CRCWSC Research Synthesis

Discussion Paper | CRC for Water Sensitive Cities

IDEAS FOR VIC. PLANNING CONTROLS

CRC for Water Sensitive Cities

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Ideas for VIC Planning Controls

Publisher

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About this document

This "Ideas for Vic Planning Controls" document outlines a potential approach to improve stormwater management in Victoria, centred around changes to planning controls.

It compiles feedback and ideas generated by stakeholders during a research synthesis workshop hosted by the Cooperative Research Centre for Water Sensitive Cities (CRCWSC) and DELWP on 23 March 2017.

The workshop generated ideas and solutions towards a central question: how can we improve the Victorian Planning Provisions (VPP) to improve stormwater management across Victorian cities and towns? To address this question, the workshop integrated research conducted by the CRCWSC with stakeholder experiences and recent investigations commissioned by the DELWP.

Workshop purpose

Identifying ways to optimise the VPP was the primary aim of this workshop, although this challenge was not considered in isolation from other potential changes to stormwater management.

The Victorian Government is committed to expanding the VPP, which will continue to be used as a tool to manage stormwater. This commitment is made in Water for Victoria (DELWP, 2016) and the Yarra River Action Plan (DELWP, 2017).

Two key questions arise from this:

1. How to amend the VPP generally, and Clause 56 specifically, to improve stormwater management?

2. How to identify the best mix of instruments to manage the problem effectively?

These questions recognise the history and importance of planning controls in stormwater management as well as the limitations and issues with the current controls and their implementation.

With a policy window currently open to develop reforms, there is an opportunity to move beyond a short-term solution and look to 2065 and design planning controls and a mix of instruments for this outcome.

Policy context

Water for Victoria

Water for Victoria is the Victorian Government's strategic plan for the management of water resources. In this plan, the Government commits to managing water to support a healthy environment, a prosperous economy and thriving communities. In particular, Water for Victoria outlines ways to make better use of alternative water resources, including urban stormwater, to reduce the impact on Victoria's rivers and environment. In doing so it recognises the many roles that water plays in the community and in the need for locally relevant solutions.

Figure 1 - Water for Victoria makes a commitment to improve stormwater management through planning controls and other instruments. (DELWP, 2016)

Water for Victoria acknowledges that 'now is the time to review the way we manage stormwater and simultaneously improve environmental land liveability outcomes'. Action 5.5 (Figure 1) articulates a specific initiative for planning controls to help achieve these outcomes.

Yarra River Action Plan

The Yarra River Action Plan provides Melbourne's community with a blueprint for the continued management of this waterway, to guard the river from inappropriate development and to promote the river's health and amenity. This plan acknowledges a specific gap in Clause 56 of the VPP and commits to addressing this gap (Figure 2).

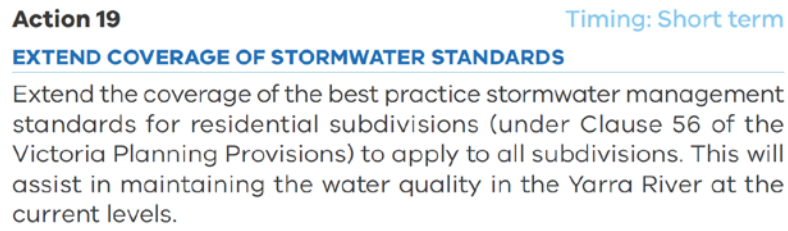

Figure 2 - The Yarra River Action Plan makes a commitment to extend the coverage of stormwater standards (DELWP, 2017).

Water sensitive cities context

What is a water sensitive city?

A water sensitive city is a place that is resilient, liveable, productive, and sustainable as a result of the way the urban water cycle is managed. This can be achieved by managing the urban water cycle in an integrated way that:

- Provides the water security essential for economic prosperity through efficient use of diverse available resources.
- Enhances and protect the health of waterways and wetlands, the river basins that surround them, and the coast and bays.
- Mitigates flood risk and damage.
- Creates public spaces that collect, clean, and recycle water.

Integrating water and urban planning

Embedding water thinking in all phases of urban planning and operations is one of the goals of integrated water management.

This goal recognises the limitations of conventional approaches in which water is plumbed to and from a city, with little regard to the way the city itself is designed and the effect of this on the water cycle.

