Committee of Management with clear and independent advice on the immediate coastal risk issues and appropriate options for management at East Beach, and inform the prioritisation of government investment.

It is relevant to note that BMT WBM was given specific "*policy direction on the study objectives*" by the East Beach Erosion Study Steering Committee (see BMT WBM 2007, Section 4.1). These *project directives* have guided WBM in the delivery of their assignment. The *project directives* are reproduced below:

- There is a demand to **retain the rock seawall** as protection for the residential and surf club development located on the dune behind it.
- There is a demand to **preserve the existing dune area between the seawall and the properties** as a public amenity, ecological habitat and buffer from the sea. Thus, re-aligning the seawall further landward is not a feasible option.
- There is demand for **restoration of the whole beach as far north as the northern end of the seawall**, although targeted improvement of some key sections (eg adjacent to the surf club) would have priority. This expectation requires a substantial increase in the sand volume seaward of the seawall alignment along about 2 km of the beach. Improvement of some sections of beach could be achieved by local site-specific works, which would require less additional sand, but would leave other parts of the beach with no improvement.

As noted by WBM, the *project directives* had a significant effect on the study outcomes:

- A rock seawall is required
- Retreat options would not be considered
- The minimum length of restoration works is the entire 2.4km stretch of beach currently backed by the rock seawall – thus requiring the sourcing of significant quantities of sand

This review has not been constrained by these *project directives*, and considers the engineering feasibility of the available options and the consistency of those options with the Victorian Coastal Strategy (VCS) 2008.

Key Issues and Risks

In the late 1800's, training walls were constructed at the entrance to the Moyne River. The training walls extend some 300m beyond Griffiths Island and effectively capture sand migrating around the headland at Lighthouse Beach. An historical assessment indicates some 500,000m³ of sand has accumulated on Griffiths Island since the introduction of the training walls. This has led to a corresponding loss of sand supply to East Beach. This loss of supply is the key process influencing coastal erosion and observed recession at East Beach.

The key issues relating to coastal erosion along East Beach have been identified through review of previous studies, site inspections, consultation with DSE and drawing on the local experience of the study team. The key issues are summarised below:

- Declining quality of the beach asset
- Ongoing coastal erosion
- Coastal defences in poor condition
- Inadequate design of coastal defences
- Inappropriate development on the coastal dune
- Unfounded community perception of protection by seawall
- Climate change impact exacerbating coastal hazards
- Limited priority based funding constraints

An independent risk assessment has been undertaken that identifies 4 key priorities that require immediate action to address their *Extreme* risk rating, being:

- Poor condition of the seawall resulting in seawall failure during a storm event with the possible loss of public infrastructure and private property
- The interrupted longshore transport regime continuing to reduce beach levels and further compromising the structural integrity of the seawall, again with the possible loss of public infrastructure and private property during storm events
- Limited quantitative data regarding the coastal processes and the coastal defences
- Insufficient sand to meet the ongoing longshore transport demand and/or the bulk restoration requirements

Summary of Proposed Works

The *project directives* provided by the Steering Committee to a large degree dictated the scope of the “works” option for WBM. The “works” option includes a number of components:

- **Repair Seawall** – these works aim to improve the engineering standard of the seawall to provide the level of service assumed or implied by the existing structure.
- **Beach Restoration** – the objective of these works is to improve beach amenity, access and usability. Three major elements are involved: beach nourishment, removal of derelict timber groynes and dune rehabilitation.
- **Ongoing Nourishment** – to maintain the beach in the improved state resulting from Beach Restoration, ongoing nourishment is required. WBM propose that sand be sourced by harvesting from Lighthouse Beach and South West passage.
- **Regulatory Controls** – WBM propose a range of management actions and regulatory controls to limit future risks.

Within the constraints of the *project directives* provided by the Steering Committee, it is considered that the approach offered by WBM was the most appropriate solution available to achieve the stated objectives and, in an engineering context, is considered feasible. It is apparent that the *project directives* of the Steering Committee support the protection of private lands, and (at the time) there was limited State guidance on this issue. Moreover, while the direction provided at the time was not necessarily flawed, the direction is considered inconsistent with the current VCS (and leads to outcomes inconsistent with the VCS).

Because of the scale of restoration, the approach proposed by WBM is very expensive and requires significant ongoing funding commitment. Much of the proposed works directly benefits private landowners. While not wholly inconsistent with the VCS, many aspects of the proposed works would fail to demonstrate significant **public** benefit. Accordingly, it is unlikely that funding for restoration/protection/nourishment works would be available when assessed against state-wide priorities.

Recommended Approach

The recommended approach focuses efforts (and funding) on the central activity node, from the Surf Club through to Ritchie Street. In this area, the seawall is to be upgraded, beach restoration

undertaken and ongoing nourishment should focus on this as the primary discharge location for bypassed material.

Seawall Repair/Upgrade

- Undertake immediate emergency repair of the seawall at its northern end.
- Inspect entire seawall to confirm its toe elevation and structural integrity.
- South of the Surf club, repair and maintenance of the seawall.
- From the Surf Club through to the end of the seawall, the seawall should be upgraded so that it provides the level of service that would be expected for a last line of defence structure on the coast.

Beach Restoration

- 100,000m³ of sand as an initial nourishment volume placed between about Lydia Place and Ritchie Street (approx 700m).
- Sourced from Southwest Channel, Puddney Ground and Lighthouse Beach bay.
- The heritage status of the timber groynes should be investigated, and a plan prepared for their removal or rehabilitation as appropriate.
- Dune restoration

Ongoing Nourishment

- Ongoing commitment for nourishment via bypassing of 20,000m³ of sand annually discharged between Lydia Place and the Surf Club.

Monitoring

- A series of profiles should be established and monitored.
- Quarterly measurements of beach width.
- Annual surveys of beach profile
- A visual inspection of the seawall with photographic record

Funding

A range of state funding mechanisms are accessible for contributions towards recommended works. These include:

- Coastal Risk Management Program
- Improving Public Safety in Public Places Program
- Coast Action / Coast Care

These state funding programs have guidelines for eligibility, and funding is awarded based on priority in “competition” of all other eligible funding applications across the state. That is, while a project may meet the funding criteria, if its risk-priority is low, it may not receive a share of the limited funding pool.

Opportunities to source funding for works at East Beach could also consider:

- **Moyne Shire Council** – funding through local government, as a co-contributor to the funding of seawall repair and maintenance activities, and in-kind contributions of Council services, personnel and plant.
- **East Beach Residents – contribution to capital works** – a one-off levee on property owners along East Beach to assist funding the capital upgrade works to improve the level of service offered by the seawall protecting private property.

- **East Beach Residents – contribution to ongoing maintenance** – an on-going levee on property owners along East Beach to assist funding the ongoing maintenance of the seawall protecting private property.
- **Port of Port Fairy – Initial Beach Restoration** – a commitment from Port of Port Fairy to contribute to the funding of the initial beach restoration volume of 100,000m³ and in-kind contributions of Port services, personnel and plant.
- **Port of Port Fairy – Ongoing Nourishment** – a commitment from Port of Port Fairy to fund the bypass of up to 20,000m³ of sand trapped annually by the training walls.

Priorities

The Tier 1 priorities, requiring immediate action and/or commitment are

1) Emergency Works

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy

2) Investigations

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy

3) Major Works – Bypassing System Upgrade

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy

4) Ongoing Monitoring & Maintenance Tasks

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy

Key Message

The review of the Port Fairy East Beach Coastal Erosion Engineering and Feasibility Study has identified, together with the discussion above, the following key take-home message:

The ongoing future management of coastal processes to address erosion hazards at East Beach Port Fairy is a shared responsibility for DSE, Moyne Shire Council, Port of Port Fairy and the Port Fairy Community. Collective ownership of the coastal risks together with innovative funding partnerships will be required to achieve beneficial outcomes for all stakeholders.

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1. Introduction

1.1 Background

East Beach is a valuable asset providing coastal recreation opportunities for the local community and visitors to Port Fairy. There are numerous public and private assets located along the coastal dune system and on-going erosion has led to a loss of sand from the beach system and is threatening these assets. An overview of the study area is provided below in Figure 1.

The beach erosion identified at East Beach is principally a result of reduction in the sand supply from the west caused by the construction of the Moyne River training works undertaken during the late 1800s. To address the on-going erosion, a seawall has been progressively constructed since the 1950's. The seawall has not been constructed in accordance with sound engineering design principles and, in many places, is structurally inadequate. This structure does not provide the level of protection that would be associated with an engineered shore protection structure.

In 2007, BMT WBM undertook a detailed investigation of the East Beach erosion issues under the direction of a Steering Committee established specifically to oversee the study. It is understood that the Steering Committee and Moyne Shire Council received the BMT WBM study report in December 2007, on the basis that a peer review would be conducted.

Victoria's Department of Sustainability and Environment (DSE) has engaged Aurecon to undertake a peer review of the BMT WBM study report. The peer review is required to provide State Government and Moyne Shire Council as the appointed Committee of Management with clear and independent advice on the immediate coastal risk issues and appropriate options for management at East Beach, and inform the prioritisation of government investment.

This report documents the findings of the peer review.



Figure 1 East Beach Port Fairy – Overview

1.2 Approach

Aurecon's approach in delivering the peer review is summarised below:

Task 1 – Project Initiation

Upon commissioning, Aurecon scheduled a Project Initiation Meeting, which included representatives from Moyne Shire Council and DSE. At this meeting, key members of the project team were introduced, and our proposal reviewed as necessary to best meet the needs of all parties. This meeting also allowed an opportunity to confirm study timeframes and reporting protocols as well as initiate data/information handover.

A second meeting was held at Moyne Shire offices attended by Moyne Shire Council and DSE and representatives from the East Beach Steering Committee. This meeting was primarily to inform the Committee of the study process.

Preliminary site inspections were scheduled to occur following the Project Initiation Meetings to further familiarise the study team with the area. Members from DSE accompanied the project team during these preliminary inspections to facilitate a thorough briefing of local and stakeholder issues as well as promote a targeted understanding of the vision for threatened sections of this shoreline.

Task 2 – Setting the Scene

The objective of this task was to gather and review all available relevant information (including legislation/policy) to provide background and guidance on appropriate action to occur along the threatened sections of East Beach. Collated information documented in the study brief included:

- BTM WBM Pty Ltd (August 2007) 'Port Fairy East Beach – Coastal Erosion Engineering and Feasibility Study,' Prepared for Moyne Shire.
- WRL (June 2008) 'Expert Witness Statement by James Carley regarding coastal processes and hazards for proposal subdivision at East Beach Port Fairy.'
- WBM Pty Ltd (November 2006) 'East Beach Port Fairy Comparative Review of Coastal Process Studies,' prepared for DSE.
- Environmental GeoSurveys Pty Ltd (July 2005) 'Griffiths Street, Port Fairy - Geomorphology & Coastal Processes in Relation to a Proposed Subdivision,' Prepared for Paul Crowe.
- WBM Oceanics Australia (June 1996) 'Draft Coastal Study of East Beach Port Fairy' Prepared for Moyne Shire.
- Coastal Engineering Solutions Pty Ltd (July 2006) 'Port Fairy Shoreline Stability Study – Draft Report,' Prepared for Marcson Pty Ltd.
- Victorian Coastal Council (2008) 'Victorian Coastal Strategy' (available at <http://www.vcc.vic.gov.au/vcs.htm>).

Additional Information sourced/provided included:

- Proposed Harbour Improvements (1925) - map illustrating proposed training wall and harbour basin improvement works
- ENSR (March 2008) – letter report documenting outcomes of the East Beach Landfill Investigation
- AECOM (August 2009) Port Fairy River Training Walls. Report prepared for Moyne Shire Council
- Estimate of dredging volumes in the Moyne River entrance over the past 3 years
- Summary of community concerns/responses arising from the community consultation undertaken by Council.
- CSIRO (2009) The Effect of Climate Change on Extreme Sea Levels along Victoria's Coast. A Project Undertaken for the Department of Sustainability and Environment, Victoria as part of the 'Future Coasts' Program

Task 3 – Review of BMT WBM Report

Aurecon undertook a comprehensive review the BMT WBM report. This included independent assessment of the key processes influencing coastal geomorphology along East Beach. The recommendations made by BMT WBM have been reviewed to assess their capacity to achieve the desired erosion control, and for their consistency with Victoria State policy.

Task 4 – Risk Assessment

The hazards and issues identified at East Beach were reviewed for completeness. Any additional significant hazards/issues have been nominated for inclusion.

