Stormwater Management Design Objectives

DISCUSSION PAPER – PART 2 – NEW APPROACHES FOR WATERWAY OUTCOMES

Final Report – May 2019

Healthy land & water
Solutions Protecting Your World

aqua terra

ETHOS URBAN

alluvium

Funded by:

Queensland Government

Document history

Revision:

Revision no.	03
Author/s	Tony Weber (Alluvium) Lisa Walpole (Alluvium) Jenny Roughan (Ethos Urban) Earl Shaver
Checked	Matt Francey (Alluvium)
Approved	Steve Skull (Alluvium)

Distribution:

Revision no.	01
Issue date	26/05/2018
Issued to	Glenn Browning (HLW) Andrew O'Neill (HLW) Brad Dines (DES)
Description:	Draft for comment
Revision no.	02
Issue date	17/10/2018
Issued to	Glenn Browning (HLW) Andrew O'Neill (HLW) Brad Dines (DES)
Description:	Revised draft for comment
Revision no.	03
Issue date	28/05/2019
Issued to	Glenn Browning (HLW) Andrew O'Neill (HLW)
Description:	Final report

Citation:
Alluvium (2019). Discussion paper – Part 2 – New approaches for waterway outcomes, prepared on behalf of Health Land and Water and the Department of Environment and Science, Brisbane, 2019

Acknowledgments:
We particularly appreciate the inputs of Glenn Browning, Andrew O'Neill and Shaun Leinster in the development of this discussion paper.

Contents

1 Introduction 1

2 What are the issues with the frameworks for implementing urban stormwater design objectives? 2

2.1 The existing policy frameworks 2

2.2 Stakeholder views 5

2.3 Integration with Local Government Planning Schemes and Infrastructure Plans 5

2.4 Planning for Waterway Outcomes 6

2.5 Key issues 7

3 What needs to change for the implementation frameworks to succeed? 9

3.1 Theme 1 – Planning for Waterway outcomes 9

3.2 Theme 2 – Declaring Waterway Outcomes and Strategic Intent 9

3.3 Theme 3 – Establishing clear linkages 10

3.4 Theme 4 – Integration and System Thinking 10

3.5 Theme 5 - Equitable management of stormwater impacts 11

3.6 Key issues 11

4 How should we change the frameworks for implementing urban stormwater design objectives? 12

5 Conclusions 17

6 References (for Part 1 and Part 2) 18

Figures

Figure 1. *Current process for achieving waterway outcomes* 2

Figure 2. *Policy framework links* 4

Figure 3. *Pathways of strategic intent* 13

Figure 4. Waterway Asset Management Planning process (suggested) 15

Figure 5. *Policy links with recommended approaches* 16

1 Introduction

This second part of the discussion paper on urban stormwater design objectives focuses on a new framework that considers the policy, legislative and other contexts and proposes new approaches for how design objectives may be implemented to provide better waterway outcomes in urban areas across Queensland.

It should be read in conjunction with Part 1 which is a review of the development of the existing design objectives, the science around how stormwater design objectives are contributing to waterway health outcomes and potential improvements in the numerical objectives themselves.

The purpose of splitting the discussion paper into two parts is to allow a broader consideration of the implementation approaches in this part separately from a discussion around the science and implementation issues associated with the objectives themselves.

2 What are the issues with the frameworks for implementing urban stormwater design objectives?

2.1 The existing policy frameworks

Within Queensland, the Environmental Protection (Water) Policy 2009, usually abbreviated to the EPP Water, provides the regulatory head of power for the setting of water quality objectives in the waterways of the State. That document provides concentration-based targets for specific waterways and regions in Queensland and is used in association with the *Environmental Protection Act 1994*, to manage Environmentally Relevant Activities, and also provide guidance on the water quality needed to protect Environmental Values for a range of activities that have been identified in conjunction with the community. It also links to mapping of defined "management intents" including High Ecological Value (HEV) areas which are locations where there is a requirement to demonstrate no change in water quality in order to protect the HEV status of these waterways.

In addition to the EPP Water, the Water Quality State Interest in the State Planning Policy (SPP) 2017 is one of 6 State Interests that must be appropriately reflected into planning schemes to address stormwater impacts from new urban development. Specific Stormwater Design Objectives are contained in Appendix 2 of the SPP and apply above a threshold (currently lots larger than 2500 m^2 in area, or greater than 6 lots). These design objectives are also set for different climatic regions across the state. They are stated as percentage load reduction objectives for total suspended solids, total phosphorous, total nitrogen, and gross pollutants and include a flow management objective, limiting 63% AEP flows to not exceed pre-development flow rates. Local governments are required to reflect the policies set out in the SPP in local planning schemes which regulate development.

When this process is considered at a high level, what we find is that the strategic intent of the SPP and EPP Water are not being achieved, as per the diagram below.

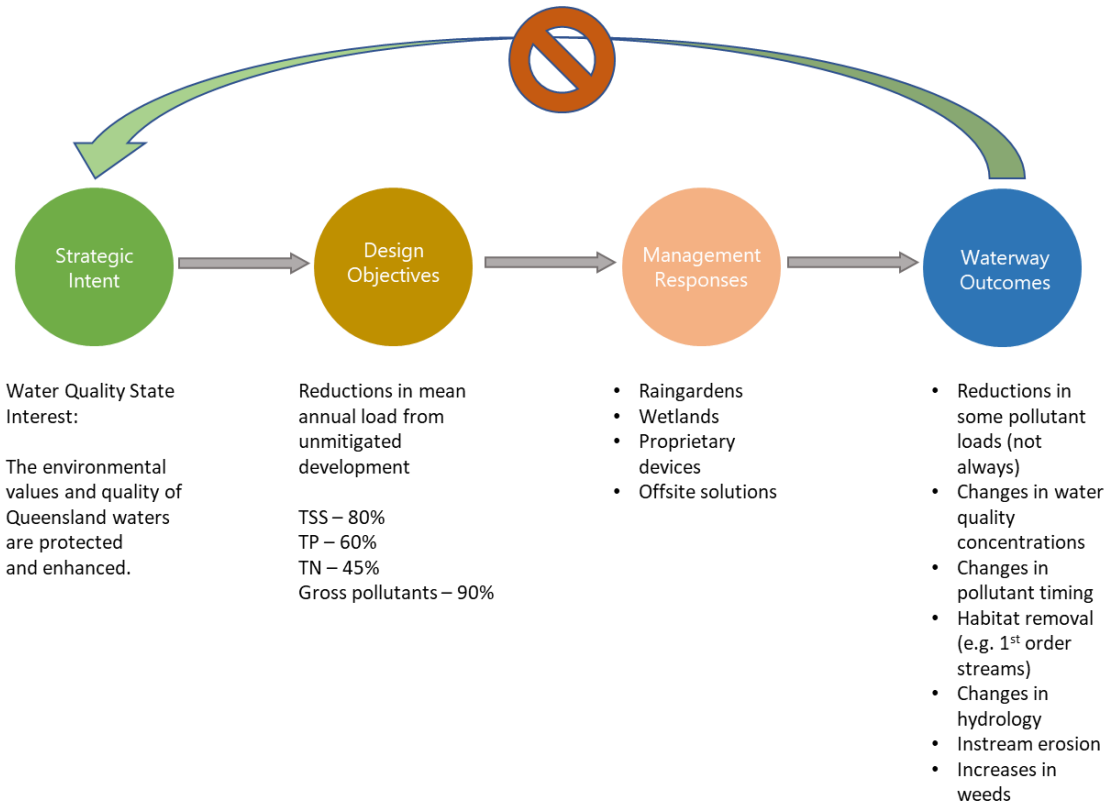

Figure 1. *Current process for achieving waterway outcomes*

This figure highlights **that there is a significant disconnection between the high-level intent and the outcomes that are being delivered in our waterways**, in that if we wish to protect the range of Environmental

Values that have been identified for Queensland's Waterways, we need to have design objectives that will drive the management responses needed for that to be achieved. Currently, this is not occurring to any significant degree.

