



CRC for
Water Sensitive Cities

Policy Frameworks for Water Sensitive Urban Design in 5 Australian Cities

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Policy Framework for Water Sensitive Urban Design in 5 Australian Cities

Statutory Planning for Water Sensitive Urban Design (Project B5.1)

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Abbreviations

Abbreviation	Full Reference
BASIX	<i>SEPP (Building Sustainability Index: BASIX) 2004 (NSW)</i>
BCA	Building Code of Australia
BPEM Guidelines	<i>Urban Stormwater – Best Practice Environmental Management Guidelines</i>
BUWM	<i>Better Urban Water Management (WA)</i>
CMA	Catchment Management Authority
CMC	Catchment Management Council
CRCWSC	Cooperative Research Centre for Water Sensitive Cities
Development Act	<i>Development Act 1993 (SA)</i>
DSS	Development Services Schemes (Vic)
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EPBC Act	<i>Environment Protection & Biodiversity Conservation Act 1999 (Cth)</i>
EPP Water	<i>Environment Protection (Water) Policy 2009</i>
EPWQP	<i>Environment Protection (Water Quality) Policy 2015</i>
Exempt and Complying Development Code	<i>SEPP (Exempt and Complying Development Code) 2008 (NSW)</i>
GCD Code	<i>Growth Centre Development Code 2005</i>
ICM	Integrated Catchment Management'
IPART	Independent Pricing and Regulatory Tribunal (NSW)
IWCM	Integrated/Total Water Cycle Management
LGIP	Local Government Infrastructure Plan (Qld)
Liveable Neighbourhoods	<i>Liveable Neighbourhoods: A Western Australian Government Sustainable Cities Initiative</i>
NRC	Natural Resources Commission
NRM	Natural Resource Management
NSW	New South Wales
P&E Act	<i>Planning and Environment Act 1987 (Vic)</i>
PDA	Priority Development Area
P&D Act	<i>Planning and Development Act 2005 (WA)</i>

Abbreviation	Full Reference
P&D Regulations	<i>Planning and Development (Local Planning Schemes) Regulations 2015 (WA)</i>
PIP	Priority Infrastructure Plan
POS	Public Open Space
PSP	Precinct Structure Planning/Plan
PSP Guidelines	<i>Precinct Structure Planning Guidelines (Vic)</i>
R-Codes	<i>SPP 3.1 Residential Design Code</i>
SA	South Australia
SAPP Library	<i>South Australian Planning Policy Library</i>
SEPP	State Environmental Planning Policy (NSW)
SEPP(WofV)	<i>State Environment Protection Policy – Waters of Victoria</i>
State Interest Guidelines Water Quality	State Planning Policy State Interest Guideline: Water Quality
SP Act	<i>Sustainable Planning Act 2009 (Qld)</i>
SPP	<i>State Planning Policy</i>
SPPF	State Planning Policy Framework
SMF	Stormwater Management Fund
30-Year Plan	<i>The 30-Year Plan for Greater Adelaide – A Volume of the South Australian Planning Strategy</i>
UWMP	Urban Water Management Plan (WA)
UWMS	Urban Water Management Strategy (WA)
VPP	<i>Victorian Planning Provisions</i>
WA	Western Australia
WAPC	Western Australian Planning Commission
WQIP	Water Quality Improvement Plan (WA)
SA WSUD Policy	<i>Water Sensitive Urban Design – Creating more liveable and water sensitive cities in South Australia</i>
WSUD	Water Sensitive Urban Design

Introduction

This is a report published by the Cooperative Research Centre for Water Sensitive Cities (**CRCWSC**), an interdisciplinary and multi-institutional collaborative research initiative seeking to promote the uptake of water sensitive practices within Australia and overseas. The CRCWSC's vision of water sensitive cities is for future cities and towns, and their regions, to be sustainable, resilient, productive, and liveable.

Water sensitive cities interact with the urban hydrological cycle in ways that: provide the water security essential for economic prosperity through efficient use of the diversity of water resources available, enhance and protect the health of watercourses and wetlands, mitigate flood risk and damage, and create public spaces that harvest, clean and recycle water. Its strategies and systems for water management contribute to biodiversity, carbon sequestration and reduction of urban heat island effects. (CRCWSC 2015).

Statutory Planning for Water Sensitive Urban Design (B5.1) is part of the Water Sensitive Urbanism Program B in the CRCWSC, focusing on the influence of urban design, planning, and land development on resource flows across a range of spatial scales.

Since the term Water Sensitive Urban Design (**WSUD**) was first coined in Australia over twenty years ago, it has been promoted through the National Water Initiative and policy initiatives at the State level. The Council of Australian Governments (COAG) adopted the National Urban Water Planning Principles, which supported the adoption of WSUD principles. In addition, the Australian Government has been working with States and Territories to progress the implementation of urban water policy reforms to improve the long-term security and sustainability of urban water supplies. This has included a range of COAG work programs on water in the urban water sector and urban water planning, leading to the development of a substantial body of materials and project based case studies. Nonetheless, Australia still lacks a suite of best practice planning policy objectives, key performance indicators, and standards that can be applied at different planning scales, contexts, and jurisdictions.

Project B5.1 seeks to fill this knowledge gap by considering the extent to which WSUD has been adopted in modern statutory planning frameworks and whether current frameworks are sufficient to maximise the up-take of WSUD opportunities in Australia's cities. Specifically, B5.1 aims to:

- identify and assess the extent to which current statutory planning frameworks across Australian jurisdictions promote or hinder the adoption of WSUD and adaptive reuse of water;
- identify benchmarks and best practice urban planning policy, standards, and regulation for WSUD;
- assess existing models for funding WSUD infrastructure through statutory planning;
- develop options for reform of statutory planning and related legislation to facilitate WSUD, with regard to relevant legislative and economic constraints; and
- identify institutional constraints to the implementation of WSUD affecting local government, and options for reform.

This is B5.1's Final Report, which synthesizes key observations from previous work and consultation outcomes. It provides a comparative analysis of the policy regimes across five cities. Based on these analyses, the report makes a range of planning reform recommendations for each State and for consideration nationally.

Previous work

Between July 2014 and July 2015, B5.1 undertook literature reviews of the policy frameworks relevant to WSUD across five Australian cities – Brisbane, Sydney, Melbourne, Adelaide, and Perth. This was followed by the *Issues Paper – Policy Framework for WSUD in Australian Cities*¹ (**Issues Paper**) (Choi and McIlrath, 2016) which summarises the observations from the Literature Review and reform directions. Extensive stakeholder consultations were then taken across the five cities based on the Issues Paper, where a range of stakeholders

¹ Published as a draft for Consultation Purposes Only.

including local councils, agencies, consultants, and water utilities were consulted on their views on WSUD implementation issues and planning reform priorities.

The Issues Paper identified a range of potential reform areas for further consideration. These were the subject of further stakeholder consultation, in 2016. This confirmed that the reform directions identified in the Issues Paper were generally supported.

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Executive Summary

The term 'Water Sensitive Urban Design' (**WSUD**) is thought to have originated in Australia over two decades ago (Whelans et al., 1994) and has been described as the 'integration of urban planning with the management, protection, and conservation of the urban water cycle, that ensures urban water management is sensitive to natural hydrological and ecological processes' (National Water Commission 2004).

In 2004, its importance was elevated at a national level under the *Intergovernmental Agreement on a National Water Initiative* (National Water Commission 2004). Under this agreement, the Federal, State, and Territory Governments committed to undertaking a range of actions, including the development of national guidelines and evaluating options for implementing WSUD, with the goal of creating water sensitive Australian cities. In 2008, the Council of Australian Governments (**COAG**) endorsed the National Urban Water Planning Principles. Since then, however, there has not been consistent progress across jurisdictions in adopting WSUD policy.

The review of policy framework for WSUD² conducted by *Project B5.1 Statutory Planning for WSUD (B5.1)*³ across Brisbane, Sydney, Melbourne, Adelaide, and Perth found significant variability in the policy framework and implementation of WSUD across the jurisdictions. While WSUD practices have become increasingly mainstream over the past 10–15 years, the extent to which WSUD policies are adopted and implemented remains patchy, varying across jurisdictions and among the development industry.

As yet there are no consistent national policy framework, definitions, or performance and technical standards that apply to WSUD. If we compare policy for WSUD and Integrated Water Management, with that applicable to roads and the built environment it is clear that governments are yet to harmonise WSUD policy or develop consistent performance based standards. In response to inconsistent policy coverage, some local governments have developed innovative local policy solutions which have played a role in supporting innovation. However, reliance on local policy responses results in a diverse array of policy obligations which developers must navigate from municipality to municipality.

A more consistent approach to WSUD and best practice integrated water management is needed to ensure that the policy framework is consistent, predictable, and efficient. Project B5.1's Final Report hopes to provide a research product that can be utilised by policy makers to benchmark best practice and harmonise policy responses to WSUD, by highlighting the strengths and weaknesses of different policy approaches, and demonstrating where commonly accepted approaches to WSUD practice can provide a basis for consensus among stakeholders.

Many jurisdictions have developed WSUD policy at the State level but its application is often reliant on the development of local planning responses, or the exercise of discretion. Project B5.1 concludes that if WSUD policy is to become truly mainstream, it is necessary to ensure that decision making is supported by mandatory performance based codes, rather than continued reliance on the discretionary application of policy in the decision making process.

A performance-based approach to policy is inherently more likely to drive consistency among the development sector. This approach is more evident in some states than others, and varies across municipal boundaries.

For example, while pollutant load reduction and stormwater flow targets are usually identified as being important in a policy sense, most jurisdictions apply them within a discretionary framework. Some states such as NSW have not integrated water quality targets into the planning process, except in very limited areas. In too many instances, WSUD leadership has been championed at the local level through 'bottom-up' responses, rather than being led by state policy of general application.

² This consisted of a literature review of policy framework for WSUD in Brisbane, Sydney, Melbourne, Adelaide and Perth published as five separate reports, the *Issues Paper: Policy Framework for WSUD in Australian Cities – Draft for Consultation Purposes Only* (Choi L. and McIlrath, B. 2016) and project consultations across the five cities between the December 2015 and April 2016.

³ Cooperative Research Centre for Water Sensitive Cities (**CRCWSC**)

Planning policy for WSUD – mandatory or discretionary?

Of the five Australian jurisdictions studied in this report, all except New South Wales (**NSW**), have developed planning policy at the state level supporting WSUD, but implementation approaches vary considerably from state to state. For example, Queensland and Western Australia have well developed policy frameworks to support Integrated Water Management (**IWM**) and WSUD. But these frameworks are not automatically effective, applying only where state policy has been adopted or integrated through local planning policy responses and decision-making. These jurisdictions have developed policy responses that guide decision making on a broad range of planning scales, but rely heavily on local planning authorities for implementation. There is greater scope for policy to be applied and implemented more consistently, efficiently, and effectively.

Victoria does not have a broad based state WSUD policy that governs decision making across its various planning scales. Instead, the state's key approach to WSUD is defined by Clause 56.07 of *Victoria Planning Provisions* (**VPP**) and given automatic effect in all planning schemes. This IWM policy applies to new residential subdivisions, based on the quantitative water protection targets described in the *Best Practice Environmental Management Guidelines* (**BPEM Guidelines**). Clause 56.07 has been instrumental in supporting WSUD approaches across Melbourne's growth corridors through the Precinct Structure Planning Guidelines.

Clause 56.07 operates as a performance based code, which sets out a series of mandatory objectives deemed necessary to satisfy standards. Developments must be designed to meet best practice performance standards set out in the BPEM Guidelines, underpinned by the *State Environment Protection Policy (Waters of Victoria)* (**SEPP(WofV)**). This policy, established under the *Environment Protection Act 1970*, requires planning decisions to minimise adverse impacts on receiving waters from urban development (cl 46). Sections 60 and 84B of the *Planning & Environment Act 1987* (**P&E Act**) require planning authorities in Victoria to 'give effect' to the SEPP(WofV). Being underpinned by the SEPP(WofV) means that Victoria's WSUD policy response is strongly driven to adopt measures to protect receiving waters from the adverse effects of urban development.

This mandatory code based approach to IWM is not a feature of other jurisdictions and may help to explain why WSUD has been so broadly adopted in Victoria. However, Victoria still has its own weaknesses: unlike other states' policy frameworks, Clause 56.07 is limited, applying only to residential subdivision. Victoria has recently announced a review of Clause 56.07 to address this very issue. But Clause 56.07 operates as part of a mandatory performance based code – it is not a policy consideration that can be balanced against, and potentially compromised by, other competing policy objectives. For this reason, this report highlights it as potentially assisting with mainstream adoption of WSUD practices.

In Queensland, the State Planning Policy (**SPP**) *State interest 3 – Water quality* (Department of State Development, Infrastructure and Planning 2014) and the *South East Queensland Regional Plan 2009–2031* (**SEQ Regional Plan**) support the uptake of WSUD by providing detailed policy measures including water quality targets. Although the provisions of the SPP are not automatically included in all planning schemes, the local planning scheme must 'coordinate and integrate' any State and regional matters dealt with by section 16 of the planning scheme, *Planning Act 2016* (**Planning Act**). To this end, there is a clear expectation that councils will amend their planning schemes to integrate the provisions of the SPP and the SEQ Regional Plan.

Western Australia (**WA**) also supports a wide range of high-level WSUD policy measures under the 2003 SPP2.9 – *Water Resources* (**SPP2.9**) (Western Australian Planning Commission) (**WAPC**). But unlike Queensland and Victoria, councils are given the discretion to adopt policy under the *Planning and Development Act 2005* (**P&D Act**) where planning authorities are to 'give due regard' to the *State Planning Framework* (s 77).

South Australia's (**SA**) approach to WSUD policy is similarly high level, provided under *The 30 Year Plan for Greater Adelaide – A Volume of the South Australian Planning Strategy* (DEWNR 2010) and *Water Sensitive Urban Design – Creating More Liveable and Water Sensitive Cities in South Australia* (**SA WSUD Policy**) (Department of Environment Water and Natural Resource 2013). The latter contains water quality targets and is considered to be SA's key WSUD policy, but it does sit outside the current Planning Strategy and its status is unclear. Although the new *Planning, Development and Infrastructure Act 2016* (**PD&I Act**) – intended to repeal the *Development Act 1993* – establishes a range of statutory instruments, whether the SA WSUD Policy will be given statutory effect under the new planning system is unknown.

NSW does not provide an overarching WSUD policy that applies across the state with the exception of the *State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 (BASIX)*, which sets mandatory sustainability targets for water and energy consumption in all developments and requires up to 40% reduction in potable water consumption. This policy is therefore focused on water efficiency rather than stormwater management, which is the focus of WSUD policy in other jurisdictions. Support for WSUD is fragmented, generally applying to Sydney's Growth Centres, the Sydney Drinking Water Catchment, the Sydney Harbour Catchment, and Coastal Zones.

Water quality targets

Water quality standards generally derive from environment protection legislation in the first instance. Planning policy seeks to regulate urban development by setting standards for development that avoid and minimise adverse impacts to receiving waterways.

All jurisdictions other than New South Wales recognise quantitative water protection targets within town planning policy frameworks. However, as outlined above, Victoria and Queensland are the only jurisdictions where water quality targets are binding for a class or classes of developments. In Victoria targets are adopted under SEPP(WofV) and are integrated into the statutory planning system. In Queensland, water quality targets are adopted under the SPP Code, which forms part of the SPP, and applies to developments on land area greater than or equal to 2500m².

In other jurisdictions, water quality targets are generally adopted under non-statutory guidelines and given discretionary effect by councils when incorporated into the planning scheme. WA's policy framework supports the development and use of Urban Water Management Plans (**UWMPs**) and Urban Water Management Strategies (**UWMSs**) on various scales as planning tools to set and manage water quality targets, preventing contamination of the State's vital ground water resources. Preparation of an UWMP is usually a condition of subdivision, rather than a required input reflected in application plans and initial design.

WSUD policy on different scales

As WSUD is a broad concept, B5.1 considered whether WSUD policy and controls are appropriately targeted for each spatial planning scale – precinct structure planning (**PSP**), residential subdivision, infill, and single lot development.

For PSPs and residential subdivisions, Victoria applies consistent requirements for WSUD and integrated water cycle management (**IWCM**) based on Clause 56.07 and the *Precinct Structure Planning Guidelines (PSP Guidelines)* (Growth Area authority 2009). As discussed, the SEPP(WofV) and the BPWM Guidelines underpin these policies by acting as performance codes for IWM and the implementation of WSUD.

In WA, the *Liveable Neighbourhoods: A Western Australian Government Sustainable Cities Initiative* (WAPC 2009) (**Liveable Neighbourhoods**) and the *Better Urban Water Management* (WAPC 2008) (**BUWM**) frameworks are key WSUD policies for structure planning and subdivision of urban areas. These policies require developments on these scales to be accompanied by a UWMP that incorporates the principles of WSUD.

SA and Queensland generally rely on their respective WSUD State planning policy as a broad basis for councils to adopt WSUD requirements on various development scales. NSW does not provide any targeted policy to implement WSUD on different planning scales across the state. *SEPP 59 – Central Western Sydney Regional Open Space and Residential* (Department of Planning and Environment 2009) requires PSPs for land to observe the principles of IWCM.

All jurisdictions lack targeted WSUD policy for urban infill and lot scale developments. In most jurisdictions, a lot scale development is generally not subject to planning controls unless it is in a particular zone, overlay or in areas where smaller lot sizes prevail. WA is the only jurisdiction which provides statutory planning control for all residential developments in relation to stormwater management. This is contained in the *SPP 3.1 Residential Design Code* (WAPC 2013) (**R-Code**), which requires all stormwater runoff to be retained onsite where possible – 'where climatic and soil conditions allow for effective retention' (Part 5, cl 5.3.9). In other jurisdictions, lot scale developments are subject to various sustainability targets or measures under the State's building and plumbing regulations.

However, a review of local planning policies suggests that many councils across all jurisdictions have been active in developing local WSUD policies to fill the policy gaps at various development scales.

Funding WSUD infrastructure and public open space planning

While all jurisdictions allow councils to levy development contributions under their respective enabling planning legislation, there is a high degree of variability in approaches taken and amounts levied both within and across the states. Queensland, Victoria and NSW now have capped development contributions. In NSW and Queensland an independent water-pricing regulator oversees proposed charges above the capped amount.

In all jurisdictions, infrastructure planning by water agencies and councils is often not well aligned to facilitate the provision of WSUD infrastructure in the public realm. Jurisdictions vary dramatically in their approaches to Public Open Space (**POS**) contributions and the integration of water planning along waterways and drainage corridors. Some allow for higher levels of passive POS to be levied through the PSP process compared with infill POS requirements, which can provide land for the delivery of WSUD solutions to scale.

The amount of money that can be levied on development for open space and infrastructure contributions is not unlimited. Levies are capped and the allocation of funds for one purpose may compromise other equally important planning objectives. That said, it is legitimate to ask whether we will conceptualise WSUD infrastructure as 'basic and essential' infrastructure in the future. At this point in time, it may be regarded by some as an 'optional extra'. But if we assume that WSUD is becoming more widely accepted over time, it is likely that our very definition of what constitutes basic and essential infrastructure will continue to evolve.

The Project concludes that there are opportunities to adopt smarter approaches to planning for the public realm through the better use of open space levies and infrastructure contributions to fund regional and precinct level IWM priorities. With regard to infrastructure funding under the current planning systems, there are significant differences in terms of how open space levies and infrastructure contributions apply, what the caps are, and the extent to which WSUD infrastructure can be funded. There are opportunities for review of the approach to this issue across state and local government, in a manner that achieves synergy between WSUD planning objectives and other planning objectives for the public realm.

Market based instruments

Water quality offset programs are not widely used: at present, Victoria is the only State with a major program (primarily in Growth Areas) operated by Melbourne Water. Melbourne Water's Water Quality offset scheme operates in tandem with its Development Services Scheme, allowing developers to pay money in lieu of providing physical works to achieve best practice water quality protection on-site. There are a number of councils that accept stormwater offsets, either as works in kind (credited against other development levy liabilities) or through in-lieu payments.

Councils such as the City of Kingston are considering the acceptance of offset payments to leverage investment in public WSUD infrastructure on the rationale that economies of scale may be achieved. The City of Kingston asserts that directing investment into the open space network will deliver increased water quality protection per dollar invested, compared with on-site treatment of water within residential zoned land.

Stormwater offset schemes are common features of the stormwater regulatory framework in the United States of America, where stormwater discharges are subject to greater regulation.

Implementation guidance

Most jurisdictions offer a range of implementation guidelines. Project B5.1 advocates for governments considering more harmonised approaches, involving reviews of the diverse array of guidelines created by public authorities. Such guidance generally has no statutory force, is often poorly integrated into policy hierarchy, and can be difficult to locate, making it challenging to apply in an integrated and efficient manner. Many such guides are now out of date or at least partially redundant.

Although there is a plethora of technical guidance available, it varies from state to state. In addition, there are currently no national technical standards for WSUD infrastructure design, construction, and maintenance that

serve as a baseline for engagement with industry. Guidance for the purposes of maintenance and asset handover is of particular concern to councils who acquire responsibility for WSUD assets constructed by developers.

A number of regional councils in Victoria have developed the Infrastructure Design Manual which provides a more consistent approach to infrastructure design, including guidance for design and construction of WSUD assets managed by public authorities following subdivision. This is an example of an effort to harmonise approaches to infrastructure across local governments to make subdivision more consistent, predictable, and efficient.

All jurisdictions have, or are in the process of developing, capacity building programs to encourage implementation of WSUD. Such programs would be more effective if they were supported by harmonisation of policy and technical guidance for construction and design of stormwater infrastructure relevant to WSUD.

In all jurisdictions, there is a need to harmonise, consolidate, review, streamline, and simplify WSUD guidance so that planners and developers can easily apply it. Internal resistance to change within councils, possibly reflecting a 'fear of the unknown', is commonly reported across all jurisdictions. In time, however, this could be changed through government endorsement of technical standards or the initiation of an Australian Standard. An online 'one stop shop' initiative could assist planners and consultants navigating WSUD guidelines across the country.

Conclusions and recommendations

Section 9 of the Report makes a series of conclusions under the following themes:

- National standards, policy harmonisation, and consolidation
- Use of mandatory, performance based approaches to regulation
- Policy integration and leadership (role of state and local government)
- Policy coverage
- Use of market based instruments and water quality offsets
- Infrastructure funding
- Role of cost benefit assessments
- Governance reform and institutional capacity.

Recommendations are set out in Section 10.

Given the different levels of development in WSUD policy frameworks across the five cities, identifying planning reform priorities by which each jurisdiction might establish a best practice policy framework for WSUD is a complex task. It requires effective integration and coordination between strategic and statutory planning, the water sector, and local government planning, budgeting, and capital works processes which sit outside the planning system.

Such considerations mean that the recommendations provided in this report should be seen as part of a broad range of reform opportunities that must be addressed to support future implementation and mainstreaming of WSUD practices in the planning system.

Section 1 The role of statutory planning in achieving WSUD

Introduction

Conventionally, urban planning in Australia can be divided into strategic and statutory categories. In this report 'statutory planning' will refer to decision making on development applications within an established decision making framework. Reference to 'strategic planning' concerns the re-zoning of land and the approval of precinct scale development controls (including structure plans and the like) that guide future decision making. Despite the functional separation, statutory and strategic planning are clearly inter-dependent. Each plays important roles in supporting and implementing WSUD.

As most developments must go through statutory planning processes, including approval of structure plans, re-zoning, development permits, and planning appeals, embedding WSUD policy in the planning process is recognised as one of the best ways to achieve WSUD outcomes. A recent survey has found that many professionals working in local government and urban water management believe that statutory planning can 'materially encourage' the wider adoption of WSUD practice (Williams 2016). The experience of Australia's cities to date (as examined by B5.1) in WSUD also supports this view.

Each Australian jurisdiction's planning system has evolved independently and individual states adopt different approaches. Nonetheless, there are some common elements, including:

- enabling planning legislation, which establishes planning authorities and statutory instruments, plus administrative procedures for preparing and amending them. Such legislation also establishes legal rights for public participation and consultation, including rights to object to a plan or decision;
- planning instruments and guidelines;
- strategic planning policies setting out a state's vision for growth and development;
- planning bodies established to administer the planning system and powers given to these bodies;
- financial arrangements for public infrastructure and open space through developer contributions; and
- local planning schemes containing a system of zones and development controls, and local planning policies which are the primary instruments for regulating the use, development, protection, or conservation of land.

Some of the key elements of the policy landscape are identified in Figure 1.

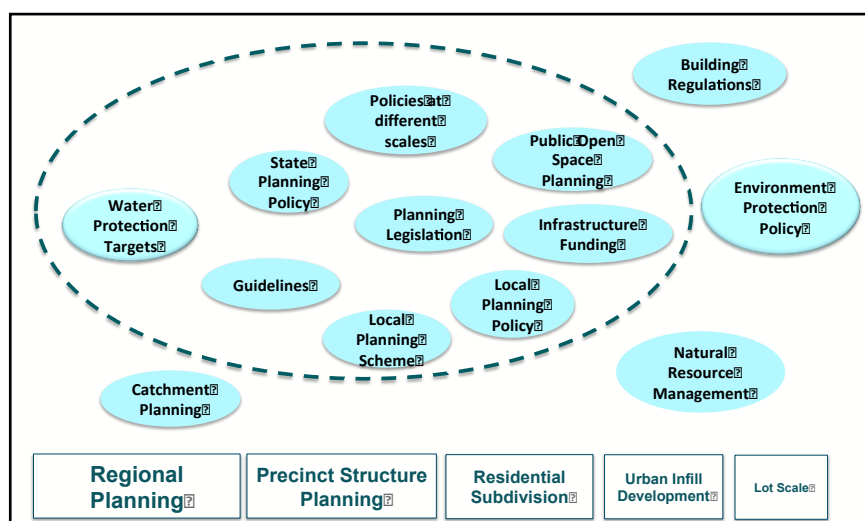


Figure 1: Elements of statutory land use planning (Choi 2016)

This report discusses the role of statutory planning in WSUD for each spatial scale, its perimeters and its relationship to other laws.

Scope and limits of statutory planning in achieving WSUD

The planning system regulates the use and development of land. For the most part this involves regulating the actions of the private sector, but sometimes it involves regulation of proposals by public authorities. The planning system is limited in what it can achieve.

Project B5.1 considers that WSUD policy has played a role in 'mainstreaming the adoption of WSUD infrastructure over time'. But progress is hindered by jurisdictional boundaries.

While the planning system can play a role in promoting changes of attitude over time, and improving the ability of local government to levy developer and open space contributions to better support public realm outcomes, it also has limitations.

Public open space planning policies and developer contributions can increase social amenity in urban areas, enhancing liveability while minimising the cost of development drainage infrastructure. To these ends, a requirement to connect to the third pipe in greenfield developments may minimise demand on the reticulated water supply system to maintain a lush green environment.

Statutory planning can also play a central role in supporting planning processes aligned with WSUD. It can use zones, overlays, and flood protection policies to regulate the use and development of land and minimise development impacts on existing natural features, ecological processes, and the natural hydrological behaviour of catchments. Controls relating to set-backs, site coverage, and imperviousness of a development may be applied to assist with protecting water quality of surface and ground waters. Stormwater management requirements, such as on site retention of stormwater, landscaping requirements, and drainage works, can maintain natural hydrological processes and minimise polluted water discharges to the natural environment.

Limits

However, statutory planning cannot achieve all the objectives of WSUD. It has a limited role in achieving reuse of treated effluent and minimising wastewater generation, lowering development costs, and addressing wider social and resource issues relating to water. Resolution of these issues requires alignment of natural resource management, health regulations, building policies and, to some extent, economic regulations regarding potable water, drainage, and energy.

Statutory planning is also limited in a general sense as it is reactive and can only address prospective or future activities. This curtails its ability to regulate existing land use protected by existing use rights. Consequently, in the context of urban water management, statutory planning cannot easily address legacy issues and environmental impacts from established developments.

Further, planning policy and planning legislation is unlikely to completely address issues such as:

- entrenched attitudes towards conventional drainage and stormwater infrastructure;
- the supply of potable water from various sources (including desalinated water, aquifer recharge, or advanced water treatment);
- the regulation of grey-water and water supply systems (which are generally regulated under environment protection legislation outside of the planning system); and
- limits on the ability of local governments to raise funds to finance new infrastructure.

In most jurisdictions, a local government's willingness to accept the maintenance obligations that come with different forms of public infrastructure is an institutional barrier, and there can be a perception that WSUD assets involve greater maintenance obligations. It is unclear if this is simply fear of the unknown, or whether there is an

empirical basis for such concerns. Such obligations require educational programs and cost benefit justification before resistance will diminish.

Delivering WSUD as public assets

The way in which public authorities build and maintain infrastructure is an important issue for consideration. If roads, drains, and waterways are constructed and maintained in a manner inconsistent with WSUD, statutory planning decisions cannot do much to redress this. However, strategic planning policy could, over time, play a role in influencing how public authorities design and manage public infrastructure.

