



CRC for
Water Sensitive Cities

Towards a Water Sensitive Elwood

A Community Vision and Transition Pathways



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Towards a Water Sensitive Elwood:

A Community Vision and Transition Pathways

Mapping Water Sensitive City Scenarios (Project A4.2)

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Executive summary

Elwood, a bayside suburb in Melbourne's southeast, is the focus of a Cooperative Research Centre for Water Sensitive Cities (CRCWSC) project on water sensitive city transition planning (Project A4.2). Elwood has strong historical connections to water, being the site of a swamp until its drainage in the late nineteenth century, and with generations of residents drawn to its leafy streets and beachside location. Due to its low topology and position at the bottom of a substantial catchment, it is also the site of periodic major flooding.

A key aim of this project is to develop and test methods for engaging the community in envisioning processes to develop transition strategies for creating water sensitive cities, suburbs and towns. Such a transition will involve complex long-term social and technical changes, so it is imperative that citizens be engaged in deliberations concerning these shifts. In a series of three workshops, the project drew on methods from transition planning processes such as context mapping, envisioning and backcasting and involved 24 community members over a four month period in mid-2015.

The research commenced with a detailed analysis of Elwood's social, institutional and environmental context. A number of participants were involved in pre-workshop interviews at this early stage, providing insight into Elwood's historical and contemporary conditions, including its present sustainability challenges.

During the workshops, participants developed a vision of Elwood as a water sensitive suburb. Envisioning was open and inclusive and resulted in five themes representing different dimensions of the community's desired future in the year 2065: "Celebration of water in the landscape", "Adapted to rising waters", "Rich habitats and thriving biodiversity", "An innovative green economy", and "The united people of Elster Creek". Each theme was developed into a rounded narrative of Elwood's future, drawing on the ideas and phrases expressed during workshop discussions. This desired future vision for Elwood was contrasted with an undesired vision of 'Remembering Elwood lost', which highlighted risks the suburb is facing and the need for proactive transition planning to steer away from such a future.

Participants then identified and expanded on the transitional changes they considered necessary to achieve the desired vision for Elwood. This two-stage process involved first identifying spatial opportunities to realise Elwood's vision within its built and natural environment, and then proposing a range of social, political, economic or technical strategies and actions to achieve the transition to a water sensitive suburb. Participant deliberation followed eight transition pathways: "Greening streets and lanes", "Managing floodpaths", "Encouraging informed, resilient and adaptive citizens", "Connecting citizens to place and to each other", "Naturalising the canal", "Protecting and enhancing coastal life", "Taking responsibility for environmental impacts from private property", and "Catchment level deliberation and action".

The ideas, strategies and solutions developed by the participants were diverse and demonstrated the benefits of transition planning processes for revealing the interconnections between water, people, infrastructure and the landscape. Ideas for change related to:

- Catchment governance
- Regulatory frameworks
- Community connectedness
- Individual resilience and adaptive capacity
- Urban planning approaches
- Transportation methods
- The form of public and private spaces
- The Elster Creek and foreshore environments

The project showed the value in employing participatory deliberative processes with community members for transition planning at the local scale. In particular, it revealed the breadth of community values and aspirations related to water, infrastructure and environmental management in Elwood, and identified key future risks that the community are concerned about. It also resulted in a rich source of ideas for strategies and solutions for improving Elwood's water sensitivity, highlighting the value of developing local and regional-scale solutions with community knowledge and support.

Finally, the project demonstrated that such participatory processes are important for building awareness of and legitimacy for the transition to water sensitive cities, as well for empowering citizens to be active partners in driving this transition.

1. Introduction

1.1 About this report

Cities globally are attracting significant attention, as climate change, population growth and urbanisation pressures strengthen calls to better plan for urban futures. While aspirations for liveability, sustainability and resilience are compelling concepts for cities at a high level, achieving these aspirations requires interpreting their meaning for the local neighbourhoods of which cities are comprised. Translating high-level goals to have local perspective requires the input of the people who live, work and play in the area. It is therefore critical to support effective engagement with citizens about their neighbourhood's long-term future.

This report presents the outcomes of a local-scale participatory process conducted in Elwood, a bayside suburb of Melbourne, to develop a community-driven future vision for their suburb and pathways for advancing towards it. The process centred on the concept of water sensitivity, an approach that centres on urban water management enhancing the liveability, sustainability and resilience of a city. It has two distinct aims: (1) develop a vision and strategies for guiding initiatives towards achieving the vision, and (2) catalyse momentum and commitment amongst community champions for driving change towards the vision.

The process was conducted as part of a Cooperative Research Centre for Water Sensitive Cities (CRCWSC) project, which develops and applies innovative transition planning processes and frameworks. The project aims to enable collaboration amongst stakeholders from government, business and community to address urban challenges, with a particular focus on accelerating the transition to water sensitive cities and towns in Australia.

This report is designed as a resource for community members, local Governments, water utilities and government agencies interested in local-scale initiatives to steer water sensitive city transitions. It has three main purposes. First, it showcases the results from the Elwood process to demonstrate the value of engaging with community members to inform long-term planning for liveability, sustainability and resilience transitions. Second, the results provide a vision, ideas and strategic framework to inform integrated water system planning for Elwood and its surrounding catchment area to steer its transition towards water sensitivity, although a scaled up process would be required to develop a vision for Elwood and the Elster Creek catchment that is representative of the broader community. Third, while the process was focused on the suburb of Elwood, the outcomes presented in this report may also inspire innovation in local-scale water sensitive planning in other Australian cities and towns.

Future work in this CRCWSC project will focus on developing methodological guidance and supporting CRCWSC partners in undertaking visioning and strategic transition planning through engagement with different types of stakeholders across both local and metropolitan scales.

Following this introduction, the report is structured in three chapters:

Chapter 2: The community's water sensitive vision for Elwood in 2065

Chapter 3: The transition pathways identified by the community, including analysis of the perceived challenges and ideas for strategies and actions

Chapter 4: Reflection on the outcomes of the Elwood process and synthesis of insights for policy and practice



Figure 1. Participants developing the vision during the first workshop

1.2 Towards water sensitive cities

1.2.1 What is a water sensitive city?

Conventional approaches to urban water servicing, largely characterised by large-scale centralised infrastructure and management approaches, have a strong legacy in providing reliable basic services of clean water supply, safe sanitation and stormwater drainage. However, in recent years it has become widely recognised that these traditional systems also have negative impacts in relation to environmental health and are vulnerable to changing rainfall patterns and sea level rise associated with climate change and increasing service demand due to population growth and urbanisation.

In response to these challenges, the aspirational concept of the water sensitive city has emerged in scientific, policy and practice domains as an alternative approach to urban water servicing. The water sensitive city embraces flexible and diverse infrastructure systems so they can perform reliably against a wide range of future uncertainties. Water, energy and other resources are managed so that systems are sustainable over the long-term. Perhaps most importantly, the water sensitive city celebrates the fundamental role that good water management has in enhancing the liveability of a city through the support of green landscapes, healthy rivers and extreme heat mitigation.

The goals of the water sensitive city are broad, centred on the philosophy that water systems, the urban environment and governance arrangements are designed to provide multi-functional benefits:

- Recognising all values in the integrated water cycle
- Holistic management of water systems
- Water conservation
- Fit-for-purpose water use
- Flood risk reduction
- Pollution minimisation
- Urban landscape improvement
- Shared governance processes
- Knowledgeable and engaged citizens

1.2.2 The need for transitional change

The shift from conventional water management to a water sensitive city is significant. New technical approaches are required (e.g. biofiltration systems like raingardens and recycling technologies), as are new principles of urban design (e.g. designing the urban landscape so that it has both an aesthetic role and a functional role in providing water services like flood management). New governance approaches are also required, as centralised top-down management will no longer be the most effective mode of ensuring adequate service levels across the wide range of performance objectives that are encompassed in water sensitivity.

These new approaches mean the roles and responsibilities of households, communities, local governments, water utilities and state government agencies need to change, as do the policy, legislative and regulatory frameworks that guide their activities. It is therefore widely accepted that becoming a water sensitive city will involve a transition, driven by radical shifts in the structures, cultures and practices that underpin urban water management.

The study of transitions has gained scholarly attention in the last 15 years, as people have become more aware of the sustainability challenges we are facing globally. The aim of sustainability transitions research is to enable change that would result in a more sustainable system, particularly by overcoming resistant cultures, structures and practices that are 'locked in' to a current unsustainable path. Facilitating transitions is not easy, requiring dedicated attention to disrupt the dominant paradigm (in this case, conventional water management) so that the emerging alternative (water sensitive cities) can become influential (e.g. Loorbach & Rotmans, 2010; Sondejker et al., 2006).

A key insight from transition studies is that enabling transitional change requires coordinated and aligned action across the many diverse stakeholders that influence a particular type of practice (urban water management in this project). Effectively steering processes of change relies on a shared vision that provides a framework to orient action towards a common set of goals, as well as a clear understanding of the range of strategic pathways that need to be pursued to achieve the transition.

This project aims to translate these conceptual insights on enabling sustainability transitions to support real-world water system changes, specifically by developing a vision and pathways for Elwood's transition to a water sensitive suburb. It draws on a participatory approach commonly used in transition studies, known as transition management (Loorbach, 2007). This approach aims to bring stakeholders together to generate a shared understanding and motivation for enabling transitional change, develop a common vision to guide action, and identify pathways for change that offer a roadmap for navigating change processes. Participation in such processes ideally builds momentum for innovation and action to start implementing the changes identified.

1.2.3 Community and water sensitive city transitions

Citizens have a critical role in enabling water sensitive city transitions, both through their expectations of planners and decision-makers, as well as through their own attitudes and behaviours in interacting with water and the urban environment. For example, managing water for improved liveability outcomes requires deep engagement with the needs and aspirations of local communities in relation to their place-based human needs, such as safe and pleasing habitation, and healthy and secure food supplies. Ensuring resilience requires the development of both technical and social capacity to respond, recover and adapt to stresses, threats and disasters such as flooding, drought and extreme heat. Implementing a sustainable water system requires people to be receptive to new water servicing approaches, such as being supplied recycled water for flushing toilets or maintaining household-scale technologies that more efficiently process resources.

Successful water sensitive city transitions therefore require the community to be engaged with as an active stakeholder in driving the change desired. However, Government, local Councils and water utilities are challenged by how to effectively facilitate community participation in water planning and decision-making. This is particularly as it represents a departure from the traditional water management approach, in which the role of citizens is as an end user that pays for a typically "one-size-fits-all" service; a role that does not usually require context-specific engagement. In contrast, planning water sensitive cities at the local scale means recognising that the needs, values and priorities of citizens in one suburb may be quite different to those in another, demanding a more nuanced and targeted

engagement process that elicits a variety of perspectives and localised knowledge.

The characteristics of water sensitive city transitions – complex, long-term, and involving technological, cultural, social and institutional changes – means that top-down processes on their own will not be effective enabling forces. For example, a key explanation for the defeat of Toowoomba's 2006 referendum on recycling water for drinking purposes is the rushed engagement process, so there was limited time for public support to build (Hurlimann and Dolnicar, 2010). Communities need to be involved in deliberations concerning such changes, not only to fulfil the basic democratic principle that citizens can participate in decision-making that will directly affect them, but also to bestow greater legitimacy, support and momentum for the significant directional shifts required if water sensitive cities and suburbs are to be achieved. Providing opportunities for citizens to engage in processes that set the long-term direction for water planning, design and management decisions will increase the likelihood that water systems of the future directly enhance the social fabric of a city.

"To me, that education stuff can't be understated and the things that you think are crazy and will never happen, actually end up happening."

Case study example: The Local Climate Change Visioning Project (Bizikova et al., 2014)

Visualising the potential impacts of climate change on places that are special to local residents helps increase community sustainability and resilience, according to transitions research from Vancouver, Canada.

In this project, local government, expert and community participants were invited to consider what the local landscapes would look like based on four alternative climate futures. Each of these futures, developed with the assistance of scientists and policy-makers, was based on alternative long-term climate assumptions.

Participants then responded to these regional storylines or visions. They voiced their preference for a particular vision, and explored the policy actions that would be required to bring that vision into being. Later, hypothetical depictions of climate change impacts on local places were shown to participants in order to heighten the relevance of particular decisions, as well as their climate implications.

Individuals that took part in the project gained an understanding of the local impacts of climate change, and strategies that could be used to respond to them. They also developed a heightened sense of urgency and stronger support for adaptation and mitigation policies.

1.3 Project overview

1.3.1 Aim and objectives

The CRCWSC brings together research expertise from diverse disciplines, including engineering, planning, economics and social science. Its goal is to undertake research that will revolutionise water management in Australia and overseas. With partners in industry, government and research, it aims to deliver the urban water management solutions, education and training programs, and industry engagement required to support the liveability, sustainability and resilience of towns and cities by making them more water sensitive.

The Elwood study is part of a larger CRCWSC research project³ to support planning for the transition to water sensitive urban areas that embody the principles of liveability, sustainability and resilience. The project aims to match the latest science on water management and sustainability with stakeholder aspirations and strategic planning objectives at the local, regional and city scales, with a specific focus on generating new methodological insights for participatory transition planning.

The objectives for the Elwood case study were to:

1. Trial techniques for engaging community members in local-scale, long-term visioning and transition planning for water sensitive cities
2. Develop a long-term aspirational vision for Elwood as a water sensitive city that represents the community's needs, values and priorities in relation to their local water and urban environment
3. Identify a wide range of tangible strategies and actions for enabling Elwood's water sensitive transition to inform water-related planning and decision-making in its broader catchment area

1.3.2 Research approach

Elwood was chosen as one of the case study locations⁴ for this research as it represents a range of long-term planning challenges, has a history of water management issues related to flooding and water quality, and is home to an active engaged community who feel a strong connection to their local area. Four other CRCWSC projects also selected Elwood as a case study, involving in-depth studies on urban design and densification solutions, flood risk modelling and the development of climate adaptation strategies for different future scenarios⁵. Collaboration amongst the researchers in these teams has created opportunity for bringing an interdisciplinary perspective to planning for Elwood's transition to a water sensitive suburb.

The research project involved a number of methodological steps, as outlined in Figure 3 and summarised in the following paragraphs. Participants for the research were recruited through City of Port Phillip environment-related channels (e.g. sustainability newsletter) and through targeted approaches to individuals that had been recommended by others (the snowballing technique). The number of participants in the three workshops was 24, 17 and 18 respectively, with an even gender balance for the first workshop and more women than men in the second. The participants' age range spanned from approximately 20 to 70, and most people were homeowners in Elwood. The group was not representative of the Elwood community, given the need for them to turn up to multiple workshops on a weekday evening, which meant they were sufficiently interested and engaged in the workshop themes. Their motivations for participation varied from being curious about issues related to water, passionate about sustainability and the environment in general, having had personal experience of flood impacts, or being committed to advocating for positive outcomes on local neighbourhood issues. Three of the participants had professional experience in the water industry. The recruitment approach means that the project outcomes are not intended to be representative for Elwood; rather it facilitated a process to develop a vision and set of strategies that could catalyse bottom-up momentum amongst community champions for driving the suburb and broader catchment's transition towards water sensitivity, as well as to demonstrate the potential for engaging with citizens about their priorities, ideas and long-term aspirations for their local area. Appendix B provides further details on the project methodology.

³ See Appendix A for more details on CRCWSC Project A4.2 *Mapping Water Sensitive City Scenarios*

⁴ The project has also conducted a parallel process in Western Australia, involving 32 leading practitioners developing a vision and strategic transition framework for Greater Perth as a water sensitive city at the metropolitan scale

⁵ These relate to outputs from CRCWSC Socio-technical modelling tools to examine urban water managements scenarios (DAnCE4Water) (Project A4.3); Socio-technical flood resilience in water sensitive cities (Project B4.1/B4.2); and Urban intensification & green infrastructure (Project D5.1). See <http://watersensitivecities.org.au/> and Appendix A for more information on these projects. The integration work across projects is ongoing; results are expected to be available mid-2016.

A desktop review of literature on Elwood's social, environmental and water management context, combined with semi-structured interviews with the workshop participants, informed the development of an analysis of the history of Elwood pre- and post-European settlement, the suburb's demographic characteristics, catchment and flooding issues, urban planning regulations and policies with respect to water management and development, and water use trends. Findings from this review are found in Appendix C. The interviews were also an opportunity for the project team to engage with the participants to gain early insight into the perspectives that would be brought to workshop discussions and to answer any questions the participants had.

A series of three workshops were then conducted with the community participants, as well as two representatives from the City of Port Phillip and three CRCWSC urban design researchers. Each workshop was three hours in duration and held on a weekday evening. Dinner was provided to the participants. The methods included envisioning, backcasting and scenario planning techniques (e.g. Dreborg, 2006; Ferguson et al., 2013; Loorbach and Rotmans, 2010; Robinson et al., 2011; Sondejker et al., 2006; Ziegler, 1991) to iteratively develop the future vision and transition ideas for addressing the long-term challenges and aspirations for Elwood and

its water environments. The process facilitated discussions that were framed around future risks to people's quality of life in Elwood, the impacts of flooding and pollution in the area, and the potential consequences of future development patterns for the sense of community and village lifestyle that attracts people to live in Elwood. In this way, while the participants were largely unfamiliar with the concept of water sensitive cities prior to the workshop series and related terminology and concepts were not imposed upon the participants during discussions, the vision and pathways developed were oriented towards enabling the transition towards a water sensitive Elwood

"Everyone was willing to contribute. The team did a great job managing potentially difficult people. The ideas & willingness to be positive & build on them rather than be negative [was a positive aspect of the workshops]."



Figure 2. Participants creating transition ideas for Elwood

Discussions were facilitated both as a whole group and in small groups of 5-6 people. At each workshop, CRCWSC researchers presented a small amount of content on water sensitive cities to stimulate discussions; however, their role was to facilitate discussions rather than contribute to the ideas generation process. After each workshop, the project team analysed the results and presented them in an interim report, which was circulated to the participants for review prior to the next session. The first part of the next workshop was then focused on validating and refining this analysis

through group discussion. The project team incorporated any feedback into the next interim report. Validation and refinement of the results from the final workshop was via written or verbal feedback provided to the project team.

Post-workshop interviews with workshop participants are currently in progress, with the main purpose of evaluating the workshop series to inform the development of methodological guidance for conducting community visioning and transition planning processes.