There are also some important values within the SPP that perhaps are ignored when translating the elements of individual state interests. Firstly, where there are competing state interests (which is highly likely when attempting to implement stormwater management measures through water sensitive urban design) the SPP states that it does not prioritise one state interest over another. It also outlines that the way each of them are applied may vary between and within regions depending on environmental, economic, cultural and social factors. However, the structure of **the SPP does not group together or explicitly identify the interrelationship of many of these factors for specific state interests**. It is not possible to structure the SPP in a way that deals with all related aspects together without a large amount of duplication (and, very likely, confusion), **though it may be possible to rearrange some matters to create a discrete waterway and wetland state interest**. This could, for example, more clearly relate Matters of State Environmental Significance (MSES) dimensions like HEV waters, wetlands and waterways and their buffers, to waterway health. In any event, there is much room to improve the clarity and effectiveness of the state policy statements across all the dimensions relevant to waterway health and values, and to identify more effectively how they interrelate and how they might be integrated in a local planning scheme.

Secondly, under the Outcome focused guiding principal in the SPP, it states that "when outcomes are satisfied by development, then the relevant performance outcome is taken to be satisfied in full". This means that currently, if the SPP design objectives are met by the development, then the development would have satisfied criteria (1) of the Water Quality State Interest (i.e. that development facilitates the protection and enhancement of environmental values and the achievement of water quality objectives). Hence **there is currently no recourse to require development to deliver anything beyond those design objectives** within planning legislation even though the strategic intent is to protect and enhance Queensland waterways.

The Water Quality State Interest section is one of several state policies that are to be balanced and applied to the local circumstances. Liveability, hazard and MSES (which include HEV waters, waterway corridors and wetlands) State Interests (among others) are expressed in other parts of the SPP, but **there is no explicit link to the EPP Water in any of the policies within the SPP**. For example, within the Water Quality State Interest, there is a requirement that "(1) Development *facilitates* the protection or enhancement of environmental values and the achievement of water quality objectives for Queensland waters", however there are no requirements outlined how this is to be achieved, nor is there referral to Schedule 1 of the EPP Water in which those objectives lie. This appears to present an issue, especially with respect to the protection of HEV waterways, as currently the SPP requires that "(2) Land zoned for urban purposes is located in areas that avoid or minimise disturbance to: … (b) high ecological value ecosystems…". This doesn't imply a requirement to achieve the water quality objectives needed to protect those HEV systems. Again, this is an example of the lack of a clear linkage between these two policies attempting to deliver the same or similar outcomes.

This lack of connection between different pieces of legislation and policy documents that form our policy framework is highlighted in the figure below.

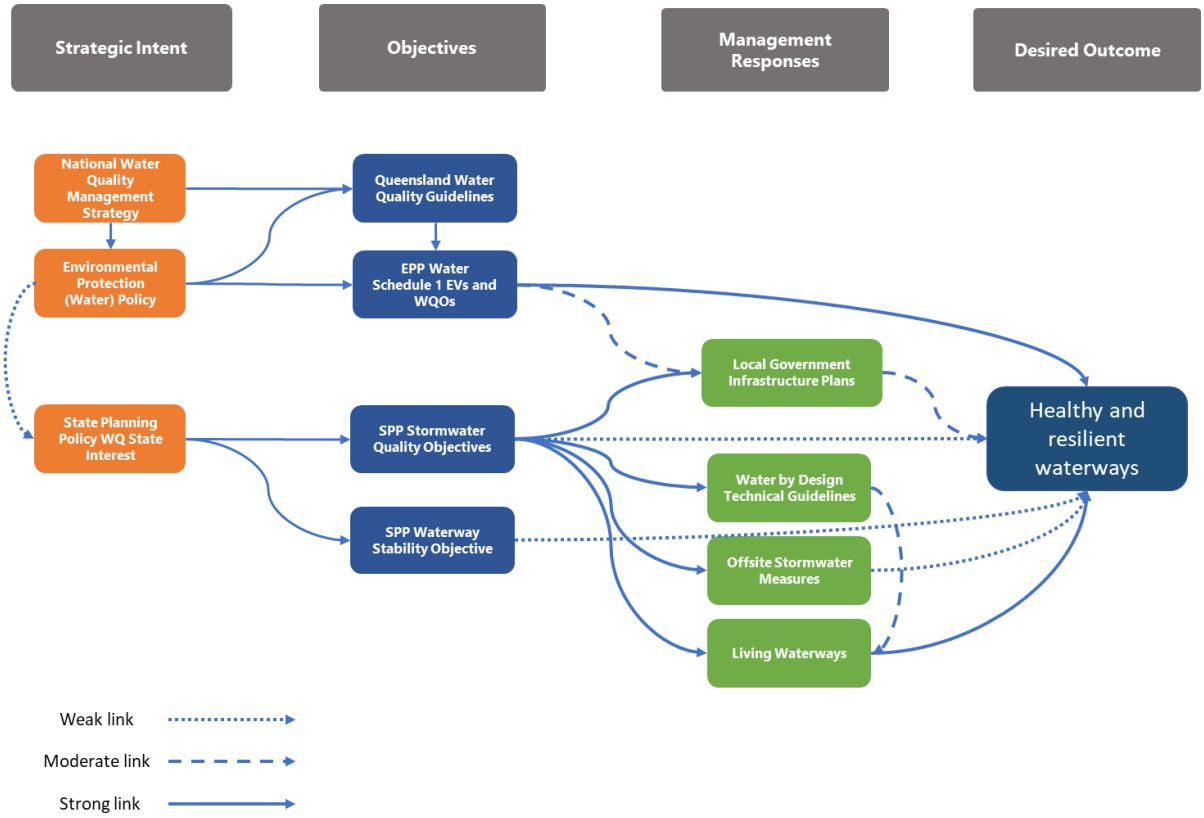

Figure 2. *Policy framework links*

In this diagram, it can be seen that our strategic intent, objectives, management responses and outcomes are currently only loosely connected. **There is no clear line of sight between our overall high-level ideals and the outcomes we are trying to achieve for our urban waterways. This needs to change.**

Our terminology in the above diagram should be clarified further. The Strategic Intent is the high-level statement within policy documents that is meant to drive towards an outcome, for example to "Protect and Enhance the Environmental Values and Quality of Queensland Waterways". This does not necessarily mean that we will have healthy and resilient waterways if this intent is met, as it is meant to connect to specific statements around defined environmental values and water quality objectives contained in the EPP Water. It also doesn't address all elements needed to achieve healthy and resilient waterways, but the intent is meant to drive policy and management responses through compliance with objectives towards achieving that outcome.

