Introduction

Thank you for the opportunity to make a submission to the *Inquiry into the Coast Protection Board and Legislation.*

The Estuary Care Foundation was incorporated in 2016 and is devoted to the protection of the ecology and shorelines of the Port River and Barker Inlet Estuary. Key objectives include:

- Conserve, protect, enhance and promote the ecology of the Port River and Barker Inlet Estuary, and the benefits thus provided
- Support, undertake, facilitate and monitor eco-engineering to safeguard shorelines, community assets and the habitat of estuarine species, from rising sea levels
- Facilitate research, education and training relevant to the conservation, protection and restoration of, and carbon sequestration in, the Port River and Barker Inlet Estuary
- Pursue the objects of the Foundation in collaboration with local residents, community organisations, industries, corporations, and governments.

The Foundation makes this submission on the understanding that the *Coast Protection Act 1972* is intended '*to make provision for the conservation and protection of the beaches and coast of this State*' and the definition for 'coast' includes land that is

> 'within any estuary, inlet, river, creek, bay or lake and subject to the ebb and flow of the tide'.

This submission seeks to encourage the Committee to recommend

- the State Government act on its responsibility to prevent flooding along the Port River associated with sea level rise, resulting from climate change and localised land subsidence
- substantially increased funding for the Coast Protection Board, through urgent representations to State and Commonwealth sources
- the Board be enabled to be proactive in tackling problems at a landscape level
- the Board act on their long-known understanding of the benefits of environmentally friendly seawalls (also known as Living Shorelines) with funding to enable their implementation
- the State Government act on the benefits, opportunities and challenges arising from 'blue open space'.

Flooding risk along Port River

The Port Adelaide region, one of South Australia's most flood-prone areas, is at risk from rising sea levels and increasing intensity of storms, resulting from climate change and localised land subsidence.

Between 25,000 and 43,000 residential buildings in South Australia, with a current replacement value of $4.4 billion to $7.4 billion, are at risk of inundation from sea-level rise according to a 2009 Federal Government report[1]. More than half of these are in the local government areas of Port Adelaide-Enfield and Charles Sturt. Businesses and infrastructure are also at risk of inundation.

[1] http://environment.gov.au/climate-change/adaptation/publications/climate-change-risks-australias-coasts

The Port River Seawall, also known as a sea defence, was proposed in a 2005 study[2] commissioned by PAEC, State Government agencies and Flinders Ports. This study assessed seawater and stormwater flood risks in the Port Adelaide area. It also proposes solutions to protect properties and infrastructure, identified by the study as at risk of flooding and damage from seawater inundation, from more frequent and intense sea surges. An integral part of these solutions are the strategies and concept designs for a sea defence.

The sea defence proposed in 2005 comprises several components including an earth bank in some locations and a vertical concrete flood-proof wall where space is limited, raised pavement levels at wharves, demountable flood defence at road crossings where vehicular access is required through the sea defence systems, extension of existing Riprap seawall and a barrier across the Port River at the Jervois Bridge.

In 2005 the sea defence proposal was costed at $24.1 to $30.5 million, depending on differing scenarios of sea level rise and land subsidence. These costs would be significantly greater today. To date, though the risks are well known within the State Government, there is no indication that plans are being advanced and timelines being set for implementation. Since 2005 more development has occurred in at-risk areas and the rate of sea level rise is increasing.

At the 2019 SA Coastal Conference Martin Haese, Chair of the Premier's Climate Council, included a slide (below) addressing the risk profile of the Port Adelaide and surrounding area. The text of the slide said

> Hazard risk profiles are changing; Extreme high water levels (high tide plus storm surge);
> Currently 1 in 100 year probability; 1 in 5 year probability by 2050 (red text)
> Source: Coastal Risk Australia website