Where urban development occurs, roads and drains are the responsibility of the local council, or other public authorities. Therefore, the council can set rules and expectations on how roads and drains are designed, and this process could be influenced to some extent by the planning system. If, however, the council adopts infrastructure guidelines that do not encourage the use of WSUD, it will be their own policies which will hinder the adoption of WSUD in the public realm.

Planning scales and WSUD

1.1 Summary

Project B5.1 has found that while there is usually a policy framework that applies to support IWM or WSUD, there are often gaps in coverage. For larger strategic redevelopment sites specifically, there is a lack of targeted policy.

If the proponent or planner does not have an easy to use guide that explains how to achieve the WSUD objective, it may simply become a lower order priority within the proposal. This could be overcome by developing tailored policy suited to the particular development's complexity. Increasingly, IWM assessments are done by aquatic ecologists and hydrologists experienced in the use of modelling applications such as MUSIC and STORM.

Single detached dwellings generally do not require a planning permit. In growth areas, a precinct structure plan may set out requirements that affect the design or construction of new dwellings. Where a permit is required, a single dwelling would not justify the engagement of a water management professional, although an apartment development or commercial building well might. A low cost simple solution should be designed for single dwellings. Developments in established urban areas need to be treated differently to developments in greenfield growth areas.

It is important to tailor the policy framework to different development typologies, and to develop systematic approaches to the assessment and certification of WSUD designs.

Policy makers should note that:

- WSUD policy for large infill development sites (strategic redevelopment sites) is lacking across jurisdictions;
- planning occurs on varying scales, and it is necessary to integrate planning across scales and to coordinate policy to achieve integrated planning across different development scales;
- it is necessary to ensure that WSUD policy objectives transcend all relevant planning scales, or can be adapted to decision making for each development scale;
- flexibility is essential so that WSUD policy objectives can be tailored to the circumstances of a particular development area or site;
- strategic environmental assessments under the *Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act)* can drive conservation outcomes and the provision of water quality habitats – supporting IWM outcomes – in areas where precinct structure planning or growth area frameworks are required.

1.2 Regional or metropolitan planning

The purpose of regional planning (or metropolitan planning in the urban context) is to address issues which extend across council or catchment boundaries. In the context of WSUD, regional plans provide opportunities to outline

water quality and integrated water cycle management objectives at the catchment level. Regional planning is recognised in the planning hierarchy of all jurisdictions but plays varying roles in each system. In Queensland, NSW, and SA, regional plans have a statutory basis whilst in WA, they generally have the status of guiding strategy or policy. In Victoria, state planning policy seeks to implement to Regional Growth Plans, though these are not statutory instruments.

Queensland

In Queensland, a regional plan is established as a State Planning Instrument under the *Planning Act* (Chapter 2, Part 2) as part of ‘the system to facilitate the achievement of ecological sustainability’ (Planning Act s 4). Regional plans set out ‘integrated planning and development assessment policies about matters of State interest for particular regions of the State’ (Planning Act s 4(b)).

There are 12 regional plans in Queensland at present. This report focuses on the SEQ Regional Plan, which applies to the following 10 regional and city councils:

- Brisbane City Council
- Gold Coast City Council
- Lockyer Valley Regional Council
- Logan City Council
- Moreton Bay Regional Council
- Toowoomba Regional Council
- Redland City Council
- Scenic Rim Regional Council
- Somerset Regional Council
- Sunshine Coast Regional Council

The SEQ Regional Plan is described as ‘the pre-eminent plan’ (DIP 2009, p. 5) for the SEQ region and takes precedence over all other local planning instruments where there is any inconsistency (Planning Act s 8(4)(b)). The SEQ Regional Plan supports the implementation of WSUD under two policies – ‘Natural Environment Policy’ and the ‘Water Management Policy’ – which outline a range of ‘desired region outcomes’ regarding water management, including the region’s water quality targets. These are discussed further in Section 3.

NSW

In NSW, regional plans are taken to be State Environmental Planning Policies, which are Environmental Planning Instruments (**EPIs**) made under Part 3 of the *Environmental Planning and Assessment Act 1979* (**EP&A Act**). State Environmental Planning Policies outline the NSW Government’s strategic approaches and control when dealing with specific planning issues at state or regional levels. The SEPPs relate either to specific subject matter – such as housing affordability, employment and economic growth, environmental conservation, resources and infrastructure – or more general policies for particular areas.

The provisions of an EPI are mandatory matters for consideration by a consent authority in determining a development application (s 79C). The EP&A Act also allows anyone to bring an action to remedy or restrain a breach of an EPI (s 123).

EPIs may include provision for, or with respect to, a very broad range of issues, for the purposes of achieving ‘any of the objects’ of the EP&A Act (s 24) and for the matters listed under section 26, including:

- (a) protecting, improving or utilising, to the best advantage, the environment,
- ...
- (c) reserving land for use for the purposes of open space, a public place or public reserve within the meaning of the Local Government Act 1993, a national park or other land reserved or dedicated under the National Parks and Wildlife Act 1974...
- ...
- (e) protecting or preserving trees or vegetation,
- (e1) protecting and conserving native animals and plants, including threatened species, populations and ecological communities, and their habitats,

...

(1A) An environmental planning instrument may also make provision for or with respect to protecting and conserving vulnerable ecological communities.

For example, the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (Harbour REP)* applies to land within the Sydney Harbour Catchment. Introduced to replace or amend a number of planning instruments pertaining to the Harbour, the Harbour REP provides a planning framework aimed at achieving better environmental outcomes for the Harbour and its catchment.

The Harbour REP (Department of Infrastructure, Planning and Natural Resources 2005) can be used by:

- councils for the preparation of environmental planning instruments;
- consent authorities for the assessment of development applications falling within the foreshores and waterways areas;
- proponents in the preparation of their development applications and plans; and
- the Minister for the assessment of State Significant Development.

South Australia

In SA, regional plans form part of the Planning Strategy as ‘an expression of policy formed after consultation within government and within the community and do[es] not affect rights or liabilities whether of a substantive, procedural or other nature’ under the soon to be repealed *Development Act* (s 22(3)). Regional plans have been given legal status as statutory instruments prepared by the Planning Commission under Part 5 of the PD&I Act. However, their role in development assessments is limited as ‘a regional plan is not to be taken into account for the purpose of any assessment or decision with respect to an application for a development authorisation’ (PD&I Act s 64(6)).

Western Australia

Regional planning in WA consists of regional and sub-regional structure plans and regional strategies, which are taken to provide a ‘basis for cooperative action to be taken by State and council on land use and development’ (WAPC 2006). These are prepared and adopted as part of the State Planning Framework pursuant to section 14 of the P&D Act.

The SPP 1 lists over 30 regional and sub-regional structure plans, which have been endorsed by the WAPC (pp. 9–10). These plans are provided for regions, sub-regions, and other locations to guide change in the short to medium term and to assist with planning of the identified areas. From the list under the SPP 1, four plans provide provisions which deal with WSUD.

Regional strategies interpret the SPPs at the regional and sub-regional level and provide ‘a basis for cooperative action to be taken by State and council on land use and development’ (p. 8). The SPP 1 lists 27 regional strategies which have been endorsed by the WAPC (pp. 8-9).

Victoria

In Victoria regional growth plans set high level direction. These are reflected in the VPP which requires planning to be consistent with these plans. But the plans do not include detailed policy direction for Integrated Water Management. Plan Melbourne supports WSUD and IWM in a general sense, but does not identify a detailed range of infrastructure priorities relevant to IWM at the city or catchment scale.

1.3 Precinct structure planning

Also called ‘neighbourhood plans’ or ‘detailed master plans’ in some jurisdictions, a PSP or structure plan may be used where there is a specific need to ‘master plan’ a strategic parcel of urban land. Such parcels are either ‘infill’ – strategic redevelopment sites requiring revitalisation and reuse – or new urban development on greenfield sites.

A clear policy and decision-making framework for PSP scale development allows strategic opportunities for WSUD in the public realm to be identified and integrated with drainage and water infrastructure, often by allocating land for different purposes (such as development, reserves, roads, or waterway corridors). PSPs identify spatial

opportunities for WSUD early in the planning process, assisting with linking open space corridors and drainage courses. A PSP may set out objectives for preservation of waterway corridors in natural conditions, prescribe standards for setbacks to waterways, allow for the provision of biodiversity habitat, and detail measures for the provision of alternative water supplies where a secure local source of recycled water is available.

Often a PSP will be accompanied by a development contributions plan, funded by developers within the PSP area. PSP requirements and processes vary from state to state and are generally required for land or area identified under a planning scheme or by the state.

For large strategic redevelopment sites within established urban areas, a site-specific planning control is often developed and applied. This too is a form of master planning, but may involve different planning controls to those applicable to larger growth corridors.

Queensland

Queensland generally provides two streams for use of structure plans. The first stream is a 'Master plan' for a 'Priority Development Area': land 'identified for specific accelerated development with a focus on economic growth' by the state (DILGP 2015). A Priority Development Area is subject to the requirements under the Economic Development Act and guided by Practice Notes and Guidelines issued under it. At the time of this report, there were 26 Priority Development Areas declared in Queensland with 13 in the SEQ region. The second stream is for land outside these areas, where PSPs requirements are set by councils and provided under the planning scheme applicable to that land. As a result, requirements tend to vary from council to council.

NSW

In NSW, PSPs are required in Growth Centres pursuant to clause 276 of the EP&A Regulation and SEPP (*Sydney Region Growth Centres 2006*) which sets out land use zones and development controls for all land in a 'Growth Centre'. *SEPP 59 – Central Western Sydney Regional Open Space and Residential (SEPP 59)* specifies the contents and general and special matters which must be addressed in a PSP, as well as the approval procedures. Similar to Queensland, PSP requirements for land outside the Growth Centres are set by councils and therefore vary from council to council.

Victoria

In Victoria, PSPs are recognised as important planning tools under the VPP, which calls for the use of structure planning to facilitate 'the orderly development of urban areas' (cl 11.02-3). A PSP is prepared primarily for land in the Urban Growth Zone (**UGZ**) (cl 37.07) and is applied to land when it is incorporated in the planning scheme through a planning scheme amendment (cl 37.07-2). However, structure plans and development plans are also used throughout Melbourne in and around activity centres, transport corridors, and strategic redevelopment sites.

A PSP can be prepared and funded by council, landowners and developers, the Victorian Planning Authority (with funding provided by the Victorian Government), or other agencies directed to do so by the Minister for Planning. The Victorian Planning Authority sets out preliminary boundaries and interim names for the PSP program and oversees the development and approval of the PSPs within the UGZ, which is used to identify future urban land where a PSP may be prepared. Clause 11.02 of the VPP sets out policy requiring PSPs to be consistent with the PSP Guidelines (Growth Areas Authority 2009) which are to be applied in the preparation and evaluation of PSPs for all new residential communities and new employment areas.

South Australia

The SA Government does not identify areas that require structure planning. Instead, PSPs are only created when a council requests the Minister for Housing and Urban Development to declare a precinct pursuant to the *Urban Renewal Act 1995* following the provision of a business case. This allows appointment of a Precinct Authority (either a council, a subsidiary of a council, the Urban Renewal Authority, or another statutory corporation) to develop a plan for the precinct. A Precinct Authority singularly manages all aspects of planning, design and infrastructure delivery of a major development project. There are, however, no clear or binding requirements for the content and form of the PSPs. The SA Government's Fact Sheet 2, *Precinct Planning and Urban Renewal Act – What Does Precinct Planning Mean for Councils?* (DPTI 2014), states that precinct master plans are expected to

be 'strategically aligned with and seek to promote the provisions of the *Planning Strategy for South Australia* and have regard to other relevant state policy documents'.

Western Australia

In WA, a structure plan may be prepared:

- for an area that is identified in a local planning scheme as suitable for urban or industrial development;
- for other areas as identified in a scheme prior to subdivision or development of land;
- as a requirement under a State Planning Policy; or
- as required by the WAPC for orderly and proper planning purposes.

The manner and form for the preparation of 'structure plans' in WA is subject to the Structure Plan Framework (WAPC 2015)⁴ and must be carried out in accordance with the *Planning and Development (Local Planning Schemes) Regulations 2015*. A structure plan is also tiered as follows:

A district structure plan is generally prepared by a council or the WAPC and may apply to several suburbs, all, or part of a townsite. This framework may be applied to both district and local structure plans. Generally, a district structure plan addresses 'fatal flaws' of a potential development area and provides for the commercial and industrial areas, and environmental conditions.

A district structure plan can provide a basis for zoning and lead to more detailed structure planning through the preparation of a local structure plan. A local structure plan would deal with residential density, subdivision, and the coordination of infrastructure on a neighbourhood or smaller scale. (cl 2.2)

Structure plans are approved by the WAPC. They do not have 'the force and effect of a scheme, unless they are incorporated or 'normalised' into a scheme' (cl 14.2) but planning decision-makers are required to give 'due regard' to them (cl 13.1).

1.4 Strategic redevelopment sites

Large strategic redevelopment sites may or may not be regulated by site-specific planning controls. Often large strategic sites will be developed subject to a specific planning scheme amendment to introduce specific controls. Sometimes larger sites are assessed through the statutory planning system alone, without the benefit of a specific strategic assessment and planning scheme amendment process. As these sites involve fewer landowners, they often involve development agreements that resolve various issues such as infrastructure contributions and provision of public open space.

1.5 Site or lot scale planning

This scale refers to a specific proposal for development in relation to a conventional parcel of land and typically relates to council's assessment of a development application against the criteria or rules contained in the planning scheme or other relevant legislation or policy. It will not generally be large enough to warrant development of site-specific planning controls or master planning.

Generally, all jurisdictions adopt similar assessment categories for lot scale planning: complying development where a planning permit is not required, assessable development, which may be subject to code or merit assessment, and prohibited development.

Code assessment is usually applied to simpler forms of development such as garages or single storey houses on a certain lot size, to enable their assessment against predetermined standards. If the site is situated within an environmentally sensitive area or zone under the planning scheme or subject to specific constraint, it may be subject to merit-based assessment, a more qualitative form of assessment.

⁴ This was released in August 2015 for a six-month trial and review until March 2016 but at the time of writing this report there was no new version available.

In all jurisdictions, a residential dwelling on a suburban block, which is not subject to any overlays, would generally be exempt from planning controls. Consequently, the policy settings applicable in most states limit the ability to impose controls on the development of single dwellings.

In older established suburbs where lot sizes are relatively small (e.g. below 500 m²) planning permits may be required for the construction or alteration of a single dwelling. For example, many inner suburbs in Melbourne have smaller lot sizes due to historical subdivision patterns. As these areas also often coincide with heritage values, it is more likely that permits will be required for construction or alteration of a single dwelling.

Single dwellings are regulated through the National Construction Code (incorporating the Building Code of Australia and the Plumbing Code) which is discussed further below.

Relationship to other law

1.6 Building

Building regulations deal with controls and requirements of built form at a lot scale and are provided under the *Building Code of Australia (BCA)* – part of the *National Construction Code 2016 (NCC)* – and the state's building and plumbing regulations. The NCC is implemented through the building regulations in each state and enshrines a comprehensive set of technical provisions relating to structure, fire resistance, access and egress, engineering services, health, and amenity.

Section J of Volume 1 and Part 2.6 of Volume 2 of the NCC deal with energy efficiency. In NSW Part 2.6 does not apply as NSW applies the BASIX scheme. Volume 2 of the NCC includes the following important performance requirements relevant to water management:

- Part 2.2.1 requires surface water management of disposal of a storm event with an average recurrence interval (**ARI**) of 20 years. The building must be designed to protect water ingress to the building resulting from the 1 in 100 ARI event;
- Part 2.6 (energy efficiency) is not specifically relevant to water efficiency, except that the Victorian Variations includes requirements that require a building to have a 'level of water use performance to facilitate the efficient use of water appropriate to the circumstances.'

Volume 3 of the NCC sets out requirements for plumbing and drainage and on-site wastewater management systems. The NCC is structured as a performance based code, spelling out performance requirements.

Drainage and stormwater systems are required to be designed, constructed, and maintained in accordance with AS/NZS 3500. Sub-surface drainage systems are subject to Part D2 of Volume 3. Objective DO2 sets out a range of objectives relating to flood risk, conservation of water, and energy and maintenance. Verification requires certification by an accredited drainage service provider. On-site wastewater treatment obligations are subject to Part F1 of Volume 3 of the NCC.

Volume 3 does not generally apply in NSW for roof drainage systems and surface and subsurface drainage systems as these are regulated under the EP&AA and the *Local Government Act 1993*. Some aspects of Volume 3 do not apply in Queensland as roof water drainage is subject to the *Building Act 1975*. The on-site wastewater provisions do not apply at all in Queensland. Volume 3 requirements relating to roof and stormwater drainage do not apply in South Australia.

In 2016 the Australian Building Codes Board published a report entitled 'Plumbing Code Development Research Project – Rainwater Harvesting and Re-use.' This research report considers the applicable statutory obligations in each state and recommended that:

- it be noted that a national approach to rainwater harvesting and re-use was supported by industry;
- the Plumbing Code of Australia be amended to recognise rainwater harvesting and re-use under a new Part (B5) with deletion of the existing deemed to satisfy provision (B3.3);
- Performance Requirement BP.1 be modified';

- work be carried out to clarify requirements for rainwater tanks in bushfire prone areas to achieve consistency with fire-fighting requirements for materials; and
- an ACBC handbook be developed to provide guidance on the current regulatory requirements and technical design considerations for rainwater harvesting systems.

In addition to compliance with the BCA, developments may also have to comply with state-specific building and plumbing requirements, which may form a variation or addition to the NCC requirements.

Building regulations can play an important role in implementing WSUD at the lot scale, particularly where developments are exempt from planning controls as discussed above. Requirements can relate to:

- site coverage;
- setback standards;
- building materials;
- floor levels;
- drainage such as on site retention of stormwater; and
- water conservation measures such as rainwater tanks and third pipe connection.

For example, in the Victorian Building Regulations, the following relevant requirements apply:

- **Regulation 411 - Site coverage – Requirement:** Where a lot is in a specified (residential) zone the site coverage must be at least the amount specified in the schedule to the relevant zone under the planning scheme, or if there is no minimum site coverage specified, buildings must not occupy more than 60% of the allotment.
- **Regulation 412 – Permeability – Requirement:** Where a lot is in a specified (residential) zone the permeability must be at least the amount specified in the schedule to the relevant zone under the planning scheme, or if there is no minimum permeable area specified, at least 20% of the lot must be permeable.
- **Regulation 802 – Flood areas – Requirement:** For most buildings in designated flood prone areas, the report and consent of the relevant council is required before a building permit can issue. The report and consent is not required where a planning permit is required. Conditions will typically require the floor level of the building to be between 300 mm and 600 mm above the declared flood level.

The conventional approach to planning for flood prone land is to introduce flood overlay controls over the area to ensure that a planning permit is required for most buildings. The use of a planning permit control allows policy to be applied for a broader range of purposes, whereas the use of the building regulation report and consent process focuses solely on flood risk by ensuring that floor levels are above the designated flood level. Where a planning permit trigger applies, there is scope to apply WSUD policy that sits within the planning scheme.

1.7 Stormwater drainage

Regulations relating to the management, maintenance, and disposal of stormwater are important considerations in the implementation of WSUD.

In all Australian jurisdictions, stormwater management is a shared responsibility between the local council, individual property owners and the water authority, although the boundaries of these responsibilities vary from state to state and are not always clearly integrated with the planning system. In some states, there may be more centralised planning of the drainage network, but decentralised responsibility for construction and maintenance of drainage assets is a typical condition in urban areas.

Previous studies have noted the potential problems arising from fragmented governance arrangements for urban stormwater (e.g. *Intergovernmental Agreement on a National Water Initiative* (Council of Australian Governments 2004) and The Senate Environment and Communications Reference Committee's report *Stormwater Management in Australia* (Environment and Communications Reference Committee 2015). Findings from these inquiries are summarised in Section 6).

In describing the stormwater management challenge, the Commonwealth Senate Inquiry into Stormwater Management made the following statement, which underscores the challenges posed by fragmented jurisdictional arrangements when planning for urban stormwater management⁵:

Nevertheless, the current approach to stormwater management has various apparent weaknesses. The primary responsibility for stormwater often falls to local governments, which are limited in their ability to make decisions that are outside their immediate area of responsibility and can be affected by actions, or inaction, in neighbouring local government areas. Evidence received by the committee during this inquiry also suggested that the regulation of water monopolies by state governments prevents those entities from considering how better stormwater management outcomes could be achieved. It was put to the committee that improved stormwater management outcomes potentially could be realised if water monopolies had broader objectives that allow them to become more involved in best practice stormwater management.

6.6 Increased attention to, and investment in, stormwater management across all levels of government could result in considerable environmental and economic benefits. Responding to the threats of flooding, climate change and ecosystem degradation should be priorities for all levels of government. The costs of inadequate stormwater planning are borne by the nation as a whole, with direct costs including those related to flood clean-up and recovery, higher insurance premiums, and riparian management. Proactive planning and well-targeted investment is needed to account for these threats.

Obligations and management functions and powers arise from a range of Acts including the state's Local Government Act, specific water or drainage Act and or the principal planning Act. Water authorities for drainage, which may or may not also be responsible for water supply and sewerage services, are generally constituted under separate Acts. Legal obligations relating to stormwater, plumbing, and water discharges arise across a range of laws and regulations and statutory instruments.

NSW

In NSW, water supply authorities are constituted under the *Water Management Act 2000* and are responsible for constructing, managing, and operating water supply, drainage, and flood works. Sydney Water Corporation provides stormwater services to south and south-west Sydney and manages flood-prone areas and trunk drainage at Rouse Hill. In the Blue Mountains and the Illawarra, the Sydney Water Corporation works with councils and agencies to manage stormwater systems (Sydney Water Corporation 2015).

The *Local Government Act 1993* authorises NSW councils to provide goods, services, and facilities, and carry out activities, appropriate to current and future needs within their local community and those of the wider public, including (Chapter 6):

- water, sewerage, and drainage works and facilities;
- stormwater drainage; and
- flood prevention, protection, and mitigation services and facilities.

It also requires council's consent (other than in prescribed areas) to carry out drainage work and to connect to a private drain or sewer with a council drain (s 68). A council may order the owner or occupier of land to refrain or take appropriate remedial action for work carried out on land that has caused environmental damage by drainage works (*Local Government Act 1993* s 128).

The *Plumbing and Drainage Act 2011* regulates the licensing of plumbers and drainers, on-site sewerage facilities, and bars a person from discharging prohibited substances, including stormwater, into an on-site sewerage facility.

Queensland

⁵Senate Environment and Communications References Committee Report into Stormwater Management in Australia, 2015, p. 70.

Property owners in Queensland have an obligation to maintain drainage and must not allow part of a stormwater installation for the premises to be connected to an on-site sewerage facility under the *Plumbing and Drainage Act 2002* (s 128G). Councils administer the stormwater drains in their municipality under the *Local Government Act 2009* and are able to request that the owner of a property connect their stormwater drainage to the council's stormwater drain. It regulates stormwater drainage by prohibiting:

- property owners from connecting their stormwater drains to the municipal drains without council approval (s 77, s 956A);
- connection of an on-site sanitary drainage to any part of a stormwater drain on the premises or council's stormwater drainage (s 956B); and
- a person from restricting or redirecting the flow of stormwater over land in a way that may cause the water to collect and become stagnant (s 956F). This requirement excludes a dam, wetland, tank, or pond if no 'offensive material' is allowed to accumulate.

South Australia

SA's *Natural Resource Management Act 2004* empowers a regional Natural Resource Management (**NRM**) board to construct, maintain, or remove any infrastructure and undertake any other form of work including work for the purpose of stormwater management or flood mitigation, and any testing, monitoring, or evaluation (s 31).

In SA, section 50 of the *Water Industry Act 2012* prohibits a person from unlawfully interfering with, connecting to or disconnecting from the water infrastructure which includes a common drain. It also prohibits unauthorised stormwater discharges to sewer to prevent flooding.

The *Plumbers, Gas Fitters and Electricians Act 1995* regulates license and registration requirements for 'draining work' which includes works to stormwater drains (s 3).

The *South Western Suburbs Drainage Act 1959* empowers the Minister to construct drains in those suburbs. Once a major drain or part of a major drain is completed, the relevant council is notified and becomes responsible for maintaining the drains (s12).

Western Australia

In WA, developers' and landowners' obligations to construct and maintain drains on their own land arise from building regulations, the *Water Services Act 2012*, and the *Health Act 1911*. Councils and the Water Corporation are responsible for the provision and management of drains, drainage works, and drainage services beyond private property.

For councils, these obligations arise under the *Local Government Act 1995*, the P&D Act, and the *Health Act 1911* which:

- prohibits a person from obstructing or encroaching on sewers or drainage without the consent of the council (s 79);
- empowers the council to enforce drainage of undrained or ineffectively drained houses (s 80);
- prohibits buildings without drains that are approved by the local government (s 82); and
- empowers the council to recover costs of sewerage and drainage works on private land if the council deems it necessary to carry out the works (s 84).

The *Water Services Act 2012* establishes the licensing requirement for 'water services' which is taken to include water supply services, sewerage services, irrigation services, and drainage services. Under the Act, drainage assets are defined to include drains, wetlands, swales, infiltration devices, devices for litter, sediment or water quality management, floodgates, pumping stations, culverts, and other similar works and natural features (s 108). It empowers the Water Resource Minister to declare a drainage asset controlled by a licensee for the purposes listed under the section (s 109). It prohibits a person from connecting a drainage asset on land to, or disconnecting a drainage asset on land from, the drainage works of a licensee without approval (s 111) and requires an owner of land to maintain drainage assets and modify them if directed by the Minister (s 112).

Victoria

In Victoria, the management and control of public sewers and drains are vested in councils pursuant to the *Local Government Act 1989* (s 198). Melbourne Water is responsible for the management of major drainage systems in Metropolitan Melbourne (for catchments greater than 60 Ha) and carrying out planning, funding, and delivery of regional scale drainage works, through levying fees to customers and through Development Services Schemes.

A council has the power to require the owner or occupier of any land or building to carry out 'any work for the drainage of a building or of surface or storm water on any land' (s 200).

Under Regulation 610 of the *Building Regulations 2006* (**Building Regulations**) the design of every stormwater drainage system to the 'point of discharge' must be approved by the relevant building surveyor. Councils must report on an application for a building permit when it involves the design of a stormwater drainage and discharge system. The building surveyor is not required to implement the council's recommendation unless it relates to the point of discharge as listed in Part 2 of Schedule 4 of the Regulations.

1.8 Environment protection

Environmental regulations relating to the protection of waterway health, native vegetation and biodiversity have a close nexus to WSUD objectives and can play a key role where they are integrated into planning policies and processes. Environmental legislation has been enacted to varying degrees across the five states to control quality and quantity of discharge from point source (such as from sewage treatment plants). However, diffuse source pollution (such as stormwater runoff), which is a primary concern for WSUD, is less coherently developed and remains largely unregulated (McCallum 2015). This Section discusses the current regulations for diffuse source pollution.

Queensland

Queensland's urban stormwater discharges quality is overseen by the Department of Environment & Heritage Protection and is regulated under the *Environmental Protection Act 1994* (**EP Act (Qld)**) and the EPP Water. The EP Act (Qld) and its subordinate legislation establishes the main framework for environmental protection and management in Queensland. Chapter 2 establishes the EPP Water, which is required to be given effect by the administering authority (EP Act (Qld) s 34). It also defines the terms 'environmental value' (EP Act (Qld) s 9) and 'best practice environmental management' (EP Act (Qld) s 21) which are employed in WSUD related planning policies. Section 319 requires all persons to comply with a general environmental duty:

A person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practical measures to prevent or minimise the harm.

Penalties apply for causing environmental harm or nuisance or serious environmental harm (EP Act (Qld) Chapter 8, Part 3), including unlawfully releasing stormwater run-off into waters, a roadside gutter, or stormwater drainage that results in the build-up of earth in waters (EP Act (Qld) s 440ZG).

Such release of stormwater run-off or a deposit of contaminant is considered 'environmental harm' (EP Act (Qld) s 493A (1)).

Queensland also provides the *Environmental Offsets Act 2014*, which establishes a framework for environmental offsets to counterbalance residual impacts of particular activities on prescribed environmental matters. It allows a council to impose an environmental offset condition if satisfied that the:

prescribed activity will or is likely to have a significant residential impact on a prescribed environmental matter' and 'all reasonable on-site mitigation measures for the prescribed activity have been, or will be, undertaken'. (s 14)

There is potential to apply this framework to stormwater.

NSW

In NSW, Sydney Water Corporation (whose area of operations covers approximately 12,700 km²) the Environment Protection Authority (**EPA**) and the Office of Environment and Heritage (**OEH**) oversee the quality of urban stormwater discharges.

