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Climate Change Asset Vulnerability Assessment

Case study: City of Port Phillip

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A Marsden Jacob Report

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Executive Summary

Introduction

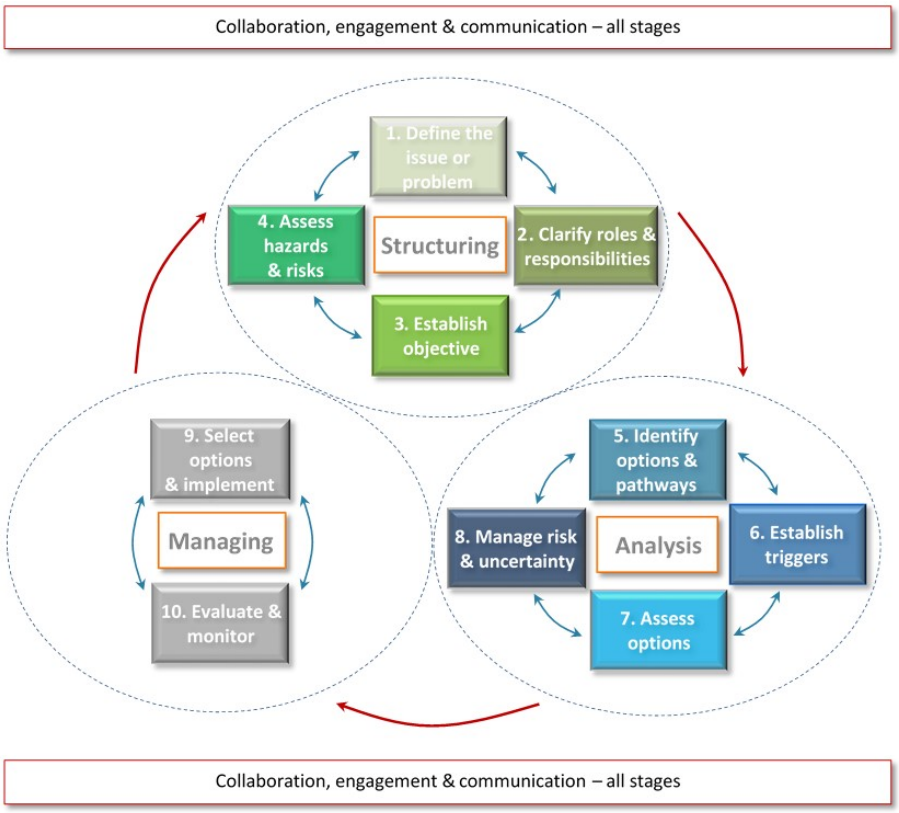
SECCCA member councils aim to better understand how their buildings, roads, drainage, and other assets will be impacted by climate change and associated extreme weather events. The *Climate Change Asset Vulnerability Assessment* project seeks to provide councils with this information. The case study phase of the project focusses on the financial and economic implications of climate change impacts on council assets and planning for those impacts.

This case study focusses on the Elwood Foreshore precinct (the Precinct) and proposed upgrades to buildings, facilities, and the broader landscape to protect it from coastal inundation and inland flooding. The case study is examining the upgrades in the context of a Master Plan, which is seeking to take a holistic approach to the precinct by protecting key built and non-built assets while enhancing visitor experience.

Climate change adaptation decision making

A sound decision-making process provides the foundation for effective climate change adaptation. Figure ES 1 identifies the key stages and steps comprising 'good practice' adaptation decision making.

Figure ES 1: Stages in the decision-making process



Working with the City of Port Phillip in a series of workshops, we have undertaken preliminary analysis relating to Steps 1 through 8 in that process, however the primary focus of our analysis has been on options assessment (Step 7).

Analysis of short term option

The options analysis focusses on a short-term option, that option being:

- Implementation of the Elwood Foreshore Master Plan.

The **Elwood Foreshore Master Plan** (hereafter referred to as Option 1) takes a holistic approach, considering the whole area rather than looking at each building or structure on its own. As such, the focus of the Master Plan is not just about protecting infrastructure from climate change impacts but also about improving visitor access and experience.

Cost-benefit analysis (CBA) is a method that compares monetary costs and benefits associated with each option. The scope of CBA is on social costs and benefits as opposed to the private cost and benefits assessed in a financial evaluation. This scope makes it well suited to measuring adaptation options from a community perspective, as will often be the basis for decision-making by councils. For our analysis, we assessed Option 1 against a business as usual (base case) option. The **Business as Usual** (BaU) option assumes that the Master Plan will not be implemented.

Although we were able to quantify the numbers and value of annual visitation to the Precinct under BaU, it is unclear how these values will be impacted by implementing Option 1. For this reason, we applied a modified version of CBA for the analysis, referred to as **threshold analysis**. We have applied threshold analysis to test the question – "*By how much will the recreation values provided by the Precinct under Option 1 (Elwood Foreshore Master Plan) need to increase above the values provided by the Precinct under BaU in order to justify the additional costs incurred by Option 1?*"

Results of the analysis are presented in ES 1.