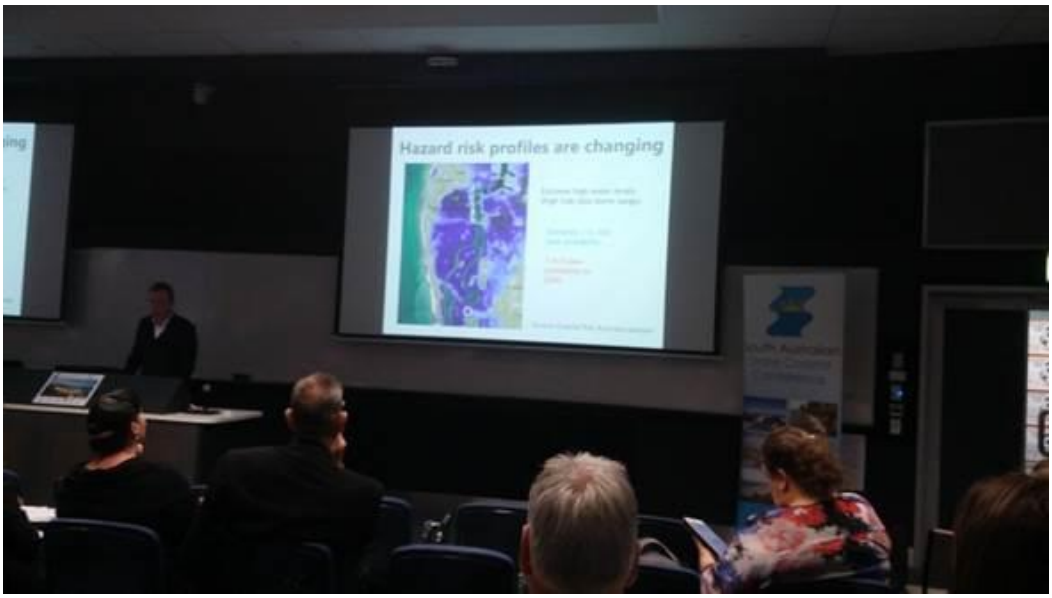

Figure 1: Martin Haese addressing 2019 SA Coastal Conference, 8th November 2019

While this work is not as detailed as the 2005 study, or the subsequent AdaptWest work, it does demonstrate that these risks are well known within the State Government. Yet they are not being adequately addressed.

[2] https://www.renewalsa.sa.gov.au/wp-content/uploads/2016/11/Port-Adelaide-Seawater-Stormwater-Flooding-Study_Vol-1_Final-Report.pdf

Renewal SA is responsible for the seawalls within Port Adelaide's inner harbour and ECF has since 2016 been advocating for Renewal SA to address the risks to those seawalls from sea level rise and to consider and adopt Living Shorelines, where appropriate. In 2016 ECF understood from Renewal SA that AECOM will be/are engaged in considering approaches to securing the Inner Harbour shoreline, however that report has not been made public. It would seem instructive for the Inquiry to understand the nature and costs of any solutions proposed and how the risks to the seawalls are being addressed, or not.

Based on Board advice the land in the inner harbour, being developed for the Cedar Woods and Starfish developments, has been/is being raised. This won't of course protect existing residents.

Funding for the Coast Protection Board and Coastal Conservation

The funding available to the Coast Protection Board is totally inadequate compared to the level of need for coastal protection and conservation in South Australia. A great deal of the Board's funding is tied to sand carting and pumping, defending beaches and structures that regrettably won't be sustainable in the longer term.

The level of need has been documented by the Coastal Councils Alliance including in this Presentation - file:///C:/Users/WIN10~1/AppData/Local/Temp/Presentation-for-LGA-AGM-1.pdf and the image below, which is the last page of the Presentation.

The scale of the challenge of coastal defence in South Australia is beyond the current resources of local and State government and needs to be a strategic infrastructure priority for the SA Government to the Federal Government.

With climate impacts that now cannot be avoided, given existing global emissions, there is growing recognition of and advocacy for climate adaptation e.g. by the insurance industry which regularly expresses its dissatisfaction with the lack of government response. To continue along this path means that insurance will be withdrawn from areas of risk and households, communities and businesses will suffer from foreseeable disasters.

Implementation of the Coast Protection Board's remit

It's disappointing that the Coast Protection Board has recently had such limited scope to achieve its functions (Clause 14 of Act).

As outlined by the Australian Coastal Society in their submission[3] to this inquiry

> The CPB initially had well-recognised functions and powers but some of these appear to have lost authority over time. For example, the CPB;
> 1) provided authoritative coastal scientific advice for proclamation of 'coast protection districts' and the preparation of district management plans;
> 2) it had the major responsibility for metropolitan coastal management with strong governmental financial backing;
> 3) it took a national lead in responding to the coastal impacts of climate change and
> 4) it provided advice to planning authorities for specified coastal development;
> 5) it developed coastal policies and coastal zoning.

The Society's submission (pp2/3) then details some impacts of the Board's diminished influence.

Governance of the Port River and Barker Inlet Estuary

In the Port Adelaide context, while individual developments are referred to the Board for their advice, integrated long-term planning and governance of the Estuary has not been addressed.

The lack of long-term government strategic planning contrasts with Flinders Ports developing a 50 year master plan (Advertiser pp57, January 18th 2020). Their plan will need to be informed by a range of inputs from government agencies since there is no overall Government strategic plan for the River and the area. This is despite the extensive ship building development underway and, as outlined above, the areas by the River being some of the most vulnerable in SA to sea level rise, due to climate change.