The management strategies presented in the BMT WBM report have been reviewed and recommendations provided regarding the most appropriate strategy(ies) for implementation over the short to medium term (10 year timeframe).

Task 5 – Consistency with the Victorian Coastal Strategy

Aurecon has undertaken an assessment of the degree to which the proposed actions are consistent with the Victorian Coastal Strategy. In particular, the proposed actions capacity to demonstrate public benefit in order to be eligible for prioritised State funding.

Task 6 – Reporting

The findings of the independent review have been documented herein. The report draws from the earlier project tasks and (in draft form) will seek input from Moyne Shire, DSE and East Beach Steering Committee. The preferred strategies will be nominated, along with preferred timelines for implementation.

Aurecon have delivered the draft final report to the DSE for review and consideration. Once endorsed, the Review findings will be presented to the East Beach Steering Committee, DSE and Moyne Shire Council at Port Fairy.

2. Overview

2.1 Port Fairy Bay Coastal Processes

The coastal processes influencing sand transport at East Beach are complex. They are a combination of waves, and tidal and wind driven currents, around a complex headland topography. East Beach is exposed to waves propagating from the southwest through to wave from the south east. In general waves from the southwest have longer period than those from the southeast but large storm waves can propagate from all southerly directions. At the southern/western end of East Beach, Griffiths Island and the entrance training walls provide shelter from southwesterly waves. Farther north/east, the sheltering gradually reduces, and it is estimated that, by the end of the seawall, East Beach is fully exposed to southerly waves conditions.

During typical southwesterly wave conditions, sand is transported towards the east. CES 2006 (as cited in WBM 2007) estimate net longshore transport at $20,000\text{m}^3/\text{yr}$ to the east (with gross transport increasing eastwards due to increased wave energy exposure).

2.2 Coastal Erosion

2.2.1 Key Process Driver

In the late 1800's, training walls were constructed at the entrance to the Moyne River. The training walls extend some 300m beyond Griffiths Island and effectively capture sand migrating around the headland at Lighthouse Beach. Review of aerial photography indicates some $500,000\text{m}^3$ of sand has accumulated on Griffiths Island since the introduction of the training walls. This has led to a corresponding loss of sand supply to East Beach. This loss of supply is the key process influencing coastal erosion and observed recession at East Beach.

2.2.2 Is Recession Continuing?

WBM and others acknowledge that the ongoing effect of the training walls is uncertain, and it has been suggested by WBM and CES (CES 2006, as cited in WBM 2007) that, after 125 years, a new equilibrium has now been achieved. However, recent erosion could be interpreted to suggest that the stability of the East Beach alignment has only been achieved through the introduction of the seawall (and groynes) in the 1950/60's. Indeed, the evidence at Lighthouse Beach is that this beach is still accreting, which is inconsistent with an equilibrium alignment on East Beach, assuming no significant change in sand supply from the west.

The WBM report states that

"it remains uncertain whether or not there is an ongoing net loss either under the action of persistent longshore sand movement or to offshore"

That is, there is uncertainty to whether or not long term recession is continuing **and** there is uncertainty regarding the mechanism for such recession.

Overall, East Beach is either receding or stable, but is clearly not in a state of accretion. Ultimately, that East Beach is continuing to recede (or not) becomes irrelevant when considering the existing condition of the beach and seawall and the risks to property and infrastructure arising from storm attack. Further, sea level rise and other climate change impacts (changes to longshore sand transport regime) could increase these risks. The situation has not been projected to improve through natural recovery, so action is required to address the risks.

2.3 Other Studies

A number of relevant studies have been reviewed by WBM in preparing their study report, and by Aurecon undertaking this peer review (See Section 1.2 for bibliography). Key amongst these are the various assessments by CES 2006, Rosengren 2005 (as cited in WBM 2007) and Carley 2007 in reference to the proposed coastal development located on the property just beyond the end of the seawall. A brief commentary on these reports is provided below.

Both Rosengren and Carley have attempted to quantify erosion/recession rates at the proposed development site north of the seawall. Over the very long term (1854-1992), Rosengren suggests 20-40m recession based on comparison of imagery/maps. Comparison of other charts suggests 20-30m recession over the period 1870-1992. It is difficult to know what is being compared (high water mark, mean sea level, scarp, dune toe), but within these broad comparisons the recession rates over the 122-138 years can be indicatively estimated. Carley indicates rates of 0.14-0.29m/yr for the 1854 comparison and 0.23-0.31m/yr for the 1870 comparison. Assuming that the bulk of the recession is occurring on the southern half of East Beach (approx 3km long), the volume losses are of order 3500m³/yr to 7900m³/yr. At the lower end, this is consistent with the accretion observed at Lighthouse Beach, but at the upper end might suggest that the training wall induced recession is on top of a background recession, perhaps of order 0.05-0.10m/yr.

There are no major inconsistencies between the studies, and the conclusions reached are supported by their respective approaches. Each study recognises the uncertainty (and complexity) regarding sand transport at East Beach.

As a further consideration, at the time beyond the scope of the WBM study, CSIRO have investigated changes to the climate in Victoria and project increases in wind speed (that vary seasonally) which are likely to result in an increase in wave energy from the southwest, but also increasing total wave energy at the coast.

2.4 Climate Change

The effects of climate change pose a significant risk for vulnerable communities along the Victorian Coastline, including Port Fairy. Impacts are likely to manifest as:

- Sea level rise
- Increased average and storm wind speeds (and potentially, small but important changes to dominant wind directions)
- Increased storminess (either by changes in frequency of events or event severity)

These changes have the potential to significantly alter Victoria coastlines causing coastal recession, changing coastal geomorphological processes, and increasing the risk of storm tide flooding. Development, both public and private, on East Beach will be at increasing risk over time.

It is noted that the WBM study adopted an approach to climate change and sea level rise consistent with accepted coastal engineering practise during 2007, based on IPCC 2007 projected range estimates of sea level rise. With regard to the IPCC 2007 scenarios, WBM report

These indicate rises of 0.18 to 0.59m by the end of the present century, with a possible upper limit of about 0.79m. Thus, planning for a sea level rise of the order of 0.3-0.5m appears appropriate in the context of the present understanding of these processes.

In recognition of these future risk, WBM identified that if no action was taken the seawall would come under greater attack and that restoration (ongoing nourishment) would need to cater progressively for increasing sea level rise.

Since that time, the VCS has been developed and now provides policy and guidance on sea level projections to be used for coastal risk identification and management. Based on the same IPCC 2007 reporting, the VCS provides the following guidance:

On the basis of the IPCC report and until national benchmarks for coastal vulnerability are established, a policy of planning for sea level rise of not less than 0.8 metres by 2100 should be implemented. This policy should be generally applied for planning and risk management purposes.

Accordingly, any action at Port Fairy to address the coastal recession and erosion issues needs to be planned in accordance with climate change projections and associated risks. In essence, at Port Fairy this means that

- Any proposed coastal erosion control response should offer an appropriate level of protection with consideration of future sea level rise, storm surge and storm wave conditions; and,
- Bypassing and ongoing future nourishment should have the capacity to adapt over time as coastal processes evolve in response to climate change.

Longer term, the future evolution of the entire western coastline is uncertain. Climate change may result in significantly increased or decreased longshore transport, and dune and/or cliff erosion to the west may introduce significantly more sand to the system. Towards 2100, climate change risks will dominate concerns along East Beach. The consequence of more frequent and/or severe storm events will increase the gross sand transport rates, increasing the variability in shoreline position, and potentially increasing beach slopes. Adequate shoreline protection will be crucial in minimising the hazards and potential losses associated with such events.

2.5 Summary of Key Issues

The key issues relating to coastal erosion along East Beach have been identified through review of previous studies, site inspections, consultation with DSE and drawing on the local experience of the study team. The key issues are summarised below:

- **Quality of the Beach Asset** – DSE, Moyne Shire Council and the community recognise the value of East Beach as a recreational and environmental asset and in serving to function within the erosion protection system for East Beach. The current level of the beach is such that access and usability is restricted and it is providing only limited performance in its erosion buffer function. There is desire, backed by the VCS, to improve usability and amenity of beach.
- **Coastal Erosion** – At East Beach, the construction of the Moyne River training walls in the late 1800's has resulted in erosion and the beach has been receding since that time. As accretion on Griffiths Island (mainly Lighthouse Beach) is still occurring, it is likely that East Beach continues to suffer from a reduced sand supply from the west.
- **Coastal Defences in Poor Condition** - Efforts to address the coastal erosion have included the construction of timber groynes and rock seawalls. These structures are now in poor condition due to decay over time and/or failure as a result of storm wave action. The structures do not offer the same level of service that would have been the design objective at the time of their introduction.
- **Inadequate design of Coastal Defences** – The seawall was constructed progressively from about the late 1950's. Since that time, seawall design has evolved such that the current structure is no longer consistent with current engineering practice (multi layered, geotextile backing). There is also some doubt that the rock size is adequate relative to the incident wave climate (evidenced by observed rock displacement during storm attack).

Based on cross sections in WBM Fig 3-1, the toe of seawall is estimated to be at or above +0.5m AHD. This is considered quite high and a toe elevation at about LAT is typically adopted in seawall design (around -0.8m AHD at Portland), depending on the wave climate exposure. With the toe at this relatively high elevation, and poor structural composition of the seawall, a relatively mild storm event could scour the toe and lead to toe failure. More severe events could see significant undercutting of the toe and complete failure of the seawall. There is significant risk of rapid shoreline recession following such failure, and the consequent risk undermining the foundations of properties "protected" by the seawall.

- **Inappropriate Development** – In the past, residential property development has occurred at locations on the crest of the main dune separating East Beach and Belfast Loch. The protection of development in these areas has required the construction of a last-line-of-defence structure (seawall), which has not allowed the beach and dune to function in response to geomorphological change. With improved knowledge regarding coastal processes and the future risks associated with climate change, it is unlikely that development of this type will be allowed now or in the future, anywhere in Victoria. Local Councils and land managers face significant challenges in addressing future risks as they manage (what are in hindsight) the poor planning decisions of the past.
- **Community Perception** – Based on our experience in other coastal locations in Victoria and elsewhere in Australia, there is likely to be a perception held by the community that the seawall, if maintained at its current level of service, provides storm protection for the public assets and private property along East Beach. It is considered that in-fill development and/or re-development of properties along east beach would have proceeded with an expectation of protection offered by the seawall. The actual level of service and protection offered is likely to be significantly less than the perceived level due to the poor design (the seawall structure is inconsistent with current coastal engineering design practise).
- **Climate Change** – rising sea levels, increased storminess and changed wind/wave climates are identified as consequences of climate change. At vulnerable coastal communities, like Port Fairy, existing coastal hazards are likely to increase over time, and additional hazards may evolve out of the climate change impacts. An adaptable and sustainable approach to coastal hazards management is required.
- **Funding Constraints** – Works to address identified issues in the coastal zone are typically expensive. There are a number of state-wide funding programs to which applications can be made to assist in rolling out agreed action plans. The funding programs typically have a limited pool of funds available on an annual basis, with funding to be directed based on state-wide priorities determined with reference to a range of criteria. Accordingly, there is no guarantee of funding for undertaking any recommendations, as these need to be assessed and prioritised within a state-wide context. Further, there is no guarantee of funding from one year to the next, making the planning and implementation of long term projects challenging.

Typically, for large projects requiring significant funding over a number of years, a number of funding sources are sought, and could include Commonwealth, State, Local, private and community contributions. Coordinated and cooperative funding (and management) arrangements are considered to achieve more effective outcomes, maximising stakeholder benefiting through the pooling of resources and economies of scale.

Another issue that has been identified is shoreline recession farther along East Beach in the vicinity of the (now) disused land fill. Shoreline recession threatens to uncover/undermine the landfill resulting in the release of contaminants into the marine/coastal environment with consequent environmental and aesthetic impacts. ENSR/AECOM was commissioned by Moyne Shire Council to investigate the risk and have recommended a cost-effective solution that protects the site from erosion by construction of a geo-container seawall (but also present other options including full rehabilitation of the site).

There is concern that a piece-wise solution involving protection of the section of shoreline in front of the landfill may lead to “end wall” type erosion on either side of the shore protection. The containment of the beach behind the proposed protection will also exacerbate the erosion of adjacent beaches as sand from the protected location will not be available to supply the dynamic surf-zone and cross shore sand movements. If/As the shoreline recedes, the protection may be outflanked, and the landfill exposed. More extensive protection will reduce this risk (at higher cost). A piece-wise solution is not consistent with the VCS.