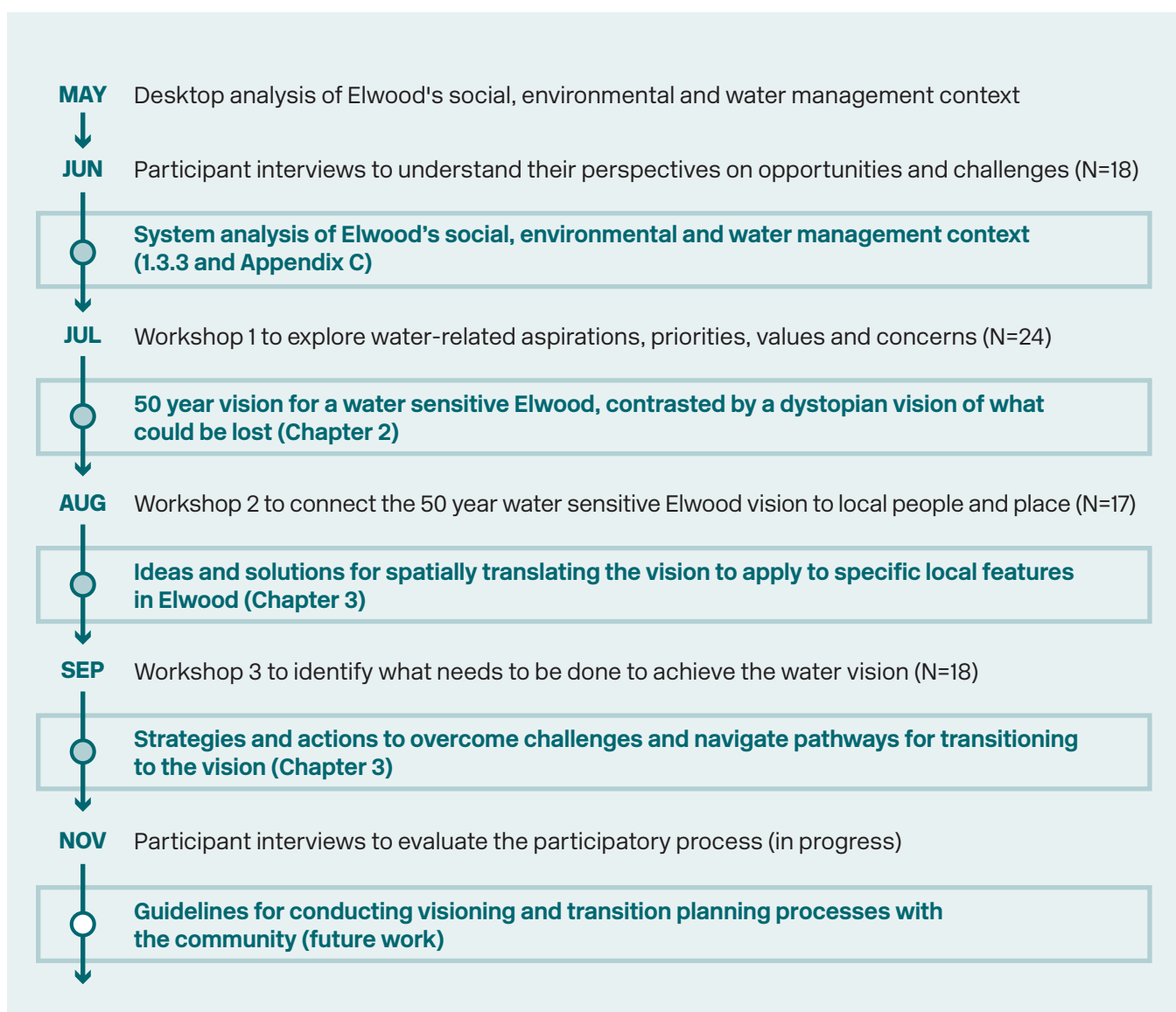


Figure 3. Key methodological steps and outputs

1.3.3 Case study details

This section provides an overview of the Elwood context; a more detailed analysis is found in Appendix C.

Elwood is a suburb in Melbourne's south-east, approximately 10 km from the CBD, with 14,638 residents (Australian Bureau of Statistics, 2013). Like many of Melbourne's inner suburbs, it has a higher proportion of apartments and townhouses than detached dwellings, as well as more renters than home-owners.

Elwood is part of the Elster Creek catchment, which is 40 km² in area, covering three local government areas (City of Port Phillip, City of Bayside and City of Glen Eira). Elster Creek is now a highly modified watercourse, only surfacing in its final 4 km in concrete-lined channels. Before European settlement, Elwood was the site of an ephemeral wetland originally approximately 65 ha in area (Heritage Alliance, 2005). This wetland was used by the Boon Wurrung people (Eidelson, 2006).

Although parts of Elwood were developed in the mid-1800s, substantial development only occurred after the Elwood Swamp was drained in the late 1880s. At about the same time Elwood Canal was constructed between Glen Huntly Road and the beach, about 150m north of the original outlet of Elster Creek (La Nauze, 2011). Unfortunately, Elwood's low-lying position at the bottom of the catchment has led to semi-regular flooding of the area. Although the majority of Elster Creek's flow was diverted to an alternative outlet in Brighton in 1958, substantially reducing the incidence of flooding (Heritage Alliance, 2005), Elwood still floods from time to time, most recently in 2011.

"People really find living here is a precious thing and people say, 'oh Elwood's a happy place', and it is. And you think, why wouldn't it be?"

Due to the risk of flooding in Elwood, a Special Building Overlay (SBO) in the Port Phillip Planning Scheme covers a substantial proportion of properties in the suburb. The purpose of the SBO is to set appropriate conditions, for example floor levels, for buildings to address flood risk and ensure that floodwaters are not obstructed or diverted by development. The other major curb on development is the Heritage Overlay, which limits the structural alteration of buildings. A large number of properties are in both the Heritage Overlay and SBO. Development is also managed by zoning provisions, and most of Elwood is in a minimal or

limited change development zone. Consistent with these development controls, forecast growth rates for Elwood are in the lower range for Port Phillip, and also lower than Melbourne as a whole.

"Flooding in the lower parts is always a concern, be it from rain or surges from the bay up the canal. The wetting and drying of the soil plays havoc with the foundations of many buildings... Then of course when we have droughts, it makes you realise the fragility of the trees."

The City of Port Phillip has developed a number of strategies that influence the planning and development of Elwood. These include the Port Phillip Water Plan (City of Port Phillip, 2010a), which predominantly guides works on Council-managed open space and streets, but also includes strategies to help the community to apply water sensitive practices, and the Climate Adaptation Plan (City of Port Phillip, 2010c), which includes strategies to protect beaches and facilitate building, streetscape and open space design that influence local climate positively.

Elwood's future will also be influenced by planning at a regional and State-wide scale. A Flood Management Strategy (Melbourne Water, 2015) has recently been released for the Port Phillip and Westernport region, of which Elwood is a part. The strategy focuses on flood risk management and preparedness to reduce the social and economic costs of flooding, and major features are raising community awareness of their flood risks and reducing local 'intolerable' flooding. Other strategies at the regional level include the Regional Catchment Strategy for the protection of environmental assets in region, and Plan Melbourne, an integrated land-use and transport planning strategy for the metropolitan region. State-wide direction is generally set by the Victorian Government, which has authority over State planning, health and environmental regulations and administers primary water and environmental resources. A new Victorian Floodplain Management Strategy is expected to be released in late 2015 or 2016. The Essential Services Commission is the independent regulator of water and sewerage pricing and monitors service standards.

Important institutions active in the planning and management of Elwood's water system include South East Water, which is responsible to customers in the Elwood area for water supply and sewerage services, and Melbourne Water, which is responsible for bulk water supply for the Melbourne area, and for managing waterways and larger drainage areas.

Climate change is forecast to make Port Phillip hotter and drier. By 2070, under a higher emissions growth scenario, the projected average annual temperature for the Port Phillip and Westernport region, in which Elwood is located, is expected to increase by 2.6°C, and the average summer temperature by 3.0°C (DSE, 2008). Rainfall projections for 2070 show wide confidence intervals, indicating that the impact of climate change on average rainfall is highly uncertain. Nevertheless, average annual rainfall is projected to decrease by 11% by 2070. Even under lower emissions scenarios, annual temperatures are projected to increase by 1.3°C and rainfall to decrease 6%.

Forecasts for 2070 indicate extreme weather will become more common for Melbourne. The number of days per year where the temperature will exceed 35°C will increase from the current 9 days to 14 days under the lower emissions scenario, and double to 20 days with higher emissions. Rainfall is projected to be more extreme by 2070, with the intensity of heavy daily rainfall expected to increase 16% in summer and 17% in winter under higher emissions. With 80cm sea level rise expected in Port Phillip Bay by 2100 (Melbourne Water, 2012), storm surges are predicted to be 2.0m (City of Port Phillip, 2010c).

The Elwood community represents a mix of cultures and heritages, which creates a diversity that is highly valued by people living there. The suburb is known for its 'village' feel, with strong local connections developed through engagement with the local schools, shopping strips and recreational opportunities. Residents are generally interested in their suburb's development and share a clear passion for ensuring its future is positive.

"I feel where you might now have to build something that's 45 centimetres or 1 metre about the floodplain, with climate change that's not going to be adequate in 40 or 50 years time... those places will have water lapping at their doorsteps."

"Yes, we like the leafy streets and yes, it's nice, but you know, community was a strong [pull] for us."



2. Elwood's 2065 water sensitive city vision

2.1 Introduction

In Workshop 1, participants were asked to develop newspaper headlines for an article profiling Elwood in 2065. These headlines represented different positive and negative futures for Elwood, connected by the community's everyday experience of water and the broader natural environment. Analysis and consolidation of the headlines both during and after the workshop revealed six vision themes.

One theme represented the community's undesired future, "Remembering Elwood lost". This theme served as a backdrop for the participants to consider more positive alternatives and to develop ideas and strategies for avoiding that future.

Five themes represented different dimensions of the community's desired future: "Celebration of water in the landscape", "Adapted to rising waters", "Rich habitats

and thriving biodiversity", "An innovative green economy", and "The united people of Elster Creek". These themes provided an orienting framework for the participants to consider how the vision can be achieved through strategic initiatives.

Each theme was developed into a rounded narrative of Elwood's future, drawing on the ideas and phrases expressed during workshop discussions. These narratives are presented in the following sections, with illustrations to visualise key features of the desired future. Also presented are samples of direct notes from the workshops and selected quotes from the participants to highlight important elements of the vision.

Overall, the five themes of the desired future reflect dimensions of a coherent and collective vision that show Elwood as:

A vibrant, connected and self-sufficient community that celebrates its healthy and beautiful environment, uses water and other resources efficiently, and is resilient to natural hazards.

2.2 Elwood's undesired future

2.2.1 Remembering Elwood lost

Elwood is most remembered by what it has lost. For example, Elwood beach has lost its battle against tide and pollution and no longer plays host to people swimming, hoping to cool down during the long intense summers. Elwood's climate, so hot and dry now, has caused the street trees to be replaced by hardier varieties, and the cooling summer shade of the old plane trees has been lost too. Even the remnant coastal tea trees and banksias have not survived the twin forces of development and climate change. As a consequence, Elwood's habitat for native fauna has all but disappeared.

*Last of the
plane trees →
not handle heat stress
& die → change
look and feel
of Elwood*

Elwood is no longer fit for the more vulnerable people of the community to live. The elderly are at risk from the extremes of climate, suffering from heat stress and unable to cope with flooding. With every flood, more residents are in need of emergency relief. Adequate insurance against these events is either not available or too expensive for most people. The residents in the flood-prone parts of Elwood have lost their ability to bounce back from flooding.

*Last of old people
→ as becomes less
habitable & accessible
→ e.g. can't access
split-level housing →
planning them out*

The conflict between heritage and rising waters was complex. Many residents and regulators would not compromise heritage values until it was too late to preserve them. Heritage homes have now become too costly to adapt to the new flooding norms, and even if they could be adapted, this would mean their accessibility for less mobile members of the community would be significantly compromised. Whether it happens in a sudden onslaught of stormwater or by attrition from crumbling foundations, many homes in Elwood are being lost to the swamp.



2.3 Elwood's desired future

2.3.1 Celebration of water in the landscape

It is 2065 and Elwood has embraced and integrated Port Phillip Bay into daily living. The foreshore, protected by a series of artificial reefs, adds to the quality of life for residents and to local productive activity. Residents swim in seawater pools and water parks, Bay aquaculture provides food for Melbourne parks, and water quality is so well protected that dolphins can frequently be seen swimming up the canal. People regularly walk along the canal's shallows, shoes in hand.

Fresh water is an essential part of Elwood life. The water flowing down the creek from the top of the catchment is clean and sustains a healthy estuary that is home to a diversity of sea life. Land along the creek benefits from an occasional flood. Elwood's many community gardens contribute to residents' diets, and are irrigated by stormwater collected from the streets and recycled water collected from people's homes. Laneways have been planted with trees and the bitumen on roads, which now see much less car traffic as people cycle, take public transport or work from home, have been replaced by surfaces that let water absorb into the ground.

The need for greater self-reliance locally has developed Elwood's culture of sharing and enhanced its village atmosphere. Water is shared among neighbours. Fish and shellfish are handed out to residents from local operators to boost their protein intakes, perhaps because they value a thriving community, or perhaps because they understand that keeping the bay clean to sustain the local seafood industry is a collective effort. The steps taken to maintain a diverse and inclusive community have also helped guarantee ongoing quality of life in Elwood. This diversity is seen when the community regularly gathers around local water bodies to celebrate important occasions.

For people living in a Melbourne suburb further inland, the visit to Elwood beach is a wonderful and unique experience. Here, they may see dolphins for the first time, eat fresh local seafood in one of the specialty restaurants near the foreshore, and swim and play away the hot summers.

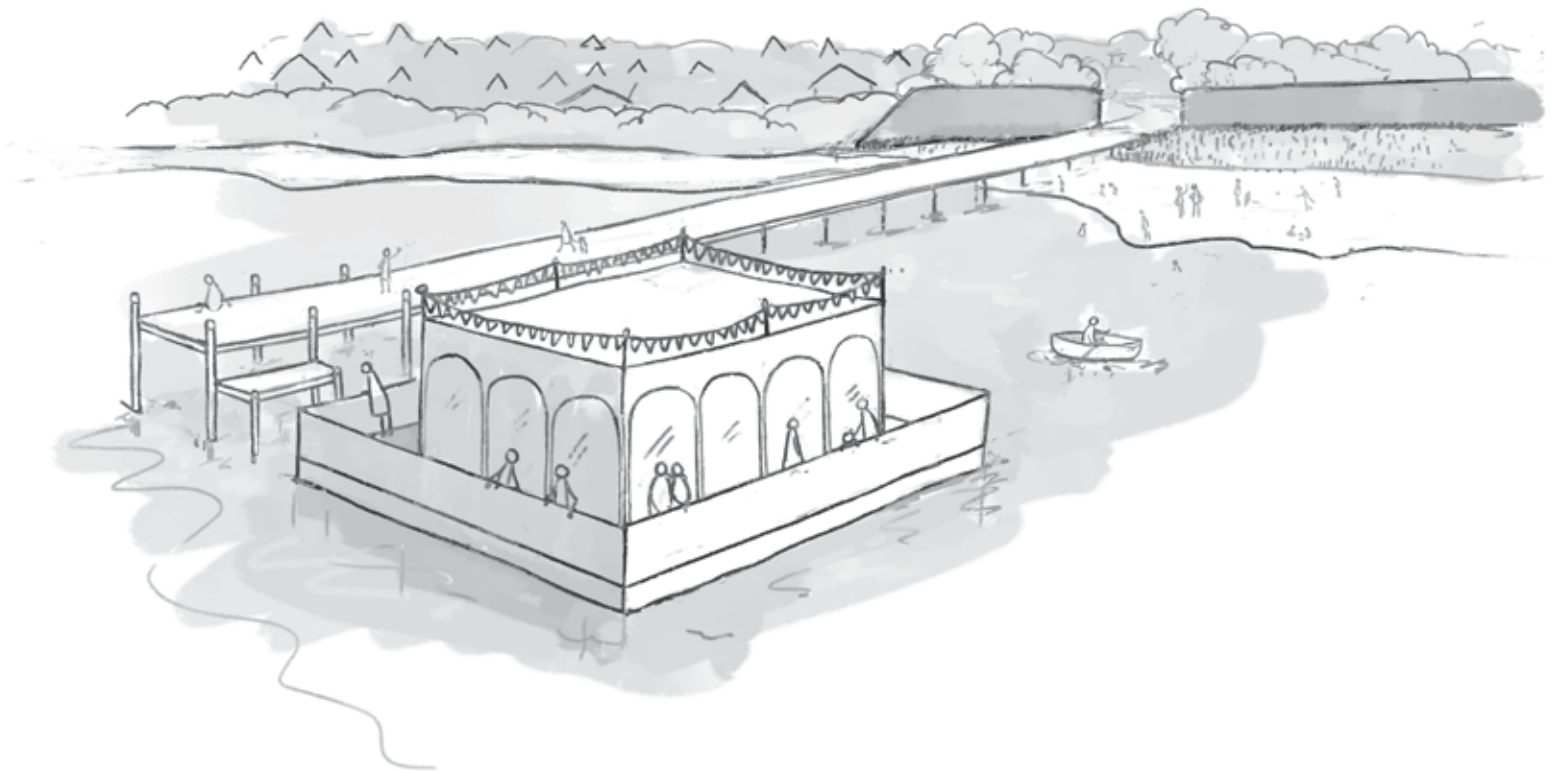
Elwood wins
annual clean
waterway awards

Catching garfish
for dinner –
BBQ direct
on beach!
(fresh herbs nearby)

Daily/weekly
fish handouts
for locals –
protein boost!

Grey water
for community
gardens

Elwood is a beautiful, playful and sharing place to live



2.3.2 Adapted to rising waters

It seems like decades ago that Elwood residents accepted that the swamp on which the suburb was built would not stay invisible when there was considerable rainfall on the catchment. As a result, they decided to abandon living in their ground floors to avoid the worst of the flood impacts. Where this was not possible, many people simply hastened what nature was doing anyway and demolished their houses altogether, replacing them with houses designed specifically to cope with flooding. These changes meant the local community came to accept that flooding would occur regularly but by adapting their built environment they could minimise the impacts on their daily life.

These adaptations led to Elwood becoming renowned throughout Australia as the “Venice of Melbourne”, a must-see attraction for any who visit Melbourne. The community was involved in planning where to extend the Elwood Canal and where floodwaters would be directed to flow. This didn’t greatly affect the area available for housing, however, with people deciding to live in homes that were adapted to cope when flooding occurs, for example by floating or being raised on stilts. This type of living was not for everyone. Some former residents felt compelled to relocate to suburbs on higher ground, but the Elwood residents that remained had good reason to stay and embrace the water-abundant environment. Some simply enjoyed living by the water, others liked the open space

that Elwood now offered due to its frequent inundation from tides or rain. Still others were happy to live with the risk of floods, preferring to rely on the sophisticated warning systems and range of local flood barriers than compete for the increasingly cramped and dense properties in other suburbs inland.