The objectives then become the goal posts for enabling action and assessing if those actions achieve a set standard, but again, our current objectives do not explicitly lead to this. They have been developed around a principle that pollutant load reduction may lead to achieving healthy and resilient waterways, but as was outlined in Part 1, the evidence supporting this is not strong. Objectives should have a clear link with the strategic intent and the outcome, but also with the management responses they are meant to enable. Management responses are those actions we take to achieve the objectives, in the case of stormwater design objectives this usually means working through a process to understand a site, develop a conceptual design, test that design against the objectives and then developing up the detailed design of the treatment measures. In doing so, the designer refers to a number of documents as noted in the diagram. Obviously, this is a simplification, many other documents and guidelines can inform the process, but the approach that management responses are driven by the objectives we set is a very clear one in our existing policy frameworks. It has driven the implementation of stormwater management in Queensland for a decade or more. The problem remains though, it hasn't allowed us to achieve an outcome of healthy and resilient waterways, not because of a failure of the objectives or management responses, but because **we failed to make a direct connection between the objectives we set and the outcome we were ultimately trying to achieve**.

2.2 Stakeholder views

In developing this discussion paper, the opportunity to consult with key industry stakeholders was taken. This included representatives from local government, water utilities, state agencies and other consultants. The intent behind this was to provide greater input into the challenges and opportunities that refined design guidance could enable. These included:

- **Systems thinking** – The design objectives should consider all elements that influence the delivery of sustainable waterway outcomes rather than focussing on individual components.
- Linking top to bottom (state interests to development outcomes) through local planning – **providing a clear line of sight between the high-level requirements and the outcomes delivered** on the ground.
- **Objectives must be measurable and transparent** – the need to demonstrate that any revised objectives were reasonable and relevant under planning legislation, but also able to be measured from a compliance perspective and have the clear line of sight to high level outcomes. They also need to demonstrate that they are consistent with best-practice.
- **Redevelopment vs greenfield** – ensuring that there was both **consistency of approaches** but also consideration of the risks of the development context were seen as important. The need to ensure that the objectives do not encourage a lesser requirement in areas that were already impacted was also identified.
- **Not effectively adapting to recent science** – as noted earlier in the discussion paper, the science has moved on considerably from when the original design objectives were developed, so any new objectives have to reflect and incorporate this science.
- Desire for consistency but an **understanding that a one size fits all approach may not deliver** all that is required for waterways.
- **Remove barriers for a range of assessment methods** – currently there are only two methods to assess compliance with design objectives, using a deemed to comply approach or using MUSIC modelling. There are other software packages and assessment methods (e.g. Living Waterways) that could also provide appropriate frameworks for understanding compliance with revised design objectives.

2.3 Integration with Local Government Planning Schemes and Infrastructure Plans

The SPP identifies the requirement that local planning schemes create the framework for an efficient development assessment system. To do this, it is important that planning schemes do not designate areas for development and then establish assessment requirements that create unnecessary impediments or delays to that development. The balancing of which areas should be used for development (and in what form) ought to be determined at the strategic level rather than site by site development assessment. The assessment process and therefore the design objectives cannot be used in ways that prevents development occurring in areas already designated for development. **Local government therefore needs to understand the higher-level strategic intent for waterways within their jurisdiction** and how urban development may impact upon them.

Local governments are required to apply the SPP policies to their local context, and to balance and integrate all the various elements. No one element is identified as more important than others in establishing the required balance. In other words, local governments need to provide for new development and economic activity, while maximising community benefit and minimising the cost to the environment. This implies that **urban development processes cannot be the only method by which urban stormwater impacts are managed**.

Planning schemes are important documents that are required to address a wide range of matters. The Queensland planning framework also requires them to be "performance based" (testing the "performance outcomes" of development rather than prescribing set standards) and allows for a high degree of flexibility and discretion in the development assessment process. Consequently, due to the "policy load" they are expected to carry and the way in which they are constructed, they are often criticised as being unclear, internally inconsistent, overly complex and lacking user friendliness. In our experience, **stormwater and environmental aspects can be a source of significant delay in assessment processes** and are often contested.

Local governments are also challenged by the resourcing implications of the combined expectations for further studies and analysis created by the various SPP components.

It is therefore important that the water related SPP requirements are clear and practical, cognisant of the ease with which local government can implement the policy directions and provide "default" options in the absence of the immediate resources to adopt a more sophisticated approach.

To establish clear and defendable assessment benchmarks within planning schemes, local governments must consider the expectations of different forms of development in different contexts and establish practical and reasonable requirements. They **must also ensure their planning schemes do not "double dip" on matters dealt with as trunk infrastructure in the LGIP and subject to infrastructure charges**. This is particularly the case for local governments where offsite stormwater management measures are being encouraged. It is highly likely that proposed measures for addressing stormwater impacts offsite (offset measures) would also provide a trunk infrastructure function under an LGIP. The challenge is around the definition of what "demand" the infrastructure is servicing to ensure that there is no confusion around the developer contribution as part of off-site measures or those required for trunk infrastructure. At present, the stormwater objectives are being used both as the assessment benchmarks for urban development (through the SPP requirements) and could also be used as the Desired Standards of Service for an LGIP. This would make it very difficult to define what may be considered trunk or non-trunk infrastructure. Further consideration is needed around how these definitions could be clarified to minimise the potential for development charges being obtained through two different mechanisms to fund the same piece of infrastructure.

2.4 Planning for Waterway Outcomes

Across Queensland we have had several approaches to plan for waterway outcomes over the last decade. This included the development of Urban Stormwater Management Strategies, Total Water Cycle Management Plans and Water Quality Improvement Plans. All of these had the strategic intent of achieving healthy and resilient waterways through the implementation of the plan and were delivered at a range of scales and complexities.

For example, Brisbane City Council previously had a process of developing Waterway Health Assessments, driven largely by the identification of actions in Council's Urban Stormwater Management Strategy which formed part of specific Waterway Management Plans on a creek by creek basis. The plans then informed actions within Local Plans that directly linked to planning scheme requirements in specific areas. This demonstrated a clear connection with a waterway outcome that was formed on an evidence base provided by assessing the condition of the waterway.

Another similar example was the development of Total Water Cycle Management Plans (driven by legislative changes in the EPP Water as part of responses to the millennium drought) that also required the identification of management responses and actions that would achieve a range of integrated water management outcomes, including healthy and resilient waterways.

Both examples had the legislative requirement of developing these plans placed on local government. The result of these requirements meant that the plans themselves differed greatly across jurisdictions in terms of complexity and connection back through planning frameworks, and obviously the outcomes they were able to influence. In many cases, the plans developed went through a process of community consultation, but largely the community were not included in the original establishment of strategic intent or the discussions around the outcomes to be achieved in waterways.

Currently, there is no requirement to undertake planning associated with waterways. Changes in the EPP Water have removed requirements on local governments to do this. Only through specific Water Quality Improvement Plans developed for the Great Barrier Reef (GBR) in the last several years do we have clear connections between the existing condition of waterways and the changes needed in those conditions (typically through pollutant load reductions) to achieve improvements in the health and resilience of the receiving environment of the GBR. For other waterways across Queensland, there is a distinct lack of planning that provides for clear direction on what we want to achieve on specific waterways. We are therefore missing

a clear process to plan for waterway outcomes and there is no direction provided to move from the waterway condition as it currently exists to what we want it to be in the future. The only possible exception to this would be waterways defined as High Ecological Value in Schedule 1 of the EPP Water, in that the direction in the policy is to achieve no change in defined water quality for those waterways. In terms of the requirement to "protect and enhance" the environmental values and water quality objectives for Queensland's waterways, other than for HEV waterways, **no process is provided for how "protect and enhance" is to be achieved**.