A more appropriate solution, consistent with the VCS, would involve progressive rehabilitation of the most at-risk sections of the landfill, such that the dune system can function naturally as a source and sink for beach sand. While current and potentially future shoreline recession continues, the risk of exposure of contaminated land will remain. Efforts to restore the longshore transport regime will reduce this risk and may modify the need rehabilitate the entire landfill area.

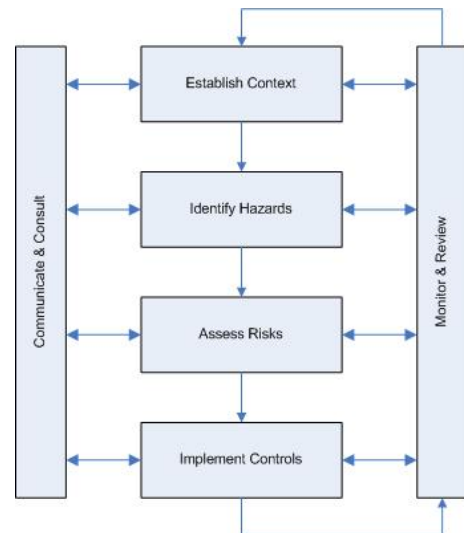
3. Risk Assessment

3.1 Risk Management Framework

AS4360:2004 Risk Management (current at the time of the WBM study) provides a framework for the assessment and management of risk. Risk Management is an ongoing process consisting of five key steps that are supported throughout with communication and consultation. The framework is illustrated on the right.

The 5 steps of the process, undertaken in sequence, enable continual improvement in decision-making regarding risk reduction and management. Communication and consultation is an integral part of all steps to ensure information exchange and includes consulting with a range of stakeholders and reference sources as applicable to the context.

Although not explicitly set out within the AS4360 Risk Management Framework, it is apparent that the WBM undertook the study in a manner consistent with this process.



The Standard also sets out a hierarchy of control types to assist in the decision making process. Possible controls are listed below in descending order of effectiveness:

- **Elimination** - where unacceptable risks exist and no suitable controls can be implemented, the hazard is removed, or the specific matter/task will not be proceeded with.
- **Substitution** - the use of an alternative process or product that has a more acceptable risk profile, eg with hazardous substances.
- **Engineering Control** - isolation of source or person, lockout of energy, design, process changes, monitoring and automated warning/control equipment.
- **Administrative Control** - management and procedural control (including the Permit to Work System), monitoring, limiting exposure, measuring performance, housekeeping, maintenance, purchasing, job rotation, training, and education.
- **Personal Protective Equipment** - the provision of appropriate personal protective equipment.

By way of example, at Port Fairy, an Elimination strategy would require those properties at risk to be relocated from the East Beach dune, a Substitution strategy might involve relocating the properties farther back on the dune, Engineering controls take the form of seawalls, nourishment and bypassing, and Administrative controls might be implemented as changes to the planning scheme or relevant overlays.

Risk evaluation involves determining the level of risk in consideration of the consequences and likelihood. The following Risk Evaluation matrix is adopted from AS 4360:2003 and can be used to provide guidance on action priorities.

	Insignificant	Minor	Consequence Moderate	Major	Catastrophic
People	First aid injury	Medical treatment injury	Lost time injury	Death, permanent injury or disability	Multiple fatalities or major irreversible effects to more than 50 people
Property	Minor damage to plant of system	Damages impact on budget and program	Significant damage to plant or system	Extensive damage to plant or system	Virtual complete loss of plant or system
Environment	Limited impact to minimal area	Minor, short-medium term impact to local area of limited significance	Moderate but reversible impact	Medium-long term widespread impact	Long term widespread significant impact
Likelihood	Almost Certain	High	High	Extreme	Extreme
	Likely	Moderate	High	High	Extreme
	Possible	Low	Moderate	High	Extreme
	Unlikely	Low	Low	Moderate	High
	Rare	Low	Low	Moderate	High
Priority		Extreme - Immediate Action High - ASAP Action		Moderate - In Context, timeframe set by context Low - Routine controls/response	

Figure 2 Risk Evaluation Matrix

3.2 Risks Identified by WBM

WBM identified 11 key problems that impacted upon East Beach and required action in order to achieve the study objectives (for discussion on the study objectives, see Section 5.2.1). With reference to the Risk Management Framework, WBM's approach is considered to be aligned with the risk management framework as follows:

- **The context** has been established within the historical setting and study objectives, together with guiding state and federal policy (limited) and engineering practise
- **The hazards** were identified ("The Problem") through consultation and inspection
- **The risk assessment** is undertaken in consideration of the consequences of "Do Nothing"
- **The controls** are identified as "Proposed Actions".

The 11 key "problems" and associated consequences of "Do Nothing" are summarised below (adapted from WBM Table 4-3):

Table 1 Nominated Hazards Requiring Action (adapted from WBM Table 4-3)

	The Problem	Consequences of "Do Nothing"	Priority
A	Unstable sections of rock wall a public risk of falling rocks getting to the beach and being on the beach. Poor standard to end of rock wall with extensive 'end effect'	Public risk continues and erosion continues behind the rock wall towards private property \$87M in rated value. 'End effect' will continue to erode dune north of rock wall.	1
B	Over the past century 500,000m ³ of sand has accumulated in and around Griffith Island starving East beach of sand.	East beach continues to be starved of sand; erosion continues with reduced beach area and the rock wall must deflect the storms to protect the private property.	1

C	Weed infested and poorly vegetated dune structure.	Continued weed growth smothering and over growing struggling native plants.	1
D	Lack of records of beach volume, shape and conditions.	A collection of anecdotal observations lacking quantified data.	1
E	Aging wooden structures (1960's) with missing sections and gaps that do not restrict sand movement.	Public risk from rusting and broken wooden structures in the middle of the beach area.	2
F	The causeway blocks water and sand flows, the sand build up. The structure provides easy access for dogs and foxes into the Griffith Island Shearwater colony. Wannon Water ocean outfall pipe also crosses the passage at this point.	Continued silting of Moyne River and sand accumulation in the Passage. High Shearwater mortality due to dogs and foxes. Treated sewerage effluent discharged to the sea just off Griffith Island.	3
G	Top up for the 500,000m ³ of sand to be replacement that can not be removed from Griffith Island Area.	Sand volumes will not provide enough protection to withstand storm events or cater for sea level rise.	4
H	After monitoring the effects of removing the causeway a permanent accessway needs to be constructed.	The temporary crossing will have a finite life and need of replacement.	5
I	Ongoing maintenance of sand removal from Lighthouse beach. Sand leakage through training wall into river channel	Lighthouse beach would again fill with sand at the expense of the benefit provided by the works for East beach. Sand would flow through into the river channel	6
J	Such a multi faceted project requires close management to ensure satisfactory completion.	Responsible use of public funds must have milestones of achievement.	7

3.3 Risk Assessment Review

The key “problems” and associated consequences of “Do Nothing” nominated in Table 1 above have been reviewed to identify the *Hazard(s)* and evaluated in the context of the Risk Evaluation Matrix (Figure 2). This review of the risk assessment is summarised on the following page in Figure 3.

The key priorities identified from this review are consistent with the priorities set out by WBM.

	Issue	Hazard Type	Hazard Influence	Consequence Level	Likelihood	Risk	Priority
A	Seawall stability	Trip/fall and/or crush	People	Moderate	Unlikely	Moderate	In Context
	Seawall failure	Asset / property damage or loss	People	Moderate	Unlikely	Moderate	In Context
			Property	Major	Possible	Extreme	Immediate
			Environment	Insignificant	Likely	Moderate	In Context
Dune Erosion	Loss of habitat and dune function	Environment	Moderate	Likely	High	ASAP	
B	Interrupted longshore transport regime	Trip/fall and/or crush	People	Moderate	Unlikely	Moderate	In Context
		Asset / property damage or loss	Property	Major	Likely	Extreme	Immediate
		Loss of habitat and dune function	Environment	Moderate	Likely	High	ASAP
C	Weeds in dune areas	Habitat loss	Environment	Moderate	Likely	High	ASAP
D	Limited data for quantitative analysis	Poor decision making	Property	Major	Possible	Extreme	Immediate
		- over/under conservative response	Environment	Moderate	Possible	High	ASAP
E	Aging wooden groynes	Public safety	People	Minor	Possible	Moderate	In Context
		Reduced amenity	Environment	Insignificant	Rare	Low	Routine
F	Causeway interference with transport regime	Asset / property damage or loss	Property	Moderate	Rare	Moderate	In Context
		Loss of beach amenity / access	Environment	Minor	Rare	Low	Routine
	Pests on Griffiths Island	Habitat / biodiversity loss	Environment	Moderate	Likely	High	ASAP
G	Insufficient sand to meet demand	Asset / property damage or loss	Property	Major	Likely	Extreme	Immediate
		Loss of beach amenity / access	Environment	Moderate	Likely	High	ASAP
H	NA	NA					
I	Interrupted longshore transport regime - reduced beach width / exposure of seawall toe	Asset / property damage or loss	Property	Major	Likely	Extreme	Immediate
		Loss of beach amenity / access	Environment	Moderate	Likely	High	ASAP
J	Project management - timely delivery of project	Asset / property damage or loss	Property	Major	Unlikely	High	ASAP
		Loss of beach amenity / access	Environment	Moderate	Unlikely	Moderate	In Context

Figure 3 Review of Risk Profile and Priorities

4. Victorian Coastal Strategy

This section provides an overview of the key policy directives within the Victoria Coastal Strategy and how those directives apply at Port Fairy.

4.1 Overview

The Victorian Coastal Strategy (VCS) sets out the framework for management of the Victorian coastline. Its purpose is to provide:

1. a vision for the planning, management and use of coastal, estuarine and marine environments
2. the government's policy commitment for coastal, estuarine and marine environments
3. a framework for the development and implementation of other specific strategies and plans such as Coastal Action Plans, management plans and planning schemes
4. a guide for exercising discretion by decision-makers, where appropriate.

Victorian Coastal Strategy 2008

The strategy sets of a range of policies and actions to manage the 3 identified significant coastal issues facing Victoria, which are:

- Climate change
- Population and growth
- Marine ecological integrity

The principals by which these issues are to be managed are introduced and set out in the VCS as follows:

Decision-making should be consistent with the hierarchy of principles, which are:

1. Provide for the protection of significant environmental and cultural values.
2. Undertake integrated planning and provide clear direction for the future.
3. Ensure the sustainable use of natural coastal resources.

When the above principles have been considered and addressed:

Ensure development on the coast is located within existing modified and resilient environments where the demand for development is evident and the impact can be managed.

Victorian Coastal Strategy 2008

The VCS has the important function of guiding decision-makers to achieve the vision for Victoria's coast. It also provides guidance on the use of public funding for coastal protection works. The specific policy directives in this regard are:

1. Prioritise funding for coastal protection works where there is significant demonstrable public value.
2. Protect assets from coastal erosion and storm activity by managing coastal processes along the Port Phillip Bay coast where there is

significant demonstrable public value, whilst having regard to the risks and impacts of climate change.

Victorian Coastal Strategy 2008 (Section 3.1.4)

Policy 2 has specific focus on Port Phillip Bay, as current funding programs (e.g. Protecting Our Bays, Enhancing Our Beaches) are limited to Port Phillip Bay and the state capacity to 'protect assets from coastal erosion and storm activity' beyond Port Phillip is limited.

With regard to coastal protection, DSE is the authority charged with the responsibility to:

Strategically plan for the management of sand with greater consideration of climate change risks and impacts and the relative costs and benefits of any beach protection or renourishment activities, and undertake education, communication and engagement with the community regarding sand management issues.

Victorian Coastal Strategy 2008 (Section 3.1.4)

4.2 VCS at Port Fairy

The principals and policies set out in the VCS apply to the Port Fairy coast. East Beach public assets on coastal Crown land would include the seawall and timber groynes, and the public lands protected by these assets would include Beach Road, numerous coastal accesses (paths and stairways), and a thin strip of Crown land between the seawall and private property. The Surf Club buildings are located on private property with access to the beach across public lands.

On East Beach, many of these assets are threatened by coastal erosion, and action to address such threats will be guided by policies set out in the VCS. Where there is significant demonstrable public value, actions to address coastal erosion threats will be consistent with the objectives of the VCS, and eligible for access to limited prioritised funding.

Public value

Public value at surf club and around Beach Street is considered moderate-high and this location is recognised as primary beach usage area for locals and seasonal visitors (especially caravan park tourists). The "availability" of the beach is limited by tide due to low elevation of beach relative to tidal range. The potential recreational value is very high, but actual value (currently) low-moderate due to a number of accessibility limitations. The Surf Club area is considered the central activity node.