While a Management Framework and Action Plan for the Barker Inlet and Port Estuary was developed in 2004 by the Barker Inlet and Port Estuary Committee (BIPEC), the Committee was subsequently disbanded.

Governance structures exist nationally, and internationally, for major urban coastal areas. For example, In Western Australia the State Government established the Cockburn Sound Management Council[4] in 2000, under s 25 the *Environmental Protection Act 1986*, and it is an advisory council to the Minister for Environment. For the adjoining Swan River estuary, the Swan River Trust provides 'independent, high level strategic advice on the protection of the Swan and Canning rivers and related developments'.[5]

The SA Government recognises the complexity[6] of managing the Torrens River, given the many players involved, and the Federal Liberal Party committed $2M[7] at the last election to 'drive further Torrens River Recovery initiatives'.

The Coast Protection Board has amongst its recent C*oastal Research and Development Grants* awarded $30,000 to City of Port Adelaide Enfield to develop a model for coastal adaptation in the Port River environs. While this small commitment is welcome, it will need real government commitment to implementation.

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[3] file:///C:/Users/WIN10~1/AppData/Local/Temp/02%20Coast%20Protection%20Board%20Inquiry%20submission%20Australian%20Coastal%20Society.pdf

[4] https://www.der.wa.gov.au/about-us/cockburn-sound-management-council

[5] https://swanrivertrust.dpaw.wa.gov.au/

[6] https://indaily.com.au/news/local/2019/04/24/democracyco-to-lead-reform-of-how-the-rivers-run/

[7] https://www.liberal.org.au/latest-news/2019/04/20/37-million-protect-south-australias-environment

Living Shorelines

Research internationally and nationally indicates that living shorelines are a potentially powerful solution to two pervasive problems: an increased need for coastal protection; and the restoration of lost habitats. Significant socio-economic and environmental benefits can flow from an enhanced capacity for the application of nature-based coastal defences.

As outlined in University of Melbourne research[8]

> To date, current strategies and infrastructures suggest a great focus on engineering responses for reducing risks, including groynes and breakwaters which are often proven to be ineffective in long the term. Little attention has been given to actually engaging with natural dynamics, protecting coastal habitat and linking social, economic, and ecological benefits…
>
> Case studies such as projects from the Rebuild by Design initiative, which emerged in the aftermath of Hurricane Sandy in NY and was funded by 100 Resilient cities, and the work that the Dutch Government has been undertaking to study benefits of living shorelines, provide important insights and offer lessons that can be adapted to the Australian context'.

ECF is actively engaging [9]in the promotion and trialling of Living Shorelines (also known as environmentally friendly seawalls) in South Australia. ECF has combined our advocacy, addressing sea level rise along the Port River, with efforts to model and trial climate adaptation solutions suited to local circumstances. ECF has sought to inform and engage the community about the risks of flooding, associated with being one of the most vulnerable areas in SA, while also demonstrating practical responses to those risks.

Living Shorelines along the Port River can potentially include seagrass (Zostera), samphires, mangroves and intertidal shellfish reefs and ECF trials involve all of these.

South Australia lags national and international experience with Living Shorelines.

While the Board has been aware of environmentally friendly seawalls, and their implementation across the world, for many years there have been limited opportunities for them to pursue these protection measures, for reasons including the Board's funds needing to be applied to badly eroded areas. The current version of the CPB's Coastal Planning Information Package was published in 2013, while NSW's guidelines for Environmentally Friendly Seawalls were first published in 2009. The University of Melbourne is currently developing national guidelines for Living Shorelines with consultation to occur in early 2021.

The CPB has been supportive of ECF's promotion of Living Shorelines and assisted with ECF's seagrass restoration trial. ECF's proposals for nature-based responses to sea level rise suit the lower wave energy environment of the Port River. They highlight the need for improved protection, a need recognised by State and local government, requiring substantial investment.

Living Shorelines can also contribute to SA's Blue Carbon strategy, offsetting carbon emissions.

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[8] https://msd.unimelb.edu.au/thrive/projects/listings/living-shorelines-innovative-design-topologies-for-coastal-landscapes

[9]https://www.estuary.org.au/category/living-shorelines/

Blue Open Space

Most of the information below was provided to the Environment, Resources and Development Committee for their 2020 inquiry into Green Urban Spaces and is repeated here, given the Coast Protection Act is intended '*to make provision for the conservation and protection of the beaches and coast of this State'.*

South Australia has the southernmost extent of mangroves, and estuaries and coasts that are home to rocky reefs, seagrasses and tidal saltmarsh. While some of the challenges include encroachment, pollution, climate change etc, the opportunities include carbon capture and storage (blue carbon), coast protection and other ecosystem services.