The alternative is a city in which water is a key design consideration of urban planning because:

- Urban development is a threatening process and we wish to reduce or avoid this impact.
- Urban planning represents a once-off opportunity to transform the urban built form to one that is more water sensitive.
- Urban design has become a tool to create new water resources, adopt green infrastructure approaches and deliver new liveability services to urban communities.

The problem: a detailed view

The nexus between urban stormwater, urban development and planning controls is complex. Clearly defining this problem is a necessary first step in developing solutions and considering the specific role the VPP should play.

To understand this, we consider the problem in different ways, which in turns helps to shape solutions.

The problem with our waterways

The condition of our waterways and bays does not meet community expectations, and water quality is the primary cause of concern.

These concerns are not new. The stormwater pollution controls currently in place were designed in response to community demands in the 1970s and 1980s to improve the condition of Port Phillip Bay and waterways such as the Yarra River that drain to it.

Whilst significant improvements have been made, and Victoria's waterways rate highly compared to those in comparable global cities, the community demands further improvements. This was highlighted by the media coverage of beach closures following heavy rainfall over the 2016/17 summer (Figure 3). Much of this impact was attributed to diffuse pollution throughout the Port Phillip Bay catchment.

Figure 3 - Port Phillip Bay water quality results communicated to the public by EPA Victoria, 20 Jan 2017, following storms. (source - https://twitter.com/EPA_Victoria/status/822195142471852032)

The problem with urban stormwater

Research (e.g. Wong et al, 2013) has established the harmful impacts of stormwater on waterways and receiving aquatic environments. The phrase “urban stream syndrome” has been coined to describe these effects.

Victoria is recognised globally as a leader in the management of urban stormwater. One of the ways this is achieved is through research to understand the problem and its solutions. As a result, there is now a better understanding of the full range of effects of urban stormwater. In summary, the stormwater problem has been redefined since the 1980s and we must now manage for the:

- broad range of pollutants in stormwater
- load of stormwater pollutants transported to receiving environments
- concentration of pollutants in stormwater
- changes to flow regimes in urban waterways
- pluvial flooding impacts
- decrease in catchment soil moisture and the effects on urban greening objectives.

The problem with the way stormwater is managed

Victoria continues to innovate in the tools and techniques used to manage stormwater. This innovation responds to the changing understanding of the stormwater problem. It is also reflecting broader changes in the philosophy of environmental protection and urban water cycle management:

- Approaches to environmental protection are shifting to prevention of harm rather than regulation of harm after it has occurred.
- The management of stormwater is shifting toward at-source controls to protect the waterways in a catchment as well as receiving waters.
- Approaches to natural resource management are differentiating waterway protection (preventing harm) from waterway restoration (returning ecological functions to previously degraded waterways). As a result, management tactics differ across the landscape.
- Approaches to urban water management are redefining stormwater as a resource rather than a waste.

The problem lies in the transition to these new approaches:

- The water quality standards currently used to manage stormwater (Best Practice Environmental Management (BEPM) Guidelines) reflect the science and stormwater management technology from the 1990s, with a focus on pollutant removal.
- The standards do not provide for 100% mitigation of stormwater impacts. Therefore, further urban development will exacerbate waterway degradation.
- We lack the technology to manage the stormwater problem at a range of physical scales.
- The broader regulatory framework lacks instruments to address the stormwater problem. Existing instruments are designed to improve the health of bays and waterways, and with greenfield development in mind. There are gaps, such as the application of State Environment Protection Policy (Water for Victoria) (SEPP) objectives to municipal drains conveying stormwater to waterways and bays.

- There is a growing legacy from past approaches, which were designed to meet best practice at the time. As a result there are gaps in the ability of stormwater infrastructure to manage flow standards.

- There has been a division of responsibilities for stormwater management; and the obligations are contested. The so-called “60Ha “rule” defining the boundary between council and Melbourne Water is an example, and effects the types of stormwater controls approved.

- There are gaps in the capability of land development designers and contractors to deliver and maintain functional stormwater management assets.

Victoria is one of the more advanced cities when it comes to integrating water and urban planning. Whereas other cities aspire to this goal, Victoria has a precedent in the Victorian Planning Provisions which directly link planning controls with water cycle best practice guidelines defined by the water/environmental management sector.

However we know that these planning controls can be improved. Problems with current planning controls include:

Coverage

- Not all development requires a planning permit.

- Subdivision is the trigger for statutory planning referrals however not all development includes subdivision.

- Land use types are not being managed consistently (i.e. with Clause 56 of the VPP and the BEPM standards).