Table ES 1: Threshold analysis (in $'000 NPV over 50 years)

	Business as Usual	Option 1 (Master Plan)	Option 1 Incremental costs and benefits
Costs			
Capital Costs	8,114	25,898	**17,784**
Flood Damage Costs	404	55	**-349**
PV Cost	**8,518**	**25,952**	**17,434**
Benefits			
Recreational values *(threshold test min. value)*	174,016	*(191,451)*	**17,435**
NPV			**1**

For our analysis we applied the travel cost method (TCM) to estimate recreational values of the precinct. Values were assessed by considering numbers of visits to the Elwood Foreshore Precinct and expenses incurred by visitors getting to the Precinct, including the cost of time. Applying this method, recreational values of the Precinct are estimated to be about $6.4 million per year, based on an estimated 1.1 million visits per year. This equates to a present value of recreational visits over 50 years of about $174 million. Given this value, recreational values would have to increase by about $17.4 million or about 15% above BaU under Option 1 (the Master Plan) for expenditure on the option to be warranted.

Conclusions and next steps

Overall, results of the analysis indicate that there is a *prima facie* case for implementing the Elwood Foreshore Masterplan. Our results also indicate that the expected value of costs associated with coastal inundation and flooding of facilities, which are the subject of the Master Plan, are likely to be relatively minor, especially in the short term.

Notwithstanding the prima facie case for implementing the Master Plan, further analysis could be warranted in some areas before decisions are made on implementation.

1. Introduction

SECCCA member councils aim to better understand how their buildings, roads, drainage, and other assets will be impacted by climate change and associated extreme weather events. The *Climate Change Asset Vulnerability Assessment* project seeks to provide councils with this information. The project also aims to help councils understand the potential risks to the community of anticipated climate change and how climate change is likely to impact the delivery of community services.

The case study phase of the project focusses on the financial and economic[1] implications of climate change impacts on council assets and planning for those impacts. The purpose of the case studies is to:

- provide a focus for efforts to achieve a more detailed vulnerability assessment, analysis of adaptation options and hence the provision of a more in-depth set of outcomes;
- provide the basis of mentoring sessions that aim to develop council capability in planning for anticipated climate change and assessing adaptation options; and
- provide practical exemplars for future reference by councils when undertaking assessments of adaptation options.

To these ends, the case studies will:

- step through the process with practical and relevant examples, and
- package up the process so that it can be reapplied and is translatable.

This case study focusses on the Elwood Foreshore precinct and proposed upgrades to buildings, facilities, and the broader landscape to protect it from coastal inundation and inland flooding. The case study is examining the upgrades in the context of a Master Plan, which is seeking to take a holistic approach to the precinct by protecting key built and non-built assets while enhancing visitor experience.

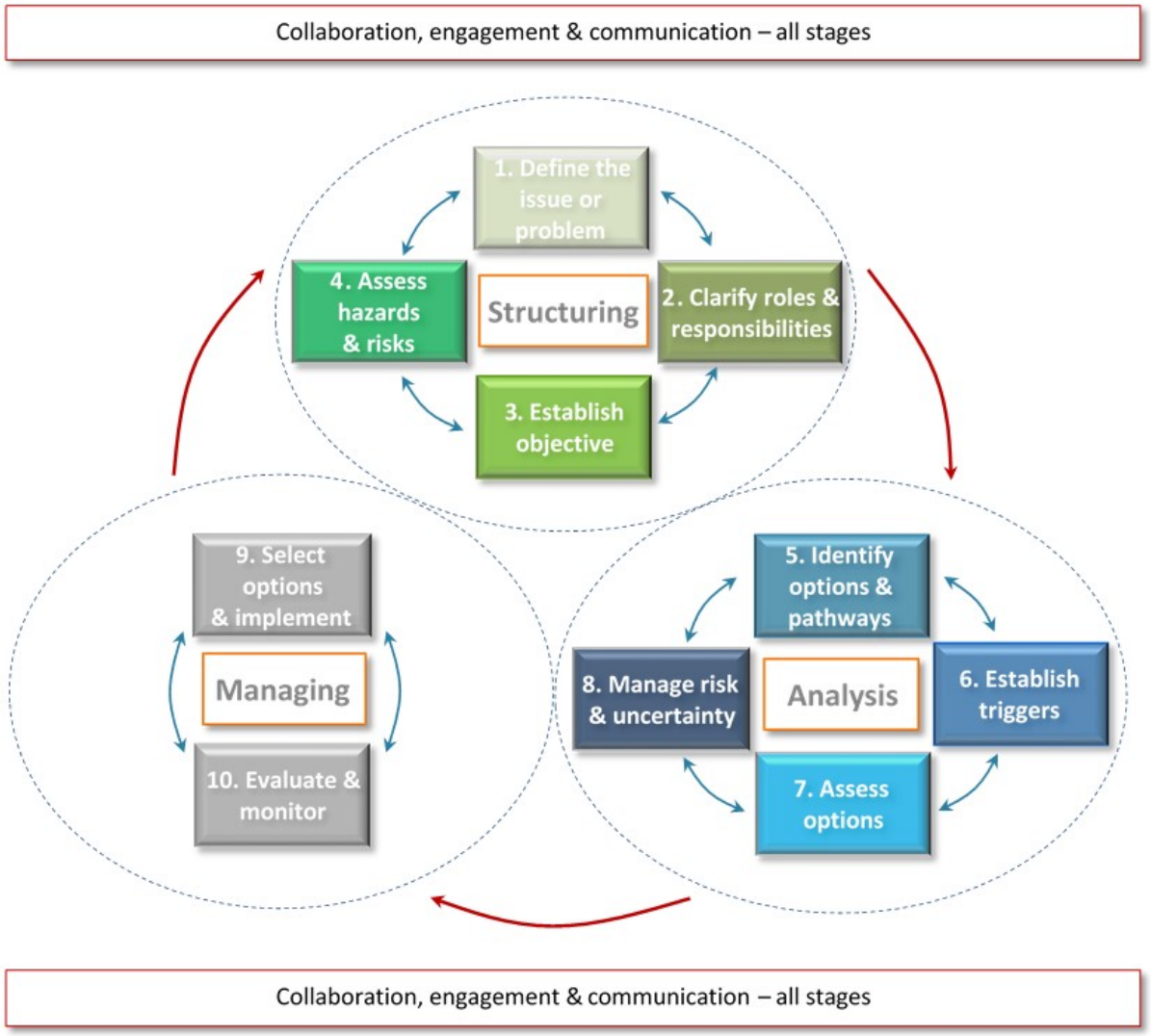
We emphasize that this case study presents a preliminary assessment of short-term adaptation options and, as such, provides guidance on the potential direction of future adaptation. Decisions on short and longer-term adaptation options may need to be accompanied by more detailed analysis at different stages of the decision-making process, which are discussed in the following section.