North of Beach St, the seawall offers varying levels of protection for private property. There is limited public use of these areas due to remoteness from town, wave exposure and lack of public facilities.

South of Beach St, the seawall offers varying limited levels of protection for private property, but the erosion potential and threat here is lower due to lesser incident wave energy (very low erosion risk at Battery Point). The beach around Battery Lane is considered to offer higher public use (value) than those areas north of Beach St, especially with locals resident and with visitors using the B&B type accommodation in this area.

Access

Beach access facilitated at a number of locations by timber stairs over seawall or paths, including:

- Belfast Coastal Park Track
- Connolly St
- Manifold St

- Richie St
- Bourne Ave
- Beach St (at least 3 accesses)
- Rogers Pl
- Battery Ln

In a number of locations, especially those north of Beach St, loss of beach (manifest as low beach elevation and shoreline recession) is compromising the timber stairs. Extension to the stairs at Belfast Coastal Track and Connolly St has been noted.

In addition to the formalised access points there are many informal paths and access tracks that meander over and along the rock wall and sand dune behind the rock wall. These are a risk management issue for DSE and the Council.

Summary

Without intervention, the public value of the beach asset will decline

Without intervention, access to and availability of the beach asset will decline

Increasing the beach width through nourishment is a significant positive outcome in terms of increasing public value and access. Maintenance of the beach width requires an ongoing commitment.

5. Proposed Erosion Management Options

In general, there are three strategic options for addressing erosion threats on coastal infrastructure:

- **Advance** the position of the shoreline
- **Hold** the position of the shoreline (accommodate / defend / reinforce)
- **Retreat** from the shoreline, allowing it to vary naturally

Practical opportunities to Advance are rare, and are seldom economical or sustainable in the longer term. At East Beach, strategic options are limited to Protect and/or Retreat.

Managed retreat is often incorporated into an adaptive management approach for specific infrastructure at risk, where the lifecycle of the infrastructure is consistent with projections of the erosion. Rather than replacing outdated infrastructure at a threatened location, replacement infrastructure is located elsewhere outside the risk area. Broad scale retreat for established towns and/or coastal communities has yet to be seriously contemplated in Australia, and our experience is that while coastal land remains highly valuable, and within the planning horizon to 2100, Protect (rather than Retreat) has been the pragmatic approach adopted by coastal land managers. However, Protect is seldom an option considered along undeveloped coastlines where the natural function of the beach and dune can continue.

5.1 Generic Options for Responding to Coastal Erosion

Shoreline erosion can generally be categorised associated with:

- Short term storm event.
- Medium to long term cyclic events (eg summer/winter seasonality differences).
- Long term recession (due to sand supply/losses and/or climate change issues).

There are a number of options available to reduce the risks associated with these erosion processes. Options include:

Soft solutions

- Regulatory controls.
- Retreat from threatened areas.
- Restoration of the eroded systems (eg nourishment, revegetation).
- Nourishment and/or beach reshaping.

Hard solutions

- Seawalls and revetments to protect threatened assets.
- Groynes, training walls and artificial headlands to control longshore littoral processes.
- Offshore breakwaters or submerged structures to modify the incident wave climate and promote accretion.

Combinations of these generic options are often utilised to provide more effective and/or immediate solutions. However, the application of the solutions must take into consideration the impact in adjacent locations. For example, a groyne may be effective in preserving sand on a beach, but by altering the longshore transport regime may result in erosion in downdrift areas.

There are a number of ways in which shore protection can be delivered and it is vital the vision for the shoreline is consistent with that held by stakeholders. Moreover, whilst Protect may be adopted in built-up areas it is unlikely to be the approach along the entire coast, particularly where suitable foreshore buffers exist and the natural erosion/accretion cycle can be maintained. In a high wave energy zone it is clear that one-off nourishment alone will not achieve the long term beach objectives,

as the natural longshore transport processes under prevailing conditions will result in the beach sediments migrating away from the works area. A number of options are available, including:

- **Revetments and Seawalls** - Hard engineering structures have their place as a last line of defence and in areas where other “softer” measures are unsuitable. Often these are coupled with nourishment and revegetation to soften the engineering solution. The materials for such structures are varied, from quarry rock, to engineered concrete units to sand filled geo-containers. The suitability depends on the location and environmental conditions, and the design criteria to be achieved. To date, this has been the approach at East Beach.
- **Headland and wide beach** - this arrangement would involve the construction of a large headland or groyne at the down coast end of the nourishment area (ie at the northern/eastern end of the seawall). Such a structure would lock the beach in place, relative to the prevailing wind/wave climate. Beach nourishment would be undertaken and the beach would evolve to a quasi-equilibrium state, likely to be wide at its northern end (near the headland) and relatively narrow at the southern end (depending of the incident wave conditions). It may be appropriate to couple this option with sand recycling, redistributing the sand accumulated at the northern end throughout the length of the beach. North/east of the headland, accelerated coastal recession would be expected, due to the loss of sand supply as material is trapped behind the new structure and such erosion is likely to be more severe than the end wall effects currently observed.
- **Groynes and pocket beaches nourishment** – as an alternative to a single groyne structure, this approach utilises numerous smaller groynes to provide longshore stability and can be integrated into the beach aesthetics and/or used to recreate historic measures. This type of system can be constructed using rock, marine grade geotextile material, timber or a combination of these, and is likely to have been the objective associated with the construction of timber groynes at the southern end of East Beach during the 50s and 60s.
- **Artificial reef or offshore breakwater** - Low lying reefs or breakwaters immediately adjacent to the beach could be constructed that modify the incident wave climate reducing longshore transport rates. The structure can be designed to facilitate the development of salients or tombolos, depending on the desired aesthetic objectives. Materials for this measure include rock or geotextile sand filled bags, but can also utilise artificial reefs from scuttled vessels (for example Cerberus at Blackrock).
- **Wide beach nourishment** - this option would require the over-nourishment of the beach to provide a sufficient sand buffer to support ongoing longshore processes. The beach would evolve from its over-nourished state back to a design minimum width over the design lifetime. At East Beach this would require significant volumes of sand not available in resources identified at Lighthouse Beach.
- **Continuous maintenance beach nourishment** - this option would consist of topping-up the beach on a continuous basis (yearly or every second year) to maintain the design width over peak usage periods (i.e. summer). This option may be economically viable depending on the ease with which source sand can be secured and the extent/volume of nourishment proposed but it would require regular site activity and a long-term budget commitment.

5.2 Proposed Restoration and Management Strategy

This section provides an overview of the approach proposed by WBM in their 2007 study.

5.2.1 General Considerations

It is relevant to note that BMT WBM was given specific “*policy direction on the study objectives*” by the East Beach Erosion Study Steering Committee (see BMT WBM 2007, Section 4.1). These *project directives* have guided WBM in the delivery of their assignment. The *project directives* are reproduced below:

- *There is a demand to **retain the rock seawall** as protection for the residential and surf club development located on the dune behind it.*

- There is a demand to **preserve the existing dune area between the seawall and the properties** as a public amenity, ecological habitat and buffer from the sea. Thus, re-aligning the seawall further landward is not a feasible option.
- There is demand for **restoration of the whole beach as far north as the northern end of the seawall**, although targeted improvement of some key sections (eg adjacent to the surf club) would have priority. This expectation requires a substantial increase in the sand volume seaward of the seawall alignment along about 2 km of the beach. Improvement of some sections of beach could be achieved by local site-specific works, which would require less additional sand, but would leave other parts of the beach with no improvement.

The Steering Committee comprised members of the community and representatives from both DSE and Moyne Shire Council. It is understood that Council had no voting rights on the Steering Committee and was present as an observer only. The directions and decisions made by the steering committee were as a majority consensus. However, it is noted that those decisions were not always supported by all stakeholders (community and Government). Further, it is not clear that the *project directives* were derived from state or local government “policy” at the time of the study.

As noted by WBM, the *project directives* had a significant effect on the study outcomes:

- A rock seawall is required
- Retreat options would not be considered
- The minimum length of restoration works is the entire 2.4km stretch of beach currently backed by the rock seawall – thus requiring the sourcing of significant quantities of sand

These directions have shaped the decision making process applied by WBM. One other guiding objective is noted, as one of the key drivers for the WBM study:

- Improve beach amenity – understood to mean to maintain a sandy beach usable at all tides, particularly in the high use areas (ie. in front of the surf club)

5.2.2 Summary of Proposed Restoration and Management Actions

WBM considered 2 broad options:

- Do Nothing
- Do Something - Implement beach improvement works

Do Nothing

The “Do Nothing” option has been interpreted to mean:

- Repair seawall consistent with its existing standard
- Maintain seawall over time
- No active nourishment (beyond existing river/port dredging)

This approach generally meets with the *project directives* of the Steering Committee, but there is no significant improvement to the amenity of the beach. Improved amenity relies on natural recovery of the beach, which is uncertain, as the natural east-to-west transport processes have been significantly altered by the Moyne River entrance training walls. Even if East Beach is now in a quasi-stable alignment, and the longshore transport has now returned to pre-1900 rates, then continued recession should be minimal. However, there is limited evidence to fully support (or rule out) the return to equilibrium conditions and recent events (whether part of ongoing recession or natural variability) further contribute to the uncertainty.

Moreover, climate change and sea level rise could further reduce beach amenity by restricting access to the beach and causing recession of the northern (eastern) unprotected beach.

This approach includes repair/maintain the seawall consistent with its existing standard. However, the existing standard (due to the relatively high toe elevation) is considered to provide limited protection against large waves during significant storms, and the seawall's integrity during larger events may be compromised with potentially catastrophic impacts on adjacent infrastructure assets and residences.

Over the short term, the do-nothing approach will achieve most of the objectives targeted by the steering committee, but there will be no significant improvement in the amenity (or usability) of East Beach as these actions will not result in an increase in the width of beach. Over the longer term, and in response to climate change, the integrity of the seawall will become compromised with potential losses of public infrastructure and private property.

Do Something - Implement Beach Improvement Works

Direction provided by the Steering Committee has effectively ruled out retreat as a “do something” option, and to a large degree dictated the scope of the “works” option. The “works” option includes a number of components:

- **Repair Seawall** – these works aim to improve the engineering standard of the seawall to provide the level of service assumed or implied by the existing structure. In general requiring the existing seawall to be replaced by a structure that includes geofabric, primary and secondary armour and constructed at a suitable slope with appropriate crest and toe elevations. Reuse of material in the existing structure may be appropriate in consideration of review of the size grading for seawall armour.
- **Beach Restoration** – the objective of these works is to improve beach amenity, access and usability. Three major elements are involved: beach nourishment, removal of derelict timber groynes and dune rehabilitation. The beach nourishment requires the placement of at least 300,000m³ (preferably 500,000m³) of sand along East Beach with the sand, the bulk of which to be sourced from Griffiths Island (Lighthouse Beach). The derelict timber groynes at the southern end of East Beach are considered to provide no erosion control benefit and for public safety reasons their removal is proposed. Dune rehabilitation is proposed in response to recognition that the dune system behind the existing seawall and backing the beach is infested with weeds with impact on dune ecology.
- **Ongoing Nourishment** – to maintain the beach in the improved state resulting from Beach Restoration, ongoing nourishment is required. WBM estimate that at least 3,000m³/yr is required in addition to the existing sand bypassing undertaken by the Port. WBM propose that sand be sourced by harvesting from Lighthouse Beach and South West passage.
- **Regulatory Controls** – WBM propose a range of management actions and regulatory controls to limit future risks.

WBM estimated the sand available on Griffiths Island at around 300,000m³, but nominate a preferred volume for beach restoration at around 500,000m³. A source for the additional 200,000m³ is not identified, but it is assumed that offshore sources could be utilised. It should be noted that this represents a huge volume of sand and beach nourishment/restoration of this magnitude is unprecedented in Victoria. Current beach nourishment programs in Port Phillip call for 30-40,000m³, which is 1/10th the size of that proposed at Port Fairy.

5.2.3 Review of Proposed Restoration and Management Actions

Based on site inspections and the information provided by DSE and Moyne Shire Council, a broad review of the feasibility of the proposed restoration and management options, proposed by WBM, has been undertaken.