The PEO Act is the key environmental protection legislation, which is administered by the NSW EPA and defines 'environmental values of water' as the environmental values of water specified in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZ Guidelines)* (ANZECC and the Agricultural and Resources Management Council of Australia and New Zealand) (PEO Act Dictionary).

Chapter 2 of the PEO Act sets out the procedures for the making of POPs which are able to set environmental standards, goals, guidelines, or protocols. Accordingly, urban stormwater quality and flow objectives could be expressed in PEPs. If such PEPs were to be made, section 29 of the PEO Act would then require the PEP to be taken into consideration where relevant by:

- a council when preparing a Local Environment Plan (**LEP**) or Development Control Plan under the EP&A Act;
- the Director-General of the Department of Urban Affairs and Planning when preparing a Regional Environmental Plan under the EP&A Act;
- the Minister administering the EP&A Act when making an LEP or Regional Environmental Plan, when recommending the making of a SEPP, or when giving direction under section 117 of the EP&A Act;
- a consent authority when determining a development application under the EP&A Act;
- a determining authority when consideration is being given under Part 5 of the EP&A Act to the likely impact of an activity on the environment; and
- the Minister administering the EP&A Act when approving under Division 4 of Part 5 of the EP&A Act the carrying out of an activity.

Nonetheless, there are no PEPs on urban stormwater at present and the EPA's role under the PEO Act for stormwater discharge predominantly relates to water pollution, while the OEH provides the relevant information on the state's water quality. The OEH provides guidance on water quality information via its website which contains links to non-statutory 'booklets' and guides that adopt the ANZ Guidelines. These guides encourage councils to incorporate water quality objectives into strategic planning. Pollutant load reduction targets are found in WQIPs, provided by the GSLLS.

As a joint initiative by the state's natural resource managers at state, regional, and local levels, the NSW *Diffuse Source Water Pollution Strategy* (Department of Environment & Climate Change 2009) provides a framework for coordinating efforts to reduce water pollution from diffuse sources (such as from runoff from rainfall and storms) across the state. It is designed to promote partnerships, and provide a guide for investment and a means to share project information and outcomes. Its main aim is to reduce diffuse source water pollution inputs into all NSW surface and ground water and contribute towards the NSW water quality objectives and the state-wide Natural Resource Management targets. The *Diffuse Source Water Pollution Strategy* has developed a Priority Action Plan, which identifies agreed projects that will be developed to help improve and manage priority diffuse source water pollution problems.

Victoria

In Victoria, Melbourne Water is vested with legal responsibility for waterway health and the EPA has established a State Environment Protection Policy for waters, which includes measures to control stormwater discharges from development sites.

Like other jurisdictions, discharges from stormwater drains are not licensed by the EPA and water quality requirements set out in SEPP(WofV) do not apply to the quality of water within a stormwater drain itself. The SEPP(WofV) regulates water quality degradation caused by urban development, and associated with increased imperviousness. Section 84B of the P&E Act requires VCAT to give effect to declared SEPPs, which provides the statutory driver to integrate the SEPP(WofV) into planning policies and decision making. It is the policy basis that underpins clause 56.07 of all Victorian Planning Schemes and allows discharges from subdivisions and new development that require town planning assessment to be regulated by planning permits and planning scheme

amendments. The SEPP(WofV) and clause 56.07 also underpin the Integrated Water management planning processes in growth corridors, as reflected in the PSP Guidelines.

South Australia

In SA, responsibility for monitoring and managing stormwater discharge quality is dispersed across SA Water, councils, and regional NRM Boards. The EPA (SA) administers the *Environment Protection Act 1993* (**EP Act (SA)**) and the *Environment Protection (Water Quality) Plan 2003* (**EPWQP**) and is charged with the duty of protecting aquatic environments and surface water in SA. The EP Act (SA) prohibits the discharge of contaminated stormwater to the environment but as is the case in some other states, the EPWQP does not apply to the discharge of stormwater from a public stormwater system (cl 4(2)).

Subject to section 7 of the EP Act (SA), the EPWQP applies to all surface waters and underground waters including water within a public stormwater disposal system or irrigation drainage channel, but excludes (cl 8):

- water within a water reticulation system;
- water within a sewage system or wastewater management system;
- the discharge of stormwater from a public stormwater disposal system into any waters by a government or public authority responsible for the system; and
- the discharge of 'uncontaminated' stormwater into any waters.

In relation to stormwater, the EPWQP includes:

- requirement for authorities constructing roads to comply with the code titled *Stormwater Pollution Prevention Code of Practice for Local, State and Federal Government* (EPA 1998) (Schedule 4);
- requirement for developers to comply with the *Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry 1999* (EPA) (Schedule 4);
- requirement for stormwater management authorities to apply the *Stormwater Pollution Prevention General Code of Practice for Local, State and Federal Government* (EPA 1998) (Schedule 4);
- compliance with the codes, standards, guidelines, or other documents prescribed in Schedule 4 if they contemplate measures that are expressed as mandatory in relation to the activity (cl 9(e)); and
- 'aquatic ecosystem' and 'recreation and aesthetics' as prescribed environmental values for public stormwater systems (Schedule 1).

Regulation 14 of the Development Regulations provides that environment protection policies under the EP Act (SA) are 'prescribed plans' for the purposes of section 29(1)(b) of the Development Act. This means that there is a discretionary power vested in the Planning Minister to ensure DPs are consistent with the EPWQP.⁶ However, the express terms of the EPWQP are not mandatory or expressly enforceable for decision making under the Development Act.

Western Australia

In WA, oversight of stormwater discharge quality, compliance, and enforcement functions are generally undertaken by the Department of Water and councils with input from the EPA and the Department of Environmental Regulation, as required under the *Environmental Protection Act 1986*. For priority waterways, they are also guided by WQIPs⁷, which contain pollutant load reduction targets.

There are two types of policies made under the *Environmental Protection Act 1986* (**EP Act (WA)**) – EPP and the *State Environmental Policy* (**SEP**). The EPPs are whole-of-Government statutory policies developed under Part III of the EP Act (WA) to establish environmental values and environmental quality objectives for a particular environment or segment of the environment. At present there are two EPPs – *Environmental Protection (Peel Inlet – Harvey Estuary) Policy 1992* and *Environment Protection (Western Swamp Tortoise Habitat) Policy 2011*. The

⁶ Section 29(1)(b) empowers the Planning Minister to amend a DP in accordance with a plan, policy, standard or code, which falls within a class prescribed by the regulations. This power is retained under section 73(d) of the PD&I Bill.

⁷ WQIPs are available for Peel-Harvey, Swan-Canning, Vasse-Wonnerup, Canning Plain and Leschenault Estuary.

SEPs are described by the EPA as ‘a more general and flexible instrument than an EPP’ (EPA 2015). Nonetheless, they can establish environmental values and environmental quality objectives similar to the EPPs.

In Swan-Canning River area, the Department of Parks & Wildlife (formerly the responsibility of the Swan River Trust) is responsible for water quality protection in the Development Control Area under the *Swan and Canning Rivers Management Act 2006* (**SCR Management Act**). The SCR Management Act establishes the Swan River Trust board with the statutory functions under the legislation divided between the Swan River Trust and the Director General of the Department of Parks & Wildlife. Part 5 of the SCR Management Act creates a separate planning approval process for development on lots that are within the Development Control Area. Decision-making in the area is done by the Minister for Environment rather than the relevant council on advice of the Director-General of the Department of Water. The Minister is also responsible for issuing permits and licenses under the SCR Management Act.

In WA, the *Waterways Conservation Act 1976* allows the Minister to declare any area of the State containing one or more rivers, inlets, or estuaries to be a management area for conservation of waters (s 10). The Minister is responsible for conservation of waters and the associated land to which this Act applies, for preserving and enhancing the quality of the environment and amenity of waters, and controlling and preventing any acts which may cause pollution of the waters or the land under declaration (s 11(1)). The Act also allows the Minister to reserve land and take and enforce covenants relating to the conservation of the land and waters (s 30, s 31, s 32). Five management areas have been established pursuant to the Act. These are the Peel/Harvey Estuaries, Leschenault Estuary and associated rivers, Albany Harbour and associated rivers, the Avon River, and Wilson Inlet and associated rivers. The Minister can request a council to refer to it details of development applications relating to a management area. The Minister may make recommendations on that development proposal, and the planning authority shall not make a decision on the proposal until it has received the Minister’s recommendations.

Regulations to protect biodiversity

Queensland

In Queensland, biodiversity is recognised as a State Interest under the SPP. The SPP includes a Model Biodiversity Overlay Code that may be adapted by a council when making or amending a planning scheme. As discussed above, Queensland provides the *Environmental Offsets Act 2014*, which is supported by the *Environmental Offsets Regulation 2014* and *Queensland Government Environmental Offset Policy* (Department of Environment and Heritage Protection 2014). Other relevant legislation relating to biodiversity protection are the *Vegetation Management Act 1999* and the *Biosecurity Act 2014*.

NSW

In NSW, *Threatened Species Conservation Act 1995* is enacted ‘to conserve biological diversity and promote ecologically sustainable development’ (s 3). It establishes lists of threatened species in addition to the *Environment Protection & Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) and the procedures for listing, declaration of ‘critical habitat’, recovery plans, licensing for taking action likely to result in harming or damaging threatened species and critical habitat, biodiversity certification and biobanking scheme. The biobanking scheme allows the ‘creation of biodiversity credits in respect of management actions carried out or proposed to be carried out on or in respect of biobank sites that improve biodiversity values’ (s 127A(2)). Once created and registered, ‘biodiversity credits’ may be traded by being purchased by developers and used as an offset against the impact of proposed development on biodiversity values (s 127A(2)). The credits can also be sold to those seeking to invest in conservation outcomes. The EP&A Act provides special provision relating to the requirement for the proponent to acquire and retire biobanking, which may form the Minister’s approval condition of State significant infrastructure (s 115ZC).

Victoria

The principle legislation for the protection of biodiversity in Victoria is the *Flora and Fauna Guarantee Act 1988* (**FFG Act**). Action statements for listed species and communities are given weight under Victorian Planning Schemes through State planning policy. However, Victoria does not have a stand-alone Act for protection of native vegetation. In practice, the FFG Act does not generally constrain the removal of vegetation from private land. The planning scheme remains the principle control on removal of native vegetation. Removal of native vegetation is

subject to state-wide clearing controls embodied in clause 52.17 of each planning scheme. Councils will apply overlay controls to provide additional protection to recognised areas of biodiversity significance and significant vegetation.

In Victoria, as part of a strategic assessment approved under EPBC Act, the Victorian government has recently endorsed:

- a Biodiversity Conservation Strategy for Melbourne's Growth Corridors (DEPI 2013);
- the Sub-regional Species Strategy for the Southern Brown Bandicoot (DEPI 2014);
- the Sub-regional Species Strategy for the Growling Grass Frog (DEPI 2013); and
- the Sub-regional Species Strategy for the Golden Sun Moth (DEPI 2013).

Along waterways in growth corridors with recognised biodiversity values such as Darebin Creek and Merri Creek these documents have identified habitats – required to protect values identified under the EPBC Act – which are to be protected and offset through a PSP process. This framework provides a lever for planners to achieve WSUD outcomes in addition to clause 56.07 and the *State Planning Policy Framework (SPPF)* through the creation of habitat and wildlife corridors. It also provides for water quality treatment outcomes.

South Australia

While SA has no specific legislation for biodiversity, it is considered in a general sense under the *National Parks and Wildlife Act 1972*, *Natural Resources Management Act 2004*, *Native Vegetation Act 1991* and *Fisheries Management Act 2007*. In 2007, the SA Government released the *No Species Loss – Overview, A Nature Conservation Strategy for South Australia 2007–2017* (Department of Environment and Heritage 2007), which proposes five goals to support No Species Loss targets. These include:

- ensuring the planning and development assessment system recognises and facilitates sustainable development that minimises its impacts on biodiversity (goal 5.3); and
- incorporating No Species Loss targets into natural resources management policy and planning at all levels (goal 5.5).

Western Australia

Similarly, WA has no legislation which directly addresses the protection of threatened species, despite the state recognising this as a gap (Conservation Council of WA). The *Conservation and Land Management Act 1984* establishes the Conservation Commission whose functions include advising the Minister on the development of policies for the conservation and management of biodiversity throughout the state (s 19(1)(d)). The SCR Management Act's objectives include maintaining and enhancing biodiversity and ecological integrity (s 5).

WA is yet to finalise a state-wide biodiversity strategy for 2010–2030. In 2006, the Department of Environment and Conservation released a draft biodiversity strategy titled *A 100-year Biodiversity Conservation Strategy for Western Australia* (2006 Draft). While this document remains listed as a strategy on WA Government's Natural Resource Management Program website, it was not available for viewing at the time of this report.

1.9 Natural resource management and catchment planning

Historically, natural resource and catchment management strategies have been independently developed and functionally separated from planning. However, the principles of WSUD suggest that an integrated and harmonised approach to these policy areas is important for achieving consistent environmental outcomes at all levels. For some time, the integration of catchment and land use planning has also been identified as a 'crucial element' in ensuring the success of Australia's 'Integrated Catchment Management' (ICM) programs and a 'key challenge' (Bellamy et al., 2002; Nelson and Hollick, 2005; Matthews, 2014).

Queensland

Queensland does not have specific legislation that creates catchment management authorities or deals with catchment management, but has established Regional Natural Resource Management boards for defined

catchment areas. Each catchment area has a water resource plan which contains strategies for achieving surface, groundwater, and overland flow water outcomes. These plans are not integrated with the planning system. The *Queensland Regional Natural Resource Management Investment Program* (2013–2018) will fund \$55 million worth of programs administered by regional Natural Resource Management bodies. Some of the funding will be aimed at waterway health and restoration projects. In 2011, the Department of Environment and Resources Management published *Framework for Regional Natural Resource Management*.

NSW

NSW has established the Natural Resource Commission (**NRC**) under the *Natural Resources Commission Act 2003* which recommends to the NSW Government state-wide standards and targets for NRM. These standards and targets encompass water, native vegetation, salinity, soil, biodiversity, coastal protection, forestry, and some marine environmental issues. They are promoted by catchment authorities who deliver state and Commonwealth funding to land managers for activities to meet the targets.

The current state-wide goals and targets for 2021 with respect to water are broadly stated as being to 'improve the condition of aquatic ecosystems' (NRC 2012, p. 6). Examples of activities that are considered to be contributing to the water targets include:

- water efficiency initiatives;
- identifying and maintaining priority groundwater-dependent ecosystems;
- establishing, protecting, and enhancing in-stream, estuarine, and marine habitats;
- managing diffuse and point-source pollution;
- improving coastal and riparian vegetation zones;
- improving the understanding of connections between surface and groundwater systems; and
- managing floodplain harvesting.

The *Water Management Act 2000* provides some scope for integrating water management planning with other environmental and land use issues by allowing a management plan to contain a number of environmental protection provisions controlling developments (s 34).

Victoria

In Victoria, the *Catchment and Land Protection Act 1994* establishes Catchment Management Authorities (**CMAs**) and a Catchment Management Council (**CMC**). The CMAs are responsible for preparing regional catchment strategies and special area plans, and co-ordinates and monitors their implementation. CMAs also have management power over regional waterways, floodplains, drainage, and environmental water under the *Catchment and Land Protection Act 1994*. Victoria is divided into 10 catchment regions with a CMA for each region. A CMA is given the power to request planning scheme amendments to facilitate consistency between planning schemes and regional catchment strategies (the *Catchment and Land Protection Act 1994* s 25(1)). However, a CMA's regional catchment strategies are generally not incorporated into the planning scheme and are rarely given direct application in town planning decisions.

South Australia

The *Natural Resource Management Act 2004* (**NRM Act**) governs NRM and catchment planning in SA and applies to the management of water, soils, pest animals, and plant control across the state. The NRM Act's objects include achieving Ecologically Sustainable Development (**ESD**) in the state by establishing an integrated scheme to promote the use and management of natural resources.

The NRM Act establishes a NRM Council and eight regional NRM boards whose responsibilities include 'undertaking an active role with respect to the management of natural resources within its region' and preparing and implementing state and regional NRM plans and water allocation plans (s 29).

On-ground development and implementation of regional plans may be delegated to NRM groups established by the NRM boards (s 43). Both the groups and the boards have general powers to 'provide for the care, control, management, conservation or preservation of any natural resource' (s 30(2), s 54(2)). A Regional NRM Board may

amend a NRM plan to achieve consistency with any other plan under the NRM Act or to give effect to the provisions of an Stormwater Management Plan under Schedule 1A of the *Local Government Act 1999* (s 89(1)).

Another function of a regional NRM Board under the NRM Act is to ensure that any DPs applying within its region promote the objects of the NRM Act and that 'insofar as is reasonably practicable', those DPs and the regional NRM plan form a 'coherent set of policies' (s 29(1)(ea)). To this end, when a DP amendment is proposed under the Development Act, a regional NRM Board is to work with the council or the Minister if the amendments are proposed by him/her (s 29(1)(ea)). A NRM board is also given special powers to carry out works and require private landowners who fail their statutory duty of care for resource management⁸ to prepare and implement action plans.

A key NRM policy is *Our Place, Our Future, State Natural Resources Management Plan 2012–2017* (NRM Council 2012) which provides high level vision, goals, and priorities for the state.

The *Adelaide and Mount Lofty Ranges Natural Resources Management Plan* (Adelaide and Mount Lofty NRM Board 2013) suggests that future urban development should include WSUD principles (p. 86). It also references Water for Good, which seeks a number of key outcomes, including:

- stormwater recycling with harvesting targets for whole state and Adelaide;
- wastewater recycling and water saving targets; and
- planning outcomes contained under Part 6, where mandatory WSUD for new residential and commercial urban developments 'dovetails with the 30-Year Plan' (p. 127).

Western Australia

Similar to Queensland, WA has no specific legislation that deals with catchment management. WA has a NRM Council and seven regional NRM groups which are not statutory bodies. The NRM groups provide policy advice on resource issues and advise government on how legislation can best be used to support NRM in the state. Catchment management is carried out under a number of Acts. NRM regions are based on catchments or bioregions, each with a regional strategy and investment plan that addresses significant NRM issues. These plans are not integrated with the planning system. While the SPP 2.9's objectives include integrating 'environment and natural resource management with broader land use planning and decision-making', there is no mandatory requirement to consider them in planning decisions.

⁸ Section 9 requires a person to act reasonably in relation to the management of natural resources within the state.

Section 2 Key drivers for WSUD

Introduction

When planning authorities engage with internal stakeholders, the development industry, or government about WSUD, there may be a discussion about the relative costs and benefits of WSUD. Debates about costs and benefits have played out at varying levels of government. When considering these matters, policy makers will need to consider:

- the need for efficient regulation;
- whether the cost of WSUD is justified by its benefits;
- how WSUD can add value to development; and
- should WSUD be regarded as something new or additional to existing policy, or should it be seen as something that is already required by the planning framework?

There is an ongoing debate about the cost of WSUD infrastructure, maintenance costs, and the affordability of housing. This economic concern must be counter-balanced with:

- the environmental costs of urban development, associated with degradation of water quality and aquatic habitat;
- the potential savings that water efficiency and WSUD approaches can offer to landowners and their tenants over time; and
- the potential effect that green infrastructure can have on the market value of developed land. There are many examples where sustainable housing or housing proximate to water demonstrate additional market value.

There are a range of policy drivers relevant to adoption of WSUD policies and practices, but broadly speaking they may be categorised as:

- environmental;
- economic;
- social/political; and
- legal.

In most jurisdictions, WSUD policy was established to achieve environmental goals relating to the mitigation of the impact of urban developments on aquatic environments. As a result, it has tended to focus on urban stormwater quality and flow management. A survey of WSUD projects in SA (Goyder Institute 2014) has found that flow management, water conservation, and quality improvement are the most common drivers, with flow management being a key driver for majority of projects (see Figure 2 below).

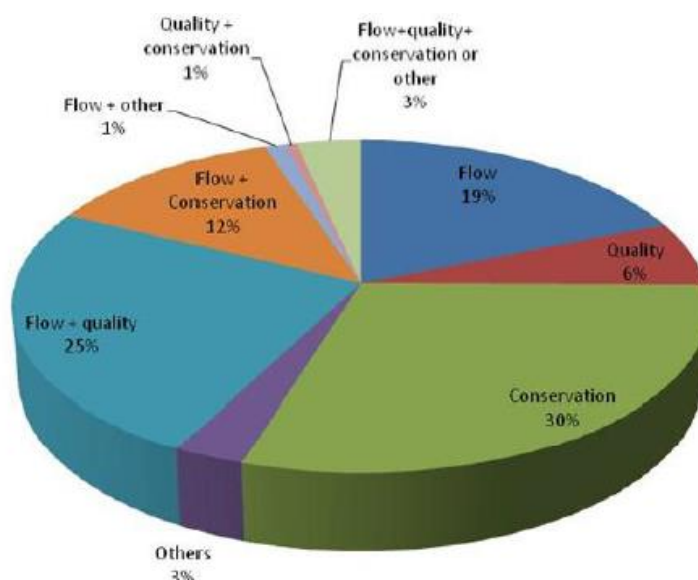


Figure 2: 'Major reasons for adoption of WSUD features in sample of 179 sites in SA', Water Sensitive Urban Design Impediments and Potential: Contributions to the SA Urban Water Blueprint: Post-implementation assessment and impediments to WSUD – Goyder Institute for Water Research Technical Report Series No. 14/16 (Goyder Institute for Water Research 2014).

However, with urban design policy being continually redefined to encompass the concept of resilience and liveability in the face of climate change, these factors are also emerging as key drivers for WSUD. This section briefly examines the policy drivers for WSUD that are currently identified in State planning policy and at the implementation level across the jurisdictions.

Key drivers

2.1 Legal

To the extent that WSUD policy is supported by existing policy frameworks, it is not always necessary to justify the provision of WSUD or IWM using cost benefit analysis. The question then is not if, but *how* to best achieve the objective. By comparison, where the policy framework is discretionary or unclear, politicians and economic regulators may ask 'why?', rather than 'how?'. Where there is a legal and policy driver of WSUD, it can change the focus of a cost benefit assessment to different methods of implementing WSUD or IWM. This may involve a discussion around the optimal scale at which the solution should be delivered, and the best mix of options to achieve the objective.

At present the key legal and policy drivers reflected in planning policy relate to flood risk, hydrology, water quality protection, and biodiversity. These legal drivers provide a price signal that encourages developers to think about different ways of mitigating the legal risk. This may be through a conventional approach to stormwater management, or may involve consideration of WSUD and IWM. Adopting a WSUD approach reliant on more decentralised management of stormwater and storage of water in the landscape may prove to be just as cost effective for developers in varying circumstances, even focusing solely on construction costs. There are known examples of structure planning where developers have proposed a more decentralised approach to drainage design on the basis of WSUD principles, on the rationale that this would free up developable land by relying on the use of passive open space for detention of stormwater.⁹ IWM and WSUD may be seen as a cost effective approach to flood risk management where there is ample land in waterways and reserves for mitigation of flood peaks. In Melbourne's growth areas, it is now standard practice due to the policy settings. In areas where site

⁹ See, for example, the Ballarat West Growth Area Development Contributions Plan, which was revised to allow for the use of passive open space to provide water management functions to defray the costs of retarding basin construction.

coverage is high or where the area of passive open space available for flood storage is low, then a decentralised approach may not be more difficult or more expensive.

Legal protection under the EPBC Act has driven conservation outcomes for threatened species reliant on waterway and wetland habitat connectivity. In the Melbourne Strategic Assessment, a series of conservation reserves were protected as a requirement of Commonwealth approval of the strategic assessment. This involved the reservation of a series of wetlands and vegetation reserves along significant waterway corridors, setting the goalposts for the development of each precinct structure plan, and providing a basis on which IWM plans were to be prepared for each precinct.

2.2 Environmental

As foreshadowed above, most jurisdictions identify environmental objectives as a key driver for the implementation of WSUD. For example, in WA, the SPP2.9 is underpinned by the need to protect the values of state's water resources, which include 'ecological values, such as flora, vegetation and fauna, and human use values such as drinking water, recreation, agriculture and industry.' The SPP2.9 identifies the issues of 'major concern' as (WAPC 2006, cl 2.1):

- sustainable use of water resources;
- stream salinisation;
- nutrient enrichment of water resources;
- loss of riparian vegetation;
- erosion and sedimentation of waterways; and
- contamination of water resources.

Similarly, in Queensland, the SPP *State interest – Water quality* identifies its objectives as 'protecting and enhancing the environmental values of Queensland's receiving waters, including high ecological value waters, freshwaters, estuaries, rivers, creeks, bays, groundwaters and the Great Barrier Reef' (Department of State Development, Infrastructure and Planning 2014, p. 31).

In Victoria, the BPWM Guidelines and the SEPP(WofV) are designed to protect the beneficial uses of urban waterways protected by SEPP(WofV). They also consider flood prevention and public safety as 'fundamental objectives' which should not be compromised by stormwater quality measures, as these should have 'inherent water quantity management benefits'.

The SA's WSUD Policy objectives are also relatively consistent with other jurisdictions' environmental drivers and include improving the health of receiving water bodies and their ecosystems and helping to reduce ecological impacts (Department of Environment, Water and Natural Resources 2013, p. 9).

2.3 Economic

Economic factors are yet to be seen as strong policy drivers for WSUD in many jurisdictions although research is increasingly exploring the business case for WSUD. Fears of new infrastructure and technology can be based on a lack of information.

WA's SPP2.9 identifies 'rising saline groundwater and associated drainage issues as affecting the productivity of agricultural lands and livelihood of rural communities in the Wheatbelt region' (WAPC 2006, cl 2.1). The SA WSUD Policy objectives include supporting 'affordable living by reducing long-term costs associated with water management'. However, with climate change and extreme weather events including flash flooding and the projected rise in sea level, many councils are increasingly recognising the long-term economic value of implementing WSUD as a means of mitigating these events.

Economic drivers may include (but are not limited to) the following:

- construction and maintenance costs;
- increased land values associated with proximity to water features, wetlands, and waterways;
- water efficiency for occupiers of buildings;

- market perceptions around sustainability (and sustainability ratings tools);
- the cost of distributing water from the point of treatment to the end user;
- the cost of alternative water augmentation for irrigating open space, or for domestic supply; and
- freeing up developable land, by directing WSUD assets to encumbered undevelopable land or public land (flood prone land, drainage easements, passive open space, and riparian corridors).

The value of sustainability as a marketing feature of urban development is now well appreciated. Industry peak bodies such as the Urban Development Institute of Australia (**UDIA**) have developed their own sustainability ratings schemes to provide a private accreditation of the green credentials of urban development. An example of this is the Enviro Develop tool developed by the UDIA.¹⁰ These accreditation schemes compete indirectly with sustainability ratings tools developed and accredited by regulators, but play an important role in dispelling concerns about sustainability policy among sections of the development industry. Consultations suggest that larger and more sophisticated developers (and their environmental consultants) are better versed in best practice sustainability innovations than medium and smaller developers, which is consistent with the author's practical experience.

The Enviro Development tool includes a water management component and is accompanied by a 'national technical standard'. The UDIA technical standard explains the economic rationale for accreditation as follows:

Attract a premium for your project

Focus group research conducted by Resolution Research, found that 88.6% of participants would be willing to pay \$10,000–\$15,000 more to buy into an EnviroDevelopment. One of the most appealing aspects of EnviroDevelopment certification is the potential to reduce operating costs. Achieving EnviroDevelopment certification in the areas of water and energy, has the potential to significantly lower operating costs for the end user, depending on behavioural patterns. This lower lifecycle cost has a positive effect of increasing value.

Satisfy consumer and tenant demand

The EnviroDevelopment National Technical Standards set the criteria for projects to demonstrate sustainable development and have been informed by specially convened expert groups, research findings and, importantly, through primary research conducted on behalf of EnviroDevelopment. The Standards incorporate best practice sustainability initiatives and those considered worthwhile and valuable to end users.

In many cases water modelling used for development planning purposes may demonstrate that a design approach reliant on storage of water in the landscape, involving constructed wetlands and other WSUD features, can assist in achieving flood risk objectives. This may be in conjunction with the use of rainwater tanks to mitigate flood peaks, although the reliability of rain water tanks for flood mitigation is contentious because freeboard levels in tanks are hard to predict. This is often better achieved at a master planning scale where greater reliance on waterways and public land can be planned.