Of course, the adaptation was not easy. Building costs increased, partly because of the engineering required to manage floodwaters, but also because of the innovations required for accessibility. Elwood homes were frequently isolated from central infrastructure due to storms so they needed to be largely self-sufficient. This meant reliance on power generation and water supply from people’s homes or local areas. Also, with streets and parking spaces so frequently flooded, the expense of maintaining private cars was seen as too much trouble so public transport and cycling options became prevalent.

The community that embraced Elwood’s flooding environment is a strong one, brought together by a need to collectively prepare for and manage flood events. As everyone in Elwood knows, it’s important to look after the elderly, kids and the sick. Elwood attracted new migrants because space, though marginal, was considerably cheaper than alternatives so near to Melbourne’s Central Business District. These features helped underpin a culture of creativity, openness and generosity.

Streets
become
orchards

No more
ground
floors

- Elwood school boat
- Ferries
- More bikes
- Pulley systems for lifting material up above flood level
- Canoes for all

Each home is self-sufficient in energy, water capture, and recycling – closed systems

“In an emergency the most important thing is to know people... that valuing of cooperation and networks is really really important.”

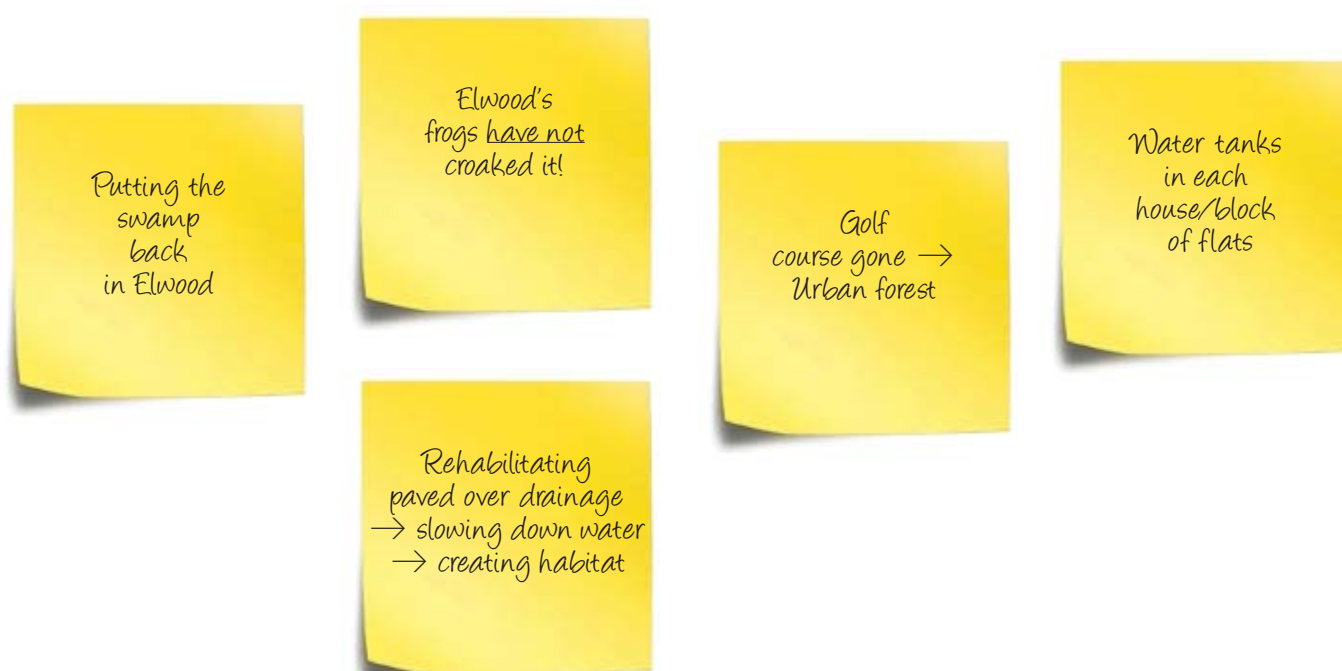
***Elwood is prepared for rising sea levels and
flooding from rainfall***



2.3.3 Rich habitats and thriving biodiversity

Elwood has recently reconnected with the rich biodiversity the site claimed prior to European settlement and was almost wiped out in the early decades of the 21st century. Features of this relatively short period of European dominance – like plane trees and the golf course – have been replaced by plants and animals that are native to the area. Species that were almost extinct found a home in Elwood’s abundant green space and healthy waterways. In this, the community drew from centuries of indigenous wisdom about the local area. The reemergence of nature has been wonderful for bringing the community together.

This increase in biodiversity has been helped by water management approaches that centre on community and ecology. Rainwater that falls on Elwood, whether private property or public land, is collected, filtered and used locally. There’s no more concrete in the canal and in laneways. The flow in the canal reflects natural patterns to support a healthy water environment. Flows are still intermittent but a range of natural and constructed features, such as a series of wetlands along the canal, backyard raingardens and massive underground tanks, stop stormwater rushing down the canal and causing damage to the ecosystems. As a result, the water in Elster creek and Port Phillip Bay is clean and healthy, providing a fertile home for frogs, shore birds and shellfish on offshore reefs.



“I think the environment will have to sustain us better, in better ways, and sustain wildlife and just sort of be more green... So that means the introduction of more wetlands, or more filtering systems that’ll filter the drainage going out in to the bay, and provide more habitat for wildlife.”

Elwood hosts abundant and resilient biodiversity



2.3.4 An innovative green economy

New economic realities and a climate that is significantly more challenging for life in the suburbs have driven major innovation, nowhere more so than in Elwood. Innovation in the public sector has been matched by the private sector, most notably in the recent award of a Nobel Prize in Engineering to a graduate of the Elwood Primary School for revolutionising the way communities manage floods. Private sector innovation, like the world's first jellyfish processing plant, established here in Elwood, has brought jobs to the local area.

Public sector innovation is seen in the way that the Elwood community advocated for governments to provide incentives for introducing sustainable water and greening initiatives, such as green roofs and walls, water recycling and tree planting. Innovation did not stop at water management; Elwood led the way in recycling household goods and organics and in changing how land is used, like converting paved roads into spaces for modern water, energy and carbon sequestration facilities.

All this means that now Elwood need not worry about flood impacts in all but the most severe events, and at the same time, it's well positioned for the coming zero-carbon economy.

Elwood
a model
for us all

Water treatment
plant under the
laneway

Climate is hotter
and drier but
our water capture
means our trees
are thriving and
we are cool
in our forest

Body corporates
working together
with water

***Elwood has a culture of innovation in technology
and policy that drives a green economy***



Elwood thrives with new-found institutions and collaborative decision-making

2.3.5 The united people of Elster Creek

After Elwood's third major flood in a decade and minor flooding all along the creek, as well as regular closures of Elwood's famous beach due to dirty water after each summer storm, there was consensus throughout the catchment that the way water is managed needed to change.

As people living in Elwood and in upstream suburbs understood more about the Elster Creek catchment, they shifted their identity, language and priorities to reflect an awareness of the need to consider catchment-wide impacts of pollution and flooding. This led to changes in governance arrangements and regulations in response to the community's emerging cultural values. Citizens are now actively engaged in deliberative planning and decision-making processes for the local catchment. Now, decisions for the Elster Creek Region are made that prioritise the social and ecological needs of the catchment

as a whole, including the need for flood management and clean water in Elster Creek. This is because local, regional and state government responsibilities are effectively and efficiently allocated to get the most positive catchment-level outcomes and water policy generally.

All along the Creek residents are required to hold back stormwater and minimise hard surfaces on their properties. Ratepayers throughout the catchment share the burden of major schemes to slow down water, like at the former golf clubs on Warrigal Rd and at Elsternwick Park. The increase in residential density has not resulted in major water shortages and polluted run-off because innovative water solutions were adopted throughout the region: rainwater tanks feed household washing and toilets, and recycled water is used for gardens. Green walls and roofs are in use by high-density developments and businesses.

Natural
awareness of up/
downstream

Water is
central in decision
making

Boundaries and
identities change
together

Run off to be
utilised by
businesses

- Permeability to be
funded

- Moorabbin Airport
to have underground
catchment



Figure 4. Elwood Canal

3. Pathways, strategies and actions

3.1 Introduction

Discussions in Workshop 2 and 3 focused on identifying ideas and strategies for achieving the desired 2065 vision developed for Elwood.

This two-stage process first involved identifying spatial opportunities to translate the vision for Elwood to have expression in its built and natural environment (see Figures 5, 6, 8 and 9). Analysis of the identified opportunities after the workshop revealed eight pathways that would need to be collectively pursued to enable the transition to the desired vision for Elwood⁶:

1. Greening streets and lanes
2. Managing flood paths to maximise community benefit
3. Encouraging citizens to be informed, resilient and adaptive
4. Connecting citizens to place and to each other
5. Naturalising the canal
6. Protecting and embracing coastal life
7. Taking responsibility for environmental impacts from private property
8. Leading catchment-level deliberation and action

The second stage expanded on these eight pathways, identifying possible challenges for their implementation and developing specific social, political, economical or technical strategies in response. Discussions utilised a simplified backcasting technique (see Figure 11), in which the eight pathways provided a framework for participants to develop coherent strategies over the 50-year horizon. As Table 1 shows, each pathway has concrete links to one or more of the desired vision themes.

This chapter presents the results for each transition pathway, including the participants' perceptions of challenges and needs related to implementation, and the identified strategies and actions for achieving the pathway outcomes. Some actions can build on existing policy or activities; such opportunities have been identified by workshop participants and the research team, and are indicated in italics. For some actions, participants identified a specific location for trialling an initiative; these are also indicated in italics. A number of example case studies are also provided to show how some of the identified strategies and actions have been successfully implemented elsewhere.

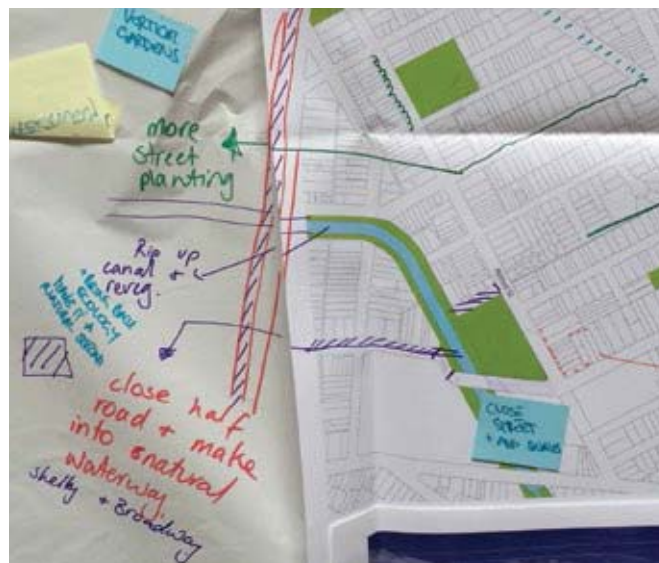


Figure 5. Ideas for street and canal treatment north of Glen Huntly Rd

⁶ Economic assessment would be an important part of developing implementation plans for each of these pathways but was not considered explicitly as part of this project as its focus was on envisioning.

Table 1. Links between desired vision themes and pathways⁷

Desired vision themes	Key concepts	Transition pathways
Celebration of water in the landscape	Protected foreshore; seawater pools; aquaculture; high water quality; community gardening; fewer cars; communal living; social diversity	2. Managing flood paths to maximise community benefit 5. Naturalising the canal 6. Protecting and embracing coastal life 7. Taking responsibility for environmental impacts from private property
Rich habitats and thriving biodiversity	Aboriginal knowledge; exotic trees replaced; high permeability; canal with wetlands; high water conservation and reuse	1. Greening streets and lanes 5. Naturalising the canal 6. Protecting and embracing coastal life 7. Taking responsibility for environmental impacts from private property
Adapted to rising waters	Flooding common; housing adapted by raising on stilts or floating; Elwood canal extended and overflow directed; community adapts and responds	2. Managing flood paths to maximise community benefit 3. Encouraging citizens to be informed, resilient and adaptive 4. Connecting citizens to place and to each other
An innovative green economy	Public-private innovation; socio-technical sustainability; incentives for green approaches; recycling & reuse practices commonplace; low carbon	1. Greening streets and lanes 3. Encouraging citizens to be informed, resilient and adaptive 7. Taking responsibility for environmental impacts from private property 8. Leading catchment-level deliberation and action
The united people of Elster Creek	Catchment-wide regulation and decision-making; water sensitive design and flood management approaches prioritised	4. Connecting citizens to place and to each other 8. Leading catchment-level deliberation and action

⁷ The undesired vision was not considered explicitly in this phase of the process focused on strategy development. Instead it provided a backdrop to set the context and rationale for why it was important to identify pathways for transitioning towards the desired vision

3.2 Greening streets & lanes

Perceived challenges and needs

- Elwood households are reliant on car use and access to car parking close to where they live.
- There is a need to provide better transport alternatives before Elwood residents will reduce their dependence on private cars.
- Action to reduce car access on specific streets and lanes will require a detailed traffic study.
- The benefits of increased vegetation and permeability on road land need to be communicated to the general population.
- Existing soil contamination on road land will need to be investigated.
- Increased roadside vegetation or vegetation corridors replacing lanes will impose a greater maintenance burden, possibly on Council.
- Regulatory barriers will need to be overcome to allow closing of lanes and streets to traffic entirely.
- Specialist landscape studies will be needed to select the most appropriate species for planting.
- Existing services and utilities, e.g. power, telecommunications, and sewer, will need to be integrated into revegetation options.
- Community responsibilities for managing increased roadside vegetation or vegetated lanes will need to be clarified.

Strategies to encourage car sharing → driverless cars

Water is prioritised in all planning and building processes

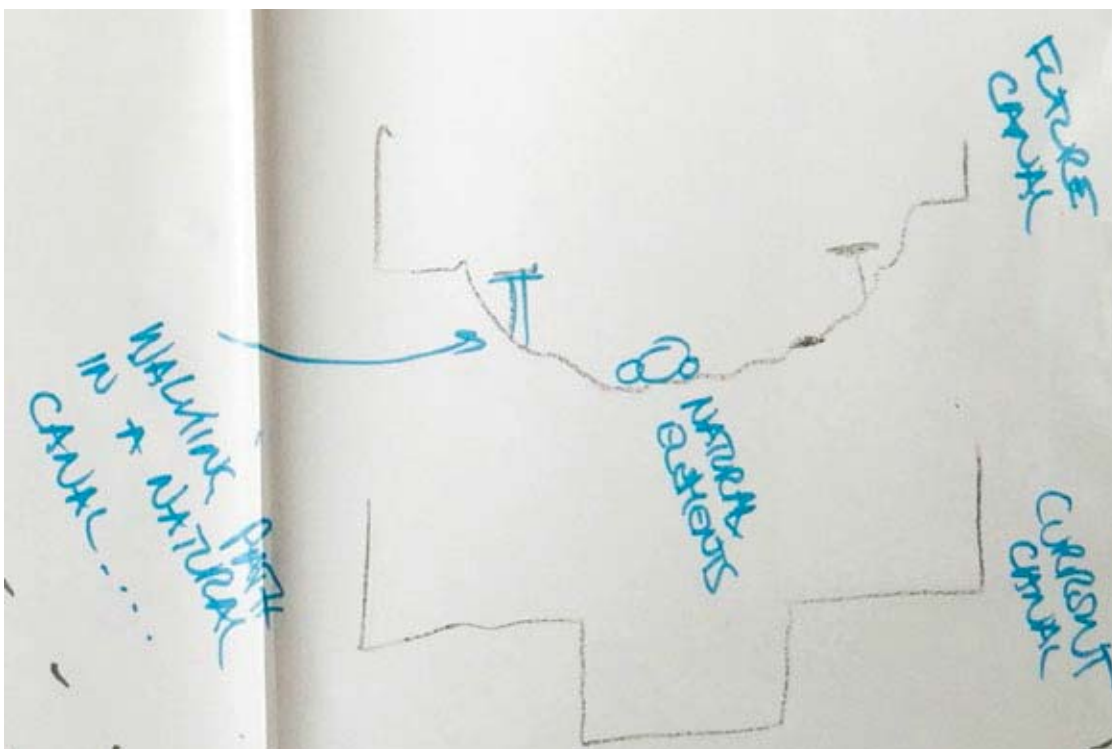


Figure 6. Ideas for naturalising the Elwood Canal (cross-section)



Strategies	Actions
a) Undertake integrated planning and management of urban services, including building, transport, energy and water	i) Reduce the reliance of Elwood residents and visitors on private cars. ii) Explore congestion charges or other additional taxes on car use. iii) Make car sharing more appealing and accessible. iv) Increase and improve bus services to connect to tram and train network. v) Audit Elwood for opportunities for greening streets and lanes <i>Elwood was identified in Greening Port Phillip 2010 as having the most vacant tree planting sites on streets of any suburb in the municipality. Consider progressively installing water sensitive bioretention systems on these sites.</i> vi) Undertake a traffic & transport study. vii) Trial road closures before investing in revegetation. <i>Participants suggested Ormond Rd, Shelley St, Broadway</i>
b) Ensure the best technical advice and science to available to support policy development	i) Undertake technical risk assessments on flooding and soil contamination. <i>Council tests for soil contamination at community garden sites. Before a soil contamination risk assessment is undertaken for Elwood, a guide for property-owners could be made available to help them understand potential risk.</i>
c) Prioritise water in all planning and building processes	i) Review planning schemes to ensure they support best practice water sensitive design principles. ii) Expand street planting and replace Plane trees with drought-tolerant natives. <i>This can be part of the natural replacement cycle. The current policy is to maximise canopy cover.</i>
d) Increase community education at all levels	i) Ensure water organisations work directly with communities. ii) Encourage use of nature strips for gardens and fruit trees <i>Many councils, including City of Port Phillip, have published guidelines for planting on nature strips. Edible planting (e.g. vegetables) should first consider the risk of soil contamination</i>

Case study example: Vancouver's leading-edge approach to greening



Figure 7. Green lane in Vancouver (Ben Nelms)

In the early 2000s, the City of Vancouver, Canada, implemented a program, 'Green Streets', that engages local residents in urban gardening on roadside vegetation (City of Vancouver, 2015). The municipality funds the plantings, provides compost, regular plant giveaways, and training, and volunteers register to provide ongoing maintenance. Signage within street gardens indicates whether the garden is available for volunteers to tend. In addition to contributing to permeable surfaces, the program helps volunteer gardeners to gain a greater sense of community and encourages a sense of ownership and pride in a neighbourhood's public space.

As of August this year, the program has expanded to over 625 sponsored gardens on streets across the city, tended to by over 600 volunteer gardeners. There are about 280 gardens available for sponsorship.