[1] Financial analysis is focused on the direct financial implications of climate change and adaptation options for Council. Economic analysis considers the financial implications plus the direct and indirect implications for the broader community.

2. Climate change adaptation decision-making process

A sound decision-making process provides the foundation for effective climate change adaptation. Figure 3 identifies the key stages and steps comprising 'good practice' adaptation decision making. Working with the City of Port Phillip in a series of workshops, we have undertaken some preliminary analysis relating to Steps 1 through 8 in that process, however the primary focus of our analysis has been on assessing the short-term adaptation options (Step 7) and consideration of uncertainties in the analysis (Step 8). Steps 1 to 6 are discussed briefly in this section, with more detailed discussion of Steps 7 and 8 provided in the following section.

Figure 1: Stages in the decision-making process



Source: Marsden Jacob Associates

2.1 Statement of the problem

Port Phillip Council is currently undertaking Master Planning for the Elwood Foreshore Precinct.

As well as providing significant recreational and open space values, the precinct has a number of council buildings and other infrastructure that support recreational and sporting activities and other services. These include 12 sport and recreational clubs (e.g. lifesaving, sailing and angling), a restaurant, a wellness centre, a cafe and a kindergarten.

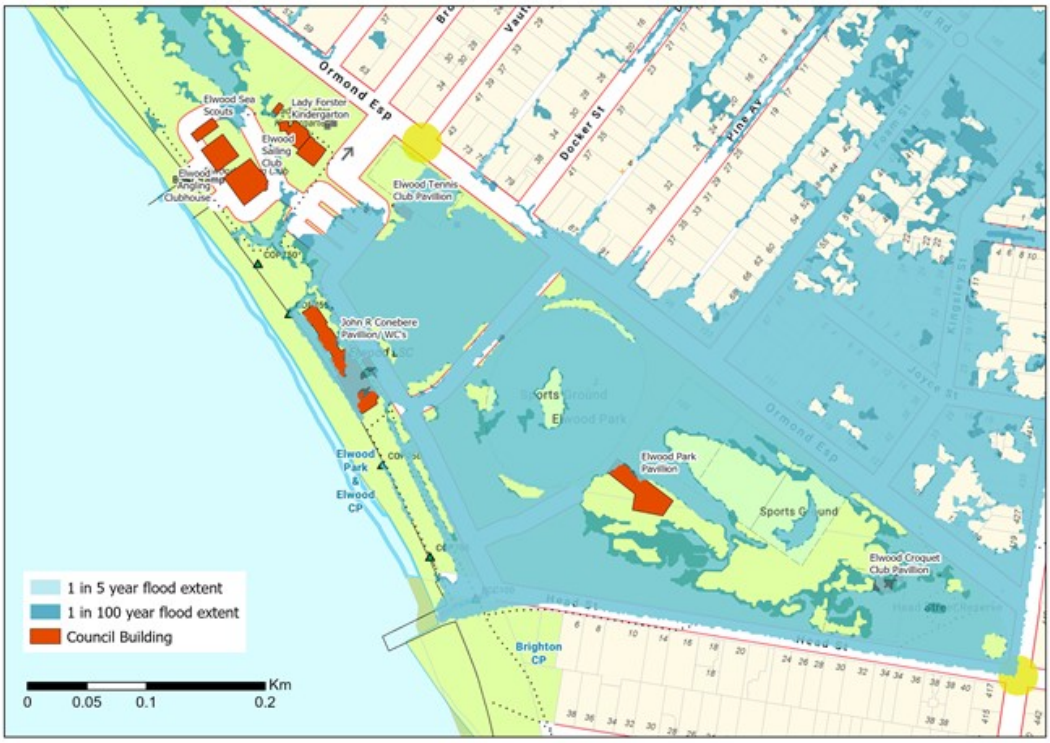
Many of the council buildings are reaching their end of life and are subject to high maintenance costs due to their age, poor condition, compliance and accessibility issues. Some of the buildings are also heritage listed. The Life Saving Club and the restaurant, in particular, are vulnerable to the risks of inundation from storm surges (exacerbated by sea level rise) and inland flooding. This is affecting insurance costs. The likely extent of coastal inundation and inland flooding in the area are shown in Figure 1 and Figure 2, respectively.

Figure 2: Coastal inundation under 82cm Sea Level Rise and Storm Surge

Source: Spatial Vision analysis

This case study is focused on options to mitigate the impacts of inundation, linked to storm surges, sea level rise and inland flooding on Council infrastructure located in the Precinct, but is looking at those options in the context of the broader objectives for the Precinct.