¹⁰ <http://www.envirodevelopment.com.au/>
http://www.envirodevelopment.com.au/dbase_upl/National_Technical_Standards_V2.pdf

Section 3 Planning framework for WSUD in Australia's cities

Introduction

The Literature Reviews (conducted between July 2014 and July 2015 and published as five separate reports) examined the extent to which WSUD policy is a feature of each jurisdiction's planning system by exploring the following themes:

- how WSUD is defined and incorporated into statutory planning in each jurisdiction. Standardising the definition of a term within and across jurisdictions can encourage a more consistent application of the term;
- the extent to which WSUD is supported under state planning policy and how this is incorporated into statutory planning;
- each jurisdiction's approach to urban stormwater management and environmental protection policy on water quality objectives and how this is integrated into land use planning and decision making processes;
- whether there are effective and clear WSUD policy and controls at different scales (regional, precinct, subdivision, infill, and lot scale) in place;
- whether developer contribution and public open space requirements provide adequate support for the implementation of WSUD in the public and private realms;
- whether there is a sufficient and useful range of implementation guidelines in each jurisdiction and how these are integrated into planning policies;
- integration of natural resource management and catchment planning with land use planning; and
- whether the governance arrangements adequately support the implementation of WSUD.

Section 3 provides a snapshot of the findings and comparison of the jurisdictions under each of the above themes whereas Section 4 provides a more detailed summary of the policy framework in each state.

As the review is focused on the urban development sector and town planning systems and policy, it does not assess risk and governance arrangements relevant to the re-use of stormwater or recycled water.

Summary

WSUD definition

It is necessary to define WSUD before assessing the extent to which it is supported and adopted in each jurisdiction. However, there is no single statutory definition applicable across the five jurisdictions.

A common reference point for WSUD definition and its scope is contained in the Australian Government's¹¹ *National Water Initiative* (2004) and the *Australian Runoff Quality: A Guide to Water Sensitive Urban Design* (Engineers Australia 2006) with the former describing WSUD as follows:

Water sensitive urban design is defined as the integration of urban planning with the management, protection and conservation of the urban water cycle that ensures urban water management is sensitive to natural hydrological and ecological cycles.

Principles of Water Sensitive Urban Design include:

1. Minimise the impact on existing natural features and ecological processes;

¹¹ This is a joint initiative of all Australian jurisdictions.

2. Minimise impact on natural hydrological behaviour of catchments;
3. Protect water quality of surface and ground waters;
4. Minimise demand on the reticulated water supply system;
5. Improve the quality of and minimise polluted water discharges to the natural environment;
6. Collect, treat, store and/or reuse runoff, including roof water and other stormwater (while ensuring natural processes are maintained);
7. Reuse of treated effluent and minimising wastewater generation;
8. Increasing social amenity in urban areas through multi-purpose greenspace, landscaping and integrating water into the landscape to enhance visual, social cultural and ecological values;
9. Add value while minimising development costs – minimise the drainage infrastructure cost of the development; and
10. Take into account the nexus between water use and wider social and resource issues.

The review found that most jurisdictions' understanding of WSUD is consistent with that of the National Water Initiative's definition as stated above. However, each jurisdiction adopts different aspects of the above 10 principles and most do not provide a statutory definition that is consistently applied and referenced in planning policies.

In Victoria, WSUD definition is contained in the BPEM Guidelines and focuses largely on urban stormwater management. The BPEM Guidelines is given legal effect by the SEPP(WofV) and is integrated into statutory planning by being a key reference document under the integrated water management clause 56.07 of the VPP.

In Queensland and WA, WSUD definition is contained in a number of statutory documents with each definition being a slight variation of the other. In both jurisdictions, the general objectives of WSUD are expanded to include integrating water into the landscape and urban planning to enhance visual, social, cultural, and ecological values.

SA provides a WSUD definition in a number of non-statutory policy documents focused on integrated water management and urban stormwater management.

WSUD is not a clearly defined concept in the NSW planning system.

The definitions in each state are discussed further in Section 4 and Appendix 1.

State planning policy for WSUD

All jurisdictions rely on a range of regulatory tools – planning policies, rules, guidelines, codes, and standards – to control land use in their jurisdiction. Generally, state planning policies are designed to sit at the apex of the policy hierarchy and set the overarching agenda and objectives for statutory planning within the jurisdiction. However, impact of state planning policy at various development scales depends on a number of interrelated factors – primarily sociological, political, economic, and legal.

In most states, WSUD policies are applied in a discretionary manner. Unlike a performance-based code, policies are not mandatory, but can be balanced against other competing policy considerations. Policies have been described as 'soft law' and provide no express legal sanctions if there is a breach unless they have been given legal status (Freiberg, 2011).

State planning policies may acquire greater legal force by being given direct or indirect statutory authorisation by being:

- prepared under primary planning legislation on approval by the Minister or the Governor in Council;
- issued under ministerial order;
- given effect under a legislative provision; or
- adopted under statutory instruments, such as planning schemes.

While enforceability of policy will depend on its legal status within the planning policy hierarchy in each state, it also depends on whether the drafting of policy is clear and capable of creating clear and enforceable requirements. Policies which only incorporate high-level objectives and principles of WSUD tend to be difficult to

apply and enforce unless they are supported by well-defined targets or performance standards with specific outcomes.

A common example of a performance standard for WSUD is the maximum allowable volume of pollutants in a particular body of water. This section of the report examines each jurisdiction's state planning policy for WSUD and legal factors which affect its application.

The primary focus of the following analysis is on effectiveness of the policy settings for WSUD. The discussion does not seek to address all of the characteristics of a good regulatory system.

Table 1: Comparison of overarching State Planning Policy on WSUD in jurisdictions

	State Planning Policy for WSUD	Policy focus	Legal status of policy	Is the policy binding? ¹²	Implication on decision makers and planning decisions	Does the policy prescribe performance outcomes or standards?
Qld	SPP, <i>State interest 3 – Water quality</i> SEQ Regional Plan	For SEQ, flood management, protection of water quality in receiving waters, and waterway health.	Planning schemes must coordinate and integrate the matters dealt with by the planning scheme, including state and regional aspects of the matters (Planning Act s 16).	✓	Mandatory to integrate into planning schemes but effectiveness of policy still depends on how well the principles are translated and given effect in the exercise of discretion by council.	Yes. State Interest 3 includes performance standards for stormwater runoff quality and quantity or 'best practice environmental management for development that is for an urban purpose' which is undefined.
NSW	No state-wide WSUD policy but BASIX scheme applies	Water conservation, protection of water quality in receiving waters in certain areas.	Unless land is within Growth Centres, Sydney Drinking Water Catchment, Sydney Harbour Catchment, or Coastal Zone, adoption of WSUD policy varies from council to council.	✗* * Exceptions are Growth Centres and where BASIX applies	N/A	No. No specific standards apply with general application, except for those under BASIX and land in the Coastal Management Zone and Sydney Drinking Water Catchment.
Vic	<ul style="list-style-type: none"> SEPP (WofV) BPEM Guidelines State Planning Policy Framework Clause 56.07 SS 60 and 84B of the P&E Act 	Flood management, protection of water quality in receiving waters, and waterway health.	Clause 56.07 incorporated into all local planning schemes for residential subdivision but otherwise it varies from council to council. SEPP(WofV) must be given effect by VCAT.	✓	Clause 56.07 given automatic effect in all planning schemes for new residential subdivisions. SEPP(WofV) must be considered and applied.	Yes. But for residential subdivisions under clause 56.07, compliance to performance standards under the BPEM Guidelines required.
SA	<ul style="list-style-type: none"> 30-Year Plan Water Sensitive Cities in SA SAPP Library 	Ground and surface water protection, water quality and stormwater harvesting.	A State planning policy or a regional plan is 'an expression of policy formed after consultation within government and within the community and does not affect rights and liabilities (whether substantive, procedural or other nature)' (PD&I Act s 72).	✗	No requirement to consider or apply policy.	Yes. Water Sensitive Cities in SA includes performance standards but the document has little or no legal status.

¹² A policy which is not binding does not have mandatory application, but may be given effect in the exercise of discretion.

	State Planning Policy for WSUD	Policy focus	Legal status of policy	Is the policy binding? ¹²	Implication on decision makers and planning decisions	Does the policy prescribe performance outcomes or standards?
WA	<ul style="list-style-type: none"> • SPP 2.9 – Water Resources • Liveable Neighbourhoods • BUWM 	Ground and surface water protection, wetland buffers, and protection of water quality in receiving waters.	Planning schemes are to have ' due regard ' to any SPP relevant to the district (Planning and Development Act s 77).	x	Requires decision makers to give 'proper genuine and realistic consideration' to policy but not necessarily make decisions that are consistent with policy.	Yes. BUWM includes performance standards but application is discretionary.

All jurisdictions except NSW have developed state planning policies which support the implementation of WSUD, but policy frameworks are significantly different from state to state.

Through clause 56.07, Victoria has implemented a performance-based approach to Integrated Water Management, which means that the obligation is mandatory and not subject to the exercise of discretion in the context of residential subdivision. Its approach is based on legislated water quality protection targets under the BPEM Guidelines (given effect by SEPP(WofV)), which provide the policy basis for modelling development design to achieve flood control and waterway health. Clause 46 of SEPP(WofV) requires planning decision makers to minimise adverse impacts on receiving waters from urban development, and seeks to support implementation of the BPEM Guidelines. Sections 60 and 84B of the P&E Act require planning decision making to 'give effect to' the SEPP(WofV).

For urban run-off, the mandatory objectives include '[t]o minimise increases in stormwater run-off and protect the environmental values and physical characteristics of receiving waters from degradation by urban run-off'. For developments to be satisfactory, they must be designed to meet the best practice performance standards set out in the BPEM Guidelines and support the use of WSUD.

For other development types and PSPs, tailored local policy responses are required, although these are influenced by local circumstances. Some councils have developed local policies which seek, in effect, to apply the approach in clause 56.07 to other developments. Under clause 11 of the SPPF, PSPs in Melbourne's growth areas must consider the PSP Guidelines (Growth Areas Authority 2009), which include requirements for IWCW.

In comparison to Victoria, other jurisdictions' WSUD policies operate within more discretionary frameworks where councils are often given wider scope to develop WSUD policy to suit their individual needs. The effectiveness of such frameworks often depends on how well WSUD policy is translated into their planning schemes and given effect in the exercise of discretion. However, there is also a wide variance in what this means in regards to the breadth of discretion given to decision makers between states.

In Queensland discretion given to councils is potentially narrower than in Western Australia as a planning scheme *must* 'coordinate and integrate the matters dealt with by the planning scheme, including State and regional aspects of the matters' (Planning Act s 16(1)(c)). *The State interest – Water quality* outlines similar obligations to prevent or minimise impacts from altered stormwater quality or flow. However, the implementation of this state policy depends on the measures adopted by the local planning scheme.

In comparison, WA's requirements under the P&D Act are not binding as planning authorities are to give 'due regard' to the *State Planning Framework* (s 77). The Project has assessed that there is greater scope for variability in implementation of the WA policy framework, which is a higher-level framework, designed to assist in the development of urban water planning. It is not a performance-based code which identifies a suite of mandatory outcomes and deemed to satisfy measures or standards. Better Urban Water Management is a comprehensive document which guides planning at all scales, but feedback from stakeholders indicates that it has not been consistently implemented.

SA's approach provides councils with the broadest discretion as a 'designated instrument' may 'refer to or incorporate wholly or partially and with or without modification, a policy or other document prepared or published by a prescribed body, either as in force at a specified time or as in force from time to time' (PD&I Act s 71(b)).¹³

Support for WSUD in NSW is fragmented, but is provided for in:

- Sydney's Growth Centres;
- Sydney Drinking Water Catchment;
- Sydney Harbour Catchment; and
- Coastal Zone under various SEPPs.

¹³ The PD&I Act 2016 establishes a range of statutory planning instruments including state planning policies, regional plans, planning and design codes, and design standards. Nonetheless, similar to section 33 of its predecessor, the PD&I Act includes a provision, which states that 'State planning policy is not to be taken into account for the purposes of any assessment or decision with respect to an application for a development authorisation under this Act', (s 58(4)).

There is no policy of general application that supports WSUD, and there are no mandatory targets or requirements for WSUD. However, the BASIX scheme sets mandatory sustainability targets for water and energy consumptions in all developments and requires up to 40% reduction in potable water consumption.

Stormwater discharge objectives

Table 2: Comparison of stormwater runoff quality and flow target in jurisdictions

State	Approach to pollutant load reduction targets and design objective	Specified targets ¹⁴	Legally binding?
Qld	Adopted under the SPP and the SEQ Regional Plan and given effect when integrated into the relevant planning scheme . Also reliant on the following guides: <ul style="list-style-type: none"> • <i>Urban Stormwater Quality Planning Guidelines</i> • <i>Queensland Urban Drainage Manual</i> 	For SEQ region: <ul style="list-style-type: none"> • TSS 80% • TP 45% • TN 45% • Gross Pollutants 90% 	No
NSW	Can be adopted under WQIPs which becomes a relevant consideration for a consent authority under s 79C of the EP&A Act , particularly if the council has incorporated in the DCPs. ¹⁵ May be given effect in the exercise of discretion.	Varies between councils <ul style="list-style-type: none"> • TSS 80–85% • TP 30–60% • TN 30–45% 	No
Vic	Adopted under the SEPP(WofV) and the BPEM Guidelines and given effect under the P&E Act . SEPP(WofV) is mandatory but is not always applied in this way. These standards are used broadly in residential subdivision and precinct planning but their application may vary in lot scale developments and large infill contexts where clause 56.07 does not apply.	<ul style="list-style-type: none"> • TSS 80% • TP 60% • TN 45% • Gross Pollutants 70% 	Yes
SA	Contained in the Water Sensitive Cities in SA . Generally administered as an engineering condition or as part of a local policy or a Stormwater Management Plan – may be given effect in the exercise of discretion.	<ul style="list-style-type: none"> • TSS 80% • TP 60% • TN 45% • Gross Pollutants 90% 	No
WA	Adopted under BUWM and Stormwater Manual for WA which are both non-statutory guides. May be used as a policy basis for adoption into planning schemes – may be given effect in the exercise of discretion	<ul style="list-style-type: none"> • TSS 80% • TP 60% • TN 45% • Gross Pollutants 70% 	No

In Victoria, water quality targets are adopted under the SEPP(WofV) and the BPEM Guidelines which are established under the state's EP Act. Unlike other jurisdictions, the P&E Act requires them to be given effect in planning decisions and incorporated in the VPP, which forms the basis for all local planning schemes. BPEM Guidelines underpin the operation of clause 56.07 (Integrated Water Management) in the VPP, which has been the cornerstone of the state's approach to WSUD, and has informed the subsequent development of PSP Guidelines for Integrated Water Management and local WSUD planning policies.

In other jurisdictions, while water quality targets are identified as important matters in a policy sense, they are generally provided under non-statutory guidelines or WQIPs and given effect when adopted into a planning scheme.

¹⁴ TSS = Total Suspended Solids; TP = Total Phosphorus; TN = Total Nitrogen.

¹⁵ Land in the Sydney Drinking Water Catchment and Coastal Zone are subject to different controls.

WSUD at different scales

Table 3: Gap analysis of WSUD policies at different scales across jurisdictions

State	State-wide policy for Precinct Structure Planning	State-wide policy for Residential Subdivision	State-wide policy for Infill (large strategic redevelopment sites)	State-wide policy for Lot Scale Development
Qld	Broad policy framework under the SPP and the SEQ Regional Plan	Broad policy framework under the SPP and the SEQ Regional Plan	x	Building regulation QDC Part 4.0, Building Sustainability – MP 4.1 Sustainable Buildings – water efficient taps and toilet.
NSW	Growth Centre Development Code & SEPPs for Growth Centres. No WSUD policy for other areas.	None in metropolitan context unless in Growth Centres	x	SEPP (Building Sustainability Index: BASIX) 2004 All new developments and renovations >\$50,000 – up to 40% reduction in potable water consumption and 40% in greenhouse gas emissions targets.
Vic	PSP Guidelines Integrated Water Management	VPP – Clause 56.07 Integrated Water Management	x	Building regulation BCA – sustainability measures Single detached dwellings to install rainwater tank or solar panels.
SA	Broad policy framework under the 30-Year Plan and the SAPP Library	Broad policy framework under the 30-Year Plan and the SAPP Library	x	Building regulation BCA – SA Additions, SA2 Water Efficiency – new houses/house extensions >50m ² are required to have additional water supply to supplement mains water or on site stormwater retention for certain soil types.
WA	Liveable Neighbourhoods BUWM	Liveable Neighbourhoods BUWM	Liveable Neighbourhoods for 'large urban infill sites'. BUWM suggests that its approaches should be applied to urban renewal projects.	R-Code cl 5.3.9 or cl 6.3.8 demonstrate compliance with the stormwater management design principles.

Generally, all jurisdictions lack targeted WSUD policy for urban infill and lot scale developments. For these scales, firstly whether a development is subject to WSUD objectives depends on a council's ability to impose planning controls. In most jurisdictions, a lot scale development is not subject to planning controls unless it is in a particular zone, overlay or lot size.

WA has the R-Codes, which provide statutory planning controls for residential developments throughout the State in relation to stormwater management. They requires all stormwater runoff to be retained onsite where possible. In other jurisdictions, lot scale developments are subject to various sustainability targets or measures under the state's building and plumbing regulations but variable planning controls with respect to stormwater management.

Notwithstanding this, a review of local planning policies suggests that many councils across all jurisdictions have been active in developing local WSUD policies to fill the policy gap at various development scales.

Funding WSUD

While all jurisdictions allow councils to levy development contributions under the respective planning Act, there is a high degree of variability in the approaches taken and amount levied both within and across states. Queensland and NSW are the only jurisdictions where the contribution amounts are capped and proposed charges above the capped amount are overseen by an independent price regulator who also regulates water pricing.

In all jurisdictions, infrastructure planning by water agencies and councils are often not aligned to facilitate the provision of WSUD in the public realm. None of the jurisdictions have a statutory process that mandates integration of planning of water infrastructure and open space infrastructure. However, guidance promotes integration in many cases. However, the misalignment of planning and funding of works in open space areas and along waterways is likely to result in missed opportunities to jointly plan for WSUD and IWM. There is a degree of

variability between states in the approach to public open space contributions and the integration of water planning along waterways and drainage corridors.

Some states allow for higher levels of passive POS to be levied through the precinct structure planning process, compared with the infill POS requirements, which can provide land for delivery of WSUD solutions at scale. There is room to better integrate planning for WSUD in the public realm with POS policies, and to assess where delivery of WSUD in the public realm would be preferable to lot-based approaches.

Market mechanisms, such as a water quality offset program, are not widely used. At present, Victoria is the only state with a major program, operated by Melbourne Water (primarily in growth areas). This scheme allows some developers to pay money in lieu of providing physical works to achieve best practice standards on their land. This approach can unlock developable land and increase development yield. The funds are then used to deliver stormwater works on public land, which gives rise to public benefits (including flood protection, water quality management, and amenity outcomes) that might not otherwise be realised.

Table 4: Comparison of infrastructure funding framework in jurisdictions

State	Levies under Local Gov Act	Approaches to Development Contributions	\$/dwelling	POS requirements	Cash in lieu of POS	WQ Offset Schemes
Qld	✓	Adopted under a LGIP or a Priority Infrastructure Plan (PIP) required under the Planning Act.	Capped at \$20k for 1–2 bedrooms; \$30k for 3 or more bedrooms.	Set through the infrastructure charges under an LGIP/PIP. No quantum prescribed	Not specified – varies from council to council	x
NSW	✓	Contributions more than the relevant cap must be authorised by a DCP.	Capped at \$20,000/ dwelling for established areas; \$30,000/dwelling for greenfield site.	No quantum prescribed Under the ROSP Guidelines, 'default' standards for open space planning in NSW for parks are stated as being: <ul style="list-style-type: none"> 0.5–2 ha within 400 m from most dwellings; 2–5 ha within 2 km from most dwellings; and 5+ ha within 5–10 km from most dwellings. 	Not specified – varies from council to council	x
Vic	✓	Planning scheme may include one or more DCPs for the purpose of levying 'community infrastructure' or 'development infrastructure'.	Transitioning to a capped arrangement with scope for supplementary levies. In growth areas benchmarked rates are \$268,000 per developable hectare (or approx. \$23k per dwelling average for subdivisions of 16 dwellings per hectare) inclusive of Melbourne Water drainage charges which can be \$6,000 per dwelling approx.) for conventional subdivisions.	5% of site value under the Subdivision Act unless different rate specified in planning scheme for permit applications. Through the PSP and DCP process – approx. 10% with 6% as active open space under the PSP Guidelines but for Growth Areas, it may be in excess of 20% depending on the local context, due to other encumbered, undevelopable land (including waterways and native vegetation) being gifted to the council.	Not specified – varies from council to council	✓ Melb Water
SA	✓	Under section 163 of the PD&I Act the Minister may initiate a scheme in relation to the provision of 'basic infrastructure' in or in connection with a designated growth area.	The PD&I Act creates an Infrastructure Delivery Scheme that allows councils to recoup contribution to the Scheme by imposing charges on rateable land in the contribution area. (PD&I Act s 180)	Prescribed under section 198 of the PD&I Act <ul style="list-style-type: none"> max 12.5% where a subdivision of land into more than 20 allotments, and one or more allotments is less than 1 hectare in area; where an application provides for 20 allotments or less, and one or more allotments is less than one hectare in area, or the subdivision is under the <i>Community Titles Act 1996</i> or the <i>Strata Title Act 1988</i>, the applicant may be required to pay the Development Assessment Commission the contribution prescribed by the Development Regulations (s 50(2)); and max 12.5% of total area of the site where a subdivision falls outside the above categories. 	<ul style="list-style-type: none"> \$6,488 for each new allotment or strata lot < 1 hectare, within or outer Metro Adelaide (Reg 56(2)(a)); and \$2,849 for each new allotment or strata lot < 1 hectare, within Regional SA (Reg 56(2)(c)). 	x

State	Levies under Local Gov Act	Approaches to Development Contributions	\$/dwelling	POS requirements	Cash in lieu of POS	WQ Offset Schemes
WA	v	<i>Under SPP 3.6 which forms part of all planning schemes</i> (P&D Regulations, Schedule 1)	None specified	10% under SPP 3.6 recommended under Liveable Neighbourhoods	Section 153 of P&D Act allows the WAPC to agree to cash-in-lieu of POS where land contribution would be too small to be of practical use.	x

Delivery of stormwater harvesting schemes

Stormwater harvesting schemes have been funded substantially through the National Urban Water and Desalination Plan (Australian Government, Department of Environment 2015), rather than as a planning requirement funded through the planning system.

Queensland				
Location	Project Name	Theme	Aust Govt Funds (excl. GST)	Status
QLD	South Bank Stormwater Harvesting and Reuse Centre Project	Stormwater	\$3,300,000	Complete
QLD	Fitzgibbon Rainwater Harvesting to Potable Reuse Scheme (PotaRoo) Project	Stormwater	\$4,050,000	Complete
QLD	Fitzgibbon Stormwater Harvesting (FiSH) Project	Stormwater	\$3,086,600	Complete
QLD	Brisbane City's Stormwater Harvesting and Reuse Project	Stormwater	\$5,391,000	Active

Figure 3: National Urban Water and Desalination Plan: Queensland's projects funded under the National Urban Water and Desalination Plan (Australian Government, Department of the Environment 2015).

New South Wales				
Location	Project Name	Theme	Aust Govt Funds (excl. GST)	Status
NSW	Terrigal Central Business District and Hylton Moore Park Stormwater Harvesting Project	Stormwater	\$2,000,000	Complete
NSW	Manly Golf Course Stormwater Harvesting and Reuse Project	Stormwater	\$2,091,700	Complete
NSW	Blacktown Stormwater Harvesting and Reuse Using Managed Aquifer Recharge Project	Stormwater	\$2,212,500	Active
NSW	Penrith Stormwater Harvesting and Reuse Using Managed Aquifer Recharge Project	Stormwater	\$1,981,000	Not Proceeding
NSW	Apex Oval/East Dubbo Sporting Complex Water Harvesting at a Regional Sporting Venue	Stormwater	\$4,506,500	Complete
NSW	Alexandra Canal Catchment Stormwater Reuse Scheme	Stormwater	\$7,633,000	Active
NSW	Lower Hunter Recycled Water Initiative	Water Recycling	\$8,850,000	Active
NSW	Water Security for the Community and Council Facilities in the City of Canada Bay	Stormwater	\$1,894,963	Active
NSW	Oberon Stormwater Harvesting Scheme	Stormwater	\$2,325,000	Not proceeding
NSW	Peakhurst Light Industrial Stormwater Harvesting and Reuse Scheme	Stormwater	\$1,071,738	Active

Figure 4: National Urban Water and Desalination Plan: NSW's projects funded under the National Urban Water and Desalination Plan (Australian Government, Department of the Environment 2015).

Victoria				
Location	Project Name	Theme	Aust Govt Funds (excl. GST)	Status
VIC	Harnessing Ballarat's Stormwater	Stormwater	\$1,544,700	Active
VIC	Kalkallo Stormwater Harvesting and Reuse Project	Stormwater	\$9,665,000	Active
VIC	Geelong-Shell Water Recycling Project	Water Recycling	\$20,000,000	Active
VIC	Stormwater Harvesting – Geelong's Plan	Stormwater	\$2,625,000	Complete
VIC	Hobson's Bay Water Security Project	Stormwater	\$3,130,600	Complete
VIC	City of Maribyrnong Stormwater Harvesting Project	Stormwater	\$3,167,500	Not proceeding
VIC	West Werribee Dual Supply (Aquifer Storage and Recovery) Project	Water Recycling	\$11,400,000	Active
VIC	City of Brimbank Alternative Water Project	Stormwater	\$3,990,000	Complete
VIC	Working Wetlands (Royal Botanic Gardens)	Stormwater	\$1,980,000	Complete
VIC	Clayton South Retarding Basin & Namatjira Park Stormwater Reuse Project	Stormwater	\$2,427,500	Complete
VIC	Melbourne Water Security Through Stormwater Harvesting Projects	Stormwater	\$7,290,100	Active
VIC	Melbourne Park Stormwater Harvesting Project	Stormwater	\$2,959,800	Complete
VIC	Eastern Melbourne Parks and Gardens Stormwater Harvesting Scheme	Stormwater	\$4,880,000	Complete
VIC	New Melbourne Wholesale Markets Stormwater Harvesting and Reuse Project	Stormwater	\$4,694,000	Complete
VIC	Coburg Principal Activity Centre Stormwater Harvesting and Reuse Project	Stormwater	\$6,036,500	Active
VIC	Extending Water Recycling at Torquay	Water Recycling	\$10,500,000	Complete
VIC	Toolern Stormwater Harvesting Project	Water Recycling	\$9,235,783	Active

Figure 5: National Urban Water and Desalination Plan: Victoria's projects funded under the National Urban Water and Desalination Plan (Australian Government, Department of the Environment 2015).

South Australia				
Location	Project Name	Theme	Aust Govt Funds (excl. GST)	Status
SA	Adelaide Botanic Gardens First Creek Wetland Aquifer Storage and Recovery Project	Stormwater	\$2,935,000	Active
SA	City of Unley Stormwater Harvesting and Reuse Project	Stormwater	\$2,558,000	Active
SA	Oaklands Park Stormwater Scheme	Stormwater	\$3,732,500	Active
SA	Adelaide Airport Stormwater Scheme	Stormwater	\$4,864,000	Active
SA	Adelaide Desalination Plant	Desalination	\$328,000,000	Complete
SA	Glenelg to Adelaide Park Lands Recycled Water Project	Water Recycling	\$30,150,000	Complete
SA	Water Proofing the West Stage 1 - City of Charles Sturt	Stormwater	\$20,000,000	Active
SA	Water Proofing the South Stage 2 - City of Onkaparinga	Stormwater	\$14,970,000	Active
SA	Unity Park Infiltration and Reuse - City of Salisbury	Stormwater	\$6,990,000	Active
SA	Barker Inlet Stormwater Reuse Scheme	Stormwater	\$3,925,000	Active
SA	Playford Stormwater Harvesting and Reuse Scheme	Stormwater	\$9,600,000	Active
SA	Waterproofing Eastern Adelaide (Feasibility Study)	Stormwater	\$500,000	Complete
SA	Waterproofing Eastern Adelaide Project	Stormwater	\$9,500,000	Active
SA	Waterproofing Greater Gawler	Stormwater	\$500,000	Complete
SA	Murray Bridge Stormwater Management and Reuse Scheme	Stormwater	\$7,115,000	Active
SA	Cobbler Creek-An Integrated Flood Mitigation, Harvesting and Re-use Scheme	Stormwater	\$2,210,000	Active
SA	Gawler Reuse Project	Stormwater	\$10,700,000	Active

Figure 6: National Urban Water and Desalination Plan: SA's projects funded under the National Urban Water and Desalination Plan (Australian Government, Department of the Environment 2015).

Implementation guidelines

Most jurisdictions offer a range of implementation guides; but they are often non-statutory, and therefore tend to be unclearly aligned with or integrated into policy hierarchy.

A list of policies and guidelines is provided in Appendix 2. The number and volume of material available can be difficult to navigate and understand. Some are out of date or redundant.

Although there is a plethora of technical guidance, it varies from state to state and there are currently no national technical standards for WSUD infrastructure design, construction, and maintenance serving as a baseline for engagement with industry. Guidance for maintenance and asset handover is of particular concern to councils who receive WSUD assets constructed by developers.