Also in Vancouver, the 'Country Lanes' program retrofitted alleyways by removing impermeable surfaces and installing low-maintenance vegetation that can support vehicles (Hutchinson, 2013). The experimental initiative, which commenced in 2003, installed rigid plastic honeycomb cells in which grass was planted. Driving areas were reinforced with concrete strips and permeable brick pavers.

The grassed areas are cooler in summer, and are well-supported by neighbours that back onto the lanes. They have also increased nearby property values. The cost of the program was evaluated to be only \$5,000 per affected property owner, spread over 10 to 15 years of rates payments.

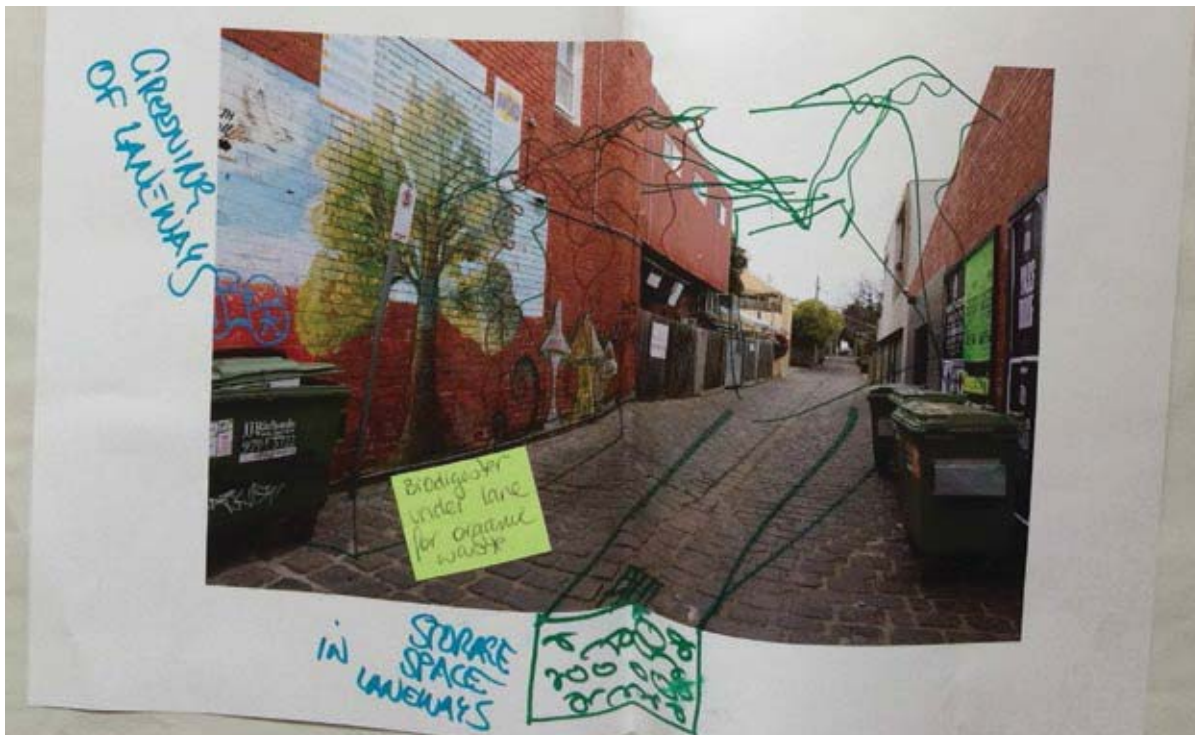


Figure 8. Ideas for greening Elwood's laneways



Figure 9. Ideas for treating the outlet of the Elwood Canal and Elwood Foreshore

3.3 Managing flood paths

Perceived challenges and needs

- The balance between the values of heritage – e.g. the bluestone lanes – and sustainability is complex.
- The cost and effectiveness of new technology porous asphalt road surfacing needs to be investigated for Elwood.
- The costs of doing nothing need to be weighed carefully with the proposed costs of flood mitigation works using the road system.
- The nature of flooding – its lack of predictability and irregular recurrence – hinders community acceptance for major physical changes
- Non-resident property owners (i.e. property investors) do not currently have the incentives to take account of long-term risks to liveability.
- The system (high-level regulatory, political, economic dimensions) does not currently support efforts to transform places at the scale of Elwood to deal with long-term risks to liveability.

Repair blue stone
laneways to retain
permeability

Trial areas
for demonstration

Utilise centre
strip of Broadway
for flood
management

Strategies	Actions
a) Exploit opportunities to harvest stormwater for reuse	i) Ensure urban renewal projects adopt leading-edge sustainable water management practices. <i>Gaining compliance of all developments with Clause 56.07 - Integrated Water Management - in Planning Schemes would also be beneficial.</i> ii) Use pilot projects to demonstrate costs and benefits, making the return on investment period for water sensitive projects transparent to potential adopters. iii) Use the Elsternwick Park project as a model water sensitive design project.
b) Increase stormwater storage capacity in Elwood	i) Investigate storage potential of broad streets. <i>Participants suggested Broadway.</i> ii) Retrofit laneways with permeable paving and bioretention. <i>Participants suggested beginning with laneways that do not have vehicle access. As laneways do not have services near the surface, they offer more flexibility for lowering or increasing permeability, e.g. removing every other paver.</i> iii) Increase the capacity of Elwood Canal, particularly near its mouth, and expand the permeable green space buffer area. <i>Participants suggested raising the banks of the canal in its lower course.</i>
c) Adopt a whole-of-catchment approach to flood management centred on continuous and responsive planning and investment	i) Pursue a formal coalition of councils around the Elster Creek catchment. <i>Build on shared community values of protecting and enhancing environmental health, much as the Association of Bayside Municipalities has done with respect to the bay.</i> ii) Achieve gradual transition in accordance with existing maintenance cycles.

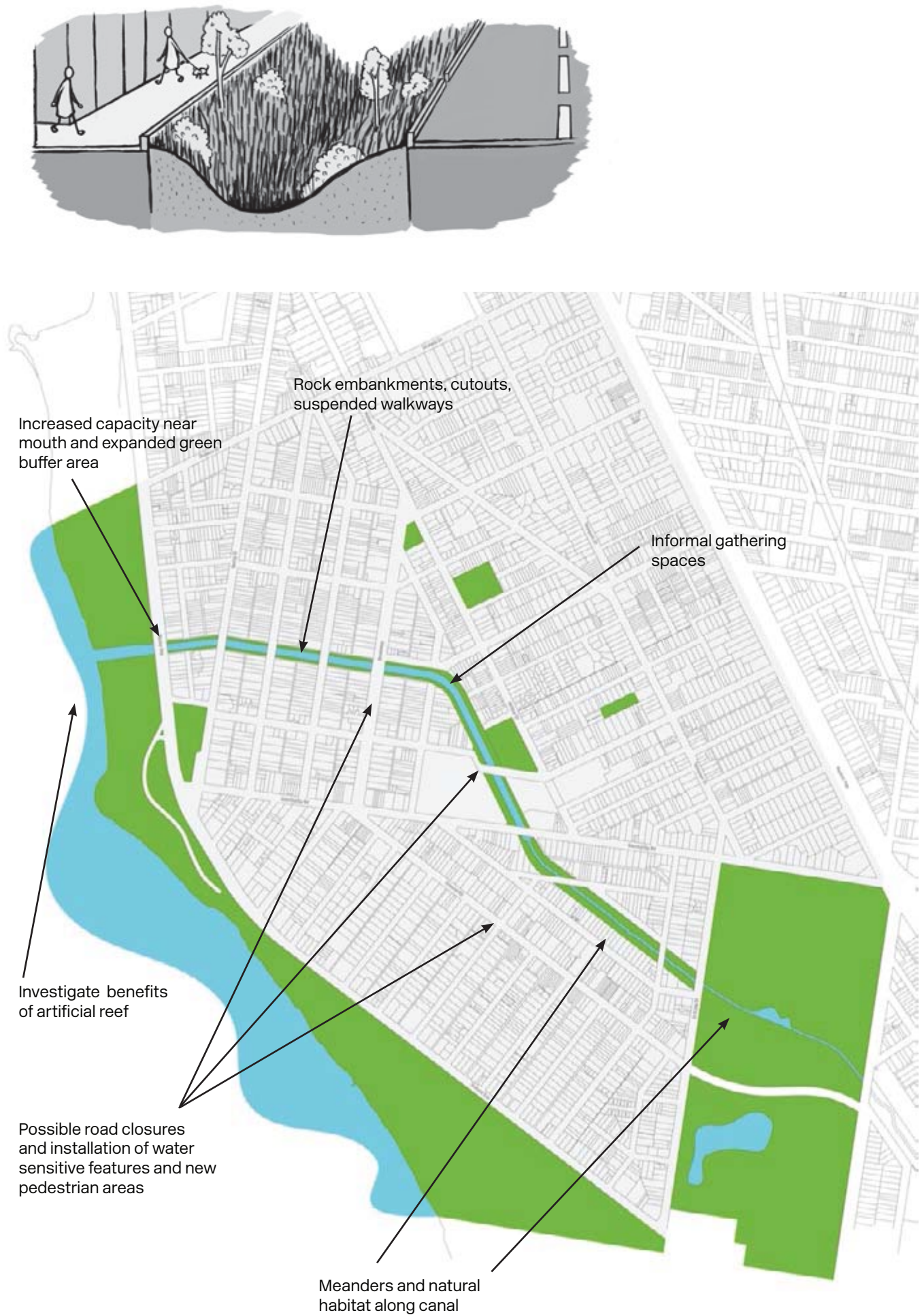


Figure 10. Spatial solutions identified by workshop participants

3.4 Encouraging informed, resilient and adaptive citizens

Perceived challenges and needs

- There is a lack of political leadership and collaboration between organisations and tiers of government.
- There is a general detachment of a majority of the community from their governments and decision-making around core public services like water.
- Community resilience and adaptation is hindered by the current management arrangements for owners corporations; there is also a disparity between the long-term outlooks of owner-occupiers and renters.
- As Elwood is only a minor proportion of the catchment by population and area, it needs to engage with the majority who reside in other council areas to solve Elwood's flooding problems.
- There is a lack of open and accessible information about current and forecast future risks facing Elwood residents.
- Teaching children new sustainable practices and behaviours has a limited impact in Elwood because of the high turnover in that demographic; new strategies to engage long-term residents, particularly in the older demographics, are vital.
- Adaptations to the built form need to accommodate the access needs of all community members

Foster innovation through demonstration projects e.g. floating house community centre

Workshops with existing community groups and institutions to develop information sharing strategies → Who does what, where, how do I engage?

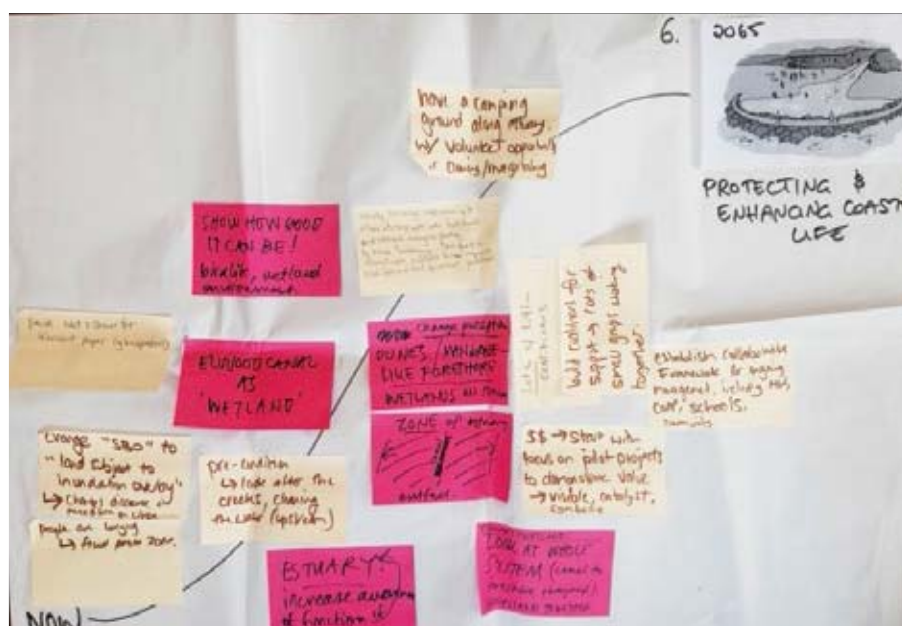


Figure 11. Backcasting strategies for protecting and enhancing coastal life.



Strategies	Actions
a) Adopt an integrated approach to enhancing community resilience involving community groups, all levels of government and other stakeholders	<ul style="list-style-type: none"> i) Raise community awareness for sustainable practices through communication channels as well as service delivery. ii) Increase the availability of community spaces, such as work sheds. iii) Commit to a long-term education program with community groups & institutions to develop information sharing strategies. iv) Promote food exchange, e.g. www.localharvest.org.au. v) Encourage community gardens and public orchards. <p><i>Elsternwick Park could support a community garden. Bayside City Council, although it has a Community Garden Policy, does not appear to have any community gardens at this stage.</i></p>
b) Increase transparency around the costs of unsustainable practices	<ul style="list-style-type: none"> i) Raise awareness for environmental risk and the long-term costs of risk management, e.g. flood insurance cost. ii) Paint the Special Building Overlay for the extent of 100 year floods on the streets to make the risk more transparent and noticeable.
c) Encourage direct involvement by community groups and developers in environmental works	<ul style="list-style-type: none"> i) Investigate better uses of the public realm, e.g. nature strips. <p><i>Refer to the Nature Strip Guidelines, Updated 2013 (City of Port Phillip).</i></p> <ul style="list-style-type: none"> ii) Foster local innovation through demonstration projects, e.g. at the Ecocentre, a standalone floating community centre, or permeable asphalt. iii) Promote innovation from street-based grassroots action to test ideas such as partial street closures (e.g. pop-up parklets).
d) Create developer incentives for water sensitive developments	<ul style="list-style-type: none"> i) Impose a stormwater charge throughout the catchment, and restrict expenditure of this revenue to priority flood management initiatives. ii) Engage owners corporations and property management companies. iii) Facilitate rainwater harvesting, water recycling and renewable electricity generation in heritage areas. iv) Support a demonstration amphibious / floating home near the Canal.



3.5 Connecting citizens to place and to each other

Perceived challenges and needs

- The meaning of community is diverse and subjective, so efforts to strengthen social and place-based connections must recognise this.
- Elwood residents are at risk of developing an insular worldview, with a narrow range of social connections.
- Incremental, holistic change is necessary, with action at the grass-roots level meeting changes from the top-down.
- Uniting a heterogeneous and post-modern community around any core values is difficult.



Strategies	Actions
a) Develop a community-driven long-term strategy for Elwood with broad authority over planning and service delivery	i) Engage youth in long-term strategic planning. ii) Implement mechanisms to create local democratic accountability associated with strategy development and implementation. <i>Some council functions or powers can be delegated to special committees comprising citizens, councillors or council staff. Special committees are typically place-based with key stakeholders represented, e.g. South Melbourne Market.</i>
b) Promote place-based connection	i) Create small-scale points of interest that encourage lingering. ii) Adopt planning rules for lower maximum fence heights. iii) Promote regular informal and formal gatherings such as community festivals, picnics, and history tours. <i>Participants suggested making use of possible vehicle free space on Ormond Rd, Broadway and Shelley St.</i> <i>Participants suggested creating new gathering places along canal.</i> iv) Encourage car sharing and communal car parking locations by relaxing planning requirements for car parking. v) Name lanes after famous waterways to raise awareness of water in the landscape. vi) Expand the "neighbourhood watch" concept to include environmental watch to monitor pollution and the quality of open public space.
c) Raise awareness for Indigenous stories	i) Implement an Indigenous art project. ii) Develop and promote a "catchment story" including local history and culture to be distributed through smartphone apps. iii) Hold regular "Catchment Connect" events.
d) Restrict traffic in Elwood village	i) Make Elwood village car free.

"Being near the beach is the thing that will always be attractive, no matter what happens."



3.6 Naturalising the canal

Perceived challenges and needs

- There is a lack of effective collaboration between organisations and tiers of government.
- In general there is a lack of openness to considering innovative solutions for the canal.
- The current management regime for the canal is a barrier to creating a sense of ownership and value in it among community members.
- There is a lack of transparency to its current management.
- Current strategic decision-making is oriented around election cycles, which does not support complex, long-term problem-solving.
- Consultation around decision-making is not generally fully integrated into the process and needs to be considered holistically.
- Engineering solutions are not clear.

Build alliance with neighbouring councils in order to be opportunistic, e.g. Bayside Elsternwick Park

Identify local areas suitable for naturalising the canal

Strategies	Actions
a) Leverage community will to improve the Elster Creek / Elwood Canal environment	i) Establish a periodic water/canal festival to share with the wider catchment community. ii) Foster stronger collaboration between community groups to strengthen collective action. iii) Promote naturalisation initiatives in conjunction with the schools that abut the canal to integrate with education programs. iv) Provide access for people with disabilities and the elderly.
b) Pursue integrated urban planning and management around the canal	i) Establish a broad consensus vision for canal transformation. ii) Prepare a study of the canal to identify suitable options for naturalisation. <i>Participants suggested naturalising the canal from Brighton Road, Gardenvale to Elsternwick Park and installing meanders and more native habitat between Elsternwick Park and Glen Huntly Rd.</i> <i>Ideas for the canal from Marine Parade to Glen Huntly Rd included rock embankments, cutouts and suspended walkways.</i> iii) Investigate appropriate regulatory levers to meet targets and manage accountability. iii) Investigate long-term costs, including the costs of inaction, in a holistic way. iv) Manage creek clean-up operations in an integrated way.
c) Learn from successful cases to benefit Elwood	i) Look to other examples of community-driven wetlands restoration. <i>Participants suggested learning from the Friends of Westgate Park efforts to restore locally native vegetation.</i> ii) Learn from Indigenous people about environmental management. iii) Learn about what existing community groups have achieved.

3.7 Protecting and enhancing coastal life

Perceived challenges and needs

- There is no clear source of funding for what could be major infrastructure works in the Bay
- There is a lack of effective collaboration between organisations and tiers of government.
- The community, and business community in particular, has no obvious 'buy-in' on an issue of this type.
- There are technical uncertainties about what ecological flows entail.
- Giving a "voice" to all community members in planning is essential.
- There is a lack of clarity around ongoing maintenance and management responsibilities.