- Waterway managers such as Melbourne Water use development services schemes (DSS) and overlays to tailor stormwater management in specific areas. Other areas - such as infill development, redevelopment or non-metro areas - are not fully covered.

Implementation

- Statutory planners find it difficult to implement the planning controls: the controls are not being applied consistently across Melbourne.

- Some councils do not accept applications for subdivision before development. In these circumstances, it is not possible for a referral authority to influence stormwater controls.

- Clause 56 of the VPP has become known as the ‘stormwater clause’: this narrowing of its definition in practice affects the way it is applied.

- Planning controls, and the corresponding institutional arrangements, do not enable solutions at regional, neighbourhood and site scales. There is specific a gap in providing localised solutions such as those at a street scale.

Effectiveness

- Planning controls were designed to work in tandem with other instruments such as the Plumbing Code and Australian Standards for plumbing and drainage. Stormwater source control measures have not been implemented through other these instruments and the burden of managing stormwater has fallen on the planning controls.

- Melbourne Water's DSS enable offsetting using contributions and regional stormwater assets. This mechanism is rarely available outside DSS, except where implemented by specific councils.

- Setting aside land for stormwater management is contentious. Pervious surface minimums for sites (typically 20% - Clause 55.03-4, 54.03-4) are not always implemented and do not cover all forms of development.

The urban development problem

Like other Australian cities, Melbourne and other Victorian cities and towns will experience considerable population growth over the next 50 years. With planned population growth and related urban development, there will be a significant change in the amount of urban stormwater runoff generated in Melbourne.

The nature of urbanisation is also changing. The previous emphasis on greenfield development will become more balanced with greater infill development. This has implications for stormwater management; greenfield developments are managed using DSS that coordinate drainage and water quality treatment assets in a catchment. There is no analogue for infill development.

The communication problem

The term 'water sensitive urban design' (WSUD) has been successfully mainstreamed within the water and development sectors. Similarly, many in the community recognise the harmful effects of littering etc. on bay water quality.

However, the narrative lags behind the science: developers consider the problem to be well-managed because they are implementing the current best practice guidelines, and community understands the issue in terms of swimmable beaches rather than effects on waterways.

These attitudes reflect messages that were developed many years ago, and Melbourne has since changed. The new, simple story about flow impacts or integrated water management (IWM) opportunities has yet to be constructed.

The problem: macro view

Melbourne is in a transition to a water sensitive city, and is shifting to adopt more integrated approaches to urban water management (Figure 4).