Seawall Upgrade

It is understood that the seawall has been constructed progressively starting in the late 50's (and perhaps earlier in localised areas). Since that time, seawall design has evolved such that the current structure is no longer consistent with current engineering practice (multi layered with geotextile

backing). There is also some doubt that the rock size is adequate relative to the incident wave climate (evidenced by observed rock displacement during storm attack). Nevertheless, in places, due to ongoing maintenance/repairs the rock seawall appears to be functioning well. Towards its northern end, inadequate construction techniques, storm wave displacement, toe erosion and overtopping have contributed to the sub-standard condition and, in places, failure of the seawall. Residences north of Connolly St are quite close to the substandard seawall/scarp (approx 25m) while at Manifold St residences are farther back (approx 35m).

At its northern end, the seawall offers minimal defence against erosion during storm wave attack, and the residences formerly offered some degree of protection are now offered essentially nil. The northern end of seawall is being "outflanked" by end effect erosion processes.

The proposed seawall upgrade is conceptually consistent with current engineering practise. However, the level of protection offered, and the longevity of the structure will be dependent on its design characteristics, including toe elevation, crest height, and rock size.

Beach Restoration

Due to their condition, the derelict timber groynes do not function as erosion control structures. They present a public safety risk. Their removal will reduce/eliminate the public safety risk of the groynes.

One of the objectives of beach restoration is to increase the usable width of beach. Assuming a depth of closure (h_c , the depth below which minimal sand transport occurs) of around -6m AHD for typical conditions, and a beach crest height at the seawall of +2.5m AHD, approximately 330,000m³ of sand would advance the 0m AHD contour approx 20m offshore. Such a beach width is considered to adequately address beach amenity concerns (h_c will vary along beach proportional to wave exposure, but 6m is considered a reasonable estimate for typical wave conditions for estimating fill volumes – although over a longer term inclusive of storm events, h_c would be of order 10-15m).

The nominated source for the sand is the Southwest Passage, Puddney Ground and Lighthouse Beach. These are likely to be appropriate sources in terms of sand characteristics and the proximity of these locations make use of this sand cost effective. The WBM approach indicates that sand harvested from Lighthouse Beach will result in the loss of 10-12% of Shearwater nesting area and the environmental issues associated with this are not explored. If the loss of Shearwater nesting area is unacceptable, an alternative source for part of the sand will be required.

The target sand volume for restoration is 300,000m³ with an additional 200,000m³ sourced from elsewhere needed to make up for volume lost to Griffiths Island. If the ongoing nourishment component of the works program is implemented, then it is unclear if this additional 200,000m³ is necessary.

Offshore sand sources are unlikely to be cost effective unless there is an opportunity to utilise the services (opportunistically) of a large dredge called to Victoria/SA for another project. The channel deepening projects in Melbourne and Adelaide are now complete, but it is understood that VRCA are considering capital dredging works in the near future in Corio Bay. Accordingly, MSC should maintain a watching brief for future major dredging projects in southern Australia, and as appropriate, "piggy-back" on these works to gain access to offshore sand reserves. This will, of course, require investigations to identify suitable sources and other works to identify and secure State/Commonwealth approvals.

The dune rehabilitation initiatives nominated are appropriate.

Ongoing Nourishment

It is clear that in order to maintain the beach at its restored state, there will need to be an incoming supply of sand equivalent to the volume lost farther north/east due to prevailing longshore transport processes.

CES 2006 (as cited by WBM 2007) estimate net longshore transport at $20,000\text{m}^3/\text{yr}$ to the east (with gross transport increasing eastwards due to increased wave energy exposure). Advice from Moyne Shire Council is that dredging of the river entrance delivers sand onto East Beach (since 2007) at volumes of order $10,000\text{m}^3/\text{yr}$, approximately half of the net longshore drift. Therefore, in order to preserve quasi-equilibrium, there would need to be an additional supply of around $10,000\text{m}^3/\text{yr}$. Supply of part of this volume around the river entrance is probably occurring as a natural bypass process. However, part of the volume is currently still being lost as sand accreting on Lighthouse Beach. Current accretion rates on Lighthouse Beach are estimated at $3,000\text{m}^3/\text{yr}$, and in order to maintain quasi-equilibrium on East Beach, an additional bypass volume of at least this amount will be required (that is, a total artificial bypass of at least $13,000\text{m}^3/\text{yr}$).

Accordingly, in order to achieve the desired beach amenity outcomes, an ongoing commitment to nourishment, probably by bypassing, is required, and will need to be at least $3,000\text{m}^3$ more than the current dredging volumes.

With climate change, sea level rise and increase wind/wave climate will increase longshore transport rates. As a result, it is likely that increased bypass sand volumes will be required to maintain the (replenished) beach condition.

An appropriate source for ongoing nourishment sand is from Lighthouse Beach bay, Southwest Passage and Puddney Ground. Lighthouse beach bay is nominated as there are concerns regarding the environmental viability of harvesting from upper Lighthouse Beach (in the Shearwater nesting area).

WBM suggest distributed placement of the bypassed material along the beach, and this is supported. Nourishment directly onto beach is considered suitable, and community expectations will need to be well managed during the nourishment exercise. Initial placement in front of surf club is considered appropriate as this directly satisfy community expectations in this primary use area.

WBM propose the opening of the Southwest Passage in order to gain access to sand in this area. Modelling by WBM indicates that wave currents would drive sand through the passage into the outer Moyne River, where it would accumulate between the training walls. The sand can then be bypassed by dredging or may migrate out of the channel and onto East Beach via natural transport processes.

Modelling suggests that during periods of "strong enough wave/wind forcing" the current between the training walls may be continuously seaward and sufficiently strong to carry the sand out of the channel.

There is concern that these conditions are not especially common (3m waves and 30kt southerly winds) although certainly not rare. Moreover, typical conditions of $H_S=1.7\text{m}$ swell (see Carley pg 27 quoting Andy Short's H_S for Reef Point) and 15-20kt winds, may not induce the requisite outflowing current, and result in deposition in the entrance channel between the training walls. This would create a significant additional dredging burden considered to be well beyond the current maintenance commitment of about $10,000\text{m}^3/\text{yr}$.

The harvesting of sand from this area is considered appropriate for ongoing nourishment. However, the information presented in the WBM report, suggesting that by opening the Southwest passage a natural bypass would be created, is considered optimistic and representative of best case conditions only. Further, comments from Harold Dempsey (ex Shire Engineer and study feedback contributor) suggest that when the passage was partially opened in the late 90's and early 50's sand that migrated through the Passage was not carried through the entrance channel. Note that this is in contradiction to the WBM report that:

After World War II the passage was temporarily opened and East beach began to accrete, only to erode again after the passage was closed.

It is considered that opening of Southwest Passage in the manner proposed is unlikely to provide the benefits sought, and requires considerably more investigation (probably in the form of numerical and physical modelling) before further consideration.

Nevertheless, it may be possible to utilise the SW Passage as a sand capture area without the adverse impact of sediment deposition in Moyne River. The following alternative concept is proposed (illustrated in Figure 4), and while not fully assessed, is considered to provide a similar sand capture opportunity without increased maintenance dredging burden.



Figure 4 Alternative Approach to Sand Management in Southwest Passage

The concept utilises the Puddney ground as a sand capture area for sand that migrates into the SW Passage. Rather than removing the seawall that connects the Island with the mainland, the 2 southerly causeways are removed (perhaps to be replaced by a higher level walkway on piles). Waves and sand would propagate up the SW Passage into the Puddney Ground basin, where the sand would deposit. The excess wave wash is discharged via culverts (invert about MSL) such that there is a net one-way through flow of water. The existing dredge could be modified and used to capture the deposited material to be discharged on the northern side of the entrance. As an alternative, a permanent by-passing system could be established in the longer term, and its size based on monitoring of initial sand capture and transfer volumes. A shared pump station could facilitate regular sand by-passing from both the Puddney Ground and Lighthouse Beach.

Detailed wave and hydraulic modelling would be required to size the culverts and determine initial estimates of sand deposition rates. There may also be a need to upgrade the seawalls around Puddney Ground to minimise existing observed sand leakage problems. A number of variations of the alternative scheme above could be tested to identify a preferred scheme.

It should be noted that the training walls and Griffiths Island are State heritage listed and that whilst this area could be an excellent source of sand there may be considerable planning challenges due to the listing. Accordingly, there is a need to undertake full liaison with Heritage Victoria and the Port of Port Fairy to confirm the availability of sand from these areas.

Heritage Victoria has not been contacted by the DSE regarding the Peer Review, as no immediate works are being proposed at this stage. Should works be proposed, the responsible body should consult with Heritage Victoria and Aboriginal Affairs Victoria to seek specific advice regarding the approvals requirements prior to undertaking any works at East Beach or Griffith Island.

The heritage values attributed to a site may not expressly preclude activities, unless those activities are seen to have an effect on the significance of the site. The following are some provisions that a proponent would need to be aware of in undertaking works at East Beach and Griffith Island.

Griffith Island has state level heritage significance and is registered on the Victorian Heritage Register (VHR H1659.) As part of the approvals process for any works at Griffith Island (including the training walls, separately registered VHR H2213) consideration will need to be given to all requirements and provisions of both the Heritage Act 1995 and the Aboriginal Heritage Act 2006.

With regard to sand removal, any such activity at Lighthouse Beach and Puddney Grounds is subject to the approval of Heritage Victoria, or in accordance with a Conservation Management Plan approved by Heritage Victoria. Further permit applications may be required for other works or activities at the heritage listed sites, pursuant to Section 67 of the Heritage Act 1995.

In regards to Aboriginal heritage, pursuant to the Aboriginal Heritage Act 2006, a Cultural Heritage Management Plan (CHMP) would be required, if:

- The Aboriginal Heritage Regulations 2007 require the preparation of the plan for the activity, or
- The Minister directs the preparation of a plan for the activity under Section 48, or
- A plan is required for the activity under Section 49.

Regulation 6 of the Aboriginal Heritage Regulations 2007 states that a CHMP is also required for an activity if:

- All or part of the activity area for the activity is an area of cultural heritage sensitivity; and
- All or part of the activity is a high impact activity,

Section 49 of the Aboriginal Heritage Act 2006 would also require a CHMP to be prepared if the proponent was required to prepare an Environmental Effects Statement for the activity under the Environmental Effects Act 1978.

Regulatory Controls

WBM propose a range of planning and regulatory controls that are appropriate and could be implemented within the existing Planning Scheme framework.

5.2.4 Consistency with VCS

Seawall Upgrade

The policies set out in the VCS do not support the use of public funding to create new assets designed to protect private property. However, in the case of existing coastal protection infrastructure on coastal Crown land, the VCS identifies the following action for implementation by DSE, Parks Victoria and local Committees of Management:

Fund the ongoing maintenance of piers and jetties, seawalls, groynes and other coastal protection infrastructure to an agreed standard and in accordance with strategic priorities.

Victorian Coastal Strategy 2008 (Section 4.3)

The seawall is located on a thin strip of land zoned either:

- RDZ2 – Road Zone Category 2 – identifying existing and/or future roads (Beach St)
- PCRZ – Public Conservation and Resource Zone – protect and conserve the natural environment and natural processes for their historic, scientific, landscape, habitat or cultural values
- PPRZ – Public Park and Recreation Zone - to protect and conserve areas of significance

For much of the length of the seawall, RES1 land sits just behind the Crown land strip. North of Ritchie St, the seawall offers protection to private property but also provides the valuable function of facilitating public access from RDZ2 carparks and streets to the beach via timber steps and accessways.

The seawall in front of Beach St is considered to be protecting the public asset (roads, parking, surf club). While the VCS recommends to avoid running roads parallel to the coast, and to redesign/remove/relocate poorly used or poorly sited roads or car parks, there seems limited opportunity to achieve this in a cost-effective manner and still maintain private property access.

It is considered that works to upgrade and improve/repair of the seawall from the vicinity of the Surf Club to Ritchie St is consistent with the objectives of the VCS facilitating access and protecting assets that have a demonstrable public value and a high strategic priority. Elsewhere (ie north of Ritchie St), public funding can be directed towards maintaining the seawall asset at its current level of service, but as such works only benefit private property owners it is likely the strategic priority for these works would be low.

Nevertheless, the level of service offered by the current seawall is considered low due in most part to the relatively high toe elevation. The level of service offered by the seawall perceived by property owners north of Ritchie Street is likely to be inconsistent with the actual level of service offered. Such expectation of protection from coastal erosion (particularly storm erosion) will be high but unfounded. As an asset on coastal Crown land, placed there in large part to protect private property, there will also be an expectation from property owners that the asset will be maintained into the future.