*Estuary / wetland:
look at whole system
(canal to foreshore and
beyond), understand
together*

*Actively encourage celebration
of release of stored water onto
foreshore and extensive mangrove
planting by tribal thanksgiving
- take your pick: released water,
gratitude for mangroves, tribal
fires and torch processions,
performances*

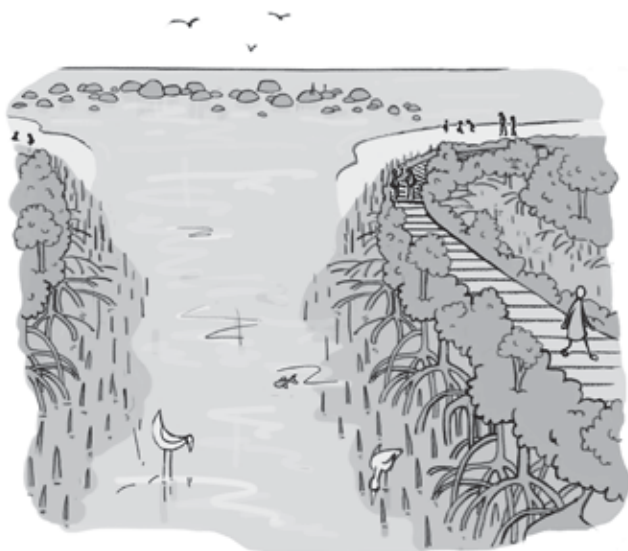
Case study example: Community-driven Regeneration at Westgate Park

The area where Westgate Park is now located was originally a saltmarsh that was part of the mouths of the Yarra and Maribyrnong Rivers. Substantial transformations of the site during the 20th century included sand mining, use as a rubbish tip, and construction of aviation factories and an airfield (Friends of Westgate Park, 2015). The park was developed in 1984, but with vegetation that was not native to the region.

Friends of Westgate Park, in collaboration with Parks Victoria, revegetated the park with plants that would have been found in the area prior to European colonisation. The project has received funding from Landcare Australia, Greening Australia, Conservation Volunteers Australia, Parks Victoria, and the Federal Government. The project won the 2010 National Urban Landcare Award. Westgate Park has benefited from the input of large numbers of regular volunteer days, including contributions by corporate partners.

Ecological Vegetation Classes represented by the more than 300 plant species that can be found in the park include, Coast Banksia Woodland, Grassy Wetlands, Saltmarsh, and Swamp Heath.

Westgate Park receives stormwater run-off into the freshwater lakes from the Herald & Weekly Times building and Wharf Road to the north of the park. It is also the site of the major sewer trunk line that runs from Melbourne to the Western Treatment Plant, just before it drops under the Yarra River.



Strategies	Actions
a) Manage Elwood Canal and its mouth as an integrated estuary and wetland	<p>i) Establish a community coalition for planning and management, including Melbourne Water, City of Port Phillip, South East Water, schools, and the wider community.</p> <p><i>An example of a recent initiative is A Cleaner Yarra River and Port Phillip Bay – A Plan of Action produced by the Victorian Government in late 2012.</i></p> <p>ii) Protect coastal zone with marine reserve.</p> <p>iii) Investigate options to mitigate storm surges, e.g. artificial reef.</p> <p><i>Part of the CRCWSC research program involves supporting decision-making around these technical flood resilience adaptations.</i></p> <p>iv) Change flooding overlay to the Land Subject to Inundation Overlay to better reflect people's perceptions and expectations around risk.</p> <p><i>Convention rather than planning rules appear to influence the application of the SBO in open drainage systems in the Melbourne metropolitan area.</i></p> <p>v) Impose mechanisms to ensure better stormwater treatment upstream to improve water quality in the estuary and bay.</p> <p>vi) Implement revegetation consistent with 1750 habitat, or investigate suitability of mangrove habitat.</p> <p><i>Participants suggested focusing on the mouth of Elwood Canal.</i></p> <p>vii) Divert floodwater onto foreshore reserve to manage bay water quality.</p> <p>viii) Replace beach sand with pebbles.</p>
b) Showcase the value of the mouth of Elster Creek as an estuary	<p>i) Celebrate the release of floodwater onto foreshore (and extensive mangrove planting) inspired by Indigenous ceremony.</p> <p>ii) Provide toilet and shower facilities for transient people (e.g. backpackers).</p> <p>iii) Establish a campground along estuary with volunteer opportunities for cleaning and the maintenance of vegetation.</p>

“Last year we had our first coastal flood where a high tide and 100 km per hour wind meant water came up the stormwater drain and spilled out.”

“Fortunately, the night of that [2011] flood.... If there had been a high tide with the amount of water coming from the catchment, you would get an enormous amount of water happening very fast.”

3.8 Taking responsibility for environmental impacts from private property

Perceived challenges and needs

- There is need to consider lifecycle costs rather than short-term costs and benefits.
- Incentives can lose effectiveness because of a lack of awareness or because householders are time poor.
- There is a lack of effective policy coordination between organisations and tiers of government.
- Planning and regulations are siloed and not uniform across the catchment.
- There is a lack of political leadership at the catchment level.
- There is currently a disconnect between private benefits and public costs.
- Private property owners currently have insufficient institutional incentives to take responsibility for impacts on other properties, and in particular the public realm.

Regulate for new properties and renovations to immediately have rainwater tanks and 40% permeable surfaces

Establish minimum water credits for each household / entity



Figure 12. Discussion during Workshop 1



Strategies	Actions
a) Align bottom-up and top-down strategies across the catchment for a more sustainable private sector	i) Create a body to coordinate at the catchment level and establish uniform water management regulation and other governance mechanisms to achieve integration.
b) Raise awareness about flood risk and each household's capacity to change to build social capital for alternative solutions	<p>i) Hold community events and markets. <i>Begin by integrating with existing events such as the Elwood Community Market.</i></p> <p>ii) Integrate water sensitive cities into school curricula. <i>AusVELS curriculum planning allows individual schools to incorporate stormwater concepts into science understanding and inquiry skills, e.g. concept of systems. Melbourne Water also provides education units.</i></p> <p>iii) Pilot integrated water solutions in model developments or neighbourhoods to demonstrate simple implementation options. <i>There are a range of support tools available, see Clearwater (supported by Melbourne Water) and MUSIC/Urban Developer, for example. The CRCWSC is also working towards developing a range of decision-support modelling tools.</i></p> <p>iv) Create a local knowledge base of exemplary projects and local suppliers to promote learning and uptake.</p>
c) Reform planning provisions and other catchment regulations to mandate sustainable practices	<p>i) Mandate all new developments and renovations in the catchment to have rainwater harvesting tanks and minimum 40% permeable surfaces.</p> <p>ii) Establish stormwater credits for each household or commercial premises to create incentives for water sensitive behaviour.</p> <p>iii) Build water sensitive design practices into owners corporation governance.</p> <p>iv) Encourage green roofs and walls with built-in water treatment for homes.</p> <p>v) Encourage green walls with built-in water treatment for businesses.</p>

3.9 Catchment-level deliberation and action

Perceived challenges and needs

- The complexity and systemic nature of the problem means that multiple solutions are needed (there is no single solution).
- There are not many sites where large-scale development can take place in the catchment due to the lack of available land.
- Funding, incentives to act and technological solutions are intertwined.
- There is a prevalence of short-term thinking and the willingness to plan and take action is strongly dependent on the time since the last flood.
- There is a reluctance to initiate major change.

Supporting current achievements of councils and translate that to other councils
→ take lessons learned and use in other councils' context

Upskill and train engineers in partnership with councils to adopt alternative solutions for water treatment

"You instantly go, 'Elwood flooding!' The problem is, even if everyone in Elwood did the right thing, that wouldn't solve it, because the water's coming from outside Elwood as well."

"Everyone has to do something, and lots of things in small ways and a few things in larger ways is going to get real results"



Strategies	Actions
a) Foster cross-jurisdictional and multi-institutional collaboration	<p>i) With State Government support, create a collaboration unit within the City of Port Philip to work with Melbourne Water, South East Water, other councils and local stakeholders.</p> <p>Agencies could promote 'boundary spanning' skills in infrastructure roles, e.g. diplomacy, networking, and persuasion</p> <p>ii) Develop an online tool for community to voice and express their issues.</p> <p>iii) Emphasise local achievements in water sensitive design and support the transfer to other jurisdictions and policy contexts.</p> <p>iv) Upskill and train engineers in partnership with councils to adopt alternative solutions for water treatment.</p> <p><i>There are providers that offer such training, including Clearwater, Water By Design, and the CRCWSC. The CRCWSC and the Monash Water for Liveability Centre run a 7-week Massive Open Online Course (MOOC).</i></p> <p>v) Facilitate co-design initiatives between engineers and the community on projects.</p> <p>vi) Develop a learning culture that accepts the risk of failure.</p> <p>vii) Review flood information and overlays across the catchment.</p>
b) Share the responsibility for managing flood risk and mitigating action across the catchment	<p>i) Create incentives for exceeding the standard for permeable spaces on private land.</p> <p>ii) Undertake research on suitable permeable surfaces for the Elster Creek catchment.</p> <p>iii) Identify new opportunities for surface water storage in moderate floods, particularly on sports grounds higher in the catchment.</p> <p>Build on secondary benefits, such as mitigating urban heat, capturing water for reuse in droughts, and treating stormwater pollutants.</p> <p>iv) Align planning mechanisms across the catchment, and pursue spatially integrated decision-making.</p> <p>v) Develop a catchment-wide education program on flood overlays.</p>
c) Create a more transparent market for vulnerable properties to raise flood awareness	<p>i) Provide detailed, accessible information on properties for sales purposes.</p> <p>ii) Investigate a long-term buy-back scheme for the most vulnerable properties.</p>

Case study example: The Cooks River Alliance



Figure 13. Cup and Saucer Creek junction with Cooks River before (left) and after (right) wetland development (Sydney Water)

Cooks River is located in the inner South West of Sydney. It runs through some of the most heavily urbanised and industrialised areas in Australia. As a result, it was one of the most polluted rivers in Australia. State and local government efforts to revitalise the river began as far back as the early 1990s, and multi-stakeholder collaborative planning started to take shape by the late 1990s (Cooks River Alliance, 2014). However, the injection of substantial NSW State Government funding in 2007 provided a significant boost to catchment cooperation and improved catchment health (Bos, Brown & Farrelly, 2013).

The OurRiver – Cooks River Sustainability Initiative was launched in 2007 to bring together eight local governments in the catchment along with community groups and residents. The outcomes of this Initiative were six sub-catchment community visions and water management plans endorsed by the municipalities, and site-specific water-sensitive infrastructures to treat stormwater, including near the junction of Cup and Saucer Creek and Cooks River shown above before (left) and after (right) the works. The OurRiver Initiative was replaced by the Cooks River Alliance in 2011, a new approach to governance of the catchment primarily resourced by the member councils.

The sub-catchment plans were critical to the success of the Initiative. They involved a multi-disciplinary, multi-stakeholder approach that was sensitive to local context and the need for adaptability. The approach explicitly aimed to encourage council staff and catchment stakeholders to recognise the perspectives of other groups, and prompted interaction between different stakeholder groups at the local and catchment level. For example, various committees were established with diverse and multi-council representation to maximise sharing of knowledge and experience.

Some of the lessons from Cooks River are the importance of clear goals that are broadly shared by the stakeholders, and the importance of building legitimacy for catchment and sub-catchment governance. For Cooks River, this legitimacy was acquired through more than a decade of steady alliance-building, as well as endorsement by the State Government with the major funding. For collaboration to work long-term, the relationships also need to be formalised, for example with financial commitment from members.

4. Discussion and conclusion

This chapter provides a reflection on the research, offering insights on the value of community transition planning and the process implemented in the project, as well as a series of specific policy recommendations and an outline of next steps.

4.1 Insights for policy and practice

Water industry practitioners and policy-makers around the world are confronting the challenge of providing sustainable, liveable and resilient urban environments in the face of climatic and urbanisation challenges and many future uncertainties. The concept of the water sensitive city embodies a range of technological, design and governance approaches that together respond to these challenges, providing flexibility and adaptability for water systems. Many of the changes exemplified by the water sensitive city represent radical departures from the status quo.

Transitions processes are designed to challenge the prevailing assumptions underpinning systems and overcome the 'lock-in' associated with current conditions. In simple terms, it can do this by making space for innovation and changing the external social or political landscape in which the system operates. Ideally, both of these forces will work in concert to exert pressure for transitional change.

This project aimed to trial an engagement process focused on envisioning and transition planning with community members to test the value and effectiveness of such processes. The results suggest that a key benefit lies with dedicated community members driving local innovation. The participants' vision and strategies emphasised the gaps to existing practice and inspired the identification of radical changes to Elwood's built and natural environment. It also brought to light priority actions the participants considered valuable for catalysing transitional change.

The results suggest that a key benefit lies with dedicated community members driving local innovation.

These ideas may challenge preconceptions about the community's appetite for change in urban water management. In particular, the participants' vision for Elwood in 2065 reflected the principles and benefits of a water sensitive city and their ideas and solutions

demonstrated an enthusiasm for alternative approaches to managing water and the urban environment. For example, participants embraced the concept of integrated water systems, major transformations to the function of streets and other shared spaces, and the reshaping of the historic beach and foreshore environment, to name a few of the proposed changes. Should these ideas gain wider public acceptance, planners, policy-makers and decision-makers may be more willing to innovate, given the community mandate to make them reality.

The participants' vision for Elwood in 2065 reflected the principles and benefits of a water sensitive city.

Community perspectives on change can be empowering for decision-makers, but this does not come without challenges. Community engagement at this scale has the potential to show the breadth of values and preferences intrinsic to a pluralistic society. Many local and regional decision-makers will have experience of the complex balance to be achieved across competing objectives that may be suggested through public engagement. This project also produced such tensions. For example, participants envisioned a future in which Elwood's introduced deciduous street trees were replaced with native vegetation that was drought tolerant, edible to reinforce Elwood's food security, and also maximised summer shade; objectives that may be competing when it comes to implementation. While this is a somewhat simplistic view of public participation – there are few decisions in the public sphere that don't involve complex trade-offs between different policy objectives – the transitions process used in this project can help clarify and articulate the community's diverse aspirations.

The transitions process used in this project can help clarify and articulate the community's diverse aspirations.

An important feature of the process for stimulating broader perspectives was setting discussions in a longer-term time frame. Encouraging participants to aim beyond contemporary policy concerns meant they were more inclined to express fundamental values of place. In this way, criticisms of organisational stakeholders uncovered during the pre-workshop interviews became a constructive force during envisioning, prompting a focus on shared interests and collective action. This factor also provided participants with a common language with which to discuss future place-based scenarios. Combined with the openness of the planning enquiry, this influence was important for uniting participants behind common goals.

A common language with which to discuss future place-based scenarios.

An open and exploratory transition planning process typically demands that participants engage with complex technical issues and ideally at a system-wide scale (e.g. Wiek & Iwaniec, 2014; van de Kerkhof & Wiecek, 2005). Thus, many transition processes have involved expert participants. However, it is important to broaden the scope of transition discussions because social sustainability is also a necessary design consideration alongside technical sustainability. This is in order to avoid scenarios that involve unrealistic expectations of behaviour and overly intrusive government intervention (Eames et al., 2013). Yet striking a balance between the need for social inclusivity and technical sustainability is not straightforward. One of the potential challenges when engaging with the community on water issues is the low level of water literacy in the general public, particularly on issues considered critical to the Elwood context such as stormwater management (as found in a national survey of Australians' water literacy undertaken in 2014, see Dean et al., 2015).

In this project, participants generally showed a stronger grasp of urban water management issues than would be expected in a representative community sample. For example, many participants recognised the link between integrated urban water systems and the values of greener, cooler and cleaner urban environments. The recruitment approaches and intensity of involvement invited through the workshop series meant that participants generally had a pre-existing interest in water, sustainability or neighbourhood issues. Despite this, the research approach emphasised empowerment through participant interaction and knowledge sharing, in line with findings

of other CRCWSC research projects⁸. It is suggested that for transition planning processes involving participants that are more generally representative of the community, greater use should be made of sophisticated interactivity, as well as sufficient time for participants to grasp all of the complex issues.

The research approach emphasised empowerment through participant interaction and knowledge sharing.

One of the key topics of discussion at the workshops was Elwood's location at the bottom of the catchment, with participants wanting to explore how governance reforms could improve outcomes for the suburb. The focus on governance has wider implications for transition planning processes such as this one. In Australia and internationally, many of the opportunities for innovative sustainable water management are found on greenfield sites, since emerging urban areas generally have no legacy infrastructure or institutions that present barriers to implementing radically different urban water management solutions. Achieving water sensitive cities in established areas is typically considered substantially more difficult. This project therefore offered insight into how radical urban retrofitting could be planned and coordinated, and highlighted the value of planning for such changes at the local scale. This emphasises the need to consider how this type of transition planning approach could be replicated and scaled up across a broader catchment or metropolitan region.

The conceptual and operational challenges associated with uncertainty and the timescale under consideration created a gap between short and medium-term action and the long-term vision. This gap may have been closed by developing a coherent transition narrative in which pathways feature contingent changes between the present and desired future states (for example by performing a detailed backcasting). However, this would have required a greater time commitment from participants than was feasible in this project. Researchers in other studies have overcome this issue by providing participants with modelled scenarios that can be explored in real-time. While that approach helps communicate the consequences of decisions, it can also oversimplify much of the complexity of real-world planning.

⁸ For example, CRCWSC Project A2.3 *Engaging communities with water sensitive cities*

Finally, we comment on the wider implications of this research. Elwood's challenges resonate with the challenges of most Australian communities. In fact, the need for more integrated and sustainable systems for providing essential services such as water, energy, transport, and waste treatment, as well as resilience to environment-related emergencies, is a global challenge. At the national level, for example, the Council of Australian Governments (COAG) has identified seven priority sectors for adaptation based on the economic, social and environmental magnitude of potential impacts from climate change. Four of these sectors correspond to challenges identified by project participants as facing Elwood (COAG, 2013):

- The availability and security of water resources
- The impacts of rising sea levels and increased storm surge on the coast
- The increase in the frequency and intensity of climate related natural disasters on emergency management resources.
- The impact of climate change such as increased temperatures on vulnerable communities such as the elderly and chronically ill.

Despite Elwood's water challenges being heavily dependent on larger systems and processes, the approach discussed in this report is important for supplementing state, national and international solutions. The Victorian Climate Change Adaptation Plan (Victorian Government, 2013) states that government planning and design responses should meet the needs of local communities. This Plan also argues "regional and local scale adaptation strategies are best developed and implemented by those with local knowledge" (p. 38). Envisioning the conditions of a future water sensitive city at the local scale, too, helps ground the framing of adaptation strategies in a sense of place.

Despite Elwood's challenges being heavily dependent on larger systems and processes, the approach discussed in this report is important for supplementing state, national and international solutions.

This research showed that with appropriate guidance, community stakeholders are capable of and engaged with problem-solving at multiple scales simultaneously. Participants in this research recognised the importance of personal and local community responsibility, and were able to identify uniquely local solutions to wider problems. At the same time, participants understood the integrated nature of catchment-scale processes and so foresaw the need for action in Elwood as well as other parts of the Elster Creek catchment. This was certainly the case when considering Elwood's vulnerability to flooding, as participants envisioned local communities throughout the catchment deliberating cooperatively and addressing risk as a single united catchment community. This research therefore supports efforts to engage local communities to develop, and potentially implement, local and regional strategies.