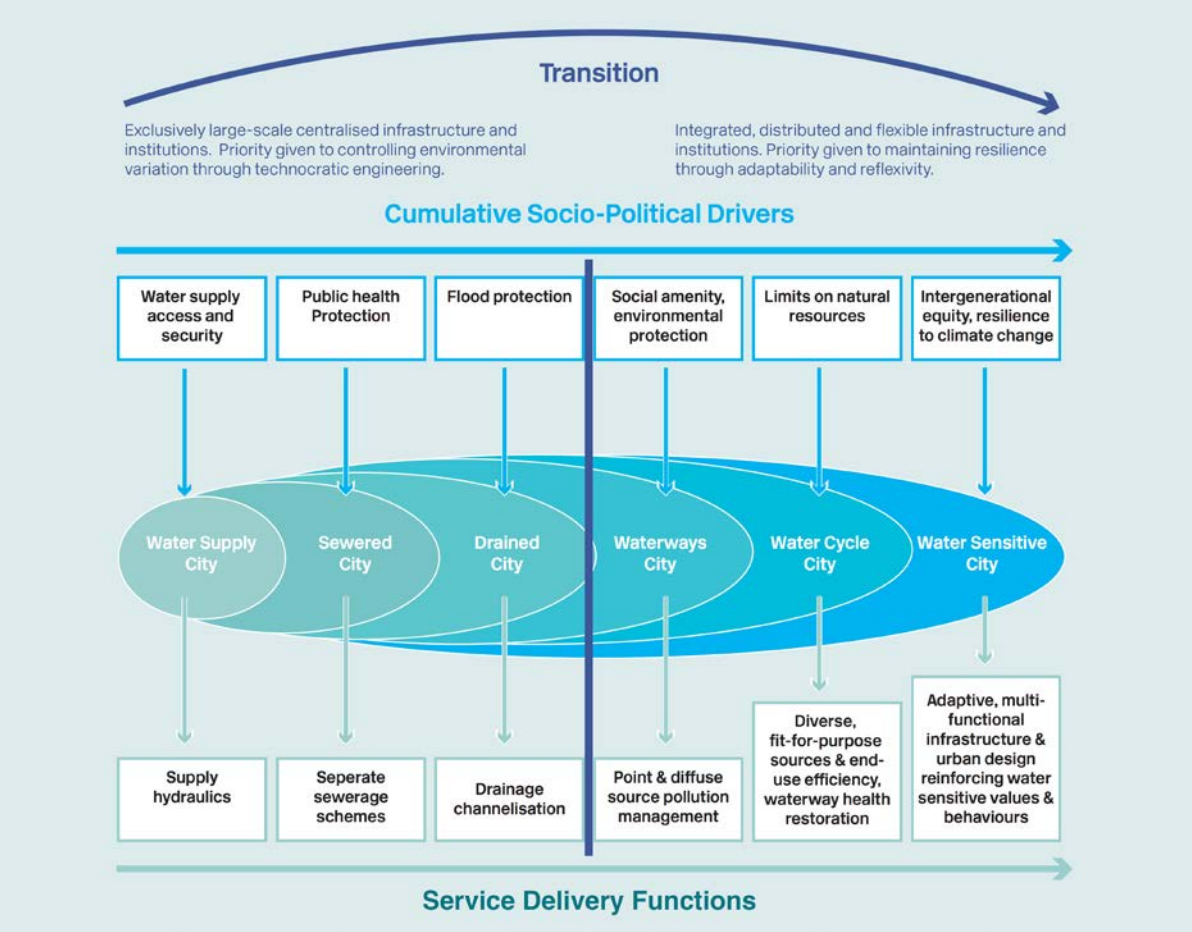

Figure 4 – The nature of transitions of cities towards water sensitivity (Brown et al., 2016)

This transition model helps us understand the context and changes required to improve stormwater management. Reframed more broadly, the question is: what role do planning controls play in fully mainstreaming integrated water management into policy thinking, regulatory tools and industry practice?

An investigation of Melbourne's transition (Brown et al., 2016) reveals a typology of six distinct "phases" through which a city's transition would typically progress (Figure 5).

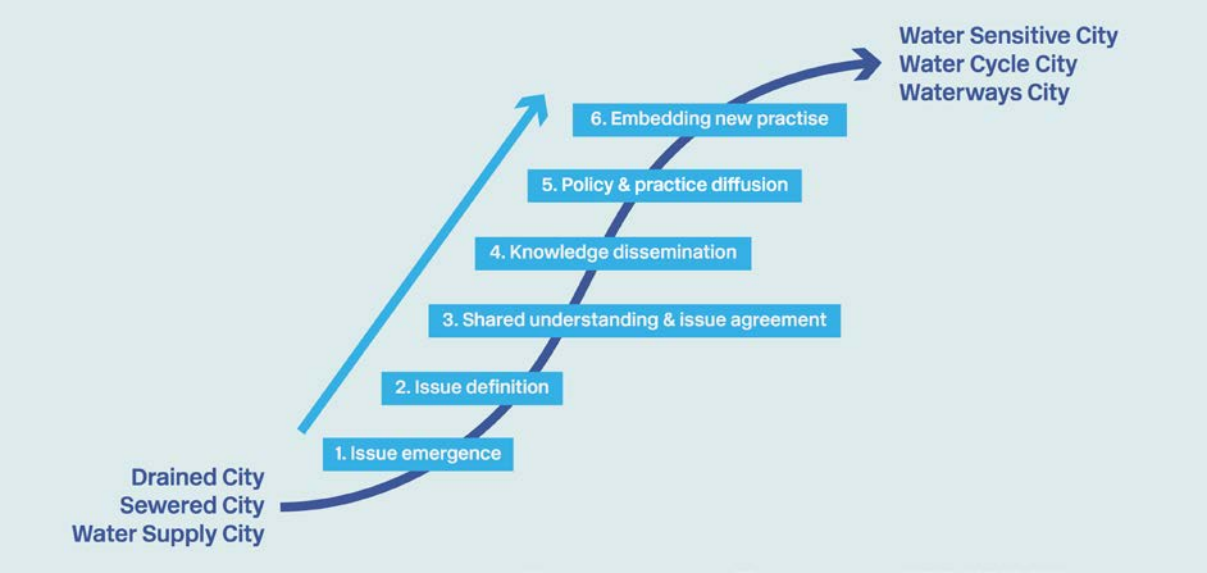

Figure 5 – The six phases of a city's transition (source – Brown et al., 2016)