By contrast, road infrastructure, for example, has evolved to the point where national guidance and standards have been developed and are commonly referenced within planning schemes. Until a similar process occurs for WSUD, there is likely to be ongoing uncertainty and hesitation to adopt local guidance. Internal resistance within councils may reflect a 'fear of the unknown' or inherent resistance to change established practices, which could be assisted over time by government endorsement of technical standards, or an Australian standard.

There is an opportunity to harmonise, consolidate, review, streamline, and simplify WSUD guidance to make it easier for planners and developers to apply. An online 'one stop shop' should be provided for navigating WSUD guidance for planners and consultants. Technical guidance for construction and maintenance (aimed at engineers and infrastructure professionals) should be separate from planning policy guidance. All jurisdictions have, or are in the process of developing, a capacity building program to encourage the implementation of WSUD.

WSUD governance

Councils across the jurisdictions are under no statutory obligation to coordinate or fund IWCM and WSUD measures – particularly at a regional level which may involve cross-boundary issues.

Stormwater drainage is generally a shared responsibility between the property owner, the council, and the local water authority, but also involves a number of government agencies in some jurisdictions.

The role of water agencies in drainage management varies from state to state. Where there is shared responsibility for drainage planning and management, there is potential for misalignment of planning and infrastructure delivery priorities and inconsistent approaches to decision making and planning.

While many jurisdictions recognise the importance of adopting an integrated approach to WSUD governance, the legal framework in each state does not always create duties to consult authorities relevant to WSUD.

Policy framework for WSUD – state by state

3.1 Queensland

WSUD definition

Queensland generally adopts the Australian Government's National Water Initiative definition of WSUD. It defines or describes WSUD with reference to the following documents:

- the EPP Water (EPA 2009) defines WSUD as 'urban planning or design that integrates water cycle management' (Schedule 2 Dictionary);
- the State Planning Policy State Interest Guideline: Water Quality (Department of State Development, Infrastructure and Planning 2014) (State Interest Guidelines Water Quality) defines WSUD as 'the planning and design of urban environments sensitive to the issues of water sustainability and environmental protection' (Department of State Development, Infrastructure and Planning 2014, p 3); and
- the South East Queensland Regional Plan 2009–2031 (Department of Infrastructure and Planning 2009) sees WSUD as an approach which 'integrates IWCM into the urban built form to minimise effects of development on the natural water cycle and environmental values, and to address water supply and use' (Department of State Development, Infrastructure and Planning 2009, p. 132).

The concept of WSUD is further explained in the State Interest Guideline Water Quality (2014) and the *South East Queensland Regional Plan 2009–2031 Implementation Guideline No. 7 Water Sensitive Urban Design: Design Objectives for Urban Stormwater Management* (Department of Infrastructure and Planning 2009). The former suggests that the principles of WSUD are to:

- protect existing natural features of the natural drainage system including waterways, water bodies, and ecological processes;
- integrate POS with stormwater drainage corridors to maximise public access, recreation activities, and visual amenity while preserving waterway habitats and wildlife corridors;
- maintain natural hydrological behaviour of catchments and preserve the natural water cycle via minimising changes to the natural frequency, duration, volume, and peak discharge of urban stormwater;
- protect water quality environmental values of surface and groundwater;
- minimise demand on the reticulated water supply system and utilise stormwater as a valued resource;
- minimise capital and maintenance costs of stormwater infrastructure and minimise sewage discharges to the natural environment; and
- integrate water into the landscape to enhance visual, social, cultural, and ecological values.

Figure 7: Illustration of the main planning instruments which make up the legislative framework for land use planning in Queensland

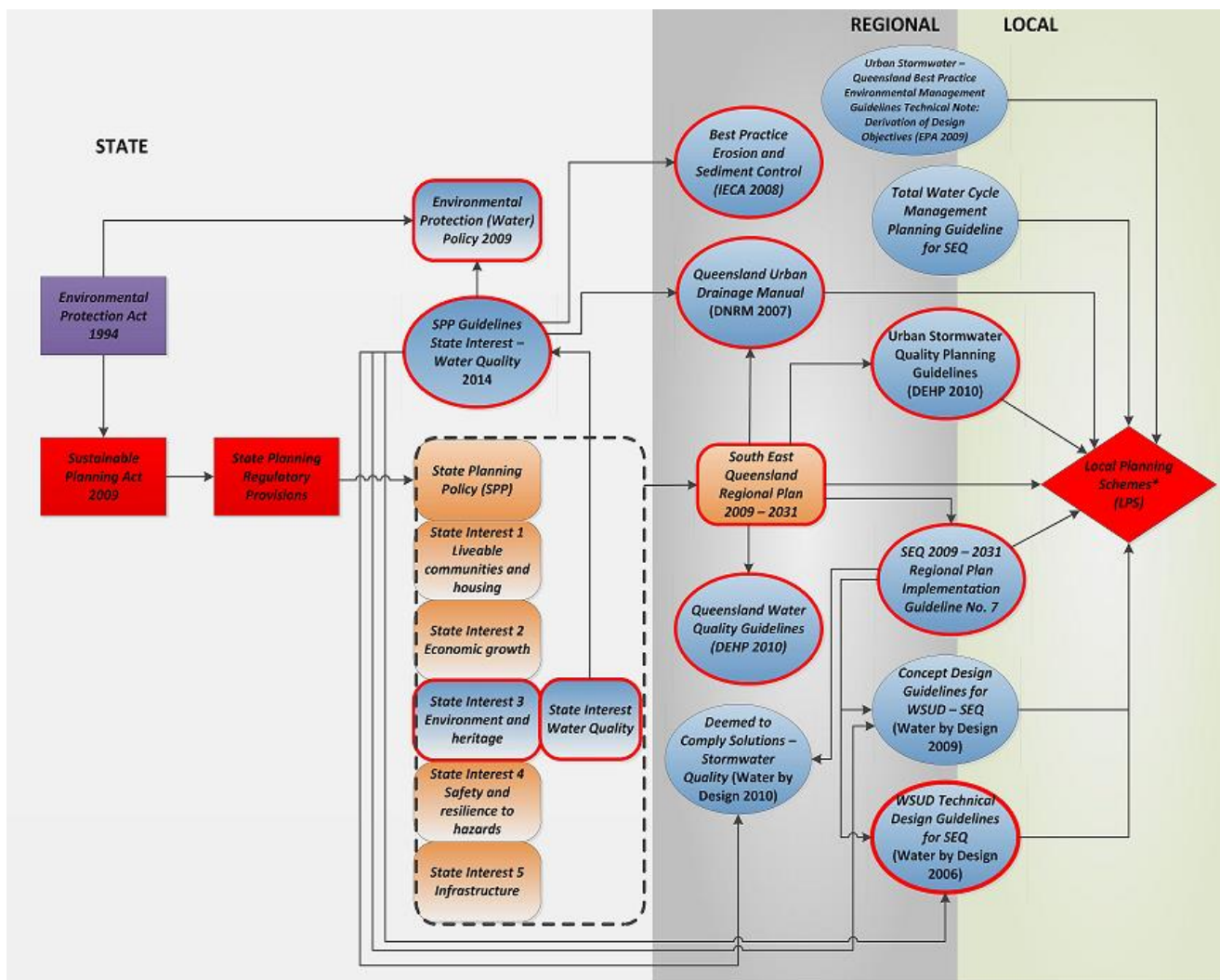


Figure 8: Illustration of planning documents containing WSUD policy and implementation guidance documents (in blue) for WSUD in Queensland. Key WSUD policy document is highlighted with red perimeter line.

The State Interest Guideline Water Quality requires all planning schemes to 'appropriately integrate' the State interest by measures which are designed for (DSIP 2014, p. 31):

facilitating the protection of environmental values and the achievement of water quality objectives for Queensland water; and

adopting the applicable stormwater management design objectives relevant to the climatic region outlined in Tables A and B (Appendix 3), or demonstrate current best practice environmental management for development that is for an urban purpose

At a regional level, the SEQ Regional Plan provides support for WSUD. Its *Desired Regional Outcome for Water Management* includes policy objectives that require all development in SEQ to incorporate IWCM and WSUD and planning management of urban stormwater in the region to comply with the design objectives. These objectives, which are consistent with the SPP and the EPP Water, are set out in the SEQ Regional Plan Implementation Guideline.

The SPP and regional plans are made under Chapter 2 of the SP Act and have legal force. Moreover, the Planning Act requires planning schemes to coordinate and integrate 'the matters dealt with by the planning scheme, including state and regional aspects of the matters' (Planning Act s 16).

Where state interest is yet to be appropriately integrated into a planning scheme, the SPP requires councils to apply the interim development assessment requirements and compliance to the SPP Code (contained in the SPP) in considering planning approvals. The SPP Code includes stormwater pollutant reduction targets and stormwater design management objectives. These requirements generally apply to developments on land area greater than 2500 m².

When making or amending a planning scheme and designating land for community infrastructure, the SPP requires the SPP Code or 'current best practice environmental management' to be adopted for urban development. The State interest – Water quality guidelines and the SEQ Regional Plan contain information on water quality targets and design objectives, but there is no mandatory obligation to meet these or apply them to a certain class of development. This depends on how the guidelines are integrated into the local planning scheme.

While the EPP Water sets out the state's environmental values, it is not given effect under the Planning Act and is not a performance-based code given mandatory status in planning schemes. Therefore, as the relevant policy framework is to be considered in the exercise of discretion, Queensland's policy framework cannot be described as a mandatory state-wide performance based code. Consequently, the implementation of the *State interest 3 – Water quality* may vary from council to council.

The *Sustainable Planning Act 2009* is to be replaced by the *Planning Act 2016* when it commences in July 2017. At the time of writing, a draft revised State Planning Policy, and draft Regulations are the subject of public consultation processes and are intended to come into effect when the new Act commences. The State Interest Water Quality has been translated as follows into the draft State Planning Policy which is subject to a period of public consultation at the time of writing¹⁶:

¹⁶ <http://betterplanning.qld.gov.au/better-planning-home/planning-policy-review.html> The balance of the analysis in this report is based on existing SPP.

State interest – water quality

The environmental values and quality of Queensland waters are protected and enhanced.



All of the following policies must be considered and appropriately integrated in policy and development assessment outcomes in a local planning instrument.

- (1) Development facilitates the protection of environmental values and the achievement of water quality objectives for Queensland waters.
- (2) Land zoned for urban or future purposes is located in areas that avoid or minimise the disturbance to natural drainage, high risk soils, aquatic ecosystems (including high ecological value and slightly disturbed waters), groundwater and landform features.
- (3) Development for an urban purpose is located, designed, constructed and operated to avoid or minimise adverse impacts on environmental values of receiving waters arising from:
 - (a) altered stormwater quality and hydrology
 - (b) waste water (other than contaminated stormwater and sewage)
 - (c) the creation or expansion of non-tidal artificial waterways
 - (d) the release and mobilisation of nutrients and fine sediments.
- (4) Development for an urban purpose protects environmental values of receiving waters by:
 - (a) achieving the applicable stormwater management design objectives outlined in tables A and B (appendix 2); or
 - (b) facilitating innovative and locally appropriate solutions that achieve an equivalent or improved water quality outcome to the relevant stormwater management design objectives; or
 - (c) demonstrating current best practice environmental management.
- (5) Development in water resource catchments and water supply buffer areas avoids potential adverse impacts on surface and groundwater to protect drinking water supply environmental values.

Development assessment requirements – water quality

These provisions apply to the following development applications, to the extent the SPP has not been identified in a local planning instrument as being appropriately integrated.

For receiving waters, a development application:

- (1) for a material change of use, or reconfiguring a lot for an urban purpose that involves premises greater than 2500 m² and that will result in six or more dwellings or lots with an impervious area greater than 25 per cent of the net developable area; or
- (2) operational works for an urban purpose that involves disturbing a land area greater than 2500 m².

For water supply buffer areas, a development application:

- (3) located wholly outside an urban area and relating to premises that is within, or partly within, a water supply buffer area, that involves:
 - (a) a material change of use for the intensive animal industry, medium and high-impact industry, noxious and hazardous industry, extractive industry, utility installation that involves sewerage services, drainage or stormwater services, or waste management facilities, or motor sport facility; or

- (b) reconfiguring a lot to create five or more additional lots if any resultant lot is less than 16 hectares in size, and the lots created will rely on on-site wastewater treatment.

The following requirements are assessment benchmarks for the development:

- (1) Development is located, designed, constructed and operated to avoid or minimise adverse impacts on environmental values arising from:
 - (a) altered stormwater quality and hydrology; and
 - (b) waste water (other than contaminated stormwater and sewage); and
 - (c) the creation or expansion of non-tidal artificial waterways; and
 - (d) the release and mobilisation of nutrients and fine sediments.

(2) Development:

- (a) achieves the applicable stormwater management design objectives outlined in tables A and B (appendix 2) or;
- (b) facilitates innovative and locally appropriate solutions that achieve an equivalent or improved water quality outcome to the relevant stormwater management design objectives; or
- (c) demonstrates current best practice environmental management

Further information in relation to these requirements is detailed in the water quality guideline.

Figure 9: Revised water quality guidelines in draft State Planning Policy 2016 (Department of Infrastructure, Local Government and Planning, 2016).

Table 5: Summary of overarching policies relevant to WSUD in Queensland

Policy document	Relevant section	Objectives	Applicable planning scale	Legal status	Statutory effect on Planning Schemes	Statutory effect on development applications
SPP	State interest – Water quality	To protect and enhance environmental values of receiving waters and quality of Queensland waters, including 'high ecological value' waters, freshwaters, estuaries, rivers and creeks, bays, groundwater, and the Great Barrier Reef.	<p>Making or amending a planning scheme.</p> <p>Designating land for community infrastructure.</p> <p>Interim development assessment requirements apply to development application for:</p> <ul style="list-style-type: none"> material change of use for urban purposes that involves a land area greater than 2500 m² land; and reconfiguring a lot that involves a land area greater than 2500 m². 	<p>Statutory Policy</p> <p>Created under the SP Act</p> <p>State Interests are given continuing effect under the <i>Planning Act 2016</i>.</p> <p>SPP are to be replaced by Regulation in the <i>Planning Act 2016</i>, when it commences in July 2017.</p>	<p>Local planning schemes must appropriately integrate the State interests (Part B, p. 9). This includes:</p> <ul style="list-style-type: none"> adopting the applicable stormwater management design objectives to the climatic region provided in Appendix 3 of the SPP; and facilitating the protection of 'environmental values' under the <i>EPP Water</i>. 	<p>Relevant consideration in development application assessment.</p> <p>Where state interests are yet to be integrated into the planning scheme, interim development assessment requirements apply and compliance to the <i>SPP Code: Water quality</i> required for certain developments (requirement under the SPP, Part B).</p>
EPP Water	Part 3, s 6 Environmental Values Part 6 Healthy Waters Management Plans	Section 3 To achieve the object of the EP Act and protect Queensland waters while allowing for development that is ecologically sustainable.	Applies to all Queensland waters.	<p>Statutory Policy</p> <p>Created under the EP Act</p>	No direct effect given under planning legislation.	No direct effect under planning legislation.
SEQ Regional Plan	Desired Regional Outcome 2. Natural environment	A healthy and resilient natural environment is protected, maintained and restored to sustainably support the region's rich biodiversity and ecosystem services including clean air and water, outdoor lifestyles, and other community needs that critically underpin economic and social development.	<p>Applies to 11 regional and city councils in the SEQ region.</p> <p>General policy for land use and infrastructure planning in the region.</p>	<p>Statutory Policy</p> <p>Created under the SP Act</p>	<p>Local planning schemes must appropriately integrate the state interests (SPP Part B, p. 9). A regional plan is taken to be a State interest (SP Act s 35).</p> <p>SEQ Implementation Guidelines <i>recommends</i> that state and local authorities complies with the design objectives as set out in the SEQ Regional Plan for planning and</p>	Relevant consideration in development application assessment (SP Act s 313, s 314).
	Desired Regional	Water in the region is managed on a sustainable and total water cycle basis to				

Policy document	Relevant section	Objectives	Applicable planning scale	Legal status	Statutory effect on Planning Schemes	Statutory effect on development applications
	Outcome 11. Water management policy	provide sufficient quantity and quality of water for human uses and to protect ecosystem health.			management of urban stormwater.	

Stormwater discharge objectives

The EPP Water sets out water quality objectives but this policy is not binding within the planning legislation. The EPP Water sets out a discretionary policy 'framework for making consistent, equitable and informed decisions about Queensland waters' (EPP Water, cl 5(c)).

That said, the water quality targets and design objectives adopted under *The State interest – Water quality* and the SEQ Regional Plan are informed by the EPP Water and given effect when integrated into the planning scheme. As discussed above, there is a clear expectation under the Planning Act that they are adopted into all planning schemes. However, this application can vary from council to council.

Water quality targets and design objectives under the SPP and regional plans are also underpinned by the following non-statutory documents:

- Urban Stormwater Quality Planning Guidelines (Department of Environment and Heritage Protection 2009);
- Queensland Water Quality Guidelines (Department of Environment and Heritage Protection 2009); and
- Queensland Urban Drainage Manual (Department of Energy and Water Supply 2013).

Figure 10 below provides an illustration of how the USQP Guidelines fit within the policy framework for urban stormwater management in Queensland. The diagram refers to the *State Planning Policy for Healthy Waters* which has now been superseded by the SPP, *State interest 3 – Water quality*.

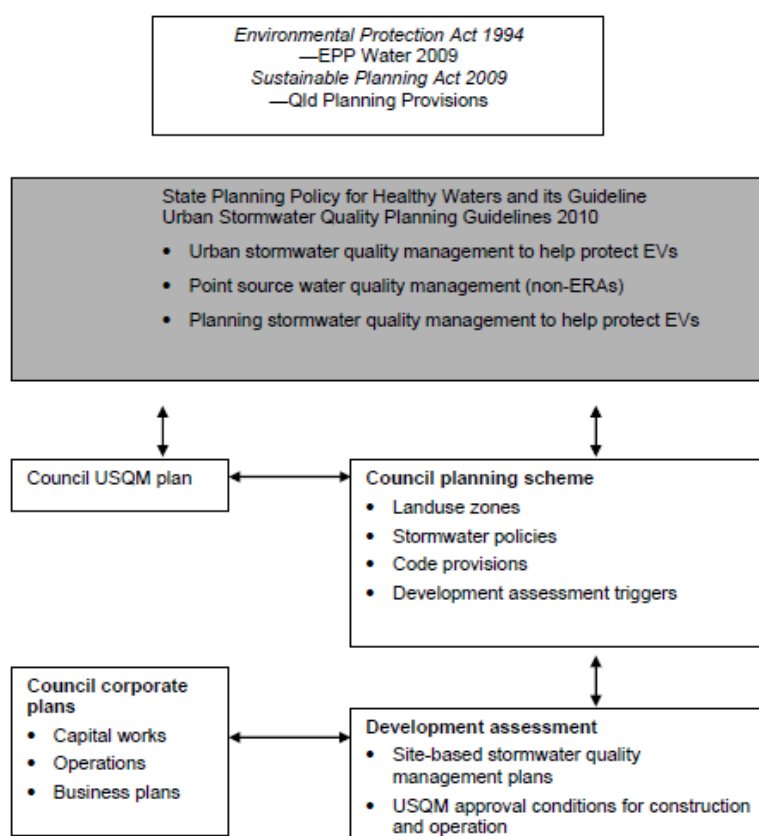


Figure 10: USQP Guidelines' illustration of the policy framework for urban stormwater management in Queensland (DEHP 2009).

WSUD at different scales

Table 6: Summary of planning controls relevant to WSUD at different scales in Queensland

Planning scale	WSUD relevant policy/control	Standard required under the policy	Mandatory (Y/N)
Regional/ sub-regional	SPP - State interest – Water quality	All regional plans are to be consistent with the SPP.	Yes. (SP Act s 25)
	SEQ Regional Plan: <ul style="list-style-type: none"> Natural Environment Policy Water Management Policy 	Compliance to the urban stormwater design objectives under the SEQ Implementation Guideline.	This is unclear as the design objectives under the SEQ Implementation Guideline are 'recommended'.
Precinct structure planning	SPP - State interest – Water quality and the SEQ Regional Plan as appropriately integrated into the planning scheme. OR Interim development requirements under the SPP (Part E & SPP Code – Water quality) if the SPP has not yet been appropriately integrated and the development involves a development application for: A material change of use for urban purposes that involves a land area greater than 2500 m ² that: <ul style="list-style-type: none"> will result in an impervious area greater than 25% of the net developable area; or will result in six or more dwellings 	The SPP and the SEQ Regional Plan do not contain any specific requirements for PSPs.	Yes , assuming that the State Interest is appropriately integrated into the planning scheme.
	Interim development requirements under the SPP (Part E & SPP Code – Water quality) if the SPP has not yet been appropriately integrated and the development involves a development application for: A material change of use for urban purposes that involves a land area greater than 2500 m ² that: <ul style="list-style-type: none"> will result in an impervious area greater than 25% of the net developable area; or will result in six or more dwellings 	SPP Code – Water quality and Table A and B, Construction and post construction phase – stormwater management design objectives apply	Yes.
Subdivision	SPP - State interest – Water quality and the SEQ Regional Plan as appropriately integrated into the planning scheme. OR Interim development requirements under the SPP (Part E & SPP Code – Water quality) if the SPP has not yet been appropriately integrated and it involves subdivision for urban purposes on land greater than 2500 m ² .	The SPP and the SEQ Regional Plan do not contain any specific requirements for subdivision of land.	Yes , if appropriately integrated into the planning scheme.
	Interim development requirements under the SPP (Part E & SPP Code – Water quality) if the SPP has not yet been appropriately integrated and it involves subdivision for urban purposes on land greater than 2500 m ² .	SPP Code – Water quality and Table A and B, Construction and post construction phase – stormwater management design objectives apply	Yes , if the SPP has not yet been appropriately integrated and the development falls into the interim development requirement categories.
Infill	SPP – State interest – Water quality and the SEQ Regional Plan as appropriately integrated into the planning scheme OR Interim development requirements under the SPP (Part E & SPP Code – Water quality) if the SPP has not yet been appropriately integrated and if the development falls within the categories under the interim development application	The SPP and the SEQ Regional Plan do not contain any specific requirements for infill development.	Yes , if appropriately integrated into the planning scheme and if it is assessable development.
	Interim development requirements under the SPP (Part E & SPP Code – Water quality) if the SPP has not yet been appropriately integrated and if the development falls within the categories under the interim development application	SPP Code – Water quality and Table A and B, Construction and post construction phase – stormwater management design objectives apply. But generally interim development requirements would not apply to infill developments. If they are large urban infill sites, it may be subject to the PSP requirements under the ED Act and therefore not the IDAS.	Yes , if the SPP has not yet been appropriately integrated and the development falls into the interim development requirement categories.
Lot scale	SPP - State interest – Water quality and the SEQ Regional Plan as appropriately integrated into the planning	The SPP and the SEQ Regional Plan do not contain any specific requirements for lot scale developments.	Yes , for <i>State interest – Water quality</i> , if appropriately integrated into the

Planning scale	WSUD relevant policy/control	Standard required under the policy	Mandatory (Y/N)
	scheme AND		planning scheme and if it is assessable development.
	QDC	QDC Part 4.0, <i>Building Sustainability</i>- MP 4.1 <i>Sustainable Buildings</i> (requirement to install water efficient taps and toilet). NOTE: A council may also opt-in to the MP 4.2 – Rainwater Tanks and Other Supplementary Water Supply Systems and the MP 4.3 – Supplementary Water Sources.	Yes. MP4.2 is mandatory for the relevant municipal area if a council has opted in.

Precinct structure planning

There are three categories of PSPs in Queensland: those within a PDA and prepared under the *Economic Development Act 2012*, those prepared under Chapter 4 of the SP Act, and those prepared under a planning scheme.

Developments within a PDA are not subject to any mandatory statutory requirements for WSUD but the PDA Guidelines encourage WSUD to be incorporated into park, street, and landscape designs, rather than within the development site.

Councils generally provide requirements for PSPs outside PDAs. If a planning scheme has appropriately integrated the SPP, *State interest 3 – Water quality*, and the SEQ Regional Plan, the WSUD policies may apply to PSPs in the council area. A council may also be able to apply the SPP and the SEQ Regional Plan to require PSPs to incorporate WSUD but there are no specifically targeted state-wide standards relating to WSUD that apply to PSPs.

If the SPP has not yet been appropriately integrated into the planning scheme and the PSP involves a material change of use for urban purposes on a land area greater than 2500 m² that will result in an impervious area greater than 25% of the net developable area, or six or more dwellings, interim development application requirements apply. This includes stormwater management design objectives under the *SPP Code – Water quality* of the SPP.

State interest—water quality

The environmental values and quality of Queensland waters are protected and enhanced.

Making or amending a planning scheme and designating land for community infrastructure

The planning scheme is to appropriately integrate the state interest by:

- (1) facilitating the protection of environmental values and the achievement of water quality objectives for Queensland waters, and
- (2) planning for safe, secure and efficient water supply, and
- (3) adopting the applicable stormwater management design objectives relevant to the climatic region*, outlined in Tables A and B (Appendix 2), or demonstrate current best practice environmental management for development that is for an urban purpose, and
- (4) facilitating innovative and locally appropriate solutions for urban stormwater management that achieve the relevant urban stormwater management design objectives, and
- (5) identifying land for urban or future urban purposes in areas which avoid or minimise the disturbance to natural drainage and acid sulfate soils, erosion risk, impact on groundwater and landscape features, and
- (6) protecting the natural and built environment (including infrastructure) and human health from the potential adverse impacts of acid sulfate soils by:
 - (a) identifying areas with high probability of containing acid sulfate soils, and
 - (b) providing preference to land uses that will avoid or minimise the disturbance of acid sulfate soils, and
 - (c) including requirements for managing the disturbance of acid sulfate soils to avoid or minimise the mobilisation and release of contaminants, and
- (7) including requirements that development for an urban purpose is located, designed, constructed and/or managed to avoid or minimise:
 - (a) impacts arising from:
 - i. altered stormwater quality or flow, and
 - ii. waste water (other than contaminated stormwater and sewage), and
 - iii. the creation or expansion of non-tidal artificial waterways, such as urban lakes, and
 - (b) the release and mobilisation of nutrients that increase the risk of algal blooms, and
- (8) including requirements that development in water catchments is undertaken in a manner which contributes to the maintenance and enhancement (where possible) of water quality to protect the drinking water and aquatic ecosystem environmental values in those catchments, and

For development in a water supply buffer area*:

- (9) including requirements that development complies with the specific outcomes and measures contained in the Seqwater Development Guidelines: Development Guidelines for Water Quality Management in Drinking Water Catchments 2012 or similar development assessment requirements.

Figure 11: SPP, State interest 3: State interest – Water quality (DSDIP, 2014, p. 31).

Residential subdivision

Subdivision of land outside a PDA is generally subject to code assessment unless a planning scheme or a planning instrument or the Planning Act require impact assessment (SP Regulation, Schedule 3, Table 3). Those within a PDA are subject to the relevant provisions of the applicable development scheme prepared under the *Economic Development Act 2012*.

As per PSPs, if a planning scheme has appropriately integrated the SPP – *State interest 3 – Water quality* and the SEQ Regional Plan, the WSUD policies may apply to subdivision of land in the council area. A council may also be able to apply the SPP and the SEQ Regional Plan to require subdivision to incorporate WSUD but there are no specifically targeted state-wide standards relating to WSUD that apply to residential subdivisions.

Urban infill development

All assessable developments under the Planning Act must be assessed against the state planning instruments. Therefore, a council may be able to apply the *State interest 3 – Water quality* and the Water Management Policy of the SEQ Regional Plan to require infill developments to incorporate WSUD measures. The Water Management Policy under the SEQ Regional Plan requires *all developments* to incorporate IWCM principles and WSUD.

If the SPP has not yet been appropriately integrated into the planning scheme and the infill development involves a land area greater than 2500 m², the interim development application requirements under the SPP apply.

Lot scale development

Works relating to single dwellings are generally self-assessable (meaning a planning permit is not generally required)¹⁷. Building works may become assessable development under the Planning Act if they fall within the matters that the Building Act allows to be regulated under the planning scheme (s 32). Such matters include designating land liable to flooding, bushfire prone areas, and transport noise corridors. Consequently, single dwellings are generally not subject to planning controls unless an overlay applies under the planning scheme.

If a dwelling is an assessable development under the planning scheme, the council may be able to apply the broad policy framework under the *State interest 3 – Water quality* and the Water Management Policy of the SEQ Regional Plan to require the development to incorporate WSUD measures.

With respect to building requirements, single dwellings are required to install water efficient toilets and taps under the Queensland Development Code (**QDC**) (Part 4.0 Building Sustainability, MP 4.1).