Community stakeholders are capable of and engaged with problem-solving at multiple scales simultaneously.

Finally, the project showed that participants valued the opportunity to engage in long-term planning discussions for Elwood and to contribute to the generation of ideas for supporting its transition to a water sensitive suburb. In particular, they expressed hope that this type of dialogue could continue such that they become active partners in shaping Elwood's future. This sentiment highlights that community engagement aiming to empower citizens and bring them along a journey of change is more likely to achieve water sensitive outcomes than engagement limited to consultation about short-term options analysis. The challenge for planners and decision-makers is to utilise methods that will meaningfully involve the community in transition planning while accommodating budgetary and other practical constraints. This points to a clear line of future research, focused on scaling up transition planning activities to support the community's influence in creating Australian water sensitive cities and towns.

Community engagement aiming to empower citizens and bring them along a journey of change is more likely to achieve water sensitive outcomes

4.2 Recommendations for Elwood and beyond

This report presents the water-related long-term aspirations, priorities and ideas of members of the Elwood community. As such it provides a valuable resource for planners, policy-makers and decision-makers in relation to the Elwood community's needs and preferences, and for community engagement in transition planning more generally.

For policy-makers in general, this research has shown there is significant value in involving the community in meaningful dialogue about the long-term future of their water and urban environments. As a result, we recommend that:

- Community members are considered active and potent stakeholders in driving water sensitive city transitions and engaged with accordingly.
- Communities are supported to create water sensitive city visions at the local or sub-catchment scale.
- The legitimacy of these processes is supported by linking local transition planning efforts across the catchment or region and by integrating outcomes into local and regional governance initiatives.
- A transitional change approach to community engagement is adopted, encouraging citizens to think systematically and examine integrated strategies for enabling transitions.

The vision and pathways developed in this project offer valuable insights for water policy development in relation to local scale initiatives and at government and agency levels in broader terms. The desired vision themes and eight pathways have relevance to many different suburbs and catchments, although some degree of contextualisation would always be needed.

In particular, however, we draw attention to the following opportunities raised by participants in this project for initiating the transition to a water sensitive Elwood:

Catchment-wide governance

- (1) Initiate a catchment-wide approach for managing water in the Elster Creek catchment, including innovations in governance to engage with communities and support collaborations across local Councils, Melbourne Water, South East Water and state Government agencies.
- (2) Develop a cross-organisational initiative to raise awareness of the catchment-wide benefits of on-site water sensitive urban design, and encouraging the retrofitting of properties to existing standards (i.e. Clause 55.07 of the Victoria Planning Provisions) that are generally only applied to new developments.

Community engagement

- (3) Initiate a community discussion across the Melbourne region about the need to adopt water sensitive practices in the existing residential and commercial building stock, canvassing options such as property charges or tiered utility charges.

Planning initiatives

- (4) Undertake a study of Elwood Canal to investigate options for more open space and flood retention, including the consideration of property acquisition.
- (5) Identify adaptation strategies for buildings affected by the Heritage Overlay.
- (6) Identify adaptation strategies for the school precinct along Elwood Canal, which might include integrated water management and hard and soft infrastructure to manage flooding risks.

Technical solutions

- (7) Determine the remaining operational lifespan of Elwood Canal's concrete channels between Glen Huntly Road and the mouth, and south east of Elsternwick Park to Brighton Road. Investigate replacement options, guided by principles of amenity, flood mitigation and habitat values.
- (8) Investigate floodwater flows on streets near Elwood Canal and evaluate options for using part of the road reserve for dedicated surface water conveyance.
- (9) Investigate options for the mouth of Elwood Canal that meet the objectives of integrating the Canal more effectively into the foreshore reserve, providing enhanced floodwater flow and protection from storm surges or high tides.

4.3 Where to from here?

The community participants maintained a strong commitment to the process throughout the project, and expressed motivation to continue working towards the visions and strategies developed for Elwood. They are therefore keen to seek opportunities that would build on the momentum and connections generated from this project to foster Elwood's water sensitive city transition, and in fact broaden stakeholder collaboration across the Elster Creek catchment.

The CRCWSC research program will continue to have a focus on Elwood for at least the short-term. The other intersecting projects are building on the community's vision and ideas to develop urban design, infrastructure and policy solutions for climate adaptation, supported by flood risk modelling to assess the performance of proposed adaptation strategies. It is anticipated that the integrated results from these projects will be showcased in a mid-2016 public exhibition.

Finally, the question of how to engage effectively with communities to inform transition planning and support the shift towards water sensitive cities is one that needs significant further investigation and will no doubt continue to attract the attention of researchers and practitioners.

Appendix A – About the CRC for Water Sensitive Cities

In recognition of the challenges facing urban growth and the importance of water to the liveability of Australia's cities and towns, the Australian Government and 85 research, local and state government, industry and community partner organisations fund the \$120 million Cooperative Research Centre for Water Sensitive Cities (CRCWSC). The CRCWSC was established in 2012 to address this national priority and change the way we build our cities by valuing the contribution water makes to economic growth and development, our quality of life and to the ecosystems of which cities are a part.

CRCWSC Project A4.2 *Mapping Water Sensitive City Scenarios* aims to develop innovative strategic planning processes and frameworks to address long-term sustainability and liveability challenges and accelerate the transition to water sensitive cities and towns in Australia. The research involves engaging communities of experts and residents in multiple case study locations to facilitate in-depth discussion and analysis about how the region can be transformed to provide reliable water services, ensure public health and wellbeing, enhance urban amenity and protect the environment over the long-term.

The project is led by Dr. Briony Rogers, a Lecturer with Monash University's School of Social Sciences. Her research explores how visioning, strategic planning and institutional change processes can enable transitions in urban water systems to create more liveable, sustainable and resilient cities. Dr. Rogers is the Deputy Leader of the CRCWSC's Program A (Society), which focuses on understanding and delivering the social transformations needed to support water sensitive cities, including community attitude and behavioural change, governance & economic assessment practices, management systems and technological innovation.

CRCWSC Program A projects aim to develop a richer understanding of social norms & behaviours underlying individual and community relationships with water. One of these is CRCWSC Project A2.1 *Understanding Social Processes to Achieve Water Sensitive Futures*, which investigated how people's water practices were embedded in deep historical, geographical and cultural contexts, for example in concepts such as cleanliness, comfort, convenience, trust and risk. Another CRCWSC project, Project A2.3 *Engaging Communities with Water Sensitive Cities* is investigating other dimensions of the community's interactions with water management policy. This project involved a large-scale national survey of current levels of Australians' knowledge about water sources, water management, and water-related issues. This is important because knowledge of these matters is linked to implementing sustainable household water practices and the acceptance of alternative water sources.

An additional goal of Project A2.3 is to identify the type of communication and community engagement that helps people understand sustainable urban water management. From interviews with water sector representatives, Project A2.3 concluded that the type of engagement strategies that were effective at connecting with communities were those that empowered people to make their own choices, enabled free exploration and self discovery, positively framed and accessible messages that provided solutions, and communication approaches that were personally relevant.

About CRCWSC Project A4.2 *Mapping Water Sensitive City Scenarios*

Project A4.2 aims to develop tools that can support and influence strategic planning to enable a city's transition to a water sensitive future. These tools include methodologies for the participatory development of water sensitive city visions and transition strategies at different scales and by different stakeholder groups. The case studies include the Perth region and Elwood, Victoria. By integrating perspectives from community, government, industry and research through novel participatory processes, this project will ultimately provide step-by-step guidance for how water sensitive city transition methodologies can be integrated effectively into formal planning processes at local, state and national scales. The combined impact of this research will enable a cohesive set of visions and strategic steps for cities and towns to advance towards greater water sensitivity.

CRCWSC Project A4.2 is linked to a number of other CRCWSC projects with Elwood as their focus. CRCWSC Project D5.1 *Urban Intensification & Green Infrastructure: Towards a Water Sensitive City* is exploring how sustainable urban water design can be incorporated into cities and towns at the precinct scale. A key outcome of Project D5.1 will be plans, visualisations, and design guidelines that support government agencies, policymakers, developers and consultants in facilitating the adoption of sustainable water management principles.

CRCWSC Project A4.3 *Socio-Technical Modelling Tools to Examine Urban Water Management Scenarios* aims to develop a modelling tool, known as DAnCE4Water, that can examine possible urban water management scenarios to support water sensitive transitions of Australian cities and suburbs. The model will simulate interactions between socio-economic changes, urban development patterns, and infrastructure adaptations to support the development of policy and water system strategies. The tool is being applied to Elwood and the Elster Creek catchment to demonstrate the potential to support policy and planning decision-making involving the interactions between urban form and efficient water infrastructure. This project is closely linked to CRCWSC Project B4.1 *Quantitative Spatio-Temporal Flood Risk Modelling in an Urban Context*, which shows how flood risk management can be integrated with other spatial planning practices for the protection of urban infrastructure and private property.

The Project A4.2 Elwood case study was made possible with the support of 24 members of the Elwood community and council representatives who attended at least one of the workshops:

Neil Blake, Port Phillip EcoCentre
Meni Christofakis
Lyn Fargher
Gio Fitzpatrick, Port Phillip EcoCentre
Chloe Farmer
Gina Fiske
Matt Francey
Leandra Gordon
Helen Halliday
Michael Harington-Hawes
Isaac Hermann
Sam Innes, City of Port Phillip
Geoffrey Love
Carey Lyon
Sharon Meredith
Helen Millicer
Les Rosenblatt
Eben Simmons
Jill Sokol
Meg Taylor
Jane Touzeau
David Vernon
Renae Walton, City of Port Phillip
Kirsten Wright

Appendix B – Project methodology

The project has approval from the Monash University Human Research Ethics Committee (Project Number: CF15/760 – 2015000341).

B.1 System analysis and preliminary engagement

B.1.1 System analysis

The initial focus of the research was an analysis of the Elwood social, institutional and biophysical system. This involved analysis of a range of qualitative data, including desktop review, survey data collected through the project website (<http://elwoodwaterproject.org>), and interviews with Elwood community members.

The desktop review involved analysis of the history of Elwood pre- and post-European settlement, Elwood's demographic characteristics, catchment and flooding issues, urban planning regulations and policies with respect to water management and development, and water use trends. Insights were developed through content analysis of primary sources of data, including City of Port Phillip planning and strategy documents, relevant publications from the Victorian State Government and state agencies, and secondary historical sources. The main insights from this review are contained in Appendix C.

B.1.2 Preliminary engagement

Survey data was collected through an interactive map on the project's website, asking people to comment on what they valued in the Elwood area. The web application allowed users to pinpoint a location in Elwood and comment on what the user (1) liked; (2) didn't like; or, (3) considered an opportunity in relation to better water management in the public or private realm (see Figure 14). Comments were posted anonymously and the research team moderated comments to ensure they were appropriate and aligned with the project aims. During the first two months of operation, 35 comments were collected. These were broken down into 7 'don't like', 12 'like' and 16 'opportunity' markers.

Interview data was collected through confidential semi-structured interviews with 18 individuals who had expressed an interest in participating in the research. 14 of these interviewees attended Workshop 1. Interviews were free-flowing but structured around questions relating to their experiences in Elwood, water sustainability issues, and the future of water management for Elwood.

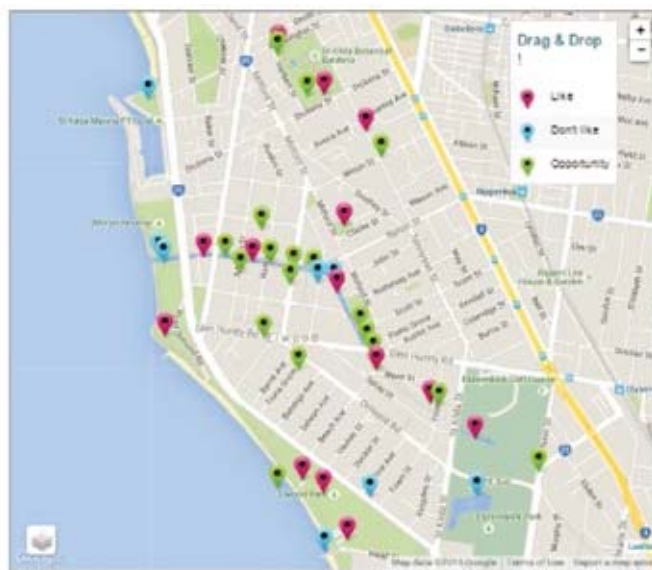


Figure 14. Survey data collected through interactive project website (<http://elwoodwaterproject.org>)

B.2 Overview of workshops

Participants for the workshops were recruited through City of Port Phillip environment-related channels (e.g. sustainability newsletter) and through targeted approaches to individuals that had been recommended by others (the snowballing technique). Most of the community participants were homeowners in Elwood. The number of male and female participants was even in the first workshop, but became uneven for the second and third workshops where female participants outnumbered male participants nearly 2 to 1. Three of the participants had experience in the water industry.

community would experience water and the broader environment in the envisioned future. This method of revisiting and expanding initial concepts through iterative development was also employed in later stages. The product of this stage can be found in Chapter 3 of this report: a vision comprising five distinct but complementary themes representing participants' positive reflections on Elwood's 50-year future.

The second stage of the deliberative process aimed to translate the vision into ideas for transforming Elwood's

Table 2. Elwood Water Project participant numbers

	Community	City of Port Phillip	Monash Art Design & Architecture	Total
June-July 2015 Interviews	18	0	0	18
26 July 2015 Workshop	19	2	3	24
24 August 2015 Workshop	13	2	2	17
21 September 2015 Workshop	13	2	3	18

The participant group was not representative of the Elwood community, in that the need to turn up to multiple workshops on a weekday evening meant they were relatively interested in the workshop themes. Their motivations for participation varied from being curious about issues related to water, passionate about sustainability and the environment in general, having had personal experience of flood impacts, or being committed to advocating for positive outcomes on local neighbourhood issues. Three of the participants had professional experience in the water industry. The recruitment approach means that the project outcomes are not intended to be representative for Elwood; rather it facilitated a process to develop a vision and set of strategies that could catalyse bottom-up momentum amongst community champions for driving the suburb and broader catchment's transition towards water sensitivity, as well as to demonstrate the potential for engaging with citizens about their priorities, ideas and long-term aspirations for their local area.

The first stage of engagement was designed to draw out participants' ideas and aspirations for Elwood to achieve a more sustainable relationship to water. This involved: first, a number of individual structured interviews; and second, cooperative activities in a workshop setting. Workshop activities attempted to draw on participants' creativity to develop and respond to statements about the future, and were designed to shift in focus from broader visions of Elwood's future to more specific views about how the

built or natural environment. Working cooperatively in small groups, participants responded to questions such as, "What might the idea or solution look like?" "What problems does it address?" and "How does it connect with the vision?" The results of this process were a range of spatial strategies to address the priority concerns of participants relating to four broad domains of the canal, the foreshore, lot- and street-scale sustainability and suburb- and catchment-wide sustainability. Participants employed a range of visual media to illustrate the ideas discussed. Analysis of the outcomes of this stage helped identify specific transition pathways around which further participant deliberation could be framed.

The third stage of the engagement aimed to develop coherent long-term strategies to outline how actors could navigate eight transition pathways. This stage involved a more focused examination of potential challenges and obstacles to be overcome within the current system. During this stage, participants identified the strategic steps they considered necessary to transition Elwood to the envisioned pathway outcomes. In addition, participants identified priority actions that were important for initiating change.

Three three-hour workshops were held between July and September in an Elwood community centre. Each workshop commenced at 5 pm and included a meal break. Each workshop was facilitated by four representatives of the CRC for WSC, including the two authors.

B.3 Developing the vision

B.3.1 Setting the scene

The first objective of the transition management process was to record the water-related aspirations and values of Elwood community members. It followed a three-part structure: (1) research and place context; (2) broad visions for Elwood's future; (3) expanded visions to investigate the Elwood community's relationships with water.

The context was set by the lead author, who introduced the purpose of the workshop, the overall aims of the CRC and the project, and also the facilitators. Participants introduced each other after a short interactive opener.

Elwood was the subject of a 20 minute presentation by the authors and a guest from the Faculty of Art, Design and Architecture at Monash University. Nigel Bertram (Professor, Architecture) provided a 5 minute overview of the Victorian and Melbourne topography of low-lying land of which Elwood is an example. Nigel also situated Elwood with respect to the Elster Creek catchment.

The second author then provided an abbreviated outline of the research into Elwood undertaken prior to the workshop, moving from investigations at suburb-scale (open space, vegetation) to smaller-scale aspects (flooding) to finer-grain analysis (culture, identity and water practices). A fuller depiction of this research is contained in Appendix D of this report.

The lead author concluded the scene-setting by discussing some of the larger trends that are likely to shape Elwood in the coming decades, including population change and changes in Elwood's climate.

B.3.2 Headline visions for 2065

The first activity involved four tables of 5-6 people responding to the following scenario: in the year 2065, the Age newspaper is profiling Elwood. Participants were asked to create multiple headlines (up to approximately five) for the article that describe Elwood in its possible future states, one headline per future. The headlines, which were documented on A4 sheets, could be desirable or undesirable. Other features or ideas associated with the headlines were appended to the headline with post-it notes.

Each table was facilitated to probe each headline vision further, uncovering implications and opportunities associated with each of the visions. Significant discussion points were recorded by both participants and the facilitators.

After 25 minutes of discussion, each group physically placed their headlines, henceforth referred to as vision statements, somewhere on the spectrum of "desirable" at one end and "undesirable" at the other.

B.3.3 Expanding the visions

Participants identified commonalities between vision statements during a short whole-group discussion. Six distinct groups of desirable vision statements were identified. These groups were distributed among the tables for a new activity, the purpose of which was to expand the desirable vision statements and to respond to the question: "What are your daily experiences of water and the broader environment in this future?"

The method for engaging with the vision statements was the World Café style. In this method, participants were able to engage with the set of statements of their choice for a predefined period. At the conclusion of this period, participants were required to move to another set of visions of their choosing, and so on for a total of three rounds. Participants either stood or were seated for their discussions. In a minor deviation from typical World Café engagement method, facilitators floated between multiple tables to prompt and provoke discussion where appropriate, and to support discussion if the number of participants happened to be low at any given time (although facilitators did not contribute content to the discussion). The number of participants at tables fluctuated between two and six, perhaps according to interest in the set of visions under discussion.

This activity was undertaken for approximately 30 minutes. The first round was 15 minutes, and subsequent rounds were approximately 7 minutes.

B.3.4 Analysis of vision data

Between the first and second workshops, facilitators reviewed and consolidated the numerous vision statements and themes into coherent narratives that represent a preliminary interpretation of the data generated through the workshop discussions.