2.5 Key issues

- **There is no clear line of sight between our overall high-level ideals and the outcomes we are trying to achieve for our urban waterways.**
- **There is no explicit link to the EPP Water in any of the policies within the SPP.**
- **The SPP does not group together or explicitly identify the interrelationship of state interests.**
- **It may be possible to create a discrete waterway and wetland state interest.**
- **There is currently no recourse to require development to deliver anything beyond the current design objectives.**
- **We need to apply systems thinking to design objectives to ensure we capture the integrated nature of how waterways operate.**
- **A clear line of sight between the high-level requirements and the outcomes delivered needs to be reflected in the objectives.**
- **Stormwater Design Objectives must be measurable and transparent and have a consistency of approaches for different development types while effectively adapting to recent science.**
- **We recognise that a "one size fits all" approach may not deliver all of the management responses needed to mitigate urban stormwater impacts.**
- **We need to provide for a range of assessment methods to evaluate compliance with design objectives.**
- **Local governments need to understand the higher-level strategic intent for waterways within their jurisdiction.**
- **Urban development processes cannot be the only method by which urban stormwater impacts are managed.**
- **Stormwater and environmental aspects can be a source of significant delay in assessment processes.**
- **Local governments are challenged by the resourcing implications for further studies and analysis created by the various SPP components.**
- **We need to ensure that water related SPP requirements are clear and practical.**

- **There is currently no process provided for how "protect and enhance" is to be achieved, even though this is the overall strategic intent of the SPP and EPP Water.**

3 What needs to change for the implementation frameworks to succeed?

From the issues identified in the previous section, there are several clear themes that are apparent. These indicate the areas where change is needed to improve the implementation of design objectives such that they deliver the waterway outcomes we desire.

3.1 Theme 1 – Planning for Waterway outcomes

As noted in the previous section, there are no current policy requirements for a planning process around waterway management and outcomes. While many plans have been created over the last 20-30 years across Queensland, there hasn't been a consistent process developed to understand the existing condition and ecosystem services of a waterway, whether those conditions and services are meeting current and future values for a waterway, and if not, mapping out a process to enhance the waterway to meet those values in the future.

What is needed is for effective waterway planning to be required under policy or regulation, such as the previous need to develop Total Water Cycle Management Plans as part of EPP Water, but the delivery of waterway planning must not be solely burdened on local government as noted in the issues above. Most waterways flow across more than one jurisdiction, and in many areas of Queensland, community involvement in waterways is strong. Waterway planning therefore needs to allow for community involvement through existing efforts from waterway groups, environmental groups, Non-Government Organisations as well as local and state agencies (including water utilities). The process needs to identify what we already have in our waterways, what we want for them in the future and the pathways to move from one to the other. This will allow us to know what needs to be "protected" and what needs to be "enhanced" and will therefore drive the development of design objectives that can allow us to do both.

3.2 Theme 2 – Declaring Waterway Outcomes and Strategic Intent

Our overall intent for urban waterways (and also non-urban waterways) is declared in both the SPP and EPP Water as protection and enhancement of environmental values and water quality. Largely, this is borne out of the process of establishing environmental values through the National Water Quality Management Strategy framework of the 1990s which requires government agencies, industry and the community to identify the values they want to achieve in a waterway, considering the costs and benefits of doing so. This required the documenting of values that the community identified as important for waterways, then establishing water quality for reference sites where those values were being provided to use as a guidance for setting water quality objectives. These environmental values then became statements of desired waterway outcomes, and while associated water quality objectives were defined, the inference was that if the water quality objectives were met, the waterway was able to support those outcomes. The problem with this inference is that if an environmental value was not solely focused on a water quality requirement, for example, swimming (primary contact recreation), then a range of other objectives would also need to be met to demonstrate that the environmental value was supported in a waterway. The other issue is that the existing environmental values as defined under the National Water Quality Management Strategy (and reflected in the EPP Water) are strongly tied to water quality. If these values were to be used to indicate waterway outcomes, the existing list of environmental values will need to be supplemented.

This does suggest that **environmental values can be used to indicate the desired outcome for a waterway**. The challenge then is to understand whether those values that are currently being provided are worthy of protection, or require investment to enhance them and if additional values need to be defined. **The need for a planning process to define them** is therefore further reinforced as outlined in Theme 1.

From a local government perspective, if waterways in their jurisdiction are already impacted, they may choose to establish a strategic intent that seeks to improve them over time, or in areas where waterways are already in a condition that is acceptable to the community, it may be appropriate to set an intent to protect their condition. In the experience of the authors, local governments where there are significant development pressures can find it challenging to achieve enhancements in waterway outcomes in the face of population growth. A strategic intent of protection of existing waterway condition in the face of that growth may be the

most appropriate way of providing waterway outcomes that are acceptable to the community and that does not result in an excessive cost burden on existing residents while still requiring future development to effectively manage their impacts. Ultimately, protection of the existing condition should be the starting point, or default position of any consideration of strategic intent, but then consideration of the implications of that on the cost burden can then be determined.

What is needed then is flexibility in declaring the strategic intent to ensure they are consistent with local issues. It should not require all local governments to achieve the same intent, but to define that intent through consideration of the issues, community expectations and future changes that may occur within their jurisdictions. Again, the planning process for a waterway could assist in achieving this, in a similar way to how this has been done through some Total Water Cycle Management Plans.

3.3 Theme 3 – Establishing clear linkages

What has become very clear in undertaking this project is that there is significant disconnection between the design objectives we currently have and the outcomes we want to achieve in our waterways. This partly reflects the objectives we have, but also the lack of clear connection between the various policies which are driving the management of stormwater impacts on urban waterways, and the responses to those to comply with the objectives.

We need to have a better connection between the EPP Water and SPP in the first instance. The concept of environmental values and management goals is entrenched within the EPP Water and these are also referred to within the SPP. Currently, this connection within the SPP is quite weak, as discussed in the previous section. To resolve this, a modification of the Water Quality State Interest to be more focussed on achieving outcomes for waterways and wetlands would provide the opportunity to directly link to the EPP Water to state that environmental values are to be protected or enhanced within the SPP, but not have that directly relate to water quality outcomes only. The wording of the Water Quality State Interest is deliberately imprecise in requiring development to "facilitate the achievement of environmental values…" as if it stated that development *must* protect or enhance environmental values, this would imply that development also needs to achieve the water quality objectives outlined in Schedule 1 of the EPP Water. This is not the intention of providing a stronger linkage between the EPP Water and the SPP, simply because development controls cannot achieve this in isolation. **Developing a State Interest for Waterways and Wetlands would allow for a stronger linkage between the strategic intent of protecting or enhancing environmental values with a broader set of policies** that were not just focussed on water quality and would remove the implication that development alone has to achieve the scheduled water quality objectives. It would allow for design objectives for stormwater management to cover a wider range of waterway outcomes needed to protect or enhance the environmental values.