Whereas water saving devices including rainwater tanks were previously mandated (MP4.2), this requirement was removed in 2013, though the QDC still empowers the Minister to specify areas where such measures are required. Local governments can opt-in to the water savings targets in MP4.2 of the QDC. At the time of writing only two councils (Toowoomba Regional Council and Gold Coast City Council) have opted into Part 4.2 with Ministerial approval. Toowoomba Regional Council also applies MP 4.3 (supplementary water sources) for some commercial buildings. The council must demonstrate that the opt-in will deliver 'net benefit to the community.'¹⁸

Funding WSUD

Queensland councils have two options for funding WSUD projects and activities within the planning system: through development infrastructure charges under a LGIP (formerly known as a PIP), and the PIP Co-investment Program. LGIPs are reviewed and assessed by the independent price regulator, the Queensland Competition Authority.

¹⁷ See section 21 of the *Building Act 1975* and SP Regulation Schedule 3, Table 1.

¹⁸ Department of Housing and Public Works advice on Water Supply systems: www.hpw.qld.gov.au/construction/Building/Plumbing/Building/WaterSupplySystems/Pages/default.aspx

The default POS quantum is also set through the infrastructure charges under the LGIP. Until recently, the chargeable rate of provision for land for public parks and community purposes was limited to a maximum of 4.8 hectares per 1000 people¹⁹ per charge area (DIP, 2009, p. 23).²⁰ There is no capping under the *Statutory Guideline 03/14 – Local Government Infrastructure Plans* (Department of State Development, Infrastructure and Planning 2014), which superseded the previous Guideline in June 2014.

All planning schemes must include an LGIP to identify the priority infrastructure area in which infrastructure is planned and provided to service expected growth for up to 15 years. For councils that have an LGIP in its planning scheme, councils may adopt, by resolution, charges for development trunk infrastructure and levy charges accordingly and/or impose particular conditions about development infrastructure for development approvals.

Councils may impose particular conditions relating to non-trunk infrastructure and provide for the *State Planning Regulatory Provision (adopted charges)* (Department of State Development, Infrastructure and Planning 2012) to govern adopted charges and charges by distributor-retailers under the *SEQ Water (Distribution and Retail Restructuring) Act 2009* for trunk infrastructure. It introduces maximum levies for trunk infrastructure, which are:

- \$20,000 for 1–2 bedroom dwellings; and
- \$28,000 for 3 or more bedroom dwellings.

Some areas are exempt from the above caps.

¹⁹ By comparison, the standard applied in Sydney under the *Recreation and Open Space Planning Guidelines for Local Government* is a rate of 2.83 ha/1000 persons.

²⁰ Under the *Statutory Guideline 01/09 Priority Infrastructure Plans and Infrastructure Charge* (DIP 2009), which is now superseded by the *Statutory Guideline 03/14 – Local Government Infrastructure Plans* (Department of State Development, Infrastructure and Planning 2014).

Table 7: Statutory Guideline 03/14, Local Government Infrastructure Plans, Appendix B – Indicative trunk and non-trunk infrastructure (DSDIP, 2014).

Infrastructure network	Trunk infrastructure	Non-trunk infrastructure
Water supply	Land or works for: <ul style="list-style-type: none"> • Water treatment facilities • Water storage facilities (e.g. Reservoirs) • Water mains • Pumping stations located on water mains • Chlorination equipment located on water mains • Meters, valves, control and monitoring systems located on water mains • Firefighting devices located on water mains 	Development infrastructure internal to a development or to connect a development to the external infrastructure network
Sewerage	Land or works for: <ul style="list-style-type: none"> • Sewage treatment plant systems • Gravity sewers • Rising mains • Pumping stations • Emergency storage 	Development infrastructure internal to a development or to connect a development to the external infrastructure network
Stormwater	Land or works for the following stormwater infrastructure: <ul style="list-style-type: none"> • Bio-retention swale • Channel • Culvert 	Development infrastructure internal to a development or to connect a development to the external infrastructure network
Public parks and land for community facilities	Land or works that ensure the land is suitable for public parks for: <ul style="list-style-type: none"> • local recreation park • district recreation park • metropolitan recreation park • district sporting park • metropolitan sporting park Land, and works that ensure the land is suitable for development, for local community facilities such as community halls, public recreation centres and public libraries	Development infrastructure internal to a development or to connect a development to the external infrastructure network

As can be seen, some WSUD infrastructure works are specifically accommodated in the charging regime.

Charges to address stormwater quality may be levied under an LGIP at the rate of \$10/m² of imperviousness for a broad range of non-residential developments. A combined maximum levy can be applied for residential development, but there is no specific levy for imperviousness. WSUD works for residential developments are generally delivered on-site.

The PIP Co-investment Program is overseen by the Queensland Competition Authority and enables the state to co-invest in certain ‘catalyst infrastructure that unlocks significant development and economic growth for local communities’ (Department of State Development, Infrastructure and Planning, 2015).

Queensland councils are increasingly expressing interest in the use of water quality offset schemes as a basis to distribute WSUD investment to the most appropriate locations. This is not presently accommodated under the state’s environmental offsets framework and there is no scheme comparable to that which is operated by Melbourne Water.

Implementation guidelines

There is a diverse array of guidance documents relevant to WSUD practitioners and stakeholders with Water by Design acting as a repository for many technical guidelines and reports. However, the three documents relating

to water quality and design objectives and guidance that are appropriate to different issues or development scales are dispersed and not easy to locate. In addition, a fee is required to access many guides.

The key documents which underpin the WSUD related policy under the *State interest 3 – Water quality* and the SEQ Regional Plan are:

- State Interest Guideline Water Quality (2014);
- SEQ Implementation Guideline (2009);
- Water Sensitive Urban Design, Technical Design Guidelines for South East Queensland, SEQ (Water by design, 2006);
- *Best Practice Erosion Soil Control* (IECA Australasia, 2008);
- USQP Guidelines (DEHP, 2010);
- QWQ Guidelines (DEHP, 2009); and
- QUDM (DEWS, 2013).

Table 8: Summary of WSUD implementation guidelines in Queensland

Guideline	Author	Date	Target audience					Purpose/content
			Planner/ council	Designer	Builder	Developer/ land owner	Council asset manager	
SEQ Implementation Guideline	DIP	2009	✓					Provided to help implement the Water Management Policy under the SEQ Regional Plan.
USQP Guidelines	DEHP	Dec 2010	✓	✓	✓	✓		Provides information on best practice urban stormwater quality management for protecting the environmental values of waterways identified under the EPP Water.
QUDM (Provisional Third Edition)	DEWS	2013	✓	✓	✓	✓		Details technical, environmental, and regulatory aspects of planning, design, and management of urban water stormwater drainage systems.
BPESC	IECA	2008	✓	✓				Erosion and sediment control information for engineers, ecologists, and civil contractors.
QWQ Guidelines	DEHP	2009	✓					Overarching technical document on water quality.
<i>Urban Stormwater – Queensland Best Environmental Practice Management Guidelines 2009 Technical Note: Derivation of Design objectives</i>	EPA	Jan 2009	✓	✓				Summarises the technical studies used to derive WSUD objectives presented in Chapter 2 of the USQP Guidelines.
<i>WSUD Technical Design Guidelines for SEQ (Version 1)</i>	Water by Design	Jan 2006	✓	✓	✓	✓	✓	Describes the appropriate methods for detailed design and construction of common structural stormwater management measures in SEQ and is a complimentary document to <i>Concept Design Guidelines for WSUD – SEQ</i> .
<i>Concept Design Guidelines for WSUD</i>	Water by Design	Mar 2009	✓	✓	✓	✓	✓	Guidance for interdisciplinary teams involved in urban design and planning and design of WSUD solutions.
<i>Deemed to Comply Solutions – Stormwater Quality</i>	Water by Design	May 2010		✓	✓			Provides 'off the shelf' stormwater solutions for meeting stormwater quality design objectives for small-scale development.
<i>TWCM Planning Guidelines for SEQ (Version 1)</i>	Water by	Dec	✓			✓		Provides information on IWCM and the key linkages

Guideline	Author	Date	Target audience					Purpose/content
			Planner/ council	Designer	Builder	Developer/ land owner	Council asset manager	
	Design	2010						between other planning instruments.
Bioretention Technical Design Guidelines	Water by Design	Oct 2014		✓				Technical and design information on bioretention systems.
Stormwater Harvesting Guidelines (Draft 01)	Water by Design	Dec 2009		✓				Information on localised stormwater harvesting in urban areas for reuse within the community.
Waterbody Management Guideline (Version 1)	Water by Design	Sep 2013		✓			✓	Provided to assist in the management of artificial and highly modified fresh and brackish waterbodies.
Transferring Ownership of Vegetated Assets	Water by Design	Feb 2012	✓		✓			Transfer process information for swales, bioretention systems, constructed wetlands and sediment basins.

Water by Design has published useful guidance on cost benefit analysis for WSUD treatments and infrastructure at varying scales. The Queensland Competition Authority has also commissioned work on the costs of WSUD requirements (in the nature of a peer review) but this did not include the non-market benefits of WSUD and focused on the costs.

WSUD governance

The Department of Infrastructure, Local Government and Planning is responsible for leading infrastructure policy and investment and overseeing the State's land use planning and development assessment system.

Other relevant bodies are:

- Department of Environment and Heritage Protection which is responsible for developing and administering a range of environmental policies, regulations and laws. It is the state's environmental regulator under the *Environment Protection Act 1994*;
- Department of Energy and Water Supply which regulates the production and supply of certain types of recycled water and also has a key role in formulating the QUDM;
- Department of State Development which administers the *Economic Development Act 2012* is responsible for planning for PDAs, deciding PDA development applications for facilitating economic development and development for community purposes;
- Queensland Competition Authority – an independent water pricing regulator responsible for reviewing and approving the PIPs/LGIPs;
- Department of Natural Resources and Mines which manages Queensland's natural resources – water, land, mineral, and energy; and
- Councils – normally the responsible authority for the administration or enforcement of a planning scheme and thereby the responsible body for considering and determining planning permit applications and for ensuring compliance with the planning scheme, permit conditions, and agreements entered into under the state's planning Act.

Management, maintenance, and removal of stormwater are shared responsibilities between councils, individual property owners, and SEQ Water.

3.2 New South Wales

WSUD definition

WSUD is not a clearly defined concept in the NSW planning system. Where WSUD is addressed, it is regarded as being interchangeable with IWCM. The Growth Centre Development Code 2006 (**GCD Code**) (Growth Centre Commission, 2006) describes the objectives of WSUD as:

- protection and enhancement of natural water systems (creeks, rivers, and wetlands) within urban catchments;
- reducing potable water demand by using stormwater as a resource;
- minimising changes in water balance and flow patterns potentially resulting from urban development;
- protection and enhancement of water quality, by improving the quality of stormwater runoff from urban areas;
- adding long-term value while minimising development costs; and
- integrating stormwater management into the landscape by using stormwater treatment systems that serve multiple uses and provide a variety of benefits, including water quality protection, stormwater retention and detention, public open space and recreational and visual amenity for the community.

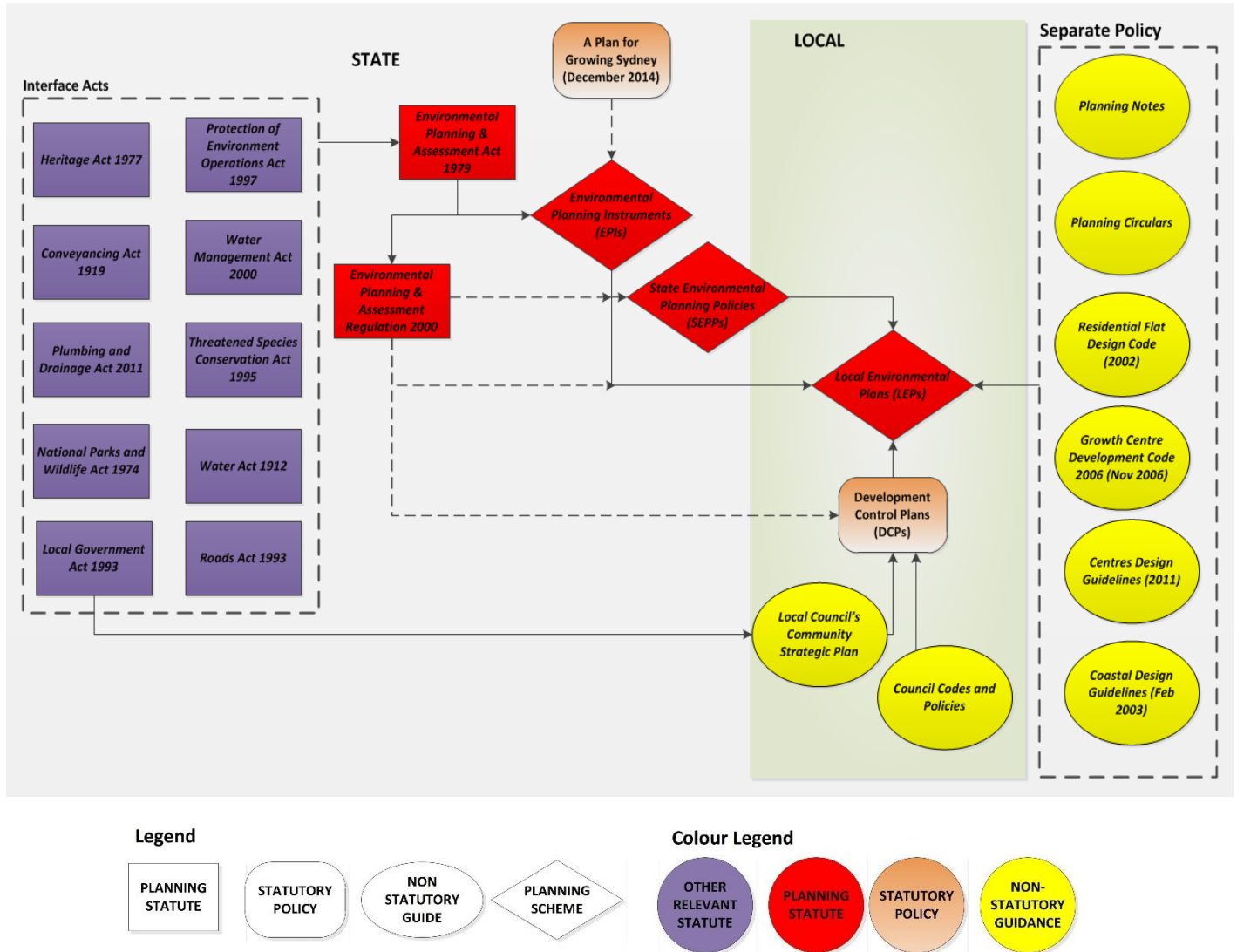


Figure 12: State planning policy for WSUD: the current legislative and policy framework for land use planning in NSW.

Planning policy to support WSUD is not yet supported in the NSW planning system to the same extent as elsewhere in Australia. NSW does not have an overarching statutory WSUD policy that applies generally across the state. The state's metropolitan planning strategy, *A Plan for Growing Sydney* (Plan) (NSW Government, 2014) includes support for 'protecting the natural environment and promoting its sustainability and resilience' and proposes to work with councils to 'protect the health of waterways and aquatic habitats' (p. 110). However, this is a high-level policy document, which does not provide direct guidance for the preparation of development applications at a local level.

At present, the state supports the implementation of WSUD for specific areas such as the Sydney Drinking Water Catchment,²¹ Coastal Zone,²² Sydney Harbour Catchment, and Sydney's 'growth centres' under various

²¹ Under the *SEPP (Sydney Drinking Water Catchment) 2011* – Part 2, all new developments in Sydney Drinking Water Catchment area are to have a 'neutral or beneficial effect' on water quality as mandated under section 34B(2) of the EP&A Act.

²² Under the *SEPP 71 (Coastal Protection)* which applies to land within the coastal zone, councils and the consent authority are to consider the 'likely impacts of development on the water quality of coastal waterbodies' when preparing an LEP or determining a development application on land to which the Policy applies. When preparing a planning proposal, a council in the coastal zone is also required to include provisions that give effect to and are consistent with the *Coastal Design Guidelines* (Coastal Council, 2003), unless the inconsistency is justified by an environmental study or strategy. The *Coastal*

State Environmental Planning Policies (**SEPPs**). From these, the SEPPs which are relevant for WSUD and which apply to the metropolitan context are:

- the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005* (Department of Planning and Environment, 2005), which applies to land in the Sydney Harbour Catchment, establishes a set of planning principles that provide broad support for WSUD. Under it, the planning principles include improving water quality of urban run-off, reducing the quantity and frequency of urban run-off, preventing the risk of increased flooding and conserving water. For land within the Sydney Harbour Catchment, the planning principles are to be considered in the preparation of Environmental Planning Instruments and Development Control Plans (**DCPs**) under Part 3 of the *Environmental Planning and Assessment Act 1979 (EP&A Act)* and in the preparation of environmental studies and master plans for the purpose of the EP&A Act;
- the *SEPP 59 – Central Western Sydney Regional Open Space and Residential* (Department of Planning and Environment, 2009) which requires PSPs to have regard to the principles of IWCM;
- the *SEPP (Western Sydney Employment Area) 2009* (Department of Planning and Environment, 2009) which requires development on land to which this policy applies to contain measures to minimise potable water and harvest rainwater; and
- the *SEPP (Sydney Region Growth Centres) 2006* (Department of Planning and Environment, 2006), which contains similar provisions to the *SEPP (Western Sydney Employment Area) 2009*.

PSPs in ‘Growth Centres’ are further supported by the GCD Code, which provides a more comprehensive guidance on WSUD and urban stormwater management compared to the above mentioned SEPPs. The measures contained in the GCD Code are non-binding.

A state-wide approach to sustainable development is pursued through BASIX which sets mandatory sustainability targets for water and energy consumptions in all developments and requires up to 40% reduction in potable water consumption.

Stormwater discharge objectives

NSW does not have a clearly legislated policy on urban stormwater quality and flow objectives. Such policy could be expressed in Protection of the Environment Policies, which can be made under section 12 of the *Protection of the Environment Operations Act 1997 (PEO Act)*. However, there are none in operation at present.

‘Environmental values of water’ are defined under the PEO Act (Dictionary) as the environmental values of water specified in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000* (ANZECC and the Agricultural and Resources Management Council of Australia and New Zealand, 2000). Those values are a mandatory consideration for the EPA when issuing licences or prevention notices relating to an activity that causes, is likely to cause, or has caused water pollution.

Water quality information is provided by the NSW Government’s Office of Environment and Heritage, which provides links to various guides that adopt the above mentioned Guidelines and encourages councils to incorporate water quality objectives into strategic planning.

Pollutant load reduction targets are also found in the WQIPs for Sydney Harbour Catchment and Botany Bay & Catchment provided by Greater Sydney Local Land Services. Although not expressly referred to in the EP&A Act, WQIPs are a relevant consideration for a consent authority under section 79C(1) of the EP&A Act if the requirements of the WQIP are incorporated into the applicable Development Control Plan.

Design Guidelines support implementing a total water cycle management and WSUD initiatives for coastal villages and providing areas for water management in regional and local open space networks.

WSUD at different scales

Table 9: Summary of planning policies and controls relevant to WSUD at different scales in NSW

Scale	WSUD relevant Control	Standard required
Regional	<i>Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005</i>	Part 2 Planning Principles 13 Sydney Harbour Catchment <i>(h) development is to improve water quality of urban run-off, reduce the quantity and frequency of urban run-off, prevent the risk of increased flooding and conserve water</i>
PSP	<i>SEPP (Western Sydney Employment Area) 2009</i>	Part 5 Principal development standards 20 Ecological sustainable development <i>The consent authority must not grant consent to development on land to which this Policy applies unless it is satisfied that the development contains measures designed to minimise:</i> <i>(a) the consumption of potable water</i> 22 Rainwater harvesting <i>The consent authority must not grant consent to development on land to which this Policy applies unless it is satisfied that adequate arrangements will be made to connect the roof areas of buildings to such rainwater harvesting scheme (if any) as may be approved by the Director-General.</i>
	<i>SEPP 59 (Central Western Sydney Regional Open Space and Residential)</i>	10 Matters for consideration Environment <i>(i) Development should be consistent with the principles of total water cycle management, including minimising total water usage, minimising wastewater requiring treatment and disposal, minimising stormwater impacts on the environment, and maximising water retention and reuse.</i>
	<i>SEPP (Sydney Region Growth Centres) 2006</i>	18 Water recycling and conservation <i>(2) A consent authority must not grant consent to the carrying out of development on land unless the consent authority is satisfied that recycled water from the water recycling plant will be provided to the development.</i>
Subdivision	For subdivision on land to which the above SEPPs apply, same requirements apply as discussed above.	
Infill	None.	N/A
Lot scale	<i>SEPP (Building Sustainability Index: BASIX) 2004</i>	Sets mandatory sustainability targets for water and energy consumptions in all developments and requires up to 40% reduction in potable water consumption.

Precinct structure planning

The GCD Code is a non-binding document and guides the design of PSPs in Sydney's Growth Centres. It sets out the following objectives under the '*WSUD and Stormwater Management*' section (B-20):

- to conserve potable water supplies; and
- to minimise the impacts of stormwater on the environment.

These objectives are to be met by considering a range of matters, which include adoption of stormwater management strategies that are based on WSUD principles and objectives.

The '*WSUD and Stormwater Management*' section outlines stormwater treatment performance levels and strategies and 'requires' the stormwater quality targets developed by the Department of Environment and

Conservation (now Office of Environment and Heritage) to be met. The *Managing Urban Stormwater* documents are referred to for guidance on how to comply with these requirements.

A PSP for land to which *SEPP 59 (Central Western Sydney Regional Open Space and Residential)* applies must be consistent with the guiding principles under Part 2 of the Policy (cl 13(2)(a)), which includes the following objective:

Development should be consistent with the **principles of total water cycle management**, including minimising total water usage, minimising wastewater requiring treatment and disposal, minimising stormwater impacts on the environment, and maximising water retention and reuse.

PSPs under the *SEPP 59 (Central Western Sydney Regional Open Space and Residential)* must have regard to matters set out in Schedule 1 (cl 13(2)(c)) which include special provisions that require attention be given to a 'general services plan'. This also includes stormwater management systems, which should be in accordance with relevant council and state government stormwater management plans and policies, and the following *Managing Urban Stormwater* guidelines:

- *Managing Urban Stormwater: Strategic Framework* (Draft) (EPA, 1998);
- *Managing Urban Stormwater: Treatment Techniques* (EPA, 1997);
- *Managing Urban Stormwater: Council Handbook* (Draft) (EPA, 1997); and
- *Managing Urban Stormwater: Soils and Construction* (Department of Housing, 1998).

For PSPs outside Growth Centres, there are no planning controls for WSUD that apply across the state.

Residential subdivision

All subdivisions within a Growth Centre are subject to the same planning controls as detailed above. For a subdivision of land outside a Growth Centre and not considered as 'rural subdivision', there are no planning controls for WSUD that apply.

Urban infill development

There are no planning controls for WSUD that apply to infill developments across the state.

Lot scale development

'Complying development' is a form of development that may be carried out under Part 4 of the EP&A Act if a complying development certificate has been issued for the development by an accredited certifier or a council. As for all development consents granted under Part 4 of the EP&A Act, this certificate combines approval for use of the land and building construction.

In NSW, any development which is on a lot that has an area of 200 m² or more in residential zones (R1, R2, R3, R4 and RU5) (cl 3.1), and 400 m² or more in rural zones (RU1, RU2, RU4 or RU6) or in Zone R5 is complying development under the *SEPP (Exempt and Complying Development Code) 2008 (Exempt and Complying Development Code)* (cl 3A.2), provided it also meets the standards specified for that development and complies with the requirements of Part 1, Division 2. In particular, a development will not be compliant if it does not meet the following criteria (cl 1.17A):

- it is development for which development consent cannot be granted without the concurrence of a person other than the consent authority or Director-General; or
- the development is on land that is critical habitat; or
- the development is on land that comprises an item that is listed on the State Heritage Register or identified as a heritage item by an EPI or subject to an interim heritage order – unless there is an exemption in place for the development under the *Heritage Act 1977*.

Single buildings may be subject to the requirements under the Complying Development Code (if the buildings are otherwise 'complying development'), BASIX, *SEPP (Sydney Drinking Water Catchment) 2011* (in the area to which that SEPP applies) and the BCA.

Neither the BCA nor the Exempt and Complying Development Code require single buildings to be subject to WSUD objectives. For a residential development which falls under regulation 3.8 of the Exempt and Complying Development Code as discussed above, the following maximum site coverage (clause 3.9) applies:

- (1) The site coverage of the dwelling house and all ancillary development on a lot must not be more than the following:
 - (a) 65% of the area of the lot, if the lot has an area of at least 200 m² but less than 250 m²,
 - (b) 60% of the area of the lot, if the lot has an area of at least 250 m² but less than 300 m²,
 - (c) 55% of the area of the lot, if the lot has an area of at least 300 m² but less than 450 m²,
 - (d) 50% of the area of the lot, if the lot has an area of at least 450 m² but less than 900 m²,
 - (e) 40% of the area of the lot, if the lot has an area of at least 900 m² but less than 1500 m²,
 - (f) 30% of the area of the lot, if the lot has an area of at least 1500 m².
- (2) Despite subclause (1) (d), the site coverage of a single storey dwelling house and all ancillary development on a lot must not be more than 55% of the area of the lot, if the lot has an area of at least 450 m² but not more than 500 m².

BASIX sets mandatory sustainability targets for water and energy consumptions in all developments and requires up to 40% reduction in potable water consumption.

Funding WSUD

The EP&A Act allows councils to seek development contributions by imposing a contribution requirement as a condition of development consent. They can also do so by entering into a voluntary planning agreement with a person who has made or proposes to make a development application or has sought a change to an Environment Planning Instrument. Development contributions may take the form of the dedication of land free of cost and/or the payment of money, which is capped. Alternatively, a council may impose as a condition of development consent that the applicant pay a levy set as a percentage of the proposed cost of carrying out the development.

At present, the monetary contribution is capped pursuant to section 94E of the EP&A Act, under the Minister's Direction, *Section 94E Direction – Development contributions* (Minister for Planning 2011), as follows:

- \$20,000 per dwelling/lot for established areas; and
- \$30,000 per dwelling/lot for greenfield areas (as listed under Schedule 1 of the *Section 94E Direction – Development contributions*).

Some areas are exempt from the cap, and are listed under Schedule 1 of the *Section 94E Direction – Development contributions*.

For POS requirements, *The Recreational and Open Space Planning Guidelines for Local Government* (Department of Planning and Environment 2010) sets out the following 'default' standards for open space planning in NSW for parks (p. 29):

- at a local level, 0.5–2 ha within 400 m from most dwellings;
- at a district level, 2–5 ha within 2 km from most dwellings; and
- at a regional level, 5+ ha within 5–10 km from most dwellings.

Contributions above the relevant cap must be authorised by a contribution plan and assessed by the Independent Pricing and Regulatory Tribunal (**IPART**). The Information Paper, *Infrastructure Cost Comparison – Comparison of Costs in Contribution Plans Reviewed by IPART* (IPART 2013) provides a basis for comparing plans that are submitted to IPART. It provides a summary of IPART's reviews of five contribution plans from the

Hills Shire Council and Blacktown City Council which suggest that the 'reasonable cost' of infrastructure can vary significantly between development areas

NSW councils have the option of applying for the Local Infrastructure Growth Scheme to fund the gap between the maximum levy amount that councils can charge developers and what it actually costs councils to deliver the 'essential local infrastructure' for new housing development (Department of Planning and Environment 2015). 'Essential local infrastructure' in housing growth areas includes roads, stormwater facilities and POS. To receive funding, the gap identified in a contribution plan must be approved by the IPART.

Implementation guidelines

A limited range of implementation guidelines are available in NSW. The guidelines that are available are generally not cross-referenced in the policy framework. The *Water Sensitive Urban Design Books* provided by Urban Growth NSW (formerly Landcom Development and one of state government's property developers for the purpose of delivering housing within selected regions in NSW), provides both technical and policy guidance on WSUD.

WSUD governance

Formerly known as the Department of Planning and Infrastructure, the Department of Planning and Environment is responsible for strategic planning for the NSW regions, delivery of housing and land, assessing State Significant Development proposals, and overseeing the planning system to ensure that it is efficient and effective.

Other relevant parties are:

- the Office of Environment and Heritage which has responsibilities for conservation and protection of the state's environment and which plays a key role in formulating policies and measures on urban stormwater management;
- Urban Growth NSW – a state-owned corporation established in 2013, to integrate and refocus the roles of the former Landcom and the Sydney Metropolitan Development Authority (Urban Growth NSW 2015). It has the mandate to focus on the planning and delivery of major urban transformation programs;
- the Greater Sydney Commission, which has recently been established and is to have a coordination role to help develop strategic directions for the six subregions that it is identifying and implementing the state's metropolitan strategy, *A Plan for Growing Sydney*;
- the Greater Sydney Local Land Services which provides guidance on water quality objectives and targets under the Sydney Harbour Catchment WQIP and the Botany Bay & Catchment WQIP; and
- councils – normally the responsible authority for the administration or enforcement of a planning scheme and thereby the responsible body for considering and determining planning permit applications and ensuring compliance with the planning scheme, permit conditions, and agreements entered into under the state's planning Act.