Brown et al. (2016) describe these phases:

> *Taken together, these phases chart the emergence of a sustainability issue through to the eventual embedding of new water management systems into mainstream practice. In the Issue Emergence phase, a particular problem is identified (e.g. poor waterway health), followed by the Issue Definition phase, in which a cause of that problem is identified (e.g. stormwater pollution). The Shared Understanding and Issue Agreement phase is characterised by a common understanding of – and agreement on – the problem, its causes, and its repercussions. Solutions are not yet agreed on, but the need for action is acknowledged. From this point, the Knowledge Dissemination and Policy and Practice Diffusion phases are marked by greater agreement on the appropriate solutions. The final transition phase, Embedding New Practice, involves making the new practice mainstream.*

This framework puts the current Water for Victoria and Yarra River Action Plan initiatives into context and provides guidance on the potential next steps. To illustrate this, we simplify the current transition with three time steps: then, now and next (Figure 6).

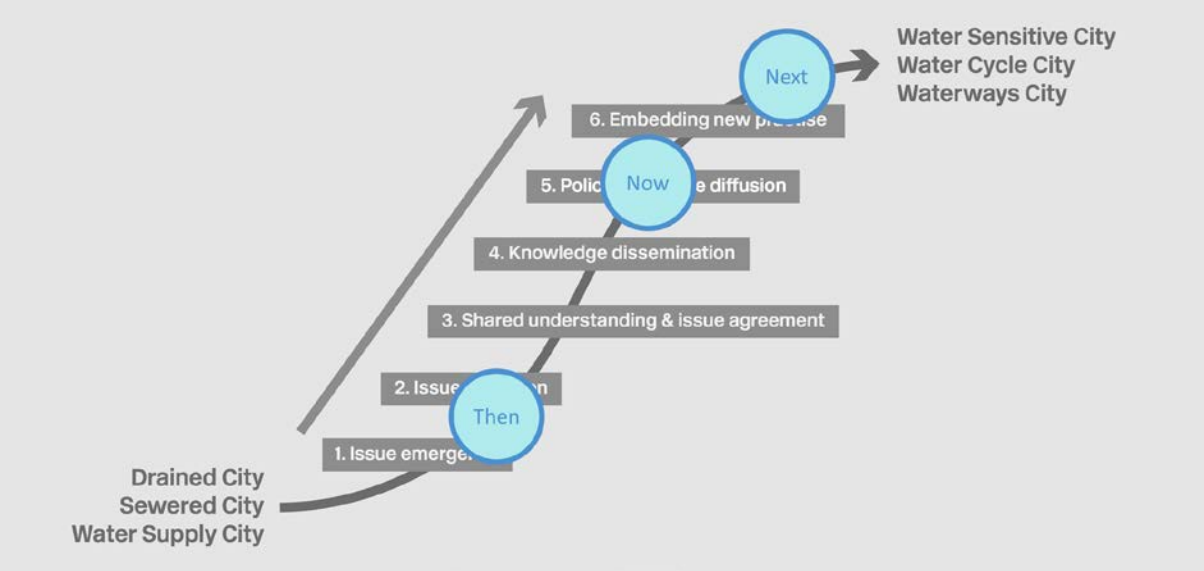

Figure 6 – The six phases as a diagnostic tool for the planning controls action

Then

Historically, Melbourne's beaches drained unsewered urban catchments. Beach closures and warnings were common. Mounting social activism and desire for change drove improvements in policy, practice and community education.

Before 1990s there were no environmental performance stormwater standards. The turning point was the Port Phillip Bay investigation in 1996, funded by Melbourne Water and delivered by the CSIRO, which suggested a 1000t reduction in the nitrogen load discharged to the Bay.

This was subsequently written into the SEPP Waters of Victoria, although at the time Melbourne was unable to comply with the SEPP objectives for waterways. In simple terms, Melbourne's waterways were failing the SEPP objectives because we were not managing diffuse pollution sources. The EPA was attempting to apply the SEPP receiving water objectives to developments as a de facto stormwater requirement, an approach that proved ineffective.

The Port Phillip Bay investigation provided a new and compelling reason to do something about stormwater pollution. Melbourne Water, the EPA and councils collaborated to determine how diffuse source pollution could be better managed. What emerged was an agenda to clarify the roles of the EPA, Melbourne Water and councils along with environmental performance standards and best practice guidelines for urban stormwater. Councils were then empowered to determine how they would apply the standards through local stormwater management plans. The potential existed to formalise these management plans to demonstrate compliance with the SEPP (or similar).