3.4 Theme 4 – Integration and System Thinking

Our existing design objectives drive management responses that are largely focussed on achieving water quality outcomes. Obviously, this does not support the design process to consider other potential benefits of implementing those responses. This has largely been the reason for developing the Living Waterways approach (see http://hlw.org.au/initiatives/waterbydesign/water-sensitive-urban-design-wsud). The intent of this framework is to encourage designers to consider the range of potential benefits of effective, integrated stormwater management through the implementation of the full scope of Water Sensitive Urban Design. It is not isolated to water quality outcomes and provides designers with opportunities to maximise the benefits of proper integration of stormwater management through providing a scoring system that provides a way to understand the potential co-benefits if a broader outcome than just water quality is considered. The Living Waterways framework therefore facilitates both integration and consideration of system thinking. **What is needed then is for the Living Waterways framework to be more strongly encouraged in the design process**, but also to link this to the pathways to achieve the waterway outcomes that may be identified in a better waterway management planning process. The connection of the Living Waterways framework to a waterway planning process would also help to facilitate this.

3.5 Theme 5 - Equitable management of stormwater impacts

In setting design objectives to drive the management of stormwater impacts, we need to realise that not all of the burden of this can be borne by new urban development. In many cases, there are significant impacts from the runoff of existing urban and non-urban areas. The management of this runoff also needs to be addressed through the implementation of stormwater retrofit programs, improvements in practices in rural areas, addressing construction site runoff and community behavioural change (amongst others). The imposition of design objectives that require development to manage impacts greater than those caused by the development is not equitable, but there also needs to be consideration that the development impacts may not be addressed through compliance with the existing SPP design objectives.

What is therefore needed is a process by which the design objectives can ensure that new urban development (both in greenfield and brownfield applications) **achieves at least a minimum consistent standard**. In addition, there may be requirements on those developments to contribute to additional trunk infrastructure to ensure that the stormwater impacts from development are mitigated. This would address the issue where the existing design objectives may not result in the stormwater impacts from development being fully mitigated.

3.6 Key issues

- **Effective waterway planning should be required under policy or regulation (like previous requirements for Total Water Cycle Management Plans).**
- **Environmental values can be used to indicate the desired outcome for a waterway but need a planning process to define them.**
- **Flexibility in declaring the strategic intent is needed to ensure the intent for a waterway is consistent with local issues.**
- **There needs to be a better connection between the EPP Water and SPP.**
- **Developing a State Interest for Waterways and Wetlands would allow for a stronger linkage between the strategic intent of protecting or enhancing environmental values with a broader set of policies.**
- **The Living Waterways framework should be more strongly encouraged in the design process.**
- **A process by which the design objectives can ensure that new urban development achieves at least a minimum consistent standard is required, but also realising that stormwater design objectives in isolation cannot achieve all the required waterway outcomes.**

4 How should we change the frameworks for implementing urban stormwater design objectives?

We have outlined in the previous sections the issues with the existing frameworks for implementing stormwater design objectives and what is broadly needed to address them. Discussed below are several potential approaches that could be applied to improve the use of design objectives in managing the impacts of urban stormwater on achieving waterway outcomes. The intention is that these serve as starting points for further assessment, as in some cases they are not fully resolved, but provide the direction that is needed for improvement. While we have had expert input from a range of sources, we also recognise that there are others in our industry who also should contribute to these approaches to ensure they best address the needs of stakeholders and are a collaborative view of how to move forward in improving how design objectives can achieve better outcomes.

The potential changes to design objective implementation frameworks include:

1. Changing the current Water Quality State Interest to a Waterways and Wetlands State Interest

The existing Water Quality State Interest is constrained first by the limitation to a water quality definition, but also that other elements needed to achieve waterway outcomes are not easily integrated because they may be contained within other state interests. We therefore suggest changing the current Water Quality State Interest to a Waterways and Wetlands State Interest. The advantages of doing this are:

a. Providing a clear linkage to the need to protect or enhance waterway and wetland environmental values (perhaps consider renaming environmental values to waterway values)
b. Removing the implication that protection or enhancement means achieving only water quality or stream stability objectives
c. Providing the ability to include a greater number of policy elements that can address the hydrologic, ecologic, social, cultural and economic outcomes that are required from the state's waterways and wetlands
d. Allowing for improved consistency in integration with other state interests that relate to waterway and wetland outcomes (such as the Coastal Environment, Biodiversity, Cultural Heritage, Liveable Communities, Integrated Infrastructure and Natural Hazards State Interests).
e. Improving the language and terminology so that it more strongly reflects the need to protect or enhance environmental values and waterway outcomes and includes the need for these to link to a waterway planning process as outlined below.
f. Providing clear linkages to the need to protect high ecological value waterways and wetlands (rather than the existing weak statements which do not achieve the requirements of EPP Water)
g. Link to design objectives developed through a waterway planning process (see below)

Recommendation: Change the current Water Quality State Interest in the SPP to a Waterways and Wetlands State Interest to provide clearer linkages between the SPP and EPP Water that also provides for a broader range of waterway outcomes and policy elements.

2. Enable a framework for setting strategic intent

The existing EPP Water has, as its basis, the need to protect or enhance environmental values. The challenge, as alluded to in previous sections, is that existing design objectives do not always provide for this outcome under some circumstances. In addition, there may be a broader need to set a strategic intent through other policy elements, such as local planning schemes, LGIPs and the like. We therefore recommend that a three-tiered approach be considered for setting strategic intent, that both aligns with the EPP Water, but also allows for the establishment of intents that may provide for at least a minimum standard to be set. This is especially useful waterways where there is insufficient information to evaluate waterway outcomes (e.g. the necessary studies have not been undertaken),

but the existing design objectives may still want to be applied in the interim manage stormwater impacts.

Each of the three tiers can be recognised as interventions along an otherwise degrading trajectory, where the lowest tier reduces the decline, the middle or default tier halts the decline and the upper tier allows for long term improvement as shown in the figure below.