Figure 3: Inland flooding (1 in 5 year and 1 in 100 year flood extent)



Source: Spatial Vision analysis

2.2 Objective for the Elwood Foreshore Precinct

A clearly defined objective is important to assist Council with the process of identifying, filtering and assessing adaptation options and for identifying a 'decision rule', which will guide selection of a preferred option or options. A clearly defined objective will also help Council to understand when it needs to be making decisions on adaptation (triggers).

The Elwood Foreshore Precinct is a valued place to the community of the City of Port Phillip and beyond. Preliminary analysis undertaken for this case study, drawing on Council data, indicates that the Precinct receives more than one million visits each year, with visitation likely to increase in the future. A primary objective for the Precinct therefore is to ensure that it is protected for the future enjoyment of locals and visitors. Moreover, recognising the inherent values of the Precinct, a holistic approach needs to be taken to upgrading buildings, facilities and landscape, ensuring that:

- the character, identity and amenity of the place are protected,
- nature and the site's past are respected, and
- local priorities, contemporary expectations and needs, and Council and state government policy are reflected.

2.3 Roles & responsibilities

Port Phillip City Council has primary responsibility for the management of the Precinct and is the owner of most of the buildings located within the precinct. As such, Council is responsible for building maintenance, refurbishments and/or rebuilds. Foot and cycling pathways, as well as carparks, also fall within Council's responsibility. Other agencies, such as Melbourne Water, the Department of Environment, Land, Water and Planning (DELWP) and Parks Victoria have some relevant management roles, such as coastal management and major stormwater discharge. Any assessment and decisions on options that involve coastal protection and/or flood management should therefore involve those agencies.

2.4 Hazard assessment

For the hazard assessment we have relied on existing flood risk and coastal inundation modelling, as shown in Figure 1 and Figure 2. While this level of flood modelling is sufficient for a preliminary assessment of this nature, a more detailed assessment of the options will require a combined hazard assessment considering both inland flooding and coastal inundation as well as the latest climate change projections. We understand that a hazard assessment of this nature is currently being undertaken by CSIRO for DELWP.

2.5 Adaptation options, pathways and timing

2.5.1 Overview of options and pathways

The Elwood Foreshore is home to several buildings and support a range of activities. Many of the buildings now need large amounts of work due to their age, poor condition, compliance and accessibility issues, and vulnerability to the risks of climate-change, such as inland flooding or coastal inundation. As climate change impacts become more marked over time, sequencing of options (adaptation pathways) is likely to be necessary to address changed conditions or circumstances over time and/or because options differ in flexibility and/or life span.

Preliminary examination of adaptation pathways, considering both short- and long-term adaptation options was undertaken and discussed with Council stakeholders. The short- and longer-term options identified include:

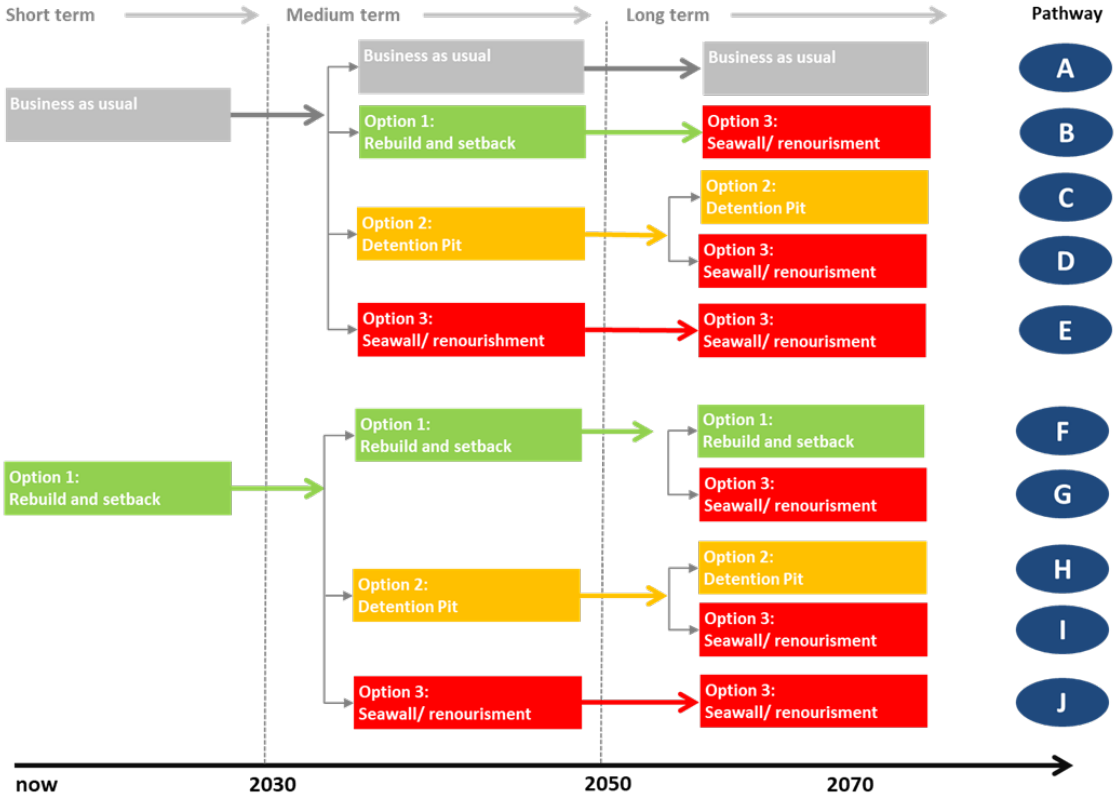
- Rebuild or refurbish the sailing club, anglers club, sea scouts, surf life saving club and restaurant in a manner that both enhances the usability of the facilities as well as protecting them from the impacts of flooding and coastal inundation. In conjunction with these changes, re-route pathways and move carparks. This option is consistent with measures detailed in the Master Plan for the Precinct.
- Stormwater diversion system at the Head Street main drain, aimed at mitigating flooding.
- Beach renourishment aimed at mitigating coastal recession. Similar renourishment, using coarse sand, was undertaken a few years ago and appears to have been quite successful in slowing recession.
- Enhancing the natural embankment/dune situated along the Precinct foreshore, aimed at protecting