Beach Restoration

The construction of the training walls in the late 1800's has interfered with the sediment transport regime which has contributed to observed recession of the East Beach shoreline. In general, beach restoration (ie in-bulk nourishment) will improve access/availability to the beach and enhance coastal protection (by creating improved buffer) consistent with meeting the recreational and sustainability objectives of the VCS.

Harvesting sand from Lighthouse Beach bay and SW Passage is considered consistent with VCS (subject to environmental review). The use of sand from upper Lighthouse Beach (and interfering with the Shearwater colony) does not appear to be consistent with the VCS objectives of maintaining biodiversity and ecosystem protection.

The priority area for restoration will be in front of Beach Street and the Surf Club. It is considered that the VCS funding criteria of demonstrable public benefit and high strategic priority can be satisfied, and the works funded (at least in part) through existing programs. It is noted however, that funding is assessed on a state-wide basis, and there is no guarantee of funding just because the eligibility criteria is met.

To the south, between the Surf Club and Moyne River, beach restoration will increase beach amenity but as this is a relatively low use area and the erosion risks are much lower than elsewhere, priority funding is unlikely to be available. Moreover, increased protection in this area primarily benefits private landowners, and as such, is unlikely to be eligible for state funding.

North of Ritchie Street, beach restoration will primarily benefit private land owners, and while there are significant coastal erosion risks in this area, with limited demonstrable *public* benefit, it is unlikely that priority funding will be available.

The dune rehabilitation initiatives are consistent with the VCS objectives of maintaining biodiversity and ecosystem protection. There is potential for such initiatives to be funded under DSE's Coast Action/Coast Care Community Program.

As noted above, the derelict timber groynes do not function as erosion control structures. Removal of the derelict timber groynes will achieve an improvement in public safety.

Ongoing Nourishment

As noted above, in order to maintain the beach at its restored state and continue to benefit from the restoration activities, consistent with WBM's proposed program, there will need to be an ongoing commitment to nourishment via artificial bypassing of the Moyne River entrance.

Ongoing nourishment is a commitment to maintaining beach amenity and maintaining the level of service offered by coastal structures (both access and protection structures). As such, ongoing nourishment is consistent with the objectives of the VCS facilitating access and protecting assets that have a demonstrable public value and a high strategic priority.

Further, ongoing nourishment goes to restoring the pre-existing transport regime upset by the training walls.

5.3 Summary

WBM considered a range of options for addressing the observed recession and erosion threats, including:

- Seawalls
- Groynes and Artificial Headlands
- Offshore Breakwaters and Submerged Reefs
- Nourishment Alone
- Nourishment with Control Structures
- Nourishment with Terminal Protection (Seawalls)

WBM's analysis considered the various benefits and dis-benefits of each approach in the context of the *project directives* given by the Steering Committee. To reiterate those *project directives*:

- There is a demand to **retain the rock seawall** as protection for the residential and surf club development located on the dune behind it.
- There is a demand to **preserve the existing dune area between the seawall and the properties** as a public amenity, ecological habitat and buffer from the sea.
- There is demand for **restoration of the whole beach as far north as the northern end of the seawall**.

Within the constraints of the direction provided by the Steering Committee, it is considered that the approach offered by WBM was the most appropriate solution available to achieve the stated objectives and, in an engineering context, is considered feasible. It is apparent that the *project directives* of the Steering Committee support the protection of private lands, and (at the time) there was limited State guidance on this issue. However, there remain concerns regarding the potential environmental impacts of harvesting sand from upper Lighthouse Beach and the uncertainty associated with opening of the Southwest Passage. Moreover, while the direction provided at the time was not necessarily flawed, the direction is considered inconsistent with the current VCS (and leads to outcomes inconsistent with the VCS).

The nourishment requirement of 300,000-500,000m³ of sand is massive and unprecedented in Victoria. This requirement was driven by the *project directives*, provided by the Steering Committee, to deliver restoration to the whole of the beach, from the Moyne River training walls to the end of the seawall (approx 2.4km).

Because of the scale of restoration, the approach proposed by WBM is very expensive and requires significant ongoing funding commitment. Much of the proposed works directly benefits private landowners. While not wholly inconsistent with the VCS, many aspects of the proposed works would fail to demonstrate significant **public** benefit. Accordingly, it is unlikely that funding for restoration/protection/nourishment works would be available when assessed against a state priority of works due to the limited amount of public benefit compared to private benefit that would be derived through the implementation of works.

6. Recommended Approach

The recommended approach for addressing the coastal erosion issues at Port Fairy East Beach is described below. This approach has been developed in an attempt to reform the WBM approach such that it is consistent with the VCS and the associated funding constraints.

6.1 Recommended Approach

The recommended approach focuses efforts (and funding) on the central activity node, from the Surf Club through to Ritchie Street. In this area, the seawall is to be upgraded, beach restoration undertaken and ongoing nourishment should focus on this as the primary discharge location for bypassed material. Note that for all recommendations contained in this report, the availability of state funding contributions would be determined according to state priorities.

Seawall Repair/Upgrade

Undertake immediate emergency repair of the seawall at its northern end to restore it to a level consistent with its condition prior to the failure.

A thorough examination of the entire seawall should be undertaken to confirm its toe elevation and structural integrity.

South of the Surf club, attention should focus on repair and maintenance of the seawall in order to maintain its current level of service.

From the Surf Club through to the end of the seawall, the seawall should be upgraded so that it provides the level of service that would be expected for a last line of defence structure on the coast. This will likely involve an engineering assessment to determine an appropriate toe elevation, armour sizing and crest elevation. Particular attention should be given to appropriate design of the end of the structure, to minimise the future risk of outflanking.

Beach Restoration

The provision of approximately 100,000m³ of sand as an initial nourishment volume placed between about Lydia Place and Ritchie Street (approx 700m). This volume is estimated to provide an increased beach width of about 20m, and, following all necessary approvals, may be sourced from Southwest Channel, Puddney Ground and Lighthouse Beach bay.

The derelict timber groynes represent a public safety risk, and a plan should be prepared to manage their removal.

Dune restoration is considered an important adjunct to the beach restoration works, and efforts to improve dune biodiversity should be undertaken.

Ongoing Nourishment

There will need to be an ongoing commitment for nourishment of 10-20,000m³ of sand annually. The ongoing nourishment should be discharged between Lydia Place and the Surf Club. This sand can be harvested from the Moyne River, Southwest Channel, Puddney Ground or Lighthouse Beach bay.

Landfill Site

The estimated proximity of the landfill to the dune scarp presents a significant risk of contaminant release during/following storm erosion. While the proposed restoration and ongoing nourishment will eventually benefit this section of coast, merely preserving the longshore transport rate will not result in an increase in the dune width. Accordingly, if the longshore transport regime is maintained, the risk of exposure of contaminants will remain constant over time (but still present).

To reduce these risks in a manner consistent with the VCS, the landfill should be rehabilitated with the waste material recovered and dumped at an appropriate waste facility. The need for temporary protection of the landfill during the period of rehabilitation should be assessed. Once the site has been rehabilitated, the temporary protection (if required) should be removed. Sand filled geo-containers, nominated by ENSR/AECOM, are considered appropriate for the temporary protection (if required).

Monitoring

A series of profiles should be established and monitored. Quarterly measurements of beach width from a control point to mean sea level should be collected for the first 3-5 years following restoration works. Annual surveys of beach profile at these locations should be undertaken extending to at least low water datum.

A visual inspection of the seawall following repair/upgrade should be undertaken concurrent with the quarterly beach width measurements. A simple photographic record is considered adequate.

The purpose of the monitoring is to accurately document the existing conditions and record changes over time.

6.2 Discussion

At its northern end, the seawall is in poor condition and in a number of places has failed. This issue requires immediate attention to reinstate the seawall such that it offers the same level of protection as prior to failure. Additionally, outflanking and failure around the end of the wall has the potential to affect the structure and reduce its effectiveness. The outflanking and end wall effects have accelerated erosion of the dune over the 50-100m north/east of the seawall end. Once the seawall has been repaired, the dune should be restored.

Based on cross sections in WBM Fig 3-1, the toe of seawall is estimated to be at or above +0.5m AHD. This is considered quite high and a toe elevation at about LAT is typically adopted in seawall design (around -0.8m AHD at Portland), depending on the wave climate exposure. With the toe at this relatively high elevation, and poor structural composition of the seawall, a relatively mild storm event could expose the toe and lead to toe scour and failure. More severe events could see significant undercutting of the toe and complete failure of the seawall. There is significant risk of rapid shoreline recession following such failure, and the consequent risk to properties "protected" by the seawall.

The observed displacement of rock elements from the seawall structure suggests that rock size may be too small for the incident wave climate.

Even with beach restoration/nourishment, there is potential that a large storm event, or a series of moderate events, could result in exposure of the seawall toe (at its current elevation), leading to structure failure. Consequently, there is a high risk of failure during storm events that result from exposure and scour of the existing seawall toe.

A thorough examination of the entire seawall should be undertaken to confirm its toe elevation and structural integrity. This information will inform an engineering design process for the design of an upgraded structure from about Lydia Place north. The design standard will need to be determined in consultation with the community.

Based on the information reviewed and site inspections, the seawall south of Lydia Place is in reasonable condition, and with the exception of a few minor repairs, upgrade of the structure in this area does not appear justified.

The beach restoration component will introduce a quantity of sand to the beach, and ongoing nourishment will top-up the volume on an annual basis. With time, it is expected that the supplied restoration volume and the ongoing nourishment volumes will redistribute along the beach nourishing the entire foreshore.

7. Funding

A range of state funding mechanisms are accessible for contributions towards recommended works. These include:

- **Coastal Risk Management Program** - an annual grants program that provides financial assistance to Victorian coastal Crown land managers to reduce coastal risk
- **Improving Public Safety in Public Places Program** - provides support to DSE land managers that are responsible for identifying, assessing, controlling and monitoring risks associated with the use of DSE public land
- **Coast Action / Coast Care** – community and indigenous groups grants to fund works to assist in the protection of the ecological integrity of Victoria’s coast.

These state funding programs have guidelines for eligibility, and funding is awarded based on priority in “competition” of all other eligible funding applications across the state. That is, while a project may meet the funding criteria, if its risk-priority is low, it may not receive a share of the limited funding pool.

Opportunities to source funding for works at East Beach could also consider:

- **Moyne Shire Council** – funding through local government, as a co-contributor to the funding of seawall repair and maintenance activities, and in-kind contributions of Council services, personnel and plant.
- **East Beach Residents – contribution to capital works** – a one-off levee on property owners along East Beach to assist funding the capital upgrade works to improve the level of service offered by the seawall protecting private property.
- **East Beach Residents – contribution to ongoing maintenance** – an on-going levee on property owners along East Beach to assist funding the ongoing maintenance of the seawall protecting private property.
- **Port of Port Fairy – Initial Beach Restoration** – a commitment from Port of Port Fairy to contribute to the funding of the initial beach restoration volume of 100,000m³ and in-kind contributions of Port services, personnel and plant.
- **Port of Port Fairy – Ongoing Nourishment** – a commitment from Port of Port Fairy to fund the bypass of up to 20,000m³ of sand trapped annually by the training walls.

7.1 Coastal Risk Management Program

The Coastal Risk Management Program (CRMP) is an annual grants program that provides financial assistance to coastal Crown land managers to reduce coastal risks. Up to \$1 million is available annually awarded on a priority basis for coastal projects throughout Victoria (individual project contribution is up to \$250,000). Projects funded under the Program must provide outcomes that contribute to the overall objective of reducing risk on coastal Crown land. Projects that may be funded include:

- Risk context development
- Risk identification, assessment & evaluation
- Risk treatment
- Risk monitoring

There is a range of criteria that must be satisfied in order to be eligible for funding, as follows:

The Applicant:

- is required to be the Coastal Crown land manager

- must have the capacity (or access to appropriate resources) to deliver the project outcomes on time and to budget
- requires Program funding to complete the risk mitigation project
- must demonstrate compliance with Program requirements and conditions, where projects have been funded in the past

The Project:

- must be located on coastal Crown land where the reservation/ management status provides for public access Consistent with the scope of the Program
- supports outcomes consistent with the Program's objectives
- is consistent with the VCS 2008
- addresses a risk of significant priority and/or provides a strategic approach to a coastal risk mitigation priority
- is appropriate to the risk identified
- provides value for money

At East Beach, funding (in compliance with the program objectives and VCS) could be sought to assist in delivery of the following:

- Condition audit of the seawall
- Removal of damaged/ dangerous assets (ie the timber groynes)
- Renewal/ replacement of coastal dependent assets or infrastructure (seawall in front of public space)
- Installation of signage and barriers/ fencing (contributing to dune restoration)
- Engineering responses to geological and erosion risks (seawall repair and bypassing infrastructure)
- As a contribution to the rehabilitation of the Port Fairy landfill

7.2 Improving Public Safety in Public Places Program

The Improving Public Safety in Public Places Program provides support to DSE land managers that are responsible for identifying, assessing, controlling and monitoring risks associated with the use of DSE public land throughout Victoria (ie not just coastal areas).