The seven groups of vision statements (six desirable and one undesirable) and connected comments were transcribed. The transcription then became the basis for a detailed narrative synthesis describing the key elements of the future envisioned by the participants. Analysis revealed that two groups of desirable vision statements – associated with adapting to an inundated Elwood – originally identified during the workshop were overly similar. These were therefore amalgamated into the narrative described in Section 4 of Chapter 4.

B.3.5 Refining and revising the vision

The method and results of the vision statement synthesis were outlined at the commencement of the second workshop. Participants were then invited to discuss the vision at their table to validate and refine it. After a brief period of discussion, participants were invited to suggest gaps in the analysis of the vision. Participants were also invited to make note of any further suggestions for the vision during the workshop on any of the copies distributed around the room and also following the workshop. This resulted in a small number of modifications to the vision.

B.4 Translating the vision into action

B.4.1 Water Sensitive Design Showcase

To support the translation of the vision into specific ideas and solutions for Elwood, features of a hypothetical water sensitive city were presented alongside real-world case studies. The cases discussed included:

- Cooks River restoration, Sydney
- Clear Paddock Creek restoration, Sydney
- Los Angeles revitalisation of previously concreted urban waterways
- Los Angeles water sensitive urban design suburban street renewal
- Rotterdam city-wide catchment planning and neighbourhood stormwater capture and storage
- Cheonggyecheon River restoration project in Seoul to daylight a waterway that had been concealed by a freeway (now demolished)
- Rotterdam temporary stormwater storage solutions such as water squares and tanks in underground parking garages
- Stawell flood levy and parkland sculpture mixed use
- New York sea level rise envisioning project
- Integrated flood protection in urban design and architecture in Hamburg

Most of these cases were presented by Rutger Pasman, Research, Monash Architecture Studio. Participants were also reminded of the data collected on the project website (www.elwoodwaterproject.org) relating to opportunities for Elwood.

B.4.2 Translating the vision into ideas and solutions for Elwood

Participants were asked what they would create or change in Elwood's built or natural environment to make their "Elwood vision come to life". This method involved first establishing the priority domains or spheres for change through whole-group discussion, then identifying specific ideas or solutions within small groups.

During the whole group phase, participants identified various (personal) priorities, which were noted on slips of paper and placed on a large (approx. 1.6m x 2.3m) format map of Elwood. This allowed the priorities to be grouped into broad categories of action to determine the context for idea creation at small group tables. These were:

- Water and environmental management and community engagement issues at individual street or lot scale
- Water or environmental management issues that concern Elwood at the neighbourhood or system scale
- Coastal and foreshore issues
- Upstream / downstream stormwater volume and quality issues concerning Elster Creek and Elwood Canal

The instructions governing the work at the small group tables were to work at the first table for 20-30 minutes before moving to another table if the participant wished. This schedule was not enforced, however, and less than half of participants chose to move tables. Each table was facilitated by one of the workshop facilitators.

No limit was set in this activity for the number of ideas to be generated. The primary direction to participants was to prompt thinking about their ideas from different perspectives; the questions posed to participants during this activity were:

- What might the idea or solution look like?
- How might it work?
- What problems does it address?
- What benefit does it achieve?
- How does it connect with the vision?
- How would people engage with it?

Participants were given a variety of materials with which to describe or illustrate their ideas, including ballpoint pens and felt-tip pens of different colours, pencils, different coloured paper, sticky tape, maps of Elwood and photos showing different built form, social or natural environment features suggested by the vision from both Elwood and around the world. The instruction supporting this last category of material was to use collage to help illustrate the ideas and solutions.

B.4.3 Analysis of ideas and solutions data

The raw output from the four tables of participants largely comprised written comments, sometimes appended to maps of Elwood or photographs showing features common in Elwood, such as laneways, residential streets or the Elwood canal. There are a few cases of diagrams or illustrations of ideas, either on plain paper or overlaid onto photographs.

Each of these table outputs were transcribed or otherwise described (in the case of illustrations, for example) and from these transcriptions a summary was prepared. This analysis aimed to preserve the spirit of the specific ideas or comments as much as possible, but structure the ideas into a more readable form.

Analysis of the full range of ideas generated through the workshop resulted in the identification of eight distinct themes. These are denoted as pathways of change. The workshop ideas and solutions were subsequently organised according to these pathways.

B.4.4 Validation

Feedback and validation of the analysis was sought from participants. Participants were generally satisfied with the analysis but sought clarification of three matters. These have been incorporated into this report.

B.5 Developing transition pathways

B.5.1 Identifying Transition Challenges

For the final workshop, participants seated themselves at one of four tables that had each been allocated two pathways. Participants were asked to identify the barriers or challenges for achieving the pathway outcomes. Participants were invited to focus on quick brainstorming rather than in-depth discussion, examples or anecdotes. Challenges were documented on A3 paper, either directly or with sticky notes. After 10 minutes of brainstorming on one of the two pathways at the table, participants were then asked to address the second pathway. This activity continued for a further 5 minutes.

B.5.2 Expanding and Developing the Transition Pathways

Participants, at the same tables as in the previous activity, were asked to identify the short, medium and long-term strategies and actions needed to lead to the desired vision. Participants were asked to consider the full range of implementation strategies needed for pursuing desired change and overcoming challenges, such as social, technical, financial, political, and cultural.

Each pathway was depicted on butcher's paper with a transition curve starting in the lower left corner and concluding in the top right corner with an illustration of the pathway outcome. Participants chose one of the pathways to brainstorm and discuss actions or strategies for a period of 25 minutes. Participants were prompted with questions about how challenges could be overcome and who needed to be involved to implement the strategy. Participants were also suggested to identify the connections between individual strategies.

For the remaining 20 minutes of the activity, participants were asked to move to another table, preferably mixing up groups, to work on the remaining pathway for the table. Participants had the same instructions as before.

B.5.3 Summarising the Pathways Forward

The final part of the workshop involved the whole group in a 45 minute activity. Facilitators summarised the transition pathways, highlighting the key changes and likely overlap with other pathways. Feedback was sought following each presentation. Participants were also invited to suggest how the issues revealed in the workshops could gain greater prominence to catalyse change.

B.5.4 Analysis of Pathway Data

Following the usual transcription of raw participant outputs, they were analysed to reveal the full range of ideas generated through the workshop. The resulted in the identification of distinct strategies and actions for achieving the desired pathway outcome.

Appendix C – Elwood's social, environmental and water management context

C.1 Introduction

The first phase of the project involved an analysis of Elwood's social, institutional and environmental system as it relates to water and the local area. This involved reviewing a range of Council, regional and State Government planning and water policy documents, demographic trends, as well as secondary historical sources relevant to water and the environment. In addition to this, survey data collected through the project website (<http://elwoodwaterproject.org>), and interviews with Elwood community members were incorporated into the analysis.

This goal of this context-setting was to provide a useful background to participants prior to embarking on the visioning process. In the interests of brevity this Appendix does not attempt to present the entirety of the analysis undertaken. It covers the origins of the suburb in a low-lying part of the Melbourne landscape, its history of flooding that early engineering measures failed to fully remedy, historical as well as modern vegetation values in the suburb, current demographics as well as population growth forecasts, critical development issues and policies, open space values, water use indicators, and forecasts associated with climate change.

C.2 Early history

Now and Then

It used to be a big big swamp but now it is nothing but the Elwood Canal.

The swamp was filled with beautiful fish but now it is filling with rubbish.

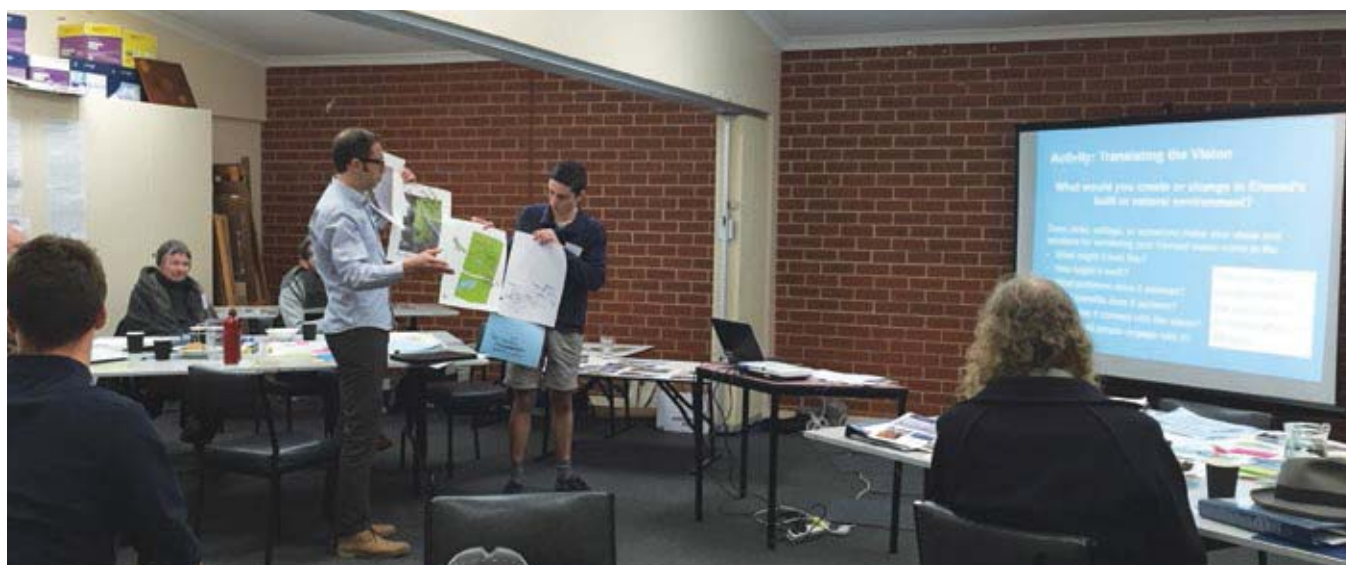
The only thing that is the same is a half cut down, dead scar tree.

Why can't it be the same?

- 3K, Elwood Primary School

Entry in the Elwood Poetry Prize 2010, *Elwood Canal: Past, Present, Future*

For thousands of years before European settlement, members of the Boon wurrung tribe occupied the coastal areas around Port Phillip Bay. Before its drainage in the late nineteenth century, much of Elwood was a wetland formed in low-lying land near the mouth of Elster Creek, shown in Figure 15. The Elster Creek catchment is 40 km², extends as far east as Bentleigh and covers areas of Port Phillip, Bayside and Glen Eira councils. The wetland was originally approximately 65 ha (0.65 km²) in area (Heritage Alliance, 2005). It is part of sweep of low-lying land in southern Victoria, which in Melbourne includes much of south and south eastern Melbourne to Mt Eliza, and the much larger drained swamps around Koo Wee Rup and the mouths of the Moonee Ponds Creek and Yarra River.



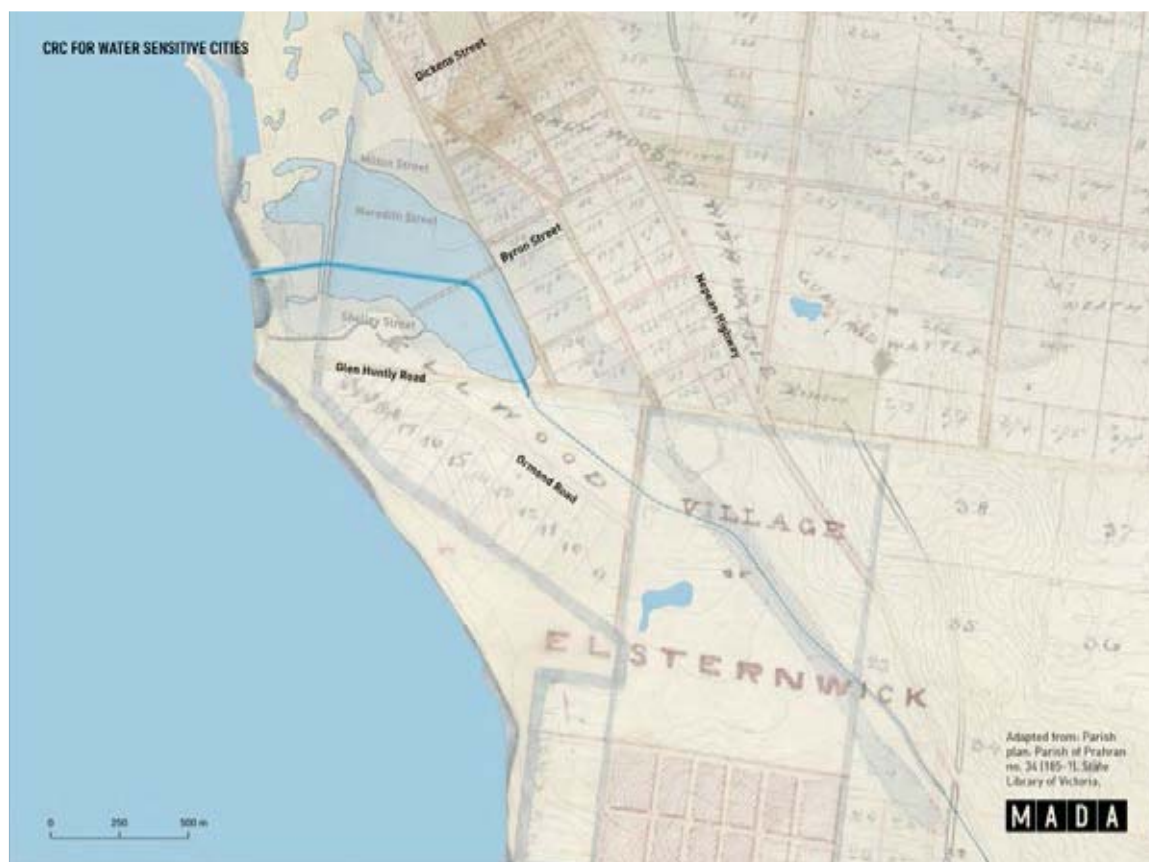


Figure 15. Map showing the extent of Elwood Swamp prior to its drainage in the 1890s (Bertram 2015)

The Elwood swamp would have provided a rich abundance of food for the aboriginal clans, “including tortoises, ducks, eels, frogs, fish and freshwater shellfish” (Eidelson, 2006). William Thwaites, before he became engineer-in-chief of the Melbourne and Metropolitan Board of Works (MMBW), oversaw the drainage of Elwood swamp in the late 1880s. Despite his integral role in this and a number of other drainage schemes, Thwaites reflected on the loss of natural beauty, such as the rich birdlife, that it signified (La Nauze, 2011).

The proposal for drainage consisted of filling the swamp to a level of 18 to 30 inches above the high water mark. The land was filled by sand and clay from the Elwood foreshore and silt from the dredging of Yarra River. At about the same time the Elwood Canal was constructed between Glen Huntly Road and the beach, about 150m north of the original intermittent outlet of Elster Creek.

Elwood Canal has been criticised over many years for its poor amenity, beginning as long ago as the 1890s (La Nauze, 2011). This was also acknowledged by some of the participants, for example:

“Elwood Canal stank like you wouldn’t believe. There was a wall of stink generated by the canal. Even into the 80s, once you hit it, it was almost like a physical thing. When you were driving through it, you had to keep your windows up. It would stick to you.”

- Participant 2

Some participants, however, felt that there is still a way to go to improve the canal’s amenity:

“For some reason I often seem to be there at low tide and it’s disgusting. It smells, there’s no water in it. The other day there was a strange milky substance on it, and I thought, “that’s gross”. It’s nicer up that end where it’s actually flowing water, but down where I am it’s pretty still....I don’t know how you keep it clean, but it’s pretty gross.”

- Participant 12

“Why does it smell so bad?”

- Participant 10

C.3 Flooding in Elwood

Flooding has occurred with some regularity in Elwood. Eidelson (2006) reported that flooding occurred four times between December 1934 and November 1935. There was also flooding in 1955, which prompted the government to approve a canal diversion from New Street, Brighton to the bay at Head Street in 1958. Nevertheless, further flooding occurred in Elwood in 1989 and 2011, both in late summer.

The following data comes from analysis undertaken for the municipality when the Water Plan was developed (City of Port Phillip, 2010a). More rainfall falls on Elwood than the water consumed, with approximately 1,313 ML of rainfall a year. Of this, almost half returns to the atmosphere as evaporation, and 626 ML runs into drains and the Bay as stormwater runoff.

Figure 16 provides this data in visual form. The Elwood water snapshot also states that “over a quarter (27%) of Elwood is residential and commercial roofs which could be suitable for rainwater harvesting. It is estimated that this area generates approximately 47% of stormwater flows in Elwood” (City of Port Phillip, u.d. p. 2). Nearly all of the remaining stormwater flows come from public roads and hard space such as car parks.

The primary cause of flooding is overland flows from outside Elwood, from the larger portion of Elster Creek catchment. Data suggests that Elster Creek carries just over 9,000 ML in a typical year. The majority of this flow is diverted at Elsternwick Park to the Head Street main drain (EDAW, 2008).

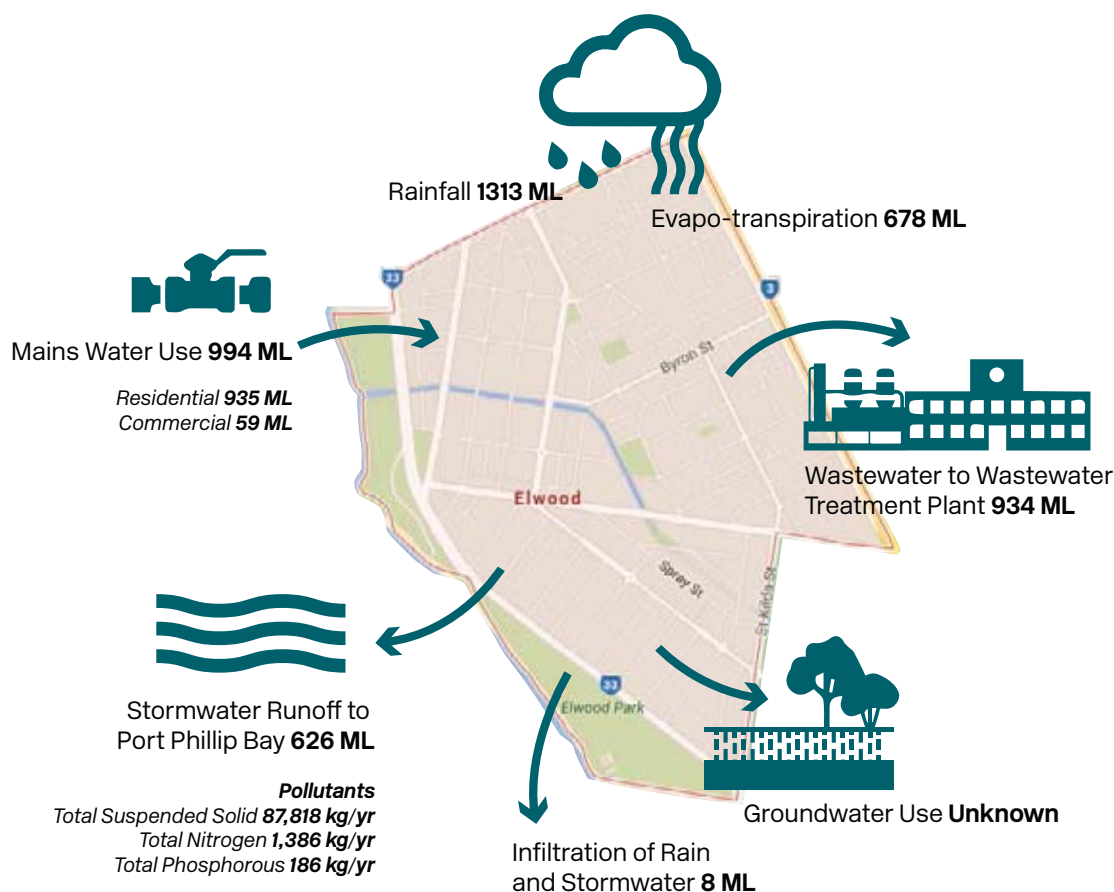


Figure 16. Elwood water balance (City of Port Phillip, u.d.)