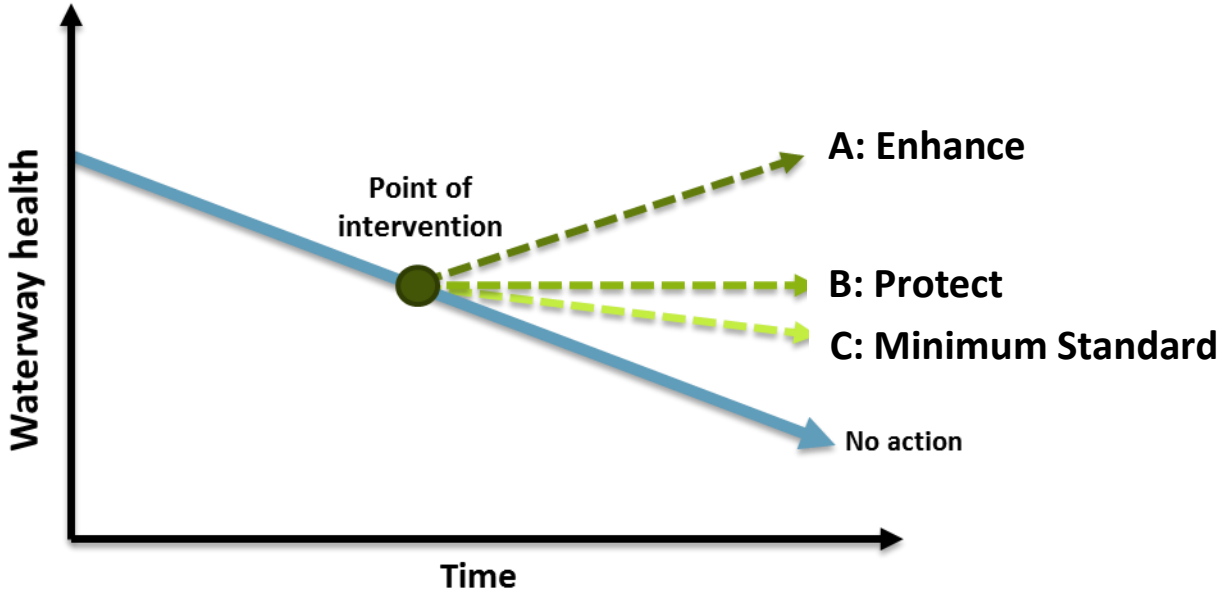

Figure 3. *Pathways of strategic intent*

This tiered approach allows for flexibility in strategic intent to cater for differences in local issues, but also provides a consistent method for establishing what pathway is desired for waterway outcomes. The approach is meant to be applied at a high level, not in a development assessment sense, so that while the minimum standard may mean that the existing SPP objectives need to be achieved for urban development, additional minimum standards around riparian corridor protection, recreational infrastructure or public access could also be included.

A default approach should always be to protect the existing condition of the waterway in order to achieve the intent of the EPP Water.

Recommendation: Provide a framework that enables the selection of strategic intent consistent with the requirements of the EPP Water but also allowing flexibility to match with local issues. This should be a three-tiered selection that provides for a minimum standard, protection of existing waterway values and enhancement where these need to be improved. It should also have a default approach that is protection of the existing condition of the waterway.

3. Require the development of Waterway Asset Management Plans in the EPP Water

Consistent with previous requirements to develop Urban Stormwater Management Plans and Total Water Cycle Management Plans (TWCMPs), establish the need to develop Waterway Asset Management Plans in the EPP Water. These plans should:

a. Identify existing waterways as waterway assets. These assets have provided a range of waterway values and contain existing infrastructure (riparian vegetation, channels, pipes, culverts, wetlands, biofilters, boat ramps, jetties etc) that provides a certain level of service.

b. Document waterway values for each asset. This would include ecological, social, economic and cultural values for the asset and the criteria by which they would be assessed. It could be based on the existing environmental values process that has already been completed for Queensland's waterways, but may be refined if further information becomes available through the planning process.

c. Assess existing and future asset condition. This would allow for an understanding of what values the asset is currently providing, what may be required in the future and whether either or both of these need protecting or enhancing. For example, if the value was being able to use the waterway for boating, then criteria around access, water quality and public safety would be needed, and if these are impacted by future urban development, the changes in these criteria could be evaluated.

d. Decide on the strategic intent for the waterway. From the previous element, decide whether the government agencies, community and industry are willing to protect or enhance the waterway values now and, in the future, or if they are willing to accept a minimum standard until further information becomes available. The choices are illustrated more clearly below:

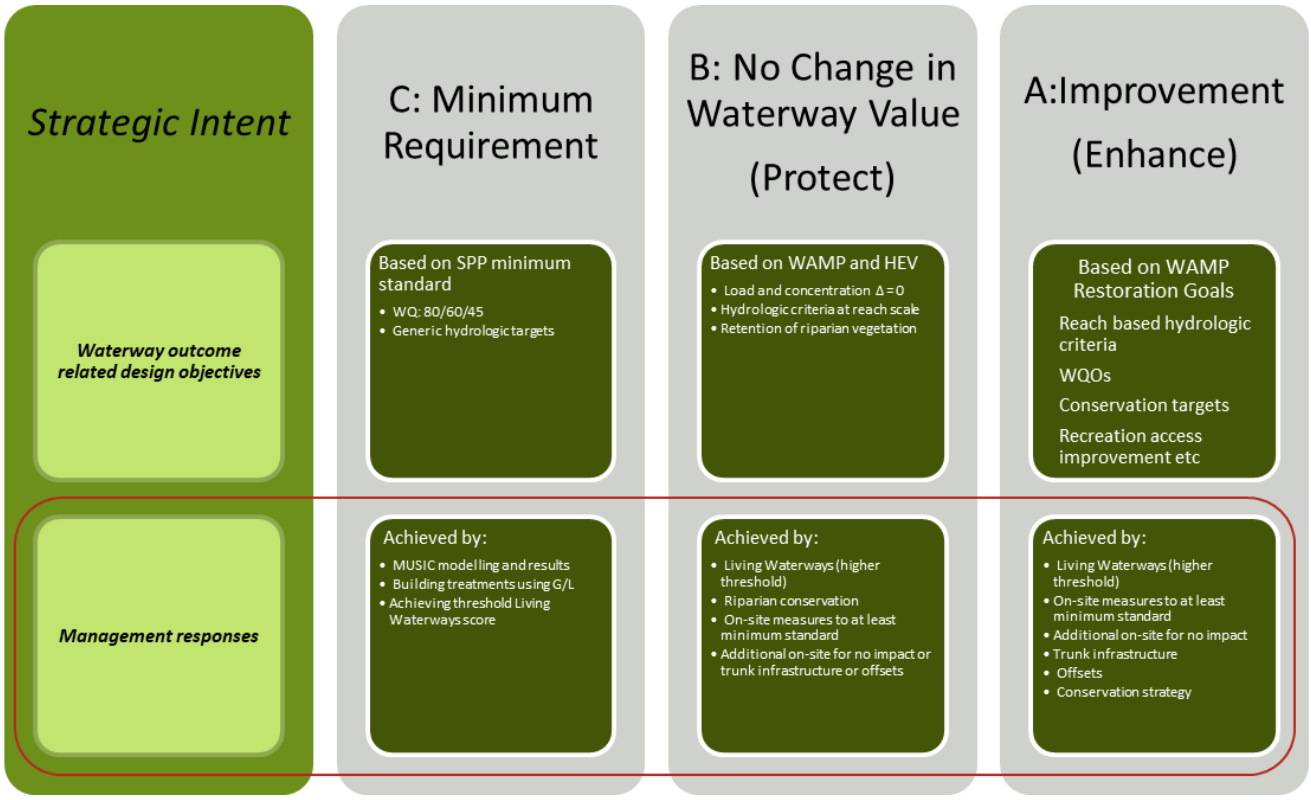

Figure 4. *Linking strategic intent through the WAMP process*

e. Evaluate the thresholds needed for each criterion within a waterway value according to the strategic intent. These thresholds would need to be evaluated for each value and the criteria which allow the evaluation of the value. The thresholds would then become the design objectives.