Management, maintenance, and disposal of stormwater are shared responsibilities between the council, individual property owners, and the water authority. Water supply authorities constituted under the *Water Management Act 2000* are responsible for constructing, managing, and operating water supply, drainage, and flood works.

Sydney Water Corporation provides stormwater services to south and southwest of Sydney. It also manages flood-prone areas and trunk drainage at Rouse Hill. In the Blue Mountains and the Illawarra, the Sydney Water Corporation works with councils and agencies to manage stormwater systems (Sydney Water Corporation 2015).

3.3 South Australia

WSUD definition

WSUD is defined as ‘an approach to urban planning and design that integrates the management of the total water cycle into the land use planning and development process’ under the following documents:

- Water for Good – A Plan to Ensure Our Water Future to 2050 (Department of Environment Water and Natural Resource 2010);
- Water Sensitive Urban Design – Creating more liveable and water sensitive cities in South Australia (Water Sensitive Cities in SA) (Department of Environment, Water and Natural Resources 2013);
- South Australian Planning Policy Library (SAPP Library) (Department of Planning and Local Government, 2010); and
- 30-Year Plan (Department of Planning and Local Government 2010).

This definition is expanded under the 30-Year Plan as (p. 223):

an approach to urban planning and design that integrates the management of the total water cycle into the urban development process. It includes:

- the integrated management of groundwater, surface run-off (including stormwater), drinking water, and wastewater to protect water-related environmental, recreational, and cultural values
- the storage, treatment, and beneficial use of run-off
- the treatment and re-use of wastewater
- using vegetation for treatment purposes, water-efficient landscaping, and enhancing biodiversity
- using water-saving measures inside and outside domestic, commercial, industrial, and institutional premises to minimise requirements for drinking and non-drinking water supplies.

WSUD incorporates all water resources, including surface water, groundwater, urban and roof run-off, and wastewater.

State planning policy for WSUD

Since 2013, the SA Government has been undertaking planning reform and has introduced a new planning Act, the PD&I Act, which repeals the Development Act. The PD&I Act was assented to on 21 April 2016 after being passed by the SA Parliament. The SA Government is currently dealing with implementation measures by reviewing existing regional plans and establishing new key planning instruments under the PD&I Act.

The PD&I Act is a significant departure from its predecessor as it establishes a range of statutory planning instruments including the ‘Planning and Design Code’ (**P&D Code**), which will incorporate a scheme of zones, overlays, policies and rules governing the use and development of land. Consequently, the role and the status of the above WSUD policies are in a state of flux. The P&D Code has a 30-year planning horizon and is now established as a ‘statutory instrument’ under Part 5 of the PD&I Act. Nonetheless, as per the Development Act, regional plans are not to be taken into account for the purpose of any assessment decision or application but an environmental impact statement will be required to evaluate consistency with the relevant regional plan (PD&I Act s 64).

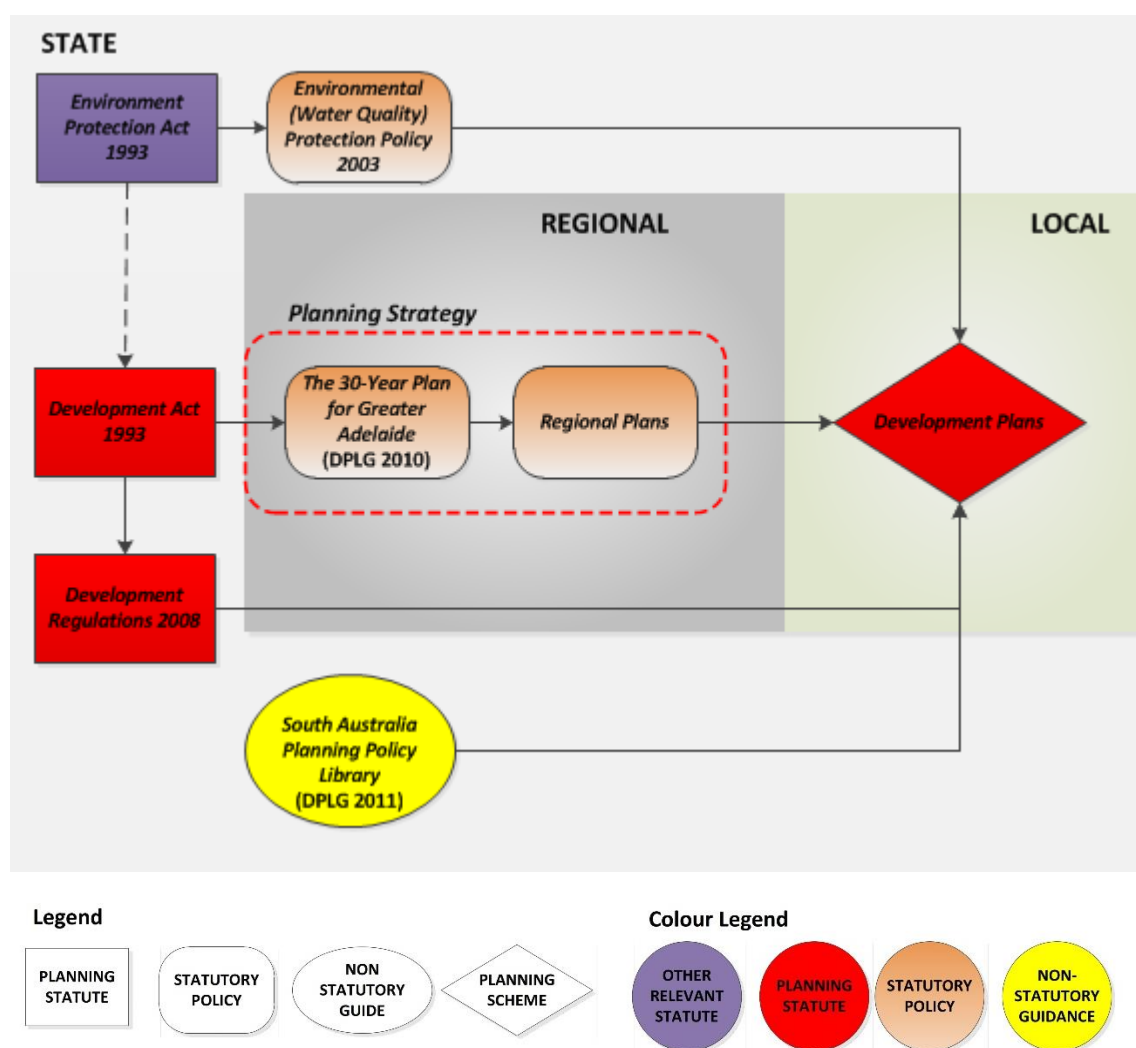


Figure 13: Illustration of the main planning instruments, which make up the legislative framework for land use planning in SA.

WSUD is endorsed under the following three key documents:

- The 30-Year Plan – a regional plan for Greater Adelaide that requires WSUD techniques to be incorporated in structure plans, precinct planning for State Significant Areas, and new developments;
- Water Sensitive Cities in SA – a high-level policy document which sets out the SA Government's position on WSUD in a local context, and details the role that Government intends to play in maximising the use of WSUD across the state. Water Sensitive Cities in SA provides WSUD performance principles and state-wide stormwater pollutant reduction targets as 'a step towards establishing WSUD as a standard approach' in SA (Minister for Sustainability, Environment and Conservation 2013, Foreword); and
- the SAPP Library, which contains standard planning provisions upon which councils are encouraged to base their planning schemes (called 'development plans' [DPs]). It includes development control requirements for WSUD and stormwater management under the *Natural Resources Policy*. This policy is aimed at minimising harm from developments to the receiving environment by limiting discharge to pre-development conditions and maximising stormwater harvesting opportunities.

Whilst the PD&I Act does not introduce any new policies or measures on WSUD or urban stormwater management, it prescribes 'principles of good planning' which include 'sustainability principles' that suggest 'policies and practices should promote sustainable resource use, reuse and renewal, and minimise impact of human activities on natural systems that support life and biodiversity' (PD&I Act s 14(e)).

Stormwater discharge objectives

The EPWQP²³ (EPA 2015) made pursuant to the *Environment Protection Act 1993* has a similar role to Victoria's SEPP(WofV). However, unlike the Victorian counterpart, the EPWQP does not impose binding obligations on planning authorities in the administration of planning schemes.

The EPWQP refers to the *Stormwater Pollution Prevention – Code of Practice for Local, State and Federal Government* (EPA, 1998), which applies to public authorities constructing roads and undertaking stormwater management (Schedule 4). For public stormwater systems, it also refers to Chapter 3 of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000* (ANZECC and ARMCANZ) for environmental value of aquatic ecosystems (cl 7).

Stormwater runoff pollutant reduction targets are provided under the Water Sensitive Cities in SA (Section 5 WSUD Performance Principles and Performance Targets), which are non-binding.

²³ The EPWQP supersedes the 2013 version and came into effect in August 2015.

Table 10: Water Sensitive Urban Design – Creating more liveable and water sensitive cities in South Australia, WSUD ‘targets’.

Section 5. WSUD performance principles and performance targets			
Performance principles	Performance principle intent	State-wide performance target	Primary focus
Water conservation water systems are efficient and, where safe and appropriate, sustainable local water resources are given preference over non-local water sources	Water systems are efficient and water resources are sustainably used	Demonstrate compliance with South Australian residential building requirements for water efficiency	Residential development
		Non-residential: evidence demonstrating reasonable effort in promoting water efficient techniques in commercial, industrial, and other non-residential urban settings	Commercial, industrial and institutional development
		Irrigated open spaces: evidence demonstrating reasonable best practice irrigation management in outdoor irrigated open spaces	Irrigated open space areas
Runoff quality Positively manage the quality of urban runoff through implementing water-sensitive urban design	To help protect and where required, enhance, the quality of runoff entering receiving water environments, in order to support environmental and other water management objectives	Achieve the following minimum reduction in total pollutant load, compared with that in untreated stormwater runoff, from the developed part of the site: <ul style="list-style-type: none"> • Total suspended solids by 80% • Total phosphorus by 60% • Total nitrogen by 45% • Litter/gross pollutants by 90% 	Residential, commercial, industrial, and institutional development, and roads, streets, and thoroughfares
Runoff quantity Post-development hydrology should, as far as practical and appropriate, minimise the hydrological impacts of urban built environments on watercourses and their ecosystems	Help protect water ways where relevant, promote their restoration by seeking to limit flow from development to pre-development levels Help to manage flood risk, by limiting the rate of runoff to downstream areas to appropriate levels	For waterway protection: Manage the rate of runoff discharged from the site so that it does not exceed the pre-urban development 1 year average recurrence interval (ARI) peak flow	Residential, commercial, industrial, and institutional development, and roads, streets, and thoroughfares, where runoff from these land uses drains to an un-lined watercourse
		For flood management: For development and other relevant infrastructure that will drain runoff to an existing publicly managed drainage system or to a drainage system or to a drainage system such as a creek or watercourse on privately-owned land: <ul style="list-style-type: none"> • the capacity of the existing drainage system is not exceeded; and • there is no increase in the 5 year ARI peak flow and no increase in flood risk for the 100 year ARI peak flow, compared to existing condition 	Residential, commercial, industrial, and institutional development, and roads, streets, and thoroughfares
Integrated design That the planning, design, and management of WSUD measures seeks to support other relevant State, regional and local objectives	Implement WSUD in a way that promotes establishment of ‘green infrastructure’ and achievement of multiple outcomes, for example: public amenity, habitat protection and improvement, reduced energy use and greenhouse emissions, and other outcomes that contribute to the wellbeing of South Australians	Evidence that relevant stakeholders are engaged at appropriate stages of planning, designing, constructing, and managing WSUD measures so as to maximise the potential for WSUD to contribute to ‘green infrastructure’ and other relevant state, regional, and local objectives	Residential, commercial, industrial, and institutional development, and roads, streets, and thoroughfares

WSUD at different scales

Precinct structure planning and residential subdivision

SA has no specifically targeted policies or controls for WSUD that apply to PSPs or residential subdivisions across the state. While the 30-Year Plan and Water Sensitive Cities SA contain WSUD policies relevant to residential subdivisions, these are discretionary policies rather than binding codes. Whether SA will introduce binding requirements for WSUD under the new planning system remains unclear.

Urban infill development

Infill developments are required to be assessed under the Development Act and the relevant DP. There are no WSUD policy or controls specific to infill developments that apply across the State.

Lot scale development

Under the current regime, single dwellings require compliance with design standards set out in the *Development Regulations 2008* rather than the relevant DP. Unless the development is in certain restricted areas of the state, single dwellings are not subject to planning controls.

As foreshadowed above, the PD&I Act introduces the P&D Code, which the Minister will prepare and maintain. The P&D Code will replace the current planning rules and set out a comprehensive set of policies, rules and classifications that may be selected and applied in various parts of the state for development assessment and related matters within the state. It will also include the use of zones, subzones, and overlays and specify policies and rules which govern the use and development of an area within those areas.

It remains unclear how the planning controls for single dwellings will be affected under the new system. Nonetheless, the broadening of what can be 'code assessed' to 'deliver quicker, simpler, more predictable assessment outcomes' (Government of SA 2016, p.18) to reduce "red tape" suggests that the extent of planning controls on single dwellings will largely remain unchanged under the new system.

With respect to building requirements, new houses and house extensions greater than 50 m² are required to have an additional non-potable water supply to supplement mains water by having it plumbed to a toilet, a water heater or to all cold water outlets in the laundry. This requirement generally applies to new *Class 1* (residential) buildings under the *SA Additions* of the BCA.

For *Class 1* and 2 buildings under the BCA, the Development Regulations require on-site retention of stormwater (Reg 78AA). If a relevant authority directs that one or more on-site stormwater retention devices are to be incorporated as part of the stormwater drainage system, any relevant requirements of *Minister's Specification SA 78AA On-Site Retention of Stormwater* must be complied with (Reg 78AA(2)). However, the use of on-site retention devices is restricted to certain soil types as listed in the *Minister's Specification SA 78AA*.

Funding WSUD

Under the Development Act, SA councils' ability to levy development contributions has been limited to open space contributions, access roads, hydraulic connections, and car parking where onsite provision is not available. The PD&I Act establishes 'basic and general infrastructure delivery schemes' that are legally binding arrangements for the delivery of infrastructure in a defined scheme area.

Essential infrastructure is defined under section 52 of the PD&I Act broadly to include:

- equipment, structures, works and other facilities used in or in connection with the generation, distribution or supply of electricity, gas, or other forms of energy;
- water infrastructure or sewerage infrastructure;
- embankments, walls, channels, drains, and earthworks;
- civil buildings and facilities; and
- other matters prescribed by regulation.

Basic infrastructure schemes apply to the provision of a suite of essential infrastructure items including equipment, structures, works and other facilities used in or in connection with, the generation, supply, and distribution of electricity, gas or other forms of energy, water and sewerage, and communications, and including stormwater management structures (s 62).

Importantly, the schemes will contain funding arrangements including a proposal for the collection of contributions for specified contribution areas to be imposed. The costs will then be recovered by way of a 'charge on land' in the contribution area, collected by the relevant council or multiple councils where contribution areas overlap.

The requirements for POS under section 198 of the PD&I Act are:

- where an application for a development authorisation provides for the division of land into more than 20 allotments, and one or more allotments is less than one hectare in area, the council may require that up to 12.5% of the relevant area be vested in the council or be held by the Crown as POS. Alternatively, or in addition to the POS contribution, the applicant may be required to make the contribution prescribed under s 198(8);
- where an application provides for 20 allotments or less, and one or more allotments is less than one hectare in area, or the subdivision is under the *Community Titles Act 1996* or the *Strata Title Act 1988*, the applicant may be required to pay the Planning Commission the contribution prescribed by the regulations or to enter into an agreement with the Planning Commission that the certain land described in the relevant plan will be vested in the Council or the Crown; and
- where a subdivision falls outside the above categories, the Planning Commission may require that an area not exceeding 12.5% of the total area of the site of the development be kept as open space. Alternatively, or in addition to the POS contribution, the applicant may be required to make a contribution as prescribed by the regulations.

A noteworthy change to the POS contributions is the Planning Commission's power to levy a monetary contribution as specified in the regulations for multi-unit buildings where subdivision into individual units is not being carried out (s 199).

The Planning and Development Fund also remains unchanged under the PD&I Act and can be used for certain purposes including acquisition, management, and development of land (s195). The fund's uses have been expanded to include providing assistance or grants to a joint planning board, another entity acting under this Act, or an entity acting under the *Urban Renewal Act 1995* (ss 194–196).

Falling under the umbrella term of 'off-set schemes', the PD&I Act allows the Minister to establish a scheme that facilitates delivery of 'provide or pay' contributions in the public interest by new developments in particular locations or of a specified class (s 197).

Another relevant fund for WSUD infrastructure is the Stormwater Management Fund (**SMF**) which has been established under the *State-Local Government Stormwater Management Agreement* (Government of SA and the Local Government Association of SA 2013) and Schedule 1A of the *Local Government Act 1999*. Under it, the State has committed to providing \$4 million a year, indexed for 30 years, to the SMF, and the state and councils have committed to considering measures which encourage the implementation of WSUD to avoid overloading any existing drainage systems. The SMF can be used for a range of purposes including for projects or measures relating to water quality or pollution abatement (Development Act Schedule 1A, cl 18(d)).

To apply for funding under the SMF, a council is required to prepare a Stormwater Management Plan that is consistent with the objectives of the SM Agreement and have it approved by the Stormwater Management Authority pursuant to schedule 1A of the *Local Government Act 1999*. However, as this is discretionary, many councils are yet to implement a Stormwater Management Plan or integrate it into planning and development controls.

Implementation guidelines

SA has a limited range of implementation guidelines for WSUD. The Goyder Institute for Water Research has produced a number of detailed reports on the status of WSUD in SA. A report by the Goyder Institute for Water

Research (2014) examining WSUD impediments in SA identifies a number of 'common themes' when considering mainstream adoption of WSUD in SA. The report suggests that there is a need to improve a council's capacity to implement WSUD at a catchment level and understanding of how small-scale implementation of WSUD in urban consolidation contexts can address catchment level objectives.

WSUD governance

The Department of Planning, Transport and Infrastructure is the SA Government's advisory agency on land use planning, development policy and strategy, the building code, and urban design and open space policy. It is responsible for undertaking strategic land use planning for the state government and provides directions for land use and development across the state.

The State Planning Commission, which is to replace the Development Assessment Commission, is established under the PD&I Act and reports to the Minister with responsibilities including provision of independent policy advice to government, guidance to councils and professionals, and coordination of planning with infrastructure delivery. It will also serve as an assessment authority for prescribed classes of development application.

Other relevant parties are:

- the Department of Environment, Water and Natural Resources which is responsible for providing advice on and administering a range of state Acts in relation to NRM. This includes water management with respect to flood hazard management, urban water policy for stormwater, IWCM and WSUD, asset management and stormwater harvesting, reuse projects in the state, and water licensing and compliance;
- the Urban Renewal Authority, which is established under the *Urban Renewal Act 1995*, and whose functions include initiating, undertaking, supporting, and promoting residential, commercial, and industrial development in the public interest, particularly for urban renewal purposes;
- councils – normally the responsible authority for the administration or enforcement of a planning scheme and thereby the responsible body for considering and determining planning permit applications and for ensuring compliance with the planning scheme, permit conditions and agreements entered into under the state's planning Act; and
- the EPA – the state's environmental regulator under the *Environment Protection Act 1993*.

Management, maintenance and disposal of stormwater are shared responsibilities between the council, individual property owners, SA Water, and in some instances, the NRM Board.

3.4 Victoria

WSUD definition

WSUD is defined in the Urban Stormwater – Best Practice Environmental Management Guidelines (**BPEM Guidelines**) (CSIRO, 2006) predominantly as an alternative to the traditional conveyance approach to stormwater management. It also sets out the objectives of WSUD, which are to:

- protect natural systems;
- integrate stormwater treatment into the landscape;
- protect water quality;
- reduce run-off and peak flows; and
- add value while minimising development costs.

The BPEM Guidelines' definition has informed the understanding of WSUD as applied in the *Victoria Planning Provisions Practice Note: Using the Integrated Water Management Provisions of Clause 56 – Residential subdivision* (Department of Sustainability and Environment, 2006), for applying Clause 56.07 of the VPP.

The BPEM Guidelines' definition is also closely aligned with the objectives set out in Clause 56.07 and one adopted by Melbourne Water. Melbourne Water describes WSUD as being about integrating water cycle management into urban planning and design (Melbourne Water, 2015).

WSUD looks to manage the impacts of stormwater from development. WSUD works at all levels – at the lot level, street and precinct level, as well as regional scales – with the aim of protecting and improving waterway health by mimicking the natural water cycle as closely as possible.

Melbourne Water also recognises that the key principles/objectives of WSUD also extend to protection of ecosystems and enhanced liveability for communities (Melbourne Water, 2015).

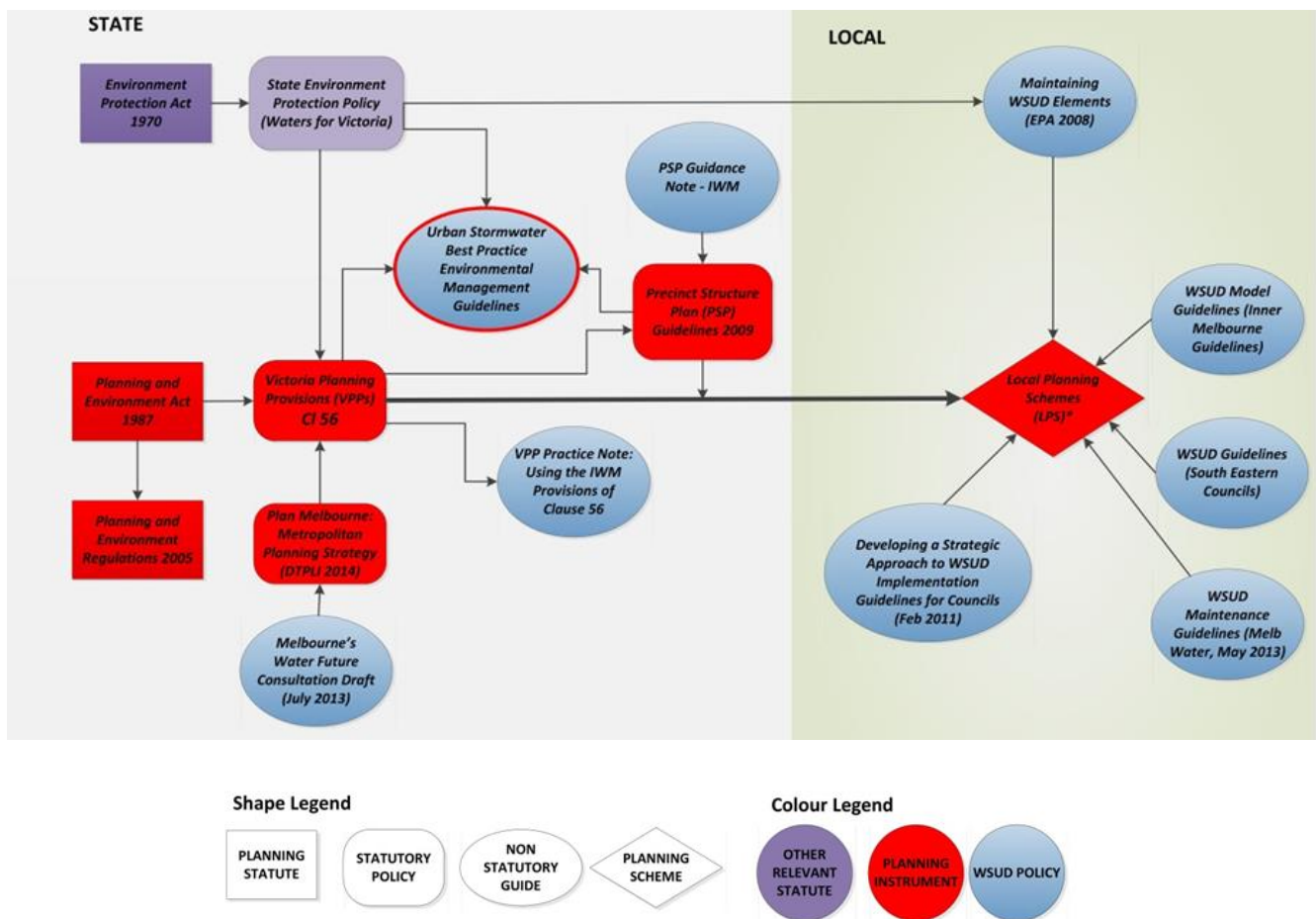


Figure 14: Illustration of planning policies containing WSUD policy and implementation guidance documents (in blue) for WSUD in Victoria. Key policy documents are highlighted with red perimeter line.

The key policy documents which support WSUD within the Victorian planning framework are:

- SEPP(WofV) (Environmental Protection Authority [EPA], 2003), made under the *Environment Protection Act 1970*, requires decision makers to apply the BPWM Guidelines;
- the *Integrated Water Management* provisions at clause 56.07 of the VPP (applicable to new residential subdivision);
- the BPWM Guidelines (applied through SEPP(WofV) and clause 56.07 of each planning scheme);
- the PSP Guidelines which are applied for PSPs in Melbourne's Growth Areas pursuant to clause 11 of the SPPF; and
- clause 14.02 of the SPPF, which requires application of SEPP(WofV).

Clause 56.07 (Integrated Water Management) of the VPP has been the centrepiece of Victoria's approach to WSUD and is the reference point for the development of related policies and guidance. It applies the BPWM Guidelines.

The BPWM Guidelines act as a performance code and contain stormwater runoff quality targets. This is discussed further below. Clause 64 of SEPP(WofV) references the BPWM Guidelines. In turn, responsible authorities and the Victorian Civil and Administrative Tribunal are required to 'give effect' to SEPP(WofV) as appropriate under the P&E Act (ss 60, 84B). The SEPP(WofV) policy basis is mandatory and is given clear support by the terms of the P&E Act. This has allowed some councils to justify inclusion of specific local planning policies for WSUD that cover developments other than residential subdivisions.

The PSP Guidelines contain detailed requirements or standards for PSPs in growth areas. The PSP Guidelines have been informed by clause 64 of the SEPP(WofV) and the BPEM Guidelines. Through its recently released Water for Victoria policy, the Victorian government has recognised the development of local planning policy responses to the limited coverage of clause 56.07–4 and has committed to review the VPP and associated planning and building rules.

WSUD at different scales

Table 11: Summary of planning controls relevant to WSUD at varying scales in Victoria.

Planning Scale	Source of Control	Standard relevant to WSUD
Precinct structure plan	PSP Guidelines (Growth Areas Authority, 2009)	<p>To demonstrate the response to the IWCM design element, a PSP should apply the following seven relevant standards which are cross referenced to clause 56 of the VPP.</p> <ol style="list-style-type: none"> 1. Urban run-off management systems are integrated into the overall plan and incorporated into the open space network, ideally by avoiding alteration of the natural drainage network and limiting the amount of cut and fill required. See Clauses 56.05–01 and 56.07–04. 2. The urban run-off system is designed and managed in accordance with the requirements of the relevant water authority (Melbourne Water for catchment greater than 60 hectares; local council for smaller catchments). See Clause 56.07–04. 3. Existing natural waterways, wetlands and their riparian vegetation are incorporated into urban run-off systems where appropriate. See Clauses 56.05–01 and 56.05–02. 4. Development is designed to ensure that the health of the downstream waterway does not decline as a result of urban development. See Clause 56.07–04. 5. Artificial lakes, ponds or other permanent water bodies provide a water management function in an urban context, protect and enhance natural systems and are cost effective. 6. Development sensitive to flood risk is not sited on significant flood risk areas. Flood storage areas are utilised as features and used for less sensitive uses such as active or passive public open space. See Clause 56.07–04. 7. Adjustments to the stream or floodway only occur if it is necessary, cost effective, does not increase flood risk elsewhere, and minimises environmental impacts. 8. Large areas of open space are located where they enable the capture of stormwater for watering.
Sub-division	VPP, CI 56.07 Integrated Water Management	<p>Standard C22: The supply of drinking water to the boundary of all lots in the subdivision to the satisfaction of the relevant water authority.</p> <p>Standard C23: Reused and recycled water supply systems must be: Provided to the boundary of all lots in the subdivision where required by the relevant water authority.</p> <p>Standard C24: Wastewater systems must be: Reticulated wastewater must be provided to the boundary of all lots in the subdivision where required by the relevant water authority.</p> <p>Standard C25: The urban stormwater management must be:</p> <ul style="list-style-type: none"> • Designed to meet the current best practice performance objectives for stormwater quality as contained in the <i>BPEM Guidelines</i> as amended. • Designed to ensure that flows downstream of the subdivision site are restricted to pre-development levels unless increased flows are approved by the relevant drainage authority and there are no detrimental downstream impacts.
Infill	VPP, LPPF	In some municipalities – see discussion under Lot scale policy and control.