Now

Eventually these activities were adopted as a government policy initiative. The Stormwater Action Plan was funded to $22.5M, all councils developed a Stormwater Management Plan and since the Millennium drought these plans have evolved into IWM plans that broaden the scope of stormwater management.

Stormwater management was written into the VPP referencing the environmental performance standards, and delivered along with extensive capacity building programs. Research shows that these planning controls work. They do influence developer behaviour, and have had an identifiable impact in mainstreaming IWM in Victoria.

Water industry practice has also changed. Melbourne Water includes the stormwater management standards in its Development Services Schemes and uses its separate head of power to mandate these standards in green field subdivisions. As a result, virtually all greenfield development is using these standards and Melbourne Water now has ~500 stormwater wetlands and at any one time will have ~20 under construction.

However, we also see that the problem itself has changed. Melbourne has been on its WSUD journey for 20 years, and while it is often rated as best city in the world for implementing WSUD, we now want to do more.

We want to extend the stormwater focus to include drainage service standards, the protection of ecological values from hydraulic impacts and to deliver broader IWM outcomes such as the conservation of water resources or mitigate heat island effects.

Moreover, we see that the instruments we use are lagging behind. The VPP has played an important role. It sought to put into practice a set of stormwater standards but was only ever part of the solution. But while VPP has been delivered, other actions have not. We also have a technical policy through the best practice environmental management guidelines but lack appropriate instruments to deliver them at a range of scales.

Melbourne has since become stuck at this point on the transition curve to new practice. It spent the last 10 years investigating different planning controls and instruments to improve stormwater

management. But there is no agreement on direction and needs, and we continue to rely on the tools of the past to get us to the next step.

Next

Melbourne's next phase can be informed by its past. Melbourne began by wanting better water quality in its bays waterways, and created environmental performance standards and planning controls that were simple; an industry was created to implement WSUD and tools such as MUSIC and capacity building programs were introduced to facilitate this. As a result, WSUD has become part of common language.

This shows that it is important to see the VPP as an extension of the Victorian Government's policy goals, rather than as a regulatory instrument in isolation. The achievement of the Water for Victoria and Yarra Action Plan goals will requirement coordination of new or additional regulatory instruments. For example, Melbourne Water uses DSS as a regulatory instrument, backed a head of power that requires its approval of subdivisions, to manage stormwater within its area of operation. This instrument was designed to ensure drainage standards were met in new development and has since been adapted to include environmental performance standards to stormwater management.

The priority in the next phase is to address the gaps in the coverage of current planning controls and to introduce additional instruments to support their implementation: gaps in land coverage and development types as well as coverage of the impacts of stormwater. This lack of coverage raises equity issues that may justify planning intervention, even though it may increase costs for those currently not regulated – merely to level the playing field.

However, the next phase will do more than correct the issues with current planning controls. It will evolve these controls within a new agenda for urban stormwater management and embed these outcomes widely across the city.

In the next phase, planning controls will create an enabling regulatory environment to address the IWM opportunities for the city, with stormwater as a component part. As practitioners become increasingly familiar with this new practice, the number and diversity of on-ground demonstrations will grow and the community will see improvements in waterways and open spaces that match the longer-term improvements seen in Melbourne's bays.

Principles for shaping ideas

The following principles may be used to assess policy options and regulatory instruments to achieve the next step.

Effective

The instrument should be effective in:

- Delivering the IWM outcomes in Water for Victoria.
- Managing different types of development, or working in combination with other instruments to achieve this outcome.
- Driving behaviour, rather than being punitive. In other words, does the person upon whom it is being applied have control over the outcome?
- Delivering system wide outcomes:
    - avoiding negative upstream or downstream externalities.
    - ensuring on-site and offsite solutions accumulate to meet Melbourne-wide and long-term goals.
- Encouraging solutions that provide multiple benefits.
- Integrating with complementary instruments and mechanisms.
- Ensuring long-term performance of on-ground assets.

Sustainable

Sustainability has several dimensions. These include:

- Environmental sustainability.
- Agility and resilience to changing climate, development and other factors to ensure continued relevance in the future.
- Sustainability in long-term operation, which refers to the maintenance and renewal over time and upgrades at end-of-life to avoid a new ‘septic tank’ legacy.