the Precinct from coastal recession and inundation.

- Constructing a seawall or revetment along the foreshore to prevent recession and inundation of the precinct. Beach renourishment could be undertaken in conjunction with this option.

These options can be combined into a series of alternative adaptation pathways that capture different options and different sequencing of options over time. Examples of alternative adaptation pathways are shown in Figure 4.

Figure 4: Examples of adaptation pathways, Elwood Foreshore Precinct

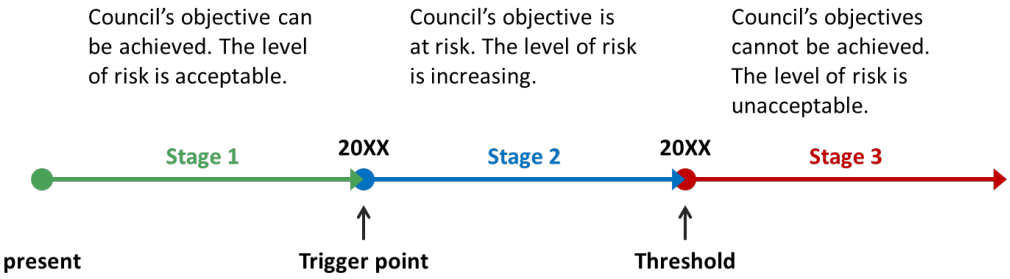


2.5.2 Triggers

Climate change poses significant uncertainties, with a range of plausible future scenarios for sea level rise and other climate related hazards. Climate change projections on the local and regional level are being continually revised as new information and data become available. This calls for a flexible and adjustable approach to climate change adaptation to avoid premature redundancy of valuable infrastructure and putting communities and assets at risk.

Triggers carefully selected to fit given circumstances and options, can serve as 'red flags' and prompt management response and/or implementation of a predefined option or set of options at an appropriate time. Triggers support adaptation strategies that maintain the acceptable level of risks and only implement adaptation actions, if actual changes in risk start to eventuate. Triggers can be linked to physical, social or planning/policy changes.

Figure 5: Appropriate timing of adaptation options



Source: Marsden Jacob after "The Time Continuum Model" (Fisk and Kay (2010))

2.5.3 Option selected for analysis

This preliminary analysis focusses on a short-term option, that option being:

- Implementation of the Elwood Foreshore Master Plan.

The **Elwood Foreshore Master Plan** (hereafter referred to as Option 1) takes a holistic approach, considering the whole area rather than looking at each building or structure on its own. As such, the focus of the Master Plan is not just about protecting infrastructure from climate change impacts but also about improving visitor access and experience. Under the Master Plan, which is detailed in the *Elwood Foreshore Precinct Preliminary Design Response*[2]:

- The buildings housing the sailing club and sea scouts will be set back and elevated and include a shared storage at ground level.
- Similarly, the lifesaving club and restaurant will be set back and elevated.
- Pedestrian and cycling pathways will be re-routed and carparking spaces will be relocated to improve the access to and movement through the site.
- Landscaping, in particular native vegetation, will also be undertaken to provide and improve shading and habitat.

There are two reasons why we have focussed on Option 1 for our analysis:

i. For many of the measures detailed in the Master Plan, the trigger point has already been reached - existing buildings and structures are close to the end of their useful life and require rebuilding or refurbishment in the coming years.

ii. It is not clear based on current flood modelling, that the other options have the same level of urgency. They are not part of the Master Plan and it is likely that they can be implemented following a decision on the Master Plan and once further analysis of their costs, feasibility and effectiveness has been undertaken.

[2] This document is not yet published

3. Analysis of short-term option

3.1 Overview of approach

Cost-benefit analysis (CBA) is a method that compares monetary costs and benefits associated with each option. The scope of CBA is on social costs and benefits as opposed to the private cost and benefits assessed in a financial evaluation. This scope makes it well suited to measuring adaptation options from a community perspective, as will often be the basis for decision-making by councils.

CBA enables comparison of alternative options to determine which options will provide net benefits to society and the option that will contribute the greatest benefit. The method can also be used to compare projects of different scales and timeframes.

For our analysis, we assessed Option 1 against a business as usual (base case) option.

The **Business as Usual** (BaU) option assumes that the Master Plan will not be implemented and instead the buildings will be replaced like-for-like in the next few years without changes to setbacks or elevation. In particular, the sailing club and sea scouts buildings as well as the life saving club and restaurant will require rebuilds in the coming years. The angling club will be refurbished. Pedestrian and cycling pathways as well as carparks will not be rerouted and remain in their current locations. No foreshore or flood protection measures will be implemented.