The nature and services of our Blue Open Space

SA researchers' Dr Sam Gaylard and Professor Michelle Waycott, together Dr Paul Lavery, WA have in June 2020 released their review article[10] *Review of Coast and Marine Ecosystems in Temperate Australia Demonstrates a Wealth of Ecosystem Services.*

While the article describes 'temperate Australia' from Tasmania to Western Australia, it is also a short useful introduction to the nature of the South Australian coastal ecosystem.

> Temperate Australia has extensive and diverse coast and marine habitats throughout its inshore and offshore waters. The region includes the southernmost extent of mangroves, over 500 estuaries and coastal embayments, home to extensive meadows of seagrasses and tidal saltmarsh. In areas of hard substrate, rocky reefs are abundant and productive with large forests of macroalgae.
>
> Coastal regions can be densely populated by humans and often habitats can be degraded, polluted or lost, while some remain relatively isolated and pristine. These habitats provide services to society including provision of food, regulate our climate through sequestration of carbon, treating our waste and protecting our shorelines from damage from storms. Coastal areas are culturally importantly hubs for recreation and tourism.
>
> Habitat mapping demonstrates diverse habitats throughout temperate Australia, but a formal investigation of services provided by these habitats has been lacking. This review of ecosystem services provided by coast and marine environments throughout temperate Australia reveals vast and productive ecosystems that provide multiple ecosystem services, substantial value to the Australian economy and contribute to the health and well-being of people who live in, visit or benefit from services or products from these regions. Some of these are considered within traditional economic metrics such as provision of wild catch fisheries, but this review demonstrates that regulation and maintenance services including waste treatment and protecting shorelines from extreme events are under recognised, and their value is substantial.
>
> However, consistent with many locations globally, coast and marine habitats are under threat from increasing development, sewage, agricultural, industrial discharges, urban runoff and climate change. Resultantly, temperate Australian coast and marine habitat extent and condition is generally declining in many regions, putting the provision of services and benefits to the community at risk. Continued degraded or lost habitats indicate current

[10] https://www.frontiersin.org/articles/10.3389/fmars.2020.00453/full

> management frameworks are not capturing the full risk from development and there are winners and losers in trade off decision making.
>
> Incorporating ecosystem services in decision making may allow an integrated approach to management, and acknowledgment of services provided could prevent habitats from being undervalued against economic and social interests, a practice that often results in environmental degradation.

Blue Carbon

In November 2019, a *Blue Carbon Strategy for South Australia* was 'released to help mitigate climate change by protecting our seagrass meadows, saltmarshes and mangroves'.

> South Australia has over one million hectares of mangroves, saltmarsh and seagrass environments and they are estimated to capture and store up to 3.6 per cent of the state's annual greenhouse gas emissions each year.
>
> Protection and restoration of these important blue carbon environments can make a major contribution to South Australia's commitments to help mitigate climate change….
>
> Carbon farming under the Commonwealth Government's Emissions Reduction Fund is a well-tested approach in Australia to finance land restoration through the creation of carbon credits. These credits can generate a new revenue stream for farmers and other land owners. A similar method for blue carbon projects would help incentivise coastal restoration.

While clearly there are opportunities in blue carbon, these landscapes are under threat from sea level rise and human incursion and so securing land for blue carbon projects (such as the Dry Creek salt fields) is vital, as is protecting existing landscapes and carbon stores.

Some of the potential for blue carbon in SA is being identified in research at the Goyder Institute:

Carbon sequestration through ecological restoration at the Dry Creek Salt Field
http://www.goyderinstitute.org/projects/view-project/67

Carbon Offsets Research to Support the State Carbon Sequestration Strategy
http://www.goyderinstitute.org/projects/view-project/10

Coastal Carbon Opportunities: demonstrating additionality and potential for future offsets in South Australia
http://www.goyderinstitute.org/projects/view-project/66

The lack of strategic planning and governance structures for the Port River and Barker Inlet Estuary has been highlighted by the unfolding tragedy at St Kilda, with the extensive loss of mangroves and saltmarsh releasing carbon to the atmosphere. Areas that offer great potential for carbon sequestration are currently tied up in a 21 year mining lease, though no salt is being produced and demand is very limited for this low value product.