This process is further illustrated below:

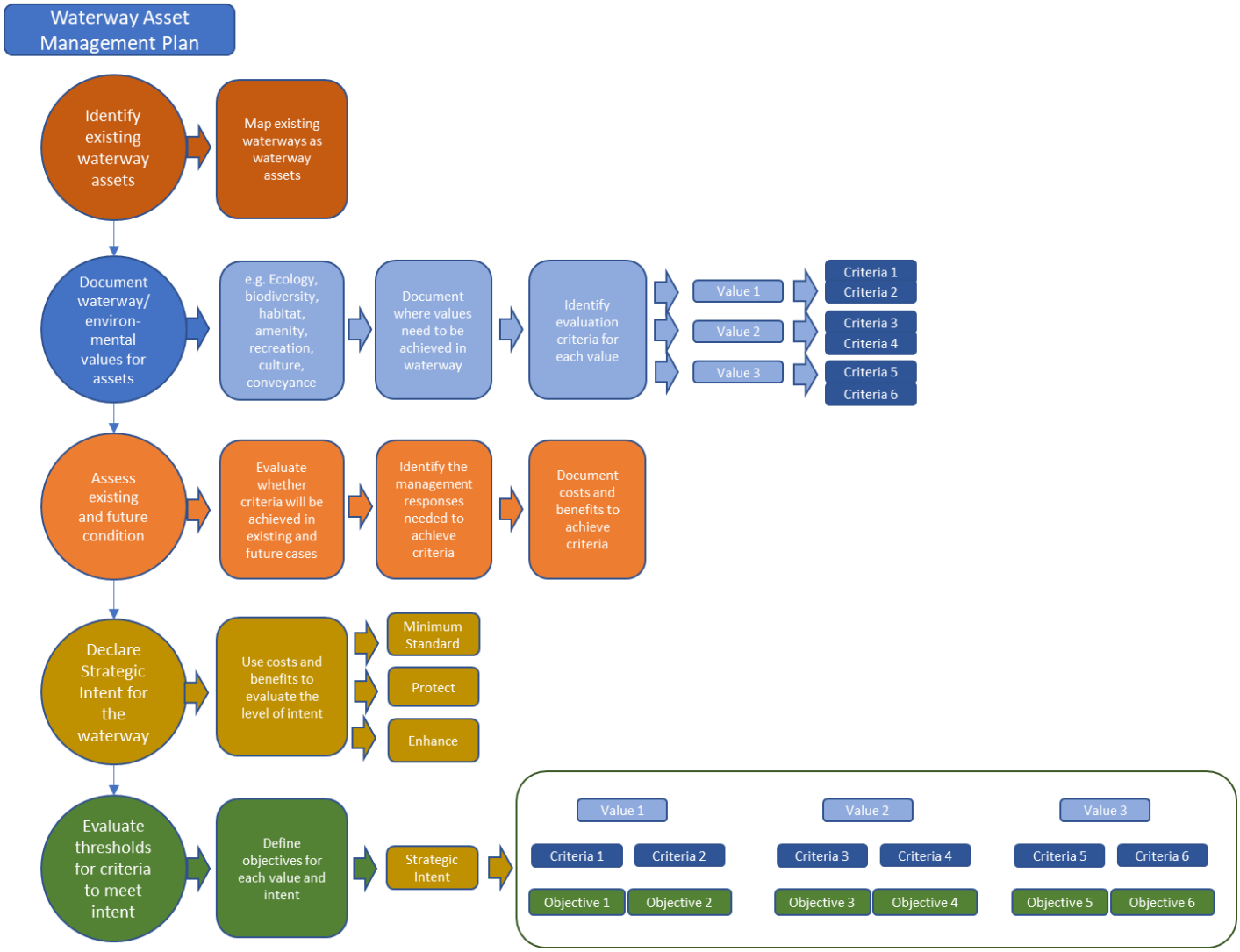

Figure 5. *Waterway Asset Management Planning process (suggested)*

The purpose of establishing a proper planning process for Queensland's waterways is to enable a consistent approach to the understanding of existing and future conditions that then lead to identifying design objectives that are directly connected to the outcomes needed for waterways. It is likely that this process can build on or even use directly, previous waterway plans, such as TWCMPs, WQIPs and Waterway Management Plans. The approach outlined above is likely to identify a range of different objectives, not all that will apply to urban stormwater management, but likely to still be highly relevant to managing development impacts on waterways. In addition, the above planning process has been formulated to be relatively consistent with other objective setting processes for waterways such as the Urban Stormwater Impact Assessment method outlined in Part 1. From this process, a series of values, criteria and objectives that link together in an evidence-based framework, will be able to supplement minimum standards such as the existing SPP design objectives, or completely replace them. It will also provide a much stronger set of linkages between the strategic intent, design objectives, management responses and the desired waterway outcomes. The figure below, which is derived from Figure 2 in Section 2, shows how the revised approaches contained in this section would result in much stronger linkages as discussed above.

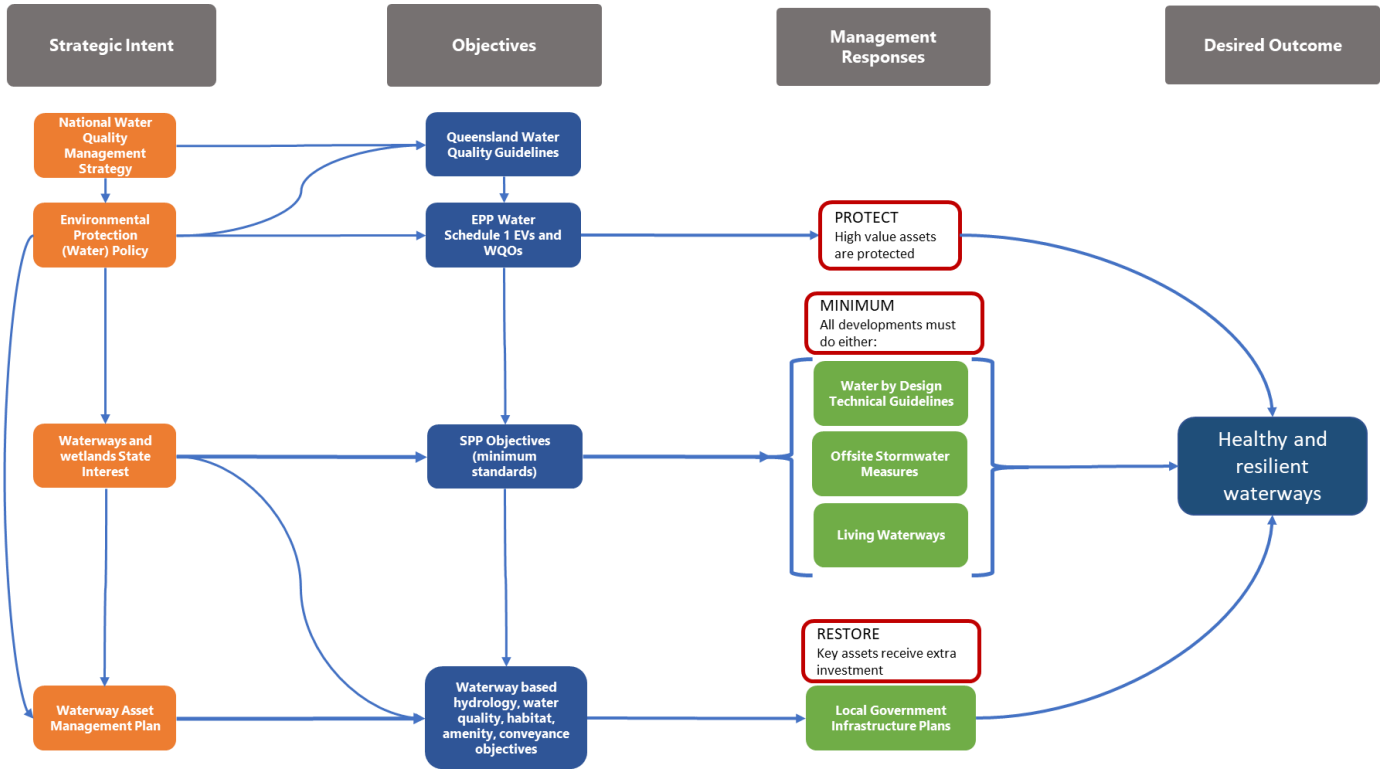

Figure 6. *Policy links with recommended approaches*

Recommendation: Require the development of Waterway Asset Management Plans that provide for an evidence-based approach to resolve design objectives that provide a stronger link between strategic intent, design objectives, management responses and waterway outcomes.