For the analysis we considered the following key costs and benefits of Option 1 relative to BaU[3]:

- incremental costs of implementing Option 1 (buildings, pathways, carparks, revegetation) relative to the costs of BaU (i.e. replacing like-for-like);
- avoided costs of flood and inundation impacts associated with the redesign, elevation and setback of buildings under Option 1; and
- incremental benefits of visiting and using the Elwood Foreshore Precinct gained the community through implementing Option 1 (valued as consumer surplus).

Note, although we were able to quantify the numbers and value of annual visitation to the Precinct under BaU, it is unclear how these values will be impacted by implementing Option 1. For this reason, we applied a modified version of CBA for the analysis, referred to as **threshold analysis**. Threshold analysis is used to test the impact of an option on a key unknown benefit (in this case change in visitation) necessary to achieve breakeven (i.e. a positive NPV or benefit/cost Ratio of >1) for that option. In this case, we have applied threshold analysis to test the question – "*By how much will the recreation and other social values provided by the Precinct under Option 1 (Elwood Foreshore Master Plan) need to increase above the values provided by the Precinct under BaU in order to justify the additional costs incurred by Option 1?*"

[3] Additional benefits not quantified for the analysis include benefits of membership and use of club facilities in the Precinct

3.2 Results

Results of the analysis are presented in Table 1 and Table 2.

The results are based on the following generic assumptions:

- 4% real discount rate (with sensitivities of 2% and 7%)
- 50 year analysis period
- all cost and benefit values are in 2020 dollars.

Table 1 shows the present value of costs under BaU and Option 1 over 50 years from 2021 to 2071 and, hence, the incremental net cost of Option 1. The PV of the incremental cost of Option 1 is estimated to be $17.434 million, after taking account of the avoided flood damage cost of Option 1. This incremental cost provides us with the threshold value against which to test the visitation benefits of Option 1.

Table 1: Present value costs of BaU and Option 1 (in $'000)

	Business as Usual	Option 1 (Master Plan)	**Option 1 incremental costs**
Capital Cost	8,114	25,898	**17,784**
Flood Damage	404	55	**-349**
PV Costs	**8,518**	**25,952**	**17,434**

Source: Marsden Jacob Analysis

Table 2 presents results of the threshold analysis.

Table 2: Threshold analysis (in $'000 NPV over 50 years)

	Business as Usual	Option 1 (Master Plan)	Option 1 Incremental costs and benefits
Costs			
Capital Costs	8,114	25,898	**17,784**
Flood Damage Costs	404	55	**-349**
PV Cost	**8,518**	**25,952**	**17,434**
Benefits			
Recreational values *(threshold test min. value)*	174,016	*(191,451)*	**17,435**
NPV			**1**

Source: Marsden Jacob Analysis

For our analysis we applied the travel cost method (TCM), to estimate the recreational values of the precinct. Values were assessed considering numbers of visits to the Elwood Foreshore Precinct and the expenses incurred by visitors getting to the Precinct, including the cost of time. Applying this method, recreational values are estimated to be about $6.4 million per year, based on an estimated 1.1 million visits per year. With visits projected to grow by about 2% per year, this equates to a present value of recreational visits over 50 years of about $174 million in NPV terms under BaU. Given this estimate, recreational values would have to increase by about $17.4 million above BaU, or about 15%, under Option 1 (the Master Plan) for expenditure on the option to be warranted. This increase could come from an increase in the number of visits, the average length of stay of visitors, the distance visitors are prepared to travel to get to the Precinct or the amount of money they spend while they are at the Precinct.

We note that this result could be conservative as it does not include values attached to the Precinct by members of sporting or recreational clubs or service organisations. Also, it assumes that a large majority of visits to the Precinct are by people living within the vicinity of the precinct, information which is not readily apparent from the limited available visitation data.

3.2.1 Sensitivity analysis

The threshold analysis is necessarily based on a series of assumptions, which means that there is a degree of uncertainty around the results. Sensitivity testing has been undertaken to clarify which assumptions can materially change the results. The following sensitivity tests have been undertaken:

- discount rates of 2% and 7%
- changes in capital cost of both a 20% increase and decrease
- changes in the visitation value estimates of both a 30% increase and decrease

Sensitivity analysis results are presented in Table 3. The results show that:

- The results are sensitive to changes in the discount rate. A lower discount rate of 2% gives more weight to costs and benefits in future years and therefore favours Option 1. An increase in recreation benefits (consumer surplus) of just over 10% - rather than 15% - would suffice for Option 1 to generate a net benefit relative to BaU.
- Conversely, a higher discount rate of 7% means that less weight is given to future benefits. That is, the visitation numbers and/or the length of stay would need to increase by about 25% for Option 1 to generate a net benefit.
- An increase in capital costs of 20% for BaU and Option 1 means that the recreation benefits under Option 1 would need to increase by 18% instead of 15%. Conversely, a decrease in capital costs means that recreation benefits under Option 1 would only need to be less than 13% greater than BaU to generate a net benefit.
- Similarly, a 30% increase in consumer surplus (value of visitation) benefits would mean that increase of just under 13% in visitation compared to the base case is required for Option 1 to achieve a net benefit. Conversely, an increase in visitation numbers and/or length of stay of over 20% is required, if the value of recreation benefits is assumed to be 30% less than the value used in the main analysis.