The flooding hazard in the City of Port Phillip was reassessed in 2010/11 by the City of Port Phillip and Melbourne Water. This project involved developing a 1D/2D model to map 5yr and 100yr flood extents and depths for the whole of the municipality. The 100 year ARI flood extent under current climate and sea level conditions have been incorporated into amendments to the Port Phillip Planning Scheme, which at time of press had not been subject to a formal determination by Council. Nevertheless, the draft amendment indicated an increase in the area of flooding risk, particular parts of the neighbourhood between Tennyson St and Brighton Rd, bounded by Byron St to the north, and the neighbourhood between Foam St and St Kilda St, south of Ormond Rd.

The impacts of climate change were also modelled in the 2010/11 project, but the larger area of flooding indicated was not a feature of the planning scheme amendments.

In 2011, the Elwood Canal area was also subject of a case study for new ways of managing changing flood risks through proactive adaptation responses (AECOM Australia, 2012). The study found that the cost of flooding in Elwood could increase from \$2.5 million per year (currently) to more than \$14 million per annum by 2100, if no adaptation actions were taken. Although the risk of flooding will increase, it was estimated that the impacts to local residential and business sectors and recreational spaces could be mitigated through cost-effective adaptation measures.

Many of the research participants have direct experience of flooding. These were some memories of the 2011 flooding:

"In February 2011... I went by car all the way around the catchment of Elster Creek and had a good look at what was happening. Everywhere you go, there's water rushing into drains. It was biblical, really. Pavements were awash, water was rushing into culverts, drains, and Elster Creek was in flood. It was very exciting really."

- Participant 10

"We've had water inside the house twice. In 1989, it was only a couple of inches, in 2011, it was up to my knees."

- Participant 1

"So we were in an apartment block, but we were on the first floor... and because our car park completely flooded, we actually had to evacuate because we were worried about it being too hard to get out. And actually the people who didn't move their cars had quite a bit of damage to their cars because Goldsmith Street was quite badly flooded."

- Participant 7

Port Phillip planning policy aims to ensure that some stormwater treatment measures are adopted in new developments (Clause 22.12), including:

- collection and reuse of rainwater and stormwater on site
- vegetated swales and buffer strips
- rain gardens
- installation of water recycling systems
- direction of flow from impervious ground surfaces to landscaped areas
- green roofs and walls irrigated with rainwater/stormwater

C.4 Vegetation

One of the most attractive features of Elwood is its leafy environment. This was not the case during Elwood's post-settlement early history. Early photographs, such as Figure 17, show a sparse landscape. One long-time resident of Elwood commented:

"Certainly there was a lot less vegetation. Aside from the Plane trees, and Blessington Street gardens, there was barely a street tree around. The foreshore reserves, some of them didn't exist; they were to be reclaimed from the bay in around 1967, was one of the main ones that was reclaimed.... There was a lot less bird life, and a lot less vegetation in the foreshore reserves in general. So there's been some significant improvements."

- Participant 6

Going further back to Elwood's pre-settlement vegetation reveals how substantial the changes to Elwood's environment have been. Modelled 1750 Ecological Vegetation Classes (Department of Environment, Land, Water & Planning, 2015) for the Elwood area are: *Coast Banksia Woodland/Coastal Dune Scrub Mosaic* along the foreshore; *Grass Woodland* in the north-east and south-west of Elwood; *Sedgy Swamp Woodland* in the former swamp area; *Swamp Scrub* along the reaches of Elster Creek south of Glen Huntly Rd; and *Damp Sands Herb-rich Woodland* in south-east Elwood either side of the Elster Creek between Nepean Hwy, Ormond Esp and Head St.

Urban development in the Elwood area has seen significant change in this vegetative cover. The modelled native vegetation extent for Elwood indicates that there are remnants of *Coast Banksia Woodland/Coastal Dune Scrub Mosaic* at Point Ormond and on the foreshore to the south-east, and a small remnant of *Damp Sands Herb-rich Woodland* in Elsternwick Park (Department of Environment, Land, Water & Planning, 2015).



Figure 17. At Glenhuntly Road looking along Mitford Street, Elwood 1904-1906 (Port Phillip EcoCentre, u.d.)

Elwood's natural landscape has been modified by the introduction of exotic species, particularly evident along Elwood's broad avenues and streets with mature London Plane (*Platanus x acerifolia*) and Callery's Pear (*Pyrus calleryana*) trees. These deciduous plantings provide street shade in summer, but are likely to require supplementary watering in times of drought (City of Port Phillip, 2010b). Trees and other introduced plants may also have the benefit of treating and cleaning stormwater in water sensitive urban design initiatives such as bioretention tree pits and rain gardens (City of Port Phillip, 2010b).

The link between vegetation types and water in the landscape was observed by a number of participants:

"Well I think from outside your property I think you've got to be pretty conscious of using what's the word, natural vegetation, things that don't use a lot of water obviously to maintain... you just have to make sure that you haven't got acres of grass and those sorts of things. You've got to be conscious of the plants and the varieties that you're using outside."

- Participant 3

"Happily we have plane trees. It's a good and bad thing. Good for shade and coolness, but bad for the stormwater drains, because their roots get into everything and the leaves are really bad for the streets, they get into the gutters and block the drains, but they are very good for coolness."

- Participant 16

"The council had a street tree audit and that's where I took my interest because I, you know, I got into a bit of guerrilla gardening last time and I'm starting it now and I'm probably looking at other trees down the street, they came back and put in an old ornamental pear and I'm just like, what the far out, you know..."

- Participant 8

On public land, there has been a deliberate strategy for a "healthy and diverse urban forest that uses innovative greening solutions to enhance the community's daily experience" (City of Port Phillip, 2010b, p. 3). The goal of enhancing liveability will involve tree planting and "implementing alternate greening options" (p. 4). There is also an adaptation element to Council's street tree strategy that involves increasing tree number and canopy cover to minimise the heat island effect, and ensuring access to mature trees.

C.5 Culture and demographics

With drainage issues largely resolved by the turn of the nineteenth century, Elwood experienced major building booms before and after the Second World War, bringing waves of European immigration (Eidelson, 2006). This has resulted in a heritage of mixed housing and apartment building styles and a multicultural history.

Key statistics from the 2011 census (Australian Bureau of Statistics, 2013)

Population and education

- There were 14,638 people in Elwood.
- 15.6% of people were aged 0-19 and 6.9% of people were aged 65 and over; this contrasts to Victoria, where 25.1% were aged 0-19 and 14.2% of people were aged 65 and over.
- 64.8% of people were born in Australia; the next most common countries of birth were England (5.1%), New Zealand (3.0%) and Ireland (1.3%).
- 77.3% of people only spoke English at home.
- 57.3% of people aged over 15 years held a Bachelors Degree or higher

Households types and housing

- In 2011, there were 6,772 occupied private dwellings in Elwood.
- Of these dwellings, 69.0% were flats, units or apartments, and 11.3% were semi-detached, terrace houses or townhouses.
- Of occupied private dwellings, 55.3% were rented and 42.4% were owned outright or owned with a mortgage.
- Of all households, 49.5% were family households, 40.2% were single person households and 10.3% were group households.

Labour force

- 9,619 people reported being in the labour force, with 3.8% of people unemployed
- The most common occupations were Professionals (39.5%) and Managers (18.1%).
- The median weekly personal income was \$1,060.

The drivers of future population change for an area at Elwood's scale include the age structure of the existing population, the mix of housing stock in the area and local and regional housing markets. Large-scale macro-level factors such as migration, consumer preferences and economic growth are difficult to resolve at the scale of Elwood. As a consequence, the Victorian State Government has not published population forecasts for Elwood, although figures

have been released for the Elwood-St Kilda District up to 2031 (Victoria in Future, 2015). The population of this Victoria in Future Small Area (VIFSA) is projected to grow from 56,443 persons in 2011 to 66,375 in 2031. This represents a projected average annual growth rate of 0.81%. This is lower than the projected annual growth rates of Victoria as a whole and Greater Melbourne, 1.66% and 1.82% respectively.

There are indications that Elwood's contribution to the population growth would be lower than other suburbs in its VIFSA, such as St Kilda, East St Kilda and Balaclava. Separate modelling by .id (2015) suggests that Elwood's population is expected to grow at a rate of 0.29% per year to 2036.

Some other perspectives on Elwood were gleaned from participant interviews:

"Demographically, I think the area has shifted from being a group that had ethnically strong Jewish populations, Greek populations. Those populations have either aged or moved out. And because when I moved in the late 70s rents were affordable, then there were significant groups of recently arrived immigrants. That time Russian people that got out during the period of détente, and small pockets of Eastern Europeans. And in that time as the area has become more popular it has gentrified. Real estate prices, rents have skyrocketed obscenely, and I think the area now has, people have put up high fences instead of being out walking and talking to people, and the connections people make are now not so informal, but more formalised like who their children go to school with, what groups they belong to rather than who your neighbours are."

- Participant 1

"The interesting thing with Elwood is it's such a mixture of properties. You have your expensive homes but you have your rental apartments and flats and so that makes the community more diverse, more interesting. You know, the flats help maintain a mixed community."

- Participant 4

"I fell in love with Elwood, because of the trees, the streets, and the general environment of the region, which was unique I found to a lot of the neighbouring suburbs with its closeness to the city and the beach. I have moved away, but didn't sell thank god for that... it was quite interesting, I really missed the culture and the diversity that you get in Elwood slash St Kilda. And it's home. The village sensation it has is really lovely."

- Participant 16

C.6 Development Policies

According to the Port Phillip Housing Strategy 2007-2017, most of Elwood is identified as “minimal change” or “limited change”, with only a small area fronting Ormond Road and Glen Huntly Road, close to the Elwood Junction and Elwood Village activity centres identified as “‘Incremental change’ through well-designed medium density ‘infill’ development” (City of Port Phillip, 2008, p 43). This is reinforced by the current planning scheme, which encourages the retention of large dwellings and single dwelling lots with low building heights.

Elwood Canal has special policies devoted to its protection in the planning scheme, aiming to protect the amenity of the linear park but also to encourage new development to have visual access to the canal and not to ‘face away’ from the canal.

The Heritage Overlay is a major aspect of the Elwood planning context. This overlay requires a permit for demolition or structurally altering a building. There is a substantial overlap in the extent of the Heritage and Special Building overlays, suggesting that the increase in the minimum floor height of a proportion of Elwood properties at risk of flood will be delayed more than it might have otherwise been.

Development and heritage were commented upon by a number of participants:

“I mean rising sea levels, they say, is going to be an impact potentially in the next couple of decades and I do get freaked out by the new buildings that go up and how high their foundations have to be because people here have heritage homes like ours and they can’t put their houses up high and so it freaks me out.”

- Participant 7

“I do understand the need for our infrastructure to have to look at our inner suburbs taking more density. But it’s the way some of these projects are done without consideration for the existing infrastructure in place to actually support that influx of people.”

- Participant 16

“I presume if the water table rises that’s going to cause structural problems in buildings. I know that if you have too much development on one side there’s not enough drainage, so for instance if we put a block of flats in that square there, all that drainage has got to drain somewhere else. That’s got to be planned.”

- Participant 18



C.7 Open space

Elwood is well catered for with open space along its edges: Elwood foreshore, Elsternwick Park and St Kilda Botanical Gardens. The canal links Elsternwick Park with the foreshore. It is City of Port Phillip policy to optimise the open space that is available. Optimising space means creating connections between spaces irrespective of their size, and basing the use of open space along principles of community benefit (City of Port Phillip, 2009). Port Phillip also requires the safe and accessible provision of open space. For Elwood, the council's strategy identified issues of the loss in the stock of large dwellings with private open space. This concern was shared by at least one of the participants interviewed in the lead up to the workshops:

"I'm concerned that kids don't have informal outdoor play spaces. They might have a swimming pool that's fenced off, but there isn't any space."

- Participant 1

"...Water not being caught on properties as much as it has been or could be is definitely a factor (in flooding risk); that there's a lot of building over land so there's not as much water being absorbed just naturally into the environment."

- Participant 7

"There's a lot of areas of the older style blocks of flats that have large concrete areas and so forth. So all that (surface runoff) water, it's difficult to do much about that. With new builds and extensions where that permeable surface has gone from or what may have been a third or half of the block is now maybe 5% of the block."

- Participant 15

The Open Space Water Management Plan (City of Port Phillip, 2011) sought to address the impact of a 70% potable water consumption reduction from 2001-02 levels on open space in Port Phillip. It recommends the majority of non-potable water for open space to come from stormwater harvesting. Doesn't recommend groundwater use based on conservation reasons and the analysis of salinity levels of 1,000-3,500 Mg/L across most of the municipality, at the top range for acceptable use for irrigation. Synthetic turf should be investigated further.

C.8 Water use

The most recent available figures for water consumption are for the 2008/09 financial year. In that year, 994 ML of mains water was used in Elwood. Most of this mains water is used in homes: residential consumers used 94%, with the remaining 6% put to commercial or industrial use (City of Port Phillip, u.d.).

The average daily water use per person in the City of Port Phillip was estimated in 2009 to be 178 L/person/day (City of Port Phillip, 2010).

The Water Plan defined WSUD as:

"a range of measures that are designed to avoid or at least minimise the environmental impacts of urbanisation (including) water efficiency fixtures, rainwater tanks, stormwater treatment systems, stormwater harvesting systems and wastewater treatment systems... WSUD allows for integrated water management, where issues of water supply and water quality are addressed and embedded into the urban landscape." (City of Port Phillip, 2010, pg 86).

It is interesting to reflect on why some community members are more conscious of their water consumption than others. This awareness of water might come from a better understanding of water in the environment. The following perspective was common among participants:

"I think the more connection you have with the environment, the easier it is to adapt. So grow your own vegetables as much as you can so you're taking pressure off general food supply, but you're also kind of noticing and in touch more with what is happening because I think one of the hardest things is to see what's happening. It's like, you know, it can be an abstract thing but until you start to experience trying to garden and make food it's all hard to put into perspective."

- Participant 7

An important issue for increasing water sensitive household practices is the capacity of some households to install rainwater tanks or grey water systems. Residents of apartment complexes face the challenge of gaining the approval of their property managers and owners corporations to install water sensitive design technologies. A number of participants discussed these difficulties, such as in the following comment:

"We're a body corporate, the flats aren't individually metred, the hot water system, again, owned by, managed by the body corporate, so there's no incentive to use less water. The only thing I've ever really done personally is during the drought, I ended up having a hose and a pump from the bath onto the garden. One of those little hand pumps [laughs] and a hose slung over the balcony".

- Participant 18

Some participants also had the perception that it is difficult to retrofit single occupancy properties, for example:

"It's very hard in an old house to make these changes. You've got old pipes and old drains and guttering and it's quite, I think, difficult to do that. It's quite difficult. You're reduced to taking the bucket from the shower into the garden which is really primitive. You need to spend quite a bit of money to divert drains and pipes, and also we've got the space issue. Where do you put the big tanks and things?"

- Participant 4

C.9 Elwood's climate forecasts

Climate change is forecast to make Port Phillip hotter and dryer (City of Port Phillip, 2010c). By 2070, under a higher emissions growth scenario, the projected annual temperature for the Port Phillip and Westernport region, in which Elwood is located, is expected to increase by 2.6°C (DSE, 2008). The average summer temperature is projected to increase by even more, by 3.0°C. Rainfall projections for 2070 show wide confidence intervals, indicating that the impact of climate change on average rainfall is more uncertain than its effects on temperature. Nevertheless, rainfall is projected to decrease over the year by 11% by 2070. Even under lower emissions scenarios, annual temperatures are projected to increase by 1.3°C and rainfall decrease 6%.

Forecasts for 2070 indicate extreme weather will become more common for Melbourne. The number of days per year where the temperature will exceed 35°C will increase by half (from the current 9 to 14 days) under the lower emissions scenario and double (to 20 days) under higher emissions. Rainfall is projected to be more extreme by 2070, with the intensity of heavy daily rainfall expected to increase 16.3% in

summer and 17% in winter under higher emissions.

With 80cm sea level rise expected in Port Phillip Bay by 2100 (Melbourne Water, 2012), storm surges are predicted to be 2.0m (City of Port Phillip, 2010c).

The impacts of these changes include (City of Port Phillip, 2010c):

- Heat stress and decreased summer outdoor activities
- Coping with more diseases and pests
- Reduced water quality
- Reduced water security and availability
- Higher water costs and restrictions
- Higher stormwater contamination
- More dust storms and air pollution
- More flooding
- More beach erosion or beach loss
- More storm damage to buildings and infrastructure
- Impacts on the city's coastal recreational spaces, trails and paths
- Higher maintenance and insurance costs
- Loss of some coastal properties

These issues were on many participants' minds:

"The other [issue] that's been of immediate concern to me is the heat island effect and ensuring that we're resilient and we have a resilient community space just so we can mitigate on that front"

- Participant 8

"With global warming and its consequences, we've taken a longer term view. All the advice we've got is that things are going to get dryer but rain events will be stronger, in a more tropical fashion, which will overwhelm the existing stormwater system which was built for temperate rainfall. With coastal winds and rising sea levels then we're looking at potential disaster. Fact that this was low-lying land, Yarra floodplain and Elster swamp, and now a suburb irrespective of what it used to be."

- Participant 2

"It is going to be affected by global warming, I know that, I've seen the maps. [laughs] I think maybe in a 100 years I might be beachfront, apparently."

- Participant 18

Appendix D – References

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