Implementable

The instrument should be:

- Understood and able to be implemented by statutory planners, not being overtly technical and enabling them to confidently defend it at tribunal.

Equity

Equity includes:

- Covering all land use types.
- Balancing responsibilities across polluters, beneficiaries and the costs of stormwater impacts.

Affordable

The instrument should be affordable:

- In its monitoring and compliance regime.
- By providing developers with choice and flexibility.
- By providing a value proposition for developers. For instance providing certainty of development approvals or enhancing land value.
- By facilitating investment in solutions across a range of scales (lot, street, regional) where this can increase the environmental and liveability outcomes per dollar invested.

Flexible

The instrument should enable:

- Use by regional councils where the level of stormwater treatment may be different.
- Evolution of best practice over time as new development typologies, WSUD technologies and other changes become available.
- Tailoring for local contexts. For instance, not all sites will want to use an offsets scheme if there is a specific waterway value to be protected and development adjoining a creek.

Ideas

This report identifies ideas and implementation pathways for further analysis. These pathways span a range from immediate actions to improve the current Victorian Planning Provisions, to more aspirational ideas for the longer term.

Business as usual (BAU) represents the actions and outcomes that can be implemented in the short-term, largely within the existing policy, regulatory and practice environment (or with achievable enhancements). Importantly, many of these ideas are the first steps to deliver the Good and Aspirational outcomes.

The Good and Aspirational outcomes reflect ideas that require more substantial change but result in significant community benefits. The Aspirational outcomes assume no constraints, and were designed to fully address the problems articulated in this report. Where barriers in achieving these Aspirational outcomes currently exist (e.g. cost effectiveness, proof of technologies, enabling policy and regulatory environment) the task is to identify, evaluate, prioritise and address these barriers. As a result, some of the ideas need to be framed as outcomes for the future, with action taken in the short term to begin this transition.

The Good category provides interim outcomes and potential milestones on this transition, particularly as key enabling steps.

These ideas and pathways are summarised in Table 1, highlighting both the role of planning controls and other actions that can prepare for, and support, the implementation of planning controls. Importantly, many of these activities are interdependent. It is recommended that DELWP and its stakeholders next:

- Define these ideas in greater detail (as required)
- Evaluate their practicality and business case
- Agree actions to implement them.

Table 1 - What does success look like?

	BAU	Good	Aspirational
	What outcomes are possible now.	What would represent a significant improvement?	What would the outcomes be in an ideal world?
Waterways	Stormwater management is integrated with waterway management – consistent values, objective setting, prioritisation.	Place based objectives for waterways defined in IWM plans. IWM plans have legislative basis. Guidelines enable translation of place based objectives to local urban waterway targets.	Waterways are managed as critical infrastructure in cities and towns, providing essential ecosystem services. Healthy waterways are protected; degraded (and valued) waterways are being rehabilitated.
Urban stormwater	The full range of stormwater impacts are being managed. Undertake research, consultation and prototyping as required to develop a flagship environmental standard that reflects that range of environmental hazards in stormwater runoff.	Licence to pollute is reduced: reduced residual impact of development on waterways. e.g. increase the nitrogen reduction target to 50%. Develop solutions that can manage or offset the full stormwater problem in new and existing development.	Licence to pollute is effectively removed. E.g. a 80% nitrogen reduction target and/or swimmable rivers. Stormwater is valued, and managed, as a resource: too valuable to waste.
Stormwater management	There is an agreed narrative for stormwater management. Standards (BEPM) are revised to recognise contemporary technical knowledge. Roles for management of stormwater – with respect to IWM – are clear. SEPP as minimum environmental standard, with the ability to vary stormwater standards to match local water way conditions. Enable flexible BEPM standards that incorporate ranges and allow catchment specific targets to be set.	Framework in place that translates IWM and WSUD into standards and planning at a local scale. Develop structures to implement offset schemes outside Development Services Schemes. Clarify Council obligations for stormwater management. e.g. General duty for councils in the Environment Protection Act to deliver stormwater quality and ecological health targets. IWM targets in place (for multiple benefits of stormwater) No implementation gap in stormwater instruments. Instruments in place to enable solutions at a range of physical scales: best practice guides, defined performance outcomes, incentives.	Stormwater runoff from existing development is being managed. Stormwater legacy issues avoided – accountability for life cycle of stormwater assets is clear. e.g. a certification scheme for on-site systems or Section 173 Agreements to ensure operation and renewal of on-lot stormwater controls. Property rights to stormwater defined. Licence to discharge stormwater and price signals related to stormwater discharge support investment in re-use. IWM contributes to greening and heat island mitigation.
Urban development	Developers understand the new stormwater problem.	Councils are using the local scale public realm (street scale) to manage stormwater. Sufficient open space (public or private) is secured in new development for offsetting opportunities or on-site stormwater management respectively.	IWM is mainstream in new development Rainwater is like solar: seen as a feature and value add to homes. It may be linked to drainage charge rebates to provide an incentive.