Table 12: VPP, Clause 56.07 Integrated Water Management

Objectives	Standard required
56.07–1 Drinking water supply To reduce the use of drinking water. To provide an adequate, cost-effective supply of drinking water.	Standard C22: The supply of drinking water must be: <ul style="list-style-type: none"> • Designed and constructed in accordance with the requirements and to the satisfaction of the relevant water authority. • Provided to the boundary of all lots in the subdivision to the satisfaction of the relevant water authority.
56.07–2 Reuse and recycled water To provide for the substitution of drinking water for non-drinking purposes with reused and recycled water.	Standard C23: Reused and recycled water supply systems must be: <ul style="list-style-type: none"> • Designed, constructed and managed in accordance with the requirements and to the satisfaction of the relevant water authority, Environment Protection Authority and Department of Human Services. • Provided to the boundary of all lots in the subdivision where required by the relevant water authority.
56.07–3 Wastewater management To provide a wastewater system that is adequate for the maintenance of public health and the management of effluent in an environmentally friendly manner.	Standard C24: Wastewater systems must be: <ul style="list-style-type: none"> • Designed, constructed and managed in accordance with the requirements and to the satisfaction of the relevant water authority and the Environment Protection Authority. • Consistent with any relevant approved domestic wastewater management plan. • Reticulated wastewater must be provided to the boundary of all lots in the subdivision where required by the relevant water authority.
56.07–4 Urban run-off management To minimise damage to properties and inconvenience to residents from urban run-off. To ensure that the street operates adequately during major storm events and provides for public safety. To minimise increases in stormwater run-off and protect the environmental values and physical characteristics of receiving waters from degradation by urban run-off.	Standard C25: The urban stormwater management must be: <ul style="list-style-type: none"> • Designed and managed in accordance with the requirements and to the satisfaction of the relevant drainage authority. • Designed and managed in accordance with the requirements and to the satisfaction of the water authority where reuse of urban run-off is proposed. • Designed to meet the current best practice performance objectives for stormwater quality as contained in the Urban Stormwater – Best Practice Environmental Management Guidelines (Victorian Stormwater Committee) as amended. • Designed to ensure that flows downstream of the subdivision site are restricted to pre-development levels unless increased flows are approved by the relevant drainage authority and there are no detrimental downstream impacts. • The stormwater management system should be integrated with the overall development plan including the street and public open space networks and landscape design.

Objectives	Standard required
	<p>For all storm events up to and including the 20% Average Exceedence Probability (AEP) standard:</p> <ul style="list-style-type: none"> • Stormwater flows should be contained within the drainage system to the requirements of the relevant authority. • Ponding on roads should not occur for longer than one hour after the cessation of rainfall. For storm events greater than 20% AEP and up to and including 1% AEP standard: • Provision must be made for the safe and effective passage of stormwater flows. • All new lots should be free from inundation or to a lesser standard of flood protection where agreed by the relevant floodplain management authority. • Ensure that streets, footpaths, and cycle paths that are subject to flooding meet the safety criteria $d_a V_{ave} < 0.35 \text{ m}^2/\text{s}$ (where, d_a = average depth in metres and V_{ave} = average velocity in metres per second). <p>The design of the local drainage network should:</p> <ul style="list-style-type: none"> • Ensure run-off is retarded to a standard required by the responsible drainage authority. • Ensure every lot is provided with drainage to a standard acceptable to the relevant drainage authority. Wherever possible, run-off should be directed to the front of the lot and discharged into the street drainage system or legal point of discharge. • Ensure that inlet and outlet structures take into account the effects of obstructions and debris build up. Any surcharge drainage pit should discharge into an overland flow in a safe and predetermined manner. • Include water sensitive urban design features to manage run-off in streets and public open space. Where such features are provided, an application must describe maintenance responsibilities, requirements, and costs. <p>Any flood mitigation works must be designed and constructed in accordance with the requirements of the relevant floodplain management authority.</p>

Table 13: VPP, Clause 55 Two or More Dwellings on a Lot and Residential Buildings.

CI No.	Subject matter	Objective	Relevance for WSUD
55.02–2	Residential policy	To ensure that residential development is provided in accordance with any policy for housing in the SPPF and the LPPF, including the MSS and local planning policies. To support medium densities in areas where development can take advantage of public transport and community infrastructure and services.	Can support local WSUD policy.
55.02–4	Infrastructure	To ensure development is provided with appropriate utility services and infrastructure. To ensure development does not unreasonably overload the capacity of utility services and infrastructure.	May support arguments about the capacity of the stormwater system to accept urban run-off.
55.03–1	Street Setback	To ensure that the setbacks of buildings from a street respect the existing or preferred neighbourhood character and make efficient use of the site.	Can allow more space for WSUD assets/permeability.
55.03–3	Site coverage	To ensure that the site coverage respects the existing or preferred neighbourhood character and responds to the features of the site.	The maximum site coverage standard of 60% plays a part in limiting the probability of an increase in run-off from land. However, many ecologists would argue for greater permeability to protect water quality.
55.03–4	Permeability	To reduce the impact of increased stormwater run-off on the drainage system. To facilitate on-site stormwater infiltration.	If no minimum area is specified in a schedule to the zone, at least 20% of the site should be permeable. Many ecologists would regard this figure as being insufficient to protect environmental values in receiving waterways.
55.03–6	Open space	To integrate the layout of development with any public and communal open space provided in or adjacent to the development.	The standard provides that if any public or open space is provided on site, it should: <ul style="list-style-type: none"> • Be substantially fronted by dwellings, where appropriate. • Provide outlook for as many dwellings as practicable. • Be designed to protect any natural features on the site. • Be accessible and useable. This provides a basis to design common areas in a way that protects natural features.
55.03–8	Landscaping	To encourage development that respects the landscape character of the neighbourhood. To encourage development that maintains and enhances habitat for plants and animals in	Can support WSUD indirectly by encouraging more permeable areas for landscaping.

CI No.	Subject matter	Objective	Relevance for WSUD
		<p>locations of habitat importance.</p> <p>To provide appropriate landscaping.</p> <p>To encourage the retention of mature vegetation on the site.</p>	
55.03–10	Parking location	<p>To provide convenient parking for resident and visitor vehicles.</p> <p>To protect residents from vehicular noise within developments.</p>	Basement car parks often leave room for rainwater water tanks where raingardens are not proposed.
55.04–1	Site and rear setbacks	To ensure that the height and setback of a building from a boundary respects the existing or preferred neighbourhood character and limits the impact of the amenity of existing dwellings.	Can allow more room for tanks and WSUD assets.
55.05–4	Private open space	To provide adequate private open space for the reasonable recreation and service needs of residents.	Can allow room for WSUD assets/permeable surfaces. However, there is no restriction on use of paving and impermeable surfaces in these locations, provided that the permeability standard is met.

Precinct Structure Planning

All PSPs must be consistent with the PSP Guidelines, which are to be applied to the preparation and evaluation of PSPs for all new residential communities and new employment areas (Minister for Planning, 2008). They contain a number of design requirements related to WSUD and IWCM.

Part One, *Objective Six* of the 'Growth Area Planning' section of the PSP Guidelines sets out policy to 'respond to climate change and increase environmental sustainability' by taking a number of actions, including:

- opportunities created for IWCM, including WSUD, re-use of stormwater and recycled water;
- waterways and ecologically significant areas are protected on site or offset in other areas; and
- land required for community purposes such as easements, drainage, community facilities, retarding basins, etc. is used efficiently for multiple purposes.

Part Two provides seven design elements and the outputs required to demonstrate the design response including for IWCM design (Growth Areas Authority 2006, p. 38). See Figure 15 below.

Design Response

The design response included in the Precinct Structure Plan should address the following question:

1. *How will the management of urban run-off be integrated with open space provisions?*
2. *How will run-off quantity and quality be controlled to meet the requirements of the relevant authorities, including the Office of Living Victoria (OLV)?²⁴*
3. *How will the impact of development on the waterways be minimised and their existing condition improved?*
4. *How does the design of waterways allow for their maintenance?*
5. *How have waterways been designed to protect riparian vegetation, provide fauna habitat and movement corridors and protect water quality?*
6. *Does the precinct's urban run-off management system have sufficient capacity to manage additional flows that occur as a result of predicted climate change and passage of peak 100 year flows to meet drainage authority requirements?*
7. *Are waterways and wetlands created as part of a water sensitive urban design scheme or otherwise designed so that they become a valuable community asset?*
8. *How will onsite use of stormwater and recycled water minimise the use of potable water?*
9. *How is consideration of water management balanced with other objectives in favour of net community benefit and sustainable development?*

Outputs

The design response should be demonstrated by including the following outputs in the Precinct Structure Plan:

An integrated water cycle management plan including:

- *A plan that sets out potential water sensitive urban design elements and planned flood capacity and conveyance;*
- *An estimate of the amount of stormwater that can be harvested for use within the development, and;*
- *Water sensitive urban design options that should apply to the precinct.*

Figure 15: PSP Guidelines, Element five, Integrated Water Cycle Management (Growth Areas Authority, 2006, p. 38).

²⁴ OLV no longer exists in Victoria.

The PSP Guidelines state that (p. 38):

The design response should be demonstrated by including the following outputs in the Precinct Structure Plan:

An integrated water cycle management plan including:

- A plan that sets out potential water sensitive urban design elements and planned flood capacity and conveyance;
- An estimate of the amount of stormwater that can be harvested for use within the development, and;
- Water sensitive urban design options that should apply to the precinct.

The standards for development of IWCM Plans within the PSP Guidelines (see Figure 16 below) are cross-referenced to clause 56 of the VPP and indirectly to BPEM Guidelines as it sets one of the standards that need to be met under the clause (Standard C25).

RELEVANT STANDARDS

The Precinct Structure Plan should respond to the following standards:

S1	Urban run-off management systems are integrated into the overall plan and incorporated into the open space network, ideally by avoiding alteration of the natural drainage network and limiting the amount of cut and fill required. <i>See Clauses 56.05-1 and 56.07-4.</i>
S2	The urban run-off system is designed and managed in accordance with the requirements of the relevant water authority (Melbourne Water for catchments greater than 60 hectares; local council for smaller catchments). <i>See Clause 56.07-4.</i>
S3	Existing natural waterways, wetlands and their riparian vegetation are incorporated into urban run-off systems where appropriate. <i>See Clause 56.05-1 and 56.05-2.</i>
S4	Development is designed to ensure that the health of the downstream waterway does not decline as a result of urban development. <i>See Clause 56.07-4.</i>
S5	Artificial lakes, ponds or other permanent water bodies provide a water management function in an urban context, protect and enhance natural systems and are cost effective.
S6	Development sensitive to flood risk is not sited on significant flood risk areas. Flood storage areas are utilised as features and used for less sensitive uses such as active or passive public open space. <i>See Clause 56.07-4.</i>
S7	Adjustments to the stream or floodway only occur if it is necessary, cost effective, does not increase flood risk elsewhere, and minimises environmental impacts.
S8	Large areas of open space are located where they enable the capture of stormwater for watering.

Figure 16: PSP Guidelines, Relevant Standards, Integrated Water Cycle Management (Growth Areas Authority, 2006).

THE IWM PLANNING PROCESS TABLE		
	DEVELOPMENT OF THE INTEGRATED WATER MANAGEMENT PLAN	
SET THE SCENE	<p>Stakeholders will determine principles and objectives for IWM at the outset.</p> <p>Establish the strategic agenda:</p> <ul style="list-style-type: none"> • Growth Area Framework Plan considerations. • State and local council planning policies. • Catchment Management Authority plans and water allocation plans. • Capacities of existing and planned bulk services, including potable water supply and storage, and sewerage transfer and treatment facilities. • Melbourne Water existing development services schemes or proposals for new development services schemes. • Water Retailer strategic plans and if they have mandated recycled water third pipes, or plan to do so. • Catchment Management Authority requirements and objectives. • Municipal public and environmental health, strategic and corporate plans, municipal strategic stormwater plans. • Existing biodiversity values within waterways, and any strategies to protect or improve these values over time. • Locally specific targets best practice water management and conservation principles and supply strategies for the precinct. • Water sensitive urban design to support water conservation, high quality landscapes, waterway health and biodiversity. 	<p>Melbourne Water to:</p> <ul style="list-style-type: none"> • Define catchments affected by the precinct structure plan, along with boundaries, existing waterways and flood extents. • Determine capacity of existing stormwater drainage systems and need for upgrade or expansion. • Define existing waterways and floodplains. • Determine appropriate risk between assets and land uses. <p>Water Retailers to:</p> <ul style="list-style-type: none"> • Determine capacity of existing water supply, sewerage and recycled water systems and need for upgrade or expansion. • Determine requirements and objectives of Water Supply & Sewerage Authority strategic plans. <p>Local Council to:</p> <ul style="list-style-type: none"> • Determine capacity of existing stormwater systems and need for upgrade or expansion.
CREATE THE STRUCTURE	<p>Prepare an overall concept for water management including:</p> <ul style="list-style-type: none"> • Identify stormwater flow patterns and peaks. • Consider how and where stormwater and wastewater will be stored and treated. • Determine layout and location of treatment facilities such as retarding basins, bio-retention systems wetlands and sewerage treatment plants. • Determine opportunities for stormwater and wastewater harvesting and re-use. • Make provisions for storage and conveyance of floodwaters and flood events through drainage reserves and water courses, including consideration of likely increases in extreme events due to predicted climate change. • Consider centralised and de-centralised systems or a combination of both for stormwater, water supply and waste water. • Environment Protection Authority and Department of Health requirements for managing the health and environmental risk associated with water recycling. 	<p>Melbourne Water and Local Council to:</p> <ul style="list-style-type: none"> • Investigate opportunities for integration of the stormwater management system with the open space network, trails, biodiversity protection, reserves and landscaping. • Integrate road reserve drainage and landscaping treatments. • Confirm their respective maintenance responsibilities based on the catchment size (i.e. below or above 60 hectares). <p>Water Retailers to:</p> <ul style="list-style-type: none"> • Integrate the stormwater systems with water supply, recycled water and wastewater systems. <p>GAA to:</p> <ul style="list-style-type: none"> • Consider opportunities for new habitats and discuss these with DSE and Melbourne Water. • Achieve an overall water management concept for the precinct. • Consult with Department of Health and EPA to ensure the concept is consistent with guidelines and that health and environmental risks can and will be appropriately managed. <p>EPA and Department of Health to:</p> <ul style="list-style-type: none"> • Advise health and risk management issues associated with recycled water for the precinct.
MAKE THE PLACE	<p>Prepare the Integrated Water Management Plan for the precinct incorporating:</p> <ul style="list-style-type: none"> • Functional drainage design set out in Melbourne Water development services scheme, including design and location of wetlands/retarding basins and design of flow channels. • Design of strategic water supply, recycled water third pipe system and sewerage system. • Local stormwater drainage network for major and minor flows including drainage reserve and drainage easement requirements. • Public open space and irrigation requirements. 	<p>GAA to:</p> <ul style="list-style-type: none"> • Ensure land use development is consistent with IWM, including addressing amenity impacts. • Develop integrated water management and land use plans, including identification of joint uses with irrigation opportunities in consultation with relevant public authorities.
CHECK THE PLAN	<ul style="list-style-type: none"> • Confirm with Stakeholders that the Integrated Water Management plan meets relevant performance objectives, KPIs and standards. 	<p>GAA to:</p> <ul style="list-style-type: none"> • Confirm with Melbourne Water approval of drainage services scheme. • Confirm with water retailers approval of sewerage/ water supply/ third pipe system or other water management innovations. • Confirm with DSE that new habitats meet biodiversity objectives.

Figure 17: The IWM Planning Process (Growth Areas Authority, 2006).

Residential subdivision

The primary control for IWCM in new residential subdivisions arises from Clause 56.07 (Integrated Water Management) of the VPP, which seeks to:

- integrate use of all water resources including rainwater, reused water, recycled water, and stormwater;
- conserve the supply and reduce the use of potable water;
- provide for wastewater systems that maintain public health objectives and environmentally friendly effluent management;
- use alternative water supplies as a substitute for potable water quality on a fit for purpose basis; and
- manage urban-stormwater run-off to achieve flood conveyance and best practice approaches to protect downstream water quality.

Clause 56.07 contains four objectives which pertain to drinking water, reused and recycled water, wastewater systems and, most relevantly, urban run-off management.

The deemed-to-comply standards relating to urban runoff provide that development should meet the best practice aspects of the BPEM Guidelines.

Urban infill development

Infill developments, which are not residential subdivisions, are not subject to Clause 56.07. If a residential building is approved before a subdivision occurs, then it is not necessary to comply with clause 56.07.

However, some councils have developed local WSUD planning policies that, in effect, seek to expand the application of clause 56.07 to other development categories. For large strategic redevelopment sites, site-specific planning controls, such as Development Plan Overlays, can include requirements relating to WSUD. However, the use of site-specific controls is not consistent. WSUD policy does not specifically target infill development and strategic redevelopment sites.

Lot scale development

A proposed use or development of land can be subject to potentially numerous separate permit triggers under the VPP. Generally a planning permit is required for constructing or altering a building (other than a single dwelling), change of use, subdividing land, and clearing native vegetation from land.

In residential zones, a planning permit is generally required:

- to construct or extend one dwelling on a lot less than 300 m² (VPP, cl. 32.07–03);
- to construct or extend one dwelling on a lot between 300 m² and 500 m² if specified in a schedule to the Residential Zone; or
- to construct a single dwelling on the lot in a Green Wedge Zone and Green Wedge A Zone.

Councils can seek approval to vary the schedule to the zone to specify different threshold requirements and lot sizes for planning permit requirements for detached dwellings. In many instances a planning permit is not required under a zone control for the construction or alteration of a single dwelling, particularly where the lot exceeds 500 m². However, in growth areas, Integrated Water Management planning occurs at the precinct scale.

Clauses 54 and 55 of the VPP apply respectively to applications to construct a building or construct or carry out works associated for one dwelling on a lot and for two or more dwellings on a lot and residential buildings. While there are a number of objectives under the clause, such as those pertaining to site coverage, setbacks, permeability, and open space, which are indirectly relevant to WSUD objectives, they currently do not include any specific requirements for WSUD.

With respect to building requirements, all detached dwellings must have either a rainwater tank connected to all sanitary flushing systems or a solar water heater system under the NCC variations for Victoria. The decision that

can be made between a tank and solar boosted hot water leads to an arbitrary choice that can create uncertainty as to the level of take-up of rainwater tanks as a WSUD feature. Future policy development can be expected to consider whether a more consistent approach to requiring rainwater tanks through the NCC and the planning system should be adopted.

Funding WSUD

Under the P&E Act, a planning scheme may include one or more Infrastructure Contribution Plans (previously known as Development Contributions Plans) to levy contributions for the provision of 'community infrastructure' and 'development infrastructure'. Contributions for drainage are regarded as development infrastructure and are currently uncapped, but it is uncommon for Development Contribution Plans to include levies to fund regional drainage infrastructure.

For new subdivisions developers will be required to construct the local drainage system to service an immediate development. Melbourne Water is responsible for regional drainage at the catchment scale of 60 Ha or more and puts in place Development Services Schemes (**DSSs**) to levy charges for drainage headworks in Melbourne's growth corridors.

Melbourne Water also funds stormwater infrastructure through water quality offset payments in the metropolitan region, for developers that cannot meet water quality requirements on-site.

Given the existence of the DSSs administered by Melbourne Water, growth area councils do not generally impose charges for drainage, although special charge schemes are developed from time to time to address localised flood issues or to fund drainage capacity upgrades. For infill development contexts in and around activity centres, as well as transport corridors in established parts of Melbourne, the DSS schemes do not apply.

A new system for Infrastructure contributions came into effect in October 2016, which applies a system of capped 'standard' levies and supplementary levies for Melbourne's growth areas that require further Ministerial approval. Levies relating to drainage are allowable items for the purposes of a standard levy.²⁵ This means that a council imposing drainage levies would generally be doing so at the expense of other infrastructure within the capped rate. Drainage infrastructure or WSUD upgrades are not expressly described as allowable items for the purposes of a supplementary levy. However, 'other' works, services, and facilities can be the subject of a supplementary levy where certain onerous requirements are satisfied. By constraining the ability to fund drainage infrastructure at the precinct scale through supplementary levies, councils will continue to be reliant on Melbourne Water to plan and fund WSUD outcomes that are to be delivered in the public realm through a DSS.

Public open space contributions can be specified under section 18 of the *Subdivision Act 1988* (up to 5% of Site Value) unless there is a different rate specified in clause 52.01 of the relevant planning scheme. For growth areas the PSP Guidelines recommend that at least 10% POS be provided with at least 6% active POS and 2% passive POS. Standard 7 seeks to integrate the design of the POS system with the techniques for managing urban runoff and biodiversity. The following standards as shown in Figure 18 below apply under Element 5 of the PSP Guidelines and indicate how POS planning can be integrated with IWCM and WSUD:

²⁵ Ministerial Direction on the Preparation and Content of Infrastructure Contributions Plans (October 2016).

S1	<p>Provide a network of quality, well-distributed, multi-functional and cost effective open space, catering for a broad range of users that includes:</p> <ul style="list-style-type: none"> • Local parks within 400m safe walking distance of at least 95% of all dwellings; • Active open space within one kilometre of 95% of all dwellings; <p>Linear parks and trails, most often along waterways, but also linked to vegetation corridors and road reserves within one kilometre of 95% of all dwellings. <i>See Clause 56.05-2</i></p>
S2	<p>In residential areas, approximately 10% of the net developable area as total public open space, of which 6% is active open space.</p> <p>In addition, residential precincts should contain active indoor recreation facilities that are co-located and/or share space with schools and integrated community facilities. This should result in an active indoor sports provision of approximately five hectares per 60,000 residents.</p>
S3	<p>In major employment areas, approximately 2% of net developable area as public open space, usually with a passive recreation function.</p>
S4	<p>In meeting standards S2 and S3, encumbered land should be used productively for open space.</p> <p>The network of local and district parks should be efficiently designed to maximise the integration and sharing of space with publicly accessible encumbered land.</p> <p>Encumbered land usually includes land retained for drainage, electricity, biodiversity and cultural heritage purposes.</p> <p>The parkland created by such sharing and integration should be suitable for the intended open space function/s, including maintenance.</p> <p>In this way, encumbered land will be well utilised, while the total amount of open space can be optimised without adversely impacting on the quality and functionality of the network.</p>
S5	<p>Active open space should be:</p> <ul style="list-style-type: none"> • Of an appropriate size, i.e. sufficient to incorporate two football/ cricket ovals, but small enough to enable regular spacing of active open space provision across the precinct. This configuration would generally require at least eight hectares; • Appropriate for its intended open space use in terms of quality and orientation; • Located on flat land (which can be cost effectively graded); • Located with access to, or making provision for a recycled or other sustainable water supply; • Designed to achieve sharing of space between sports, and; • Linked to pedestrian and cycle paths.
S6	<p>All public open space areas should be designed to maximise passive surveillance. <i>See Clauses 56.04-4 and 56.05-2</i></p>
S7	<p>The public open space network is combined with techniques for managing urban run-off and biodiversity. <i>See Clauses 56.05-1, 56.04-4, 56.05-2, 56.07-4</i></p>

Figure 18: PSP Guidelines, Element 5 ‘Open Space and Natural Systems’, Relevant Standards (Growth Areas Authority 2006, p. 34)

A PSP and DCP for a growth area may realise in excess of a 20% provision of POS depending on the local context, but this will include encumbered open space including linkages along waterways, undevelopable flood plain land, and land constrained by native vegetation or easements. Smaller rates of POS are generally achieved in infill contexts or for strategic redevelopment sites. There is, simply, more land available in the growth areas that can be allocated to stormwater management than in the established parts of Melbourne, and this is reflected in the higher open space requirements that apply in these areas.

Melbourne Water Development Services Schemes

In urban areas of Melbourne, Melbourne Water funds drainage upgrades through DSSs with variable levies for particular catchment areas. Such schemes tend to apply in areas where a PSP has been prepared for a growth corridor rather than in established urban areas. The following map provides an indication of coverage:

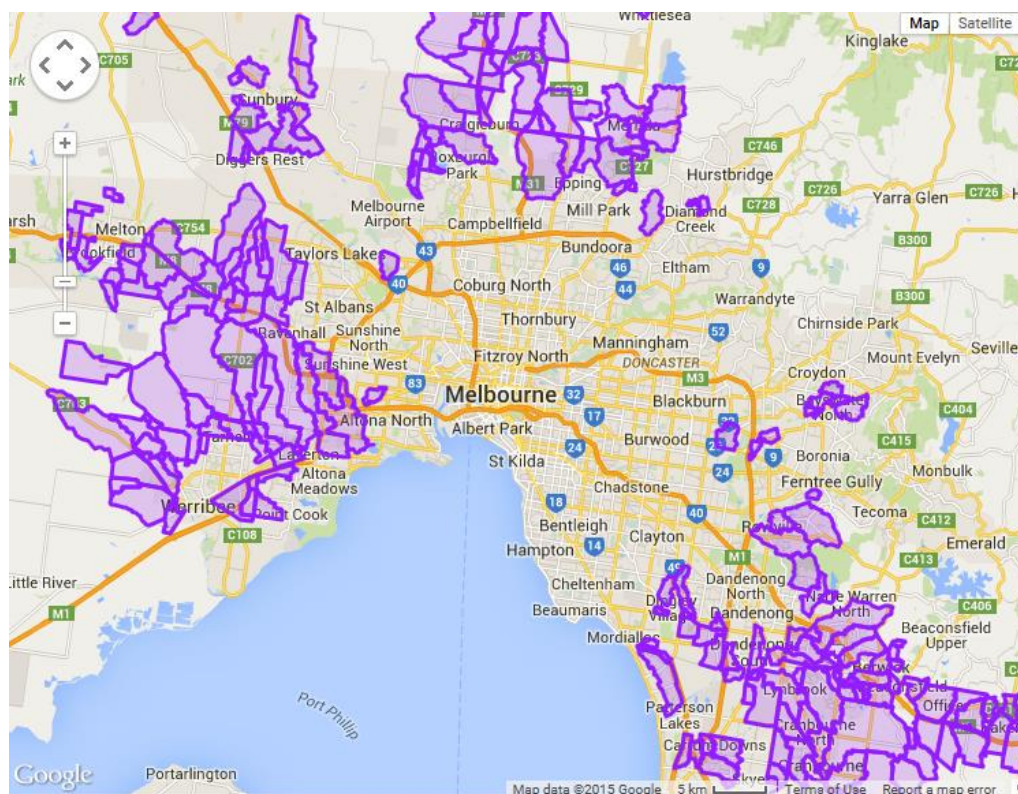


Figure 19: Find your scheme, DSS areas in metropolitan Melbourne (Melbourne Water 2015)

Melbourne Water (2015) states that:

Note that if you are developing outside a scheme or inside a scheme where no stormwater rate applies, the development is expected to provide best practice stormwater treatment. A stormwater offset rate may be payable to 'offset' stormwater works in developments where best practice storm water management is not possible.

Contributions payable are based on the area developed, and the development type. For example, industrial development would pay a higher rate than low-density residential development, as it generates a higher level of stormwater run-off.

The costs of schemes are highly variable and change according to conditions in each area. The median rate equates to about approximately \$4,250 per dwelling based on published data. The upper 50% of the schemes reviewed range from **\$4,250–\$8,680 per dwelling** (or a range of \$68,000–\$138,000 per Ha).²⁶

Melbourne Water has published principles to guide the development of DSSs, which include similar rules for cost apportionment to the rules which apply to the preparation of DCPs²⁷. The principles are outlined in Table 14, below.

²⁶ The published rates have been assessed by the authors of this report.

Table 14: Principles for Provision of Waterway and Drainage Services for Urban Growth (Melbourne Water 2007)

Principle	
1.	There shall be no formal limit on the size of the scheme area.
2.	The boundary of a scheme will be determined by the drainage characteristics of the land.
3.	Schemes will be planned to service all developable lots.
4.	Schemes should propose infrastructure to service development that is optimal in terms of cost and performance.
5.	Infrastructure benefits common to more than one scheme will have the cost apportioned.
6.	All landowners will receive an equivalent level of service.
7.	Infrastructure designed to accommodate run-off from non-developable land within the scheme boundary will be funded by development contributions.
8.	Scheme infrastructure to service existing developed land within the scheme will not be funded by development contributions.
9.	Infrastructure to service existing and future development external to the scheme will not be funded by development contributions from within the scheme.
10.	Environmental works downstream