This situation mirrors recent research[11] across six continents that showed that

> The economic benefits of protecting nature-rich sites such as wetlands and woodlands outweigh the profit that could be made from using the land for resource extraction, according to the largest study yet to look at the value of protecting nature at specific locations.
>
> Scientists analysed 24 sites in six continents and found the asset returns of "ecosystem services" such as carbon storage and flood prevention created by conservation work was, pound for pound, greater than manmade capital created by using the land for activities such as forestry or farming cereals, sugar, tea or cocoa.

Blue Urbanism

Following the impetus of the green cities' movement, Timothy Beatley wrote of Blue Urbanism[12], seeking to connect urban dwellers to their surrounding water bodies, and to have urban planning consider those blue environments.

Beatley's vision was for coastal cities to re-kindle 'an urban fondness for enjoying the water environments around us while cleaning up and restoring some of the nearest nature urbanites have.'

Harbour cities around the world are cleaning up their harbours and swimming is a demonstration of good water quality. Copenhagen has a series of harbour pools and the Paramatta River in Sydney is aiming to be swimmable by 2025, joining the living rivers around the world.

The Port River is already a swimmable river, though this is not widely known. Amongst the projects cited by Beatley, *Healthy Harbor* in Baltimore resonates with ECF's work along the Port River, with a shared focus on a swimmable river, native oyster restoration, ecotours of restoration trials, community education and engagement.

The National Aquarium in Baltimore in 2010 installed floating wetland islands to 'offer a way for shorelines that have been converted to hardened structures to regain some of the ecosystem benefits typically provided by natural tidal wetlands. These benefits can include improving water quality and clarity, removing excess nutrients from the water, reducing the incidence or severity of low dissolved oxygen events, and providing habitat for a variety of beneficial plants and animals.'

In June 2020, Biomatrix launched a new type of Floating Ecosystem designed for saltwater. It integrates elements of salt marsh and estuarine ecosystems in a unique multi-level habitat. It is based in Liverpool's historic waterfront at Wapping Dock.

These floating systems provide vegetation cover and readily adapt to sea level rise (SLR) without tying up additional land area. Floating roosts for shorebirds similarly can provide opportunities to 'rise above the tide'.

Projects like this would be a fantastic initiative in the Estuary, and in Port Adelaide inner harbour, demonstrating a beautiful way to green urban port areas.

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[11] https://www.theguardian.com/environment/2021/mar/08/land-could-be-worth-more-left-to-nature-than-when-farmed-study-finds-aoe

[12] http://blueurbanism.org/

South Australia's bid to be a National Parks City, could incorporate the Adelaide coast and a "Blue Adelaide" approach to planning and conservation to better incorporate coast and marine environments. This could add a real point of difference in the Adelaide National Parks City bid, including reference to Adelaide reefs, Adelaide Dolphin Sanctuary, Adelaide International Bird Sanctuary etc.

Planning and managing with blue open space in mind

As outlined in the research above by Gaylard, Waycott and Lavery, blue open space faces risks from increasing development, and climate change, and its value, including in providing ecosystem services, is underestimated. There are some stark examples of how our blue open space has been affected by land use planning that did not adequately consider what lies below our onshore waters. For example, the extensive loss of seagrass in metro waters has affected not only the marine environment e.g. habitat for fish, it's also led to impacts on land e.g. stronger wave action that erodes metropolitan beaches.

South Australia needs adequate nearshore habitat mapping so that, especially with sea level rise, we can better identify and address risks and threats to our blue open space. While such mapping exists to some extent along the metro coast it's not available in areas with extensive blue assets e.g. Barker Inlet to St Kilda, and it's typically not part of urban planners' and developers' frame of reference.

Conclusions

In summary, ECF's submission suggests

1. The State Government, with Federal Government support, needs to protect the Port Adelaide region, which is one of South Australia's most flood-prone areas at risk from rising sea levels, increasing intensity of storms and land subsidence.
2. The funding available to the Coast Protection Board is totally inadequate compared to the level of need for coastal protection and conservation in South Australia.
3. The scope of the Coast Protection Board to achieve its functions (Clause 14 of Act) has contracted.
4. Long term strategic planning and a governance structure is needed for the Port River and Barker Inlet Estuary.
5. The Board needs the capacity and funding to implement, where appropriate, environmentally friendly seawalls (Living Shorelines) in South Australia.
6. SA has tremendous opportunities to conserve and enhance its 'blue open space' and one of those key opportunities is in sequestering blue carbon, especially in the Dry Creek area.
7. Land use planning needs to take account of blue open space more effectively, to recognise the ecosystem services provided and to more thoroughly assess the benefit of those services compared to other uses.

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