	BAU	Good	Aspirational
	What outcomes are possible now.	What would represent a significant improvement?	What would the outcomes be in an ideal world?
Planning controls	Harmonise and simplify WSUD controls across planning scales and instruments to encourage adoption by planners. Multiple benefits approaches defined and encouraged, such as managing the predicted increasing severity of heatwaves. Planning controls enable place-based solutions that respond to differing waterway conditions and community objectives for these natural assets. Capacity building for industries across the value chain of implementing planning controls. Melbourne Water's Healthy Waterways Strategy is a reference document in the State Planning Policy Framework. Stormwater management practitioners are accredited. The trigger for statutory planning referrals changed from 'application for subdivision' to 'application for development'. Compliance standards and an auditing program developed for systems installed to meet planning control requirements.	Full coverage of land types and development types. Objectives and targets in approved IWM plans are binding and mandatory in the VPP. Enable offsets (e.g. outside of Development Services Schemes). Enable local (street) scale solutions. Enable Councils to vary the mix of offsets and on-site approaches to suit local needs. IWM and WSUD opportunities atlas in place to identify strategic regional investment projects. Use schedules to residential zones to vary the default site coverage and site permeability objectives of Clause 54 One Dwelling on a lot and Clause 55 Two or more Dwellings on a lot and residential building. Use design and development overlays to identify areas affected by specific requirements relating to the design and built form of new development. Coordinated council innovation program in place to support prototyping of 'next-generation' planning controls.	Planning controls provide incentives for developers to reduce their costs, add value to their developments. Planning controls have a consistent state framework, but targets vary by catchment and waterway as defined by IWM plan. Essential on-site solutions such as rainwater tanks are mandated for newly constructed houses. Planning controls recognise and provide incentives to restore degrade urban waterways. Instruments in place to manage existing development: • economic regulation may be a better tool to target existing imperviousness. • planning controls used to achieve incremental change over time through the application of IWM best practice. • planning can interact with market based instruments and infrastructure planning arrangements to redistribute investments to optimal locations and achieve economies of scale.

References

Brown, R., Rogers, B., Werbeloff, L., 2016, Moving toward Water Sensitive Cities: A guidance manual for strategists and policy makers. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

DELWP, 2016, Water for Victoria – Water Plan, Department of Environment, Land, Water and Planning, State of Victoria ISBN 978-1-76047-348-8.

DELWP, 2017, Yarra River Action Plan - Wilip-gin Birrarung murron, Department of Environment, Land, Water and Planning, State of Victoria ISBN 978-1-76047-475-1.

Wong T.H.F., Allen R., Brown R.R., Deletić A., Gangadharan L., Gernjak W., Jakob C., Johnstone P., Reeder M., Tapper N., Vietz, G. and Walsh C.J. , 2013, blueprint2013 – Stormwater Management in a Water Sensitive City. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities, ISBN 978-1-921912-02-3, July 2013

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About the CRCWSC

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) was established in July 2012 to help change the way we design, build, and manage our cities and towns by valuing the contribution water makes to economic development and growth, quality of life, and the ecosystems of which cities are a part.

The CRCWSC is an Australian research centre that brings together many disciplines, world-renowned subject matter experts, and industry thought leaders who want to revolutionise urban water management in Australia and overseas.

Research synthesis

Research synthesis is key to successful research application and adoption.

A facilitated design process, Research Synthesis brings together the CRCWSC's many research areas and disciplines with government and private industry partners to develop practical "ideas" for addressing specific industry-based challenges.

Research synthesis is a highly effective tool for exploring collaboration and innovation. The open-minded environment of a research synthesis design workshop is founded on science, and no individual organisation leads or owns the conversation. This supports an unbiased dialogue that enables the discovery of new and creative ideas.

CRCWSC Research Synthesis

Discussion Paper | CRC for Water Sensitive Cities

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