4. Embedding the Living Waterways framework in design processes

To achieve better integration of the range of benefits that integrated outcomes can achieve, we recommend that the Living Waterways framework be more strongly embedded in the design process. This may take the form of an evaluation process, like the BASIX (Building Sustainability Index) system in NSW, whereby particular types of development (typically urban residential development) needs to demonstrate that a certain score is achieved to demonstrate the implementation of sustainable outcomes. Such a system could be adapted for the Living Waterways framework to ensure that it is more routinely considered for stormwater (and other) management responses in urban development.

Recommendation: Consider embedding the Living Waterways framework in a design evaluation process for urban stormwater management like the BASIX system in NSW.

5 Conclusions

This discussion paper, Part 2 of evaluating new approaches for urban stormwater design objectives, has considered the frameworks for implementing design objectives as they currently stand and new approaches that may address a number of identified issues.

As noted in Part 1, the disconnection between the strategic intent for waterway management, the management responses we are currently delivering, and the waterway outcomes we are hoping that they achieve is further exacerbated by lack of clear connection between existing planning documents such as the State Planning Policy and the Environmental Protection (Water) Policy. We have identified several issues with the existing implementation frameworks that currently do not provide for a connection between the existing design objectives and waterway outcomes. Ultimately, we need a clear line of sight between our overall high-level ideals and the outcomes we are trying to achieve for our urban waterways.

Improving this line of sight will require an approach that is based on a sound planning process which provides for the understanding of what values we currently have for our waterways, how these may change in the future and to what extent we wish to address those changes. There is also a very strong need to provide clearer connections between the two key policy documents driving the management of waterway impacts, that being the EPP Water and the SPP. We have therefore recommended the development of a Waterways and Wetlands State Interest (in lieu of the Water Quality State Interest) within the SPP to better cater for the range of waterway objectives needed to manage stormwater impacts from urban development, but also to provide for better integration of the policy elements needed for waterway management, rather than being focussed around water quality.

Finally, we suggest the consideration of embedding the Living Waterways framework in a design evaluation process similar to the BASIX approach in NSW. This would provide a better mechanism to encourage the integration of stormwater management responses that can achieve multiple outcomes, rather than simply addressing a compliance requirement around water quality.

Through the development of Part 1 and Part 2 discussion papers, it has been patently obvious that there is a disconnection between the current design objectives in the SPP and the outcomes we wish to achieve in our waterways. We have made several recommendations on how this could be changed, the most essential of which would be the establishment of an improved waterway planning process as outlined in the previous section. This would provide the necessary connections between our waterway assets, our desired outcomes for them and the objectives that would drive the management responses to achieve them.

6 References (for Part 1 and Part 2)

Binney, J. & James, D. 2012. Sharing the load: A collaborative approach to investing in South-East Queensland's waterways. Brisbane.

Duncan, H.P., 1995. A Review of Urban Stormwater Quality Processes (Industry Report No. 95/9), Cooperative Research Centre for Catchment Hydrology. Monash University, Melbourne, Australia.

Duncan, H.P., Fletcher, T.D., Vietz, G., Urrutiaguer, M., 2014. The feasibility of maintaining ecologically and geomorphically important elements of the natural flow regime in the context of a superabundance of flow (Technical Report No. 14.5), Melbourne Waterway Research-Practice Partnership. Melbourne Waterway Research-Practice Partnership.

Elmore, A.J., Kaushal, S.S., 2008. Disappearing headwaters: patterns of stream burial due to urbanization. Frontiers in Ecology and the Environment 6, 308–312. https://doi.org/10.1890/070101

Fletcher, T.D., Vietz, G., Walsh, C.J., 2014. Protection of stream ecosystems from urban stormwater runoff. Prog Phys Geog 38, 543–555. https://doi.org/10.1177/0309133314537671

Hatt, B.E., Fletcher, T.D., Walsh, C.J., Taylor, S.L., 2004. The Influence of Urban Density and Drainage Infrastructure on the Concentrations and Loads of Pollutants in Small Streams. Environ Manage 34, 112–24. https://doi.org/10.1007/s00267-004-0221-8

Koster W. M., Amtstaetter F., Dawson D. R., Reich P., Morrongiello J. R. 2016. Provision of environmental flows promotes spawning of a nationally threatened diadromous fish. Marine and Freshwater Research 68, 159-166. https://doi.org/10.1071/MF15398

Li, C., Fletcher, T.D., Duncan, H.P., Burns, M.J., 2017. Can stormwater control measures restore altered urban flow regimes at the catchment scale? Journal of Hydrology 549, 631–653. https://doi.org/10.1016/j.jhydrol.2017.03.037

Lucke, T., Drapper, D., Hornbuckle, A., 2018. Urban stormwater characterisation and nitrogen composition from lot-scale catchments — New management implications. Science of The Total Environment 619, 65–71. https://doi.org/10.1016/j.scitotenv.2017.11.105

McIntosh, B.S., Aryal, S., Ashbolt, S., Sheldon, F., Maheepala, S., Gardner, T., Chowdury, R., Hartcher, M., Pagendam, D., Hodgson, G., Hodgen, M., Pelzer, L., 2013. Urbanisation and Stormwater Management in South East Queensland – Synthesis and Recommendations (Technical Report No. 106), The Urban Water Security Research Alliance. The Urban Water Security Research Alliance.

Meals, D., Dressing, S., Davenport, T., 2010. Lag Time in Water Quality Response to Best Management Practices: A Review. J Environ Qual 39, 85. https://doi.org/10.2134/jeq2009.0108

Miller, J.D., Kim, H., Kjeldsen, T.R., Packman, J., Grebby, S., Dearden, R., 2014. Assessing the impact of urbanization on storm runoff in a peri-urban catchment using historical change in impervious cover. Journal of Hydrology 515, 59–70. https://doi.org/10.1016/j.jhydrol.2014.04.011

Roy, A.H., Wenger, S.J., Fletcher, T.D., Walsh, C.J., Ladson, A.R., Shuster, W.D., Thurston, H.W., Brown, R.R., 2008. Impediments and Solutions to Sustainable, Watershed-Scale Urban Stormwater Management: Lessons from Australia and the United States. Environmental Management 42, 344–359. https://doi.org/10.1007/s00267-008-9119-1

Sydney Metropolitan Catchment Management Authority (2011). Botany Bay & Catchment Water Quality Improvement Plan. Sydney: Botany Bay Water Quality Improvement Program (BBWQIP)

Walker, T.A., Wong, T.H.F., 1999. Effectiveness of Street Sweeping for Stormwater Pollution Control, Technical Report 99/8, Cooperative Research Centre for Catchment Hydrology. Monash University, Melbourne, Australia.

Walsh, C.J., Fletcher, T.D., Burns, M.J., 2012. Urban Stormwater Runoff: A New Class of Environmental Flow Problem. PLoS ONE 7, e45814. https://doi.org/10.1371/journal.pone.0045814