Table 3: Summary of sensitivity analysis results ($'000)

	Option 1 Increase in visitation required to meet threshold test (%)
Base assumptions	15.3
Discount rate 2%	10.2
Discount rate 7%	24.9
Capital costs +20%	17.6
Capital costs -20%	12.9
Consumer surplus +30%	12.7
Consumer surplus -30%	20.1

3.3 Underlying assumptions

The following sections set out the major underlying assumptions, such as the capital cost, flood damages and the benefits (or consumer surplus) obtained from recreation at the precinct.

3.3.1 Capital costs

The major cost driver of the CBA is the capital cost for the replacement of buildings (BaU) or the implementation of the Master Plan (Option 1). We assumed that the overall operating costs, e.g. utility costs, for the buildings will be very similar under both options and have therefore not included these in the CBA. The capital cost for BaU and Option 1 are shown in Table 4 and Table 5.

For the CBA we have used the replacement values for BaU (see Table 5), noting that the total difference between replacement values and fair values is negligible.

Table 4: Replacement Value under BaU

	Replacement Value	Fair Value
John R Conebere Pavillion/ WC's	$ 264,000	$ 485,000
Elwood LSC/Control Tower	$ 1,299,760	$ 1,465,000
Restaurant/Function Room-Sails on the Bay	$ 2,621,080	$ 3,205,000
Elwood Sailing Club	$ 1,687,840	$ 1,752,000
Elwood Angling Clubhouse	$ 2,182,840	$ 1,053,000
Elwood Sea Scouts	$ 383,040	$ 541,500
Total	**$ 8,438,560**	**$ 8,501,500**

Source: Spatial Vision, All buildings-T1- Evaluations.xlsx, provided via email 6 September 2021

Table 5: Elwood Foreshore Precinct Preliminary Design Cost Estimate for Option 1

Item	Cost Estimate
Access and Movement	$ 7,013,243
Development and Footprint	$ 14,505,000
Sports and Recreation	$ 85,000
Preliminaries	$ 2,160,324
Design Consultant	$ 1,425,814
Design Contingency	$ 2,518,938
Construction Contingency	$ 1,385,416
Total	$ 29,093,735

Source: Elwood Foreshore Precinct - Preliminary Design Cost Estimate (dated 17 December 2020).

Note that this cost estimate is based on based on the draft masterplan and is subject to change through the life of the project. A Council Report dated 01 December 2021 notes a cost estimate of approximately $51m to implement the proposed Draft Site Plan.

3.3.2 Flood damages

Information on coastal inundation and overland flooding shows that only one of the relevant buildings within the Elwood Foreshore Precinct – the Life Saving Club and Restaurant – is affected by flooding (see also Figure 1 and Figure 2 in section 2). Unfortunately, detailed flood depths for different recurrence intervals (e.g. 1 in 5 year or 1 in 100 year events) are not available. We have therefore examined three different flood scenarios and estimate the average annual damage (AAD) cost associated with those to test the impact of flood damages on the CBA results (see Table 3).

The average annual damages under Option 1 (BaU) shown in Table 3 are based on the Victorian Flood RAM values[4] for commercial properties and assume a floor area of 851 sqm. We note that these flood damages are likely overestimated.

Table 6: Flood depth scenarios and associated average annual damages

Scenario	Flood Depth above floor level (m)		Average Annual Damages ($)
	1 in 100 years	1 in 5 years	
Scenario 1	0.50	0.20	18,095
Scenario 2	0.30	0.10	13,774
Scenario 3	0.20	0.00	12,153

[4] URS, 2009, Review of Flood RAM (Rapid Appraisal Method) Standard Values, February

3.3.3 Economic value of recreational visits to the Elwood Foreshore Precinct

The economic value of recreation in the Precinct cannot be directly valued through monetary exchange. Different methods can be used however, to indirectly estimate the value of recreation. A commonly used approach is the travel cost method (TCM), a method that values recreational sites based on expenses incurred by visitors travelling to and using a site to 'reveal their preference' for visiting the site. Expenses assessed include:

- the opportunity cost of time spent travelling to the site;
- vehicle expenses (where a car is used); and
- expenditure incurred at the site.

By applying this method reflects the amount people would be willing to pay for visiting the site, serving as a proxy for monetary exchange. Applying this method assumes that if the Precinct did not exist, the expenses incurred by people to visit the site would not otherwise have been incurred.

Consistent with the approach applied in other studies (e.g. McLeod et al. 2021; Gillespie et al. 2017; Heagney et al. 2019) we only include travel time to the site in opportunity costs. This makes our estimate of the opportunity cost of time relatively conservative.

Visitor numbers

Annual visitor numbers to the precinct have been estimated drawing on data provided by Council. These include recent survey data of pedestrians and cyclists using the Precinct and data on parking fees collected from motorists parking at the two public car parks located in the Precinct. Data on pedestrians and cyclists using the Precinct and car parking data were limited to a few months and therefore do not provide a complete picture of ongoing use of the area. Adjustments therefore had to be made to account for changes in visitor numbers at different times of the year and over time. This we did by drawing on more complete data from other popular coastal destinations, which provide an indication of the difference in visitation rates during the peak season (i.e. October-March) versus the off-peak season (i.e. April-September) (Marsden Jacob 2017). Adjustments were also made to account for use of street parking by some of the people visiting the Precinct by motor vehicle. After applying these adjustments, estimates of annual visits to the Precinct by travel mode are provided in Table 7.