Applications for funding must meet all of the following criteria:

- DSE has a responsibility for the public land/asset in question.
- The area/asset is accessible by the public.
- The public are at risk of injury or death.
- The public will be at less risk of injury or death upon completion of the project.
- The project has a clear delivery plan, reliable quotes/estimates and can be delivered in the current financial year.

Projects must address one or more of the following:

- Repairing or maintaining the area/asset.
- Controlling visitor access.
- Increasing visitor knowledge or skills.
- Increasing the ability to respond to incidents thus limiting or reducing the extent of injury.

At East Beach, funding (in compliance with the program objectives and VCS) under the Major Project sub-program could be sought to assist in delivery of the following:

- Condition audit of the seawall
- Removal of damaged/ dangerous assets (ie the timber groynes)
- Repair and maintenance of unstable sections of seawall

7.3 Coast Action / Coast Care

Coast Action / Coast Care grants assist community and indigenous groups in the protection of the ecological integrity of Victoria's coast.

The Program comprises three separate grant types; the Small Grants, the Indigenous Grants and the Medium-Scale Grants.

- **Small Grants** - Funds of up to \$5000 are available to engage community groups in coastal conservation projects. Projects should incorporate on-ground works that produce a demonstrable improvement in the coast's environmental condition.
- **Indigenous Grants** - Funds of up to \$20,000 are available to community groups, cooperatives, trusts, land councils and local governments. Indigenous Grants are designed to create new partnerships that will enable a greater involvement of Indigenous people in coastal management, and to record and use coastal Traditional Ecological Knowledge.
- **Medium-Scale Grants** - Funds between \$5000 and \$50,000 are allocated to deliver substantial and strategic coastal projects which align with Victorian and national environmental priorities.

Priority is given to projects that satisfy the following criteria:

- Project addresses known threat/cause of environmental damage to key coastal asset/s
- Project directly engages volunteers/community members in on-ground works, and builds capacity of community group
- Project engages broader community in management issue
- Project demonstrates sound project design and methodology
- Project demonstrates partnerships and consistency with existing strategies and programs
- Project demonstrates high Public Benefit

Coast Action / Coast Care grants may be available to assist with dune restoration activities and as a contribution to the rehabilitation of the Port Fairy landfill. Note that Coast Action / Coast Care grants are a funding source for community groups and that Council is not eligible to receive such funding unless they are working in partnership with a community group.

7.4 Contribution from Private Landowners

7.4.1 Capital Costs of Seawall Upgrade

As an asset on coastal Crown land, DSE, through the Committee of Management, has responsibility for the maintenance of the asset at its current level of service. Funding to maintain the seawall in its current configuration may be available through the Coastal Risk Management Program. However, as noted above, only limited protection is offered by the seawall in its current form due to its relatively high toe elevation and poor structural composition.

There may be a perception in the community that the seawall, if maintained at its current level of service, provides adequate storm protection for the public assets and private property along East Beach. It is considered that in-fill development and/or re-development of properties along east beach has proceeded with an expectation of protection offered by the seawall. The actual level of service and protection offered is likely to be significantly less than the perceived level due to the identified design flaws.

North of Ritchie Street, the seawall protects private property. Consistent with the VCS, public funding can be directed towards maintaining the seawall asset at its current level of service. However, upgrading the level of service is unlikely to satisfy the eligibility criteria, and public funding to undertake such upgrades will not be available.

There may be an opportunity to partner with property owners to achieve improved performance of the seawall. As direct beneficiaries, this would likely only involve landholders with ocean frontage north of Ritchie Street (approx 700m). In consultation with owners, an acceptable level of service would be agreed. An appropriate proportion of the additional cost of upgrading the seawall from its current level of service to the agreed level (commensurate with projected climate change influences over the design period) would be paid by the property owners. It is envisaged that these costs would be attributed pro-rata by ocean frontage length. The upgrade works would be directed by Council, as the local Committee of Management.

7.4.2 Ongoing Maintenance

As noted above, much of the seawall at East Beach protects private property. Consistent with the VCS, public funding can be directed towards maintaining the seawall asset at its current level of service, but as such works only benefit private property owners it is likely the strategic priority for these works would be low. Accordingly, the limited priority funding is likely to be directed elsewhere to projects that demonstrate greater public benefit.

A levee could be introduced, payable by property owners in the East Beach precinct (all properties between Griffiths Street and the Beach). The levee would contribute to the cost of seawall maintenance activities undertaken by the Committee of Management.

7.5 Contribution from the Port of Port Fairy

Coastal erosion at East Beach is primarily attributed to the introduction of the Moyne River training walls in the late 1800's. As the key beneficiary of the training walls, the Port of Port Fairy should contribute to the mitigation of coastal erosion on East Beach. The Port currently dredges approximately 10,000m³ of sand from the river and discharge the dredged material on East Beach. However, to maintain longshore quasi-equilibrium, an additional up to 10,000m³ is required.

Accordingly, the level of commitment sought from the Port would be

- A. To deliver approximately 100,000m³ of sand to the beach in front of the Surf Club as part of the initial rehabilitation program
- B. To provide ongoing dredging and/or bypassing of 15,000-20,000m³ of sand per year.

In both cases, the sand could be sourced from the river, Puddney Ground, Southwest Passage, and/or Lighthouse Beach bay.

The existing dredge appears to have the capacity to achieve this bypassing target. However, infrastructure to harvest the sand, and discharge the dredged material may be inadequate. A partnership between the DSE and the Port should be established to fund the capital upgrade, likely to be sourced through the Coastal Risk Management Program and/or relevant port maintenance funding sources. The capital upgrade works could include upgrade of the dredge pumps, additional slurry pipes, booster pumping facilities, and installation/maintenance of the bypass infrastructure.

The ongoing costs of bypassing and maintenance of the bypassing systems would become the responsibility of the Port. As part of the initial rehabilitation and ongoing bypassing, it is also anticipated that the port would contribute, in-kind, personnel and plant.

8. Action Plan

On the basis of the outcomes of the above review, an action plan has been formulated as a suggested way to implement the recommended management approaches.

8.1 Action Plan Initiatives

The Action Plan priorities are summarised below:

- 1) Emergency Works
 - a) Repair northern section and end of seawall, restoring to a level of service equivalent to that prior to failure
 - b) Restore dune north of seawall end
- 2) Investigations
 - a) Detailed inspection of seawall to determine toe elevation and structural integrity
 - b) Confirm sand source availability from Griffiths Island and Lighthouse Beach bay, and identify alternative sources as necessary
 - c) Determine bypass upgrade needs and costs
 - d) Determine level of service offered by seawall in its current configuration, and the cost of upgrading the seawall to higher levels of service.
- 3) Consultation with Port Fairy East Beach community to inform and seek cooperation regarding
 - a) level of protection offered by seawall (overall and/or on a property-by-property basis)
 - b) level of protection offered once restored
 - c) use of public funds for the protection of private property
 - d) costs for achieving various levels of service
 - e) explore opportunities to partner with the community in funding higher level of service

It is anticipated that the consultation would be a cooperative initiative with participation from DSE, Moyne Shire, East Beach Study Steering Committee and the Port Fairy community.
- 4) Major Works - Seawall Repair & Upgrade
 - a) repair/upgrade of Beach Street seawall and accesses
 - b) repair/upgrade of seawall and accesses, Ritchie Street to end of seawall
- 5) Major Works – Bypassing System Upgrade
 - a) upgrade of dredging / bypassing infrastructure
- 6) Beach Restoration
 - a) bulk supply of 100,000m³ of sand to Beach Street seawall
 - b) dune rehabilitation
 - c) remove/conservate timber groynes (if necessary)
- 7) Ongoing Tasks
 - a) bypassing
 - b) monitoring
 - c) maintenance

8.2 Roles & Responsibilities

DSE – the Department of Sustainability and Environment has responsibilities eg (leases, licences, approvals, risks) as the owner of Crown land. They are the lead approval agency for works in the coastal zone. Day to day management is delegated to Committees of Management.

CoM - Committees of Management on the Victorian coast manage Crown land reserves on behalf of the Minister for Environment and Climate Change and have the responsibility to manage, improve, maintain and control their reserve. Committees of Management can be locally elected or appointed citizens, a municipal Council, statutory bodies or trustees. Each committee gains its powers from the Crown Land (Reserves) Act 1978. The East Beach Committee of Management is Moyne Shire Council

MSC – Moyne Shire Council covers about 5,500km² and as approximately 90 kilometres of coastline stretching from Codrington in the west to Peterborough in the east. Council is the Committee of Management for coastal areas, and has representatives on the Port of Port Fairy Committee of Management. It is anticipated that Council will be the lead agency for preparing funding applications and sourcing alternative funding arrangements. Council, via the Committee of Management, will plan and oversee any proposed works.

Port of Port Fairy – the Port of Port Fairy is a working port for commercial and recreational users. It is operated and managed by Moyne Shire Council, which employs a full-time manager and two other staff to oversee operations. The Port of Port Fairy Committee of Management has operated since 1995. The committee is made up of two Moyne Shire Councillors, the Council's Corporate Business Manager, and five industry representatives. The CoM oversees the management of Port, maintenance and upgrade works, dredging activities, and Slipway waste disposal.

8.3 Action Plan Priorities

Many of the *Recommended Management Actions and Timings*, presented as the key outcome of the WBM study, are not consistent with the VCS and will be ineligible for state funding. The Action Plan that has been developed as part of this review in an attempt to reform the WBM approach such that it is consistent with the VCS and the associated funding constraints

The recommended approach focuses efforts (and funding) on the central activity node, from the Surf Club through to Ritchie Street. In this area, the seawall is to be upgraded, beach restoration undertaken and ongoing nourishment should focus on this as the primary discharge location for bypassed material. However, it cannot be over-emphasised that any state sought funding needs to be assessed against state-wide priorities and funding constraints.

Accordingly, there is a need to prioritise the proposed actions to provide understanding of the necessary minimum requirements and funding commitment.

Indicative costs and timing for the Action Plan are set out in Table 2 below.

Table 2 Indicative Costs and Timing for the Action Plan

ACTION PLAN TASK	Basis	Indicative Cost	Duration (month)	Priority	Comments
1) Emergency Works					
a) Repair northern section and end of seawall, restoring to a level of service equivalent to that prior to failure	Approx. 4m ³ / m of additional rock over 100m, plus refit work - design and construction	\$ 80,000.00	2	1	
b) Restore dune north of seawall end	100m long dune restoration project	\$ 25,000.00	2	1	
2) Investigations					
a) Detailed inspection of seawall to determine toe elevation and structural integrity	1.2km seawall, incl. limited geotech and survey	\$ 50,000.00	1	1	Equivalent in-kind contribution from CoM
b) Confirm sand source availability from Griffiths Island and Lighthouse Beach bay, and identify alternative sources as necessary	Scoping study	\$ 25,000.00	4	1	
c) Determine bypass upgrade needs and costs	Scoping and feasibility study	\$ 60,000.00	2	1	
d) Determine level of service offered by seawall in its current configuration, and the cost of upgrading the seawall to higher levels of service.	Storm erosion assessment	\$ 60,000.00	2	1	
3) Consultation with Port Fairy East Beach community to inform and seek cooperation regarding					
a) level of protection offered by seawall	Consultation program estimated at \$40,000	\$ 10,000.00	1	2	Equivalent in-kind contribution from CoM
b) level of protection offered once restored		\$ 10,000.00	1	2	
c) use of public funds for the protection of private property		\$ 10,000.00	1	2	
d) costs for achieving various levels of service		\$ 10,000.00	1	2	
e) explore opportunities to partner with the community in funding higher level of service	Consultation program + legal review	\$ 25,000.00	6	2	
4) Major Works - Seawall Repair & Upgrade					
a) repair/upgrade of Beach Street seawall and accesses	500m long, \$3,000 per metre	\$ 1,500,000.00	6	3	
b) repair/upgrade of seawall and accesses, Ritchie Street to end of seawall	900m long, \$3,000 per metre	\$ 2,700,000.00	8	3	
5) Major Works – Bypassing System Upgrade					
a) upgrade of dredging / bypassing infrastructure	Will depend of scheme selected	...	18	1	
b) yearly maintenance	On going maintenance of dredge/bypassing system	\$ 50,000.00		1	Equivalent in-kind contribution from CoM
6) Beach Restoration					
a) bulk supply of 100,000m ³ of sand to Beach Street seawall	Assumed sourced at \$20 per m ³	\$ 2,000,000.00	12	3	location dependent
b) dune rehabilitation	1.2km long dune - WBM estimate \$40k/yr	\$ 200,000.00	3	4	Equivalent in-kind contribution from CoM
c) remove timber groynes	WBM estimate	\$ 100,000.00	2	4	
7) Ongoing Tasks (per year)					
a) bypassing	Sandbypassing 20,000m ³ by dredge at \$12/m ³	\$ 240,000.00		1	Plus in-kind contribution from Port
b) monitoring		\$ 60,000.00		1	Equivalent in-kind contribution from CoM
c) maintenance	Depending on system selection	...		1	

The indicative cost estimates provided in this table are provided for comparison purpose only. The costs have not been derived from a detailed quantity and scheduling estimate, and they have also not been market-tested. For coastal and maritime projects, significant variations in unit costs can occur depending on environmental, market and contractual conditions. The indicative costs have been formed using a simplified quantification methodology based on a best estimate of unit rates and quantities but which may not account for all preliminaries and investigations. Consequently the cost estimates should be considered approximate only and comparison should be drawn only in relative terms.

8.3.1 Tier 1 Priorities

In an attempt to halt the erosion trend, and re-establish the pre-existing level of service of the seawall these priorities work towards establishing the 20,000m³ of bypassing required to meet longshore transport needs.

Also, the investigations are ranked as Tier 1 priorities to provide valuable missing information for future planning and response.

For these actions to achieve their objectives (and demonstrate such), a commitment to continued monitoring and seawall maintenance (at its current level of service) is required.

1) Emergency Works

- a) Repair northern section and end of seawall, restoring to a level of service equivalent to that prior to failure
- b) Restore dune north of seawall end

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy
 Cost Estimate: \$105,000
 Funding: Improving Public Safety in Public Places
 Port funding sources
 In-kind commitment
 Timeframe: Immediate

2) Investigations

- a) Detailed inspection of seawall to determine toe elevation and structural integrity
- b) Confirm sand source availability from Griffiths Island and Lighthouse Beach bay, and identify alternative sources as necessary
- c) Determine bypass upgrade needs and costs
- d) Determine level of service offered by seawall in its current configuration, and the cost of upgrading the seawall to higher levels of service.

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy
 Cost Estimate: \$195,000
 Funding: Improving Public Safety in Public Places
 In-kind commitment
 Timeframe: Immediate

3) Major Works – Bypassing System Upgrade

- a) upgrade of dredging / bypassing infrastructure

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy
 Cost Estimate: will depend on scheme selected
 Funding: Coastal Risk Management Program
 Port funding sources
 In-kind commitment
 Timeframe: Dependent on Investigations 2) b) & 2) c) outcomes
 nominally 3rd or 4th Quarter of 2010/2011 fiscal year

4) Ongoing Tasks

- a) bypassing
- b) monitoring
- c) maintenance

Responsibility:	DSE / Moyne Shire Council (monitoring, maintenance of seawall) Port of Port Fairy (bypassing, maintenance of bypassing system)
Cost Estimate:	\$300,000 per annum
Funding:	Coastal Risk Management Program Port funding sources In-kind commitment
Timeframe:	Ongoing commitment

Outcome

East Beach will slowly recover if the bypassed volume is greater than the longshore rate. The bypass volume will comprise the artificially bypassed volume (20,000m³) and any naturally bypassed material. The bypass requirement may need to be adjusted over time in response to monitoring outcomes.

Maintenance of the seawall will maintain the pre-existing level of service.

The recovery will be slow, and beach access and amenity will continue to be low for many years (noting that it has taken over 100 years to get to the current condition). Storm erosion threats to public and private infrastructure are not addressed and remain at their current risk level. If the bypassing is effective in restoring the beach, the storm erosion risk will reduce over time.

Uncertainties

- availability of initial and continuing funding
- access to Lighthouse Beach bay sand
- longshore transport rate
- continued sand supply from the west

8.3.2 Tier 2 Priorities

In parallel with the Tier 1 Priorities, the recommended consultation and communication initiatives should be undertaken. These will inform the community and stakeholders, with an aim to secure collaborative agreement on the approach and funding arrangements for reducing the erosion risks to private property.

- 1) Consultation with Port Fairy East Beach community to inform and seek cooperation regarding
 - a) level of protection offered by seawall (overall and/or on a property-by-property basis)
 - b) level of protection offered once restored
 - c) use of public funds for the protection of private property
 - d) costs for achieving various levels of service
 - e) explore opportunities to partner with the community in funding higher level of service

Responsibility:	DSE / Moyne Shire Council / Port of Port Fairy
Cost Estimate:	\$65,000
Funding:	Coastal Risk Management Program Council funding sources In-kind commitment
Timeframe:	In parallel with Tier 1 activities nominally 2010/2011 fiscal year

Outcome

The consultation will result in increased awareness by community and stakeholders of the coastal management issues on East Beach. It will assist in the development of an agreed approach to Tier 3 Improvement works and provide the basis for agreed funding arrangements for the Tier 3 Improvement works.

Uncertainties

- availability of initial and continuing funding
- ability to reach agreement regarding approach and/or funding

8.3.3 Tier 3 Priorities

The Tier 1 priorities do not completely address existing storm erosion threats to public infrastructure and private property and these threats remain at their current level. Managed retreat is an obvious “solution” but due to the many social, community and financial challenges has not been considered further. Three pragmatic strategies are available to reduce the storm erosion risk:

- 1) Bulk supply of sand to the beach to create an appropriate beach width that will act as a sacrificial buffer during storm wave activity; or
- 2) Upgrade the capacity of the seawall to provide appropriate protection at low beach elevations; or
- 3) Both, or a combination of the two

The Action Plan nominates a preferred approach whereby a combination of targeted bulk supply and seawall upgrade is implemented. The adopted approach and funding arrangements may require revision following Tier 2 Consultation.

1) Major Works - Seawall Repair & Upgrade

- a) repair/upgrade of Beach Street seawall and accesses
- b) repair/upgrade of seawall and accesses, Ritchie Street to end of seawall

Responsibility: DSE / Moyne Shire Council
 Cost Estimate: \$4,200,000
 Funding: Coastal Risk Management Program
 Council funding sources
 Private funding sources
 In-kind commitment
 Timeframe: Dependent on Tier 2 Consultation Outcomes
 nominally 1st and 2nd Quarter of 2011/2012 fiscal year

2) Beach Restoration

- a) bulk supply of 100,000m³ of sand to Beach Street seawall

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy
 Cost Estimate: \$2,000,000
 Funding: Coastal Risk Management Program
 Council funding sources
 Port funding sources
 In-kind commitment
 Timeframe: Dependent on Tier 2 Consultation Outcomes
 nominally delivered during 2012/2013 fiscal year

Outcome

The public areas of East Beach will benefit from an increased beach width of about 15-20m, delivered over a short period (perhaps 12 months), and together with the Tier 1 bypassing initiatives presents a sustainable long term solution.

The additional beach width provides an erosion buffer for small to medium sized storm events. During an extreme storm event, or a series of large events, the beach could erode and expose the seawall toe, potentially resulting in seawall failure and other consequences. The seawall upgrade initiative improves the current level of protection during such events.

Uncertainties

- ability to reach agreement regarding approach and/or funding
- availability of initial and continuing funding
- availability of sand
- continued bypassing commitment
- continued sand supply from the west

8.3.4 Tier 4 Priorities

These low priority initiatives further improve beach amenity and habitat values

1) Beach Restoration

- a) dune rehabilitation
- b) remove/conservе timber groynes (if necessary)

Responsibility: DSE / Moyne Shire Council / Community Groups
Cost Estimate: \$300,000
Funding: Coastal Risk Management Program
Improving Public Safety in Public Places
Coast Action / Coast Care
Council funding sources
In-kind commitment
Timeframe: Dune rehabilitation in parallel/following seawall repair
groyne removal as and when appropriate

Outcome

These works will improve beach amenity, reduce public safety risks and improve dune habitat.

Uncertainties

- availability of initial and continuing funding
- Community commitment (to access Coast Action / Coast Care funding)

9. Conclusion

9.1 Key Messages

The review of the Port Fairy East Beach Coastal Erosion Engineering and Feasibility Study has been undertaken with the following key “take home” messages:

- **Shared Responsibility** – The ongoing future management of coastal processes to address erosion hazards is a shared responsibility for DSE, Moynes Shire Council, Port of Port Fairy and the Port Fairy Community. Collective ownership of the coastal risks together with innovative funding partnerships will be required to achieve beneficial outcomes for all stakeholders.
- **WBM Study Direction** - WBM’s analysis considered the various benefits and dis-benefits of each approach in the context of the *project directives* given by the Steering Committee, being:
 - There is a demand to **retain the rock seawall** as protection for the residential and surf club development located on the dune behind it.
 - There is a demand to **preserve the existing dune area between the seawall and the properties** as a public amenity, ecological habitat and buffer from the sea.
 - There is demand for **restoration of the whole beach as far north as the northern end of the seawall**.

As noted by WBM, the *project directives* had a significant effect on the study outcomes in that a rock seawall is required, retreat options would not be considered, and the minimum length of restoration works is the entire 2.4km stretch of beach currently backed by the rock seawall (thus requiring the sourcing of significant quantities of sand). While the direction provided at the time was not necessarily flawed, the direction is considered inconsistent with the current VCS (and leads to outcomes inconsistent with the VCS).

- **Quality of the Beach Asset** – DSE, Moynes Shire Council and the community recognise the value of East Beach as a recreational and environmental asset. The current level of the beach is such that access and usability is restricted and it is providing only limited performance in its erosion buffer function.
- **Coastal Erosion** – The construction of the Moynes River training walls in the late 1800’s has resulted in erosion and the beach has been receding since that time. As accretion on Griffiths Island (mainly Lighthouse Beach) is still occurring, it is likely that East Beach continues to suffer from a reduced sand supply from the west.
- **Coastal Defences in Poor Condition** - Efforts to address the coastal erosion have included the construction of timber groynes and rock seawalls. These structures are now in poor condition due to decay over time and/or failure as a result of storm wave action. The structures do not offer the same level of service that would have been the design objective at the time of their introduction.
- **Inadequate design of Coastal Defences** – The seawall was constructed progressively from about the late 1950’s, but its design is no longer consistent with current engineering practice. There is also some doubt that the rock size is adequate relative to the incident wave climate. The toe of the seawall is considered too high, and subject to significant undercutting resulting in failure. There is significant risk of rapid shoreline recession following such failure, and the consequent risk to properties “protected” by the seawall.
- **Inappropriate Development** – In the past, residential property development has occurred at locations on the crest of the main dune separating East Beach and Belfast Loch. With improved knowledge regarding coastal processes and the future risks associated with climate change, it is unlikely that development of this type will be allowed now or in the future, anywhere in Victoria.
- **Community Perception** – There may be a community perception that the seawall, if maintained at its current level of service, provides storm protection for the public assets and private property

along East Beach. The actual level of service and protection offered is likely to be significantly less than the perceived level due to the poor design (toe elevation, rock size, lack of layering).

- **Climate Change** – rising sea levels, increased storminess and changed wind/wave climates are identified as consequences of climate change. At vulnerable coastal communities, like Port Fairy, existing coastal hazards are projected to increase over time, and additional hazards may evolve out of the climate change impacts. An adaptable and sustainable approach to coastal hazards management is required.
- **Funding Constraints** – Works to address identified issues in the coastal zone are typically expensive. There are a number of state-wide funding programs to which applications can be made to assist in rolling out agreed action plans. The funding programs typically have a limited pool of funds available on an annual basis, with funding to be directed based on state-wide priorities determined with reference to a range of criteria. Accordingly, there is no guarantee of funding for projects with low priority within a state-wide context. Further, there is no guarantee of funding from one year to the next, making the planning and implementation of long term projects challenging.

9.2 Priorities

The Tier 1 priorities, requiring immediate action and/or commitment are

5) Emergency Works

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy

6) Investigations

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy

7) Major Works – Bypassing System Upgrade

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy

8) Ongoing Monitoring & Maintenance Tasks

Responsibility: DSE / Moyne Shire Council / Port of Port Fairy