Table 7: Estimated annual visits to Elwood Foreshore precinct, by mode of travel

Mode of travel to precinct	Peak season	Off season	Annual
Car	90,476	38,089	**128,565**
paid parking	*66,927*	*28,175*	***95,102***
free parking	*23,549*	*9,914*	***33,463***
Cycling	351,441	147,951	**499,392**
Walking	384,057	161,682	**545,739**
Total	**825,974**	**347,722**	**1,173,696**
Average/day	**4,526**	**1,905**	**3,216**

In total we estimate the total numbers of visits in 2019-20 to have been almost 1.2 million, or 3,216 visits per day. Given limitations of the pedestrian and cyclist survey and parking data, this estimate clearly is subject to significant uncertainty.

To estimate the time spent by visitors getting to the Precinct and vehicle costs, it has also been necessary to break down visitation numbers by source, that is, where people who visit the Precinct normally live. For these estimates we drew on the split of visits by travel mode (noting that almost 90% of visits are estimated to have been undertaken by walking or cycling), demographic data for Elwood and the City of Port Phillip more broadly and other studies looking at visitation rates to beaches that are not major tourist attractions (Marsden Jacob 2017). The estimates derived in this way are presented in Table 8. An estimated 61% of all visits are by people who live in the immediate vicinity of the Precinct, this equates to about one visit per person per week on average by everyone who lives in the Elwood/Ripponlea area. Another 29% of visits are estimated to be by other residents of the City of Port Phillip.

Table 8: Estimated annual visits to Elwood Foreshore precinct, by source

Visitation source	Elwood/ Ripponlea	City of Port Phillip	Other	Total
Travel by car, paid parking	19,020	42,796	33,286	95,102
Travel by car, free parking	6,693	15,059	11,712	33,463
Cycling	224,726	199,757	74,909	499,392
Walking	463,878	81,861	-	545,739
Total	**714,317**	**339,472**	**119,907**	**1,173,696**
%	**61%**	**29%**	**10%**	**100%**

Travel times from these areas were estimated by selecting a central location and estimating walking, cycling and driving times using Google Maps (Table 9).

Table 9: Estimated travel time, by travel mode

Estimated average trip time (mins - one way)	Elwood/ Ripponlea	City of Port Phillip	Other
Travel by car, paid parking	4	7.5	15
Travel by car, free parking	6	8	17
Travel by cycling	4	10	27
Travel by walking	12	25	90

Finally, we used this information to estimate the economic value of recreation at the Elwood Foreshore Precinct. This was estimated applying a standard rate for the value of recreational time of 35% of the median wage (i.e. about $17/hour) and a standard vehicle operating cost of $0.75/km. Car parking costs are also included. Visitors are also estimated to spend an overage of $3.37/person/visit while at the Precinct, based on an average length of stay of 1.5 hours/visit and

average expenditure of $18/day for a full day recreational trip (Mclean et al. 2021, Marsden Jacob, 2017).

Applying these rates, we estimate the annual value of recreational visits to the Precinct of $6.37 million. This is assumed to increase by about 2% each year reflecting population growth.

4. Conclusions and next steps

4.1 Conclusions

Overall, results of the analysis indicate that there is a *prima facie* case for implementing the Elwood Foreshore Masterplan. This case, of course, rests largely on the supposition that implementing the Masterplan will increase the value of recreational visits to the Precinct (either through increased numbers, length of stay and/or source of visits) by at least 15.5% above the estimated value of recreational visits if the Masterplan were not to be implemented. Although the estimates generated by the analysis are preliminary and are subject to significant uncertainties, a 15.5% increase in the value of recreational visits would appear to be feasible given improvements to the Precinct that the Masterplan are expected to generate – i.e. improvements to the amenity of the Precinct, while also strengthening key assets from the future impacts of climate change. We note also that sensitivity analysis indicates that the range of uncertainty around the threshold value (10% - 20%) is not large.

Our results indicate that the expected value of costs associated with coastal inundation and flooding of facilities, which are the subject of the Master Plan, are likely to be relatively minor, especially in the short term. Thus, although the measures for these facilities, proposed through the Master Plan, will largely eliminate these flood costs, this has only a relatively small impact on results of the analysis.

4.2 Next steps

Notwithstanding the prima facie case for implementing the Master Plan, further analysis could be warranted in some areas before decisions are made on implementation.

4.2.1 Visitation rates

Although visitation rates to the Precinct appear to be substantial, the estimates are subject to significant uncertainty. Given this, extended surveys covering visitor numbers, the duration of visits, where visitors are coming from and how they get there could be worthwhile.

4.2.2 Financing

Substantial capital costs of nearly $30 million will be required to implement the Elwood Foreshore Precinct Masterplan. Council will need to give due consideration to how the Masterplan will be financed.

4.2.3 Implementation plan

A program implementation plan for the Masterplan will need to be developed covering:

- funding and cost sharing;
- an implementation timetable;

- roles and responsibilities for Masterplan implementation;
- monitoring of visitation and utilisation outcomes; and
- program review.

4.2.4 Analysis of medium and long term protection options

The analysis presented in this report is only preliminary, and as we have previously emphasised, is subject to considerable uncertainty. Given this uncertainty and noting that the analysis only assessed measures that are foreshadowed in the Masterplan, further detailed analysis may be warranted. This includes analysis of measures that are designed to protect the Precinct from the impacts of climate change, such as a seawall or revetment. That analysis will need to be underpinned by improved costal inundation and flood modelling for the area and preliminary design and costing of protection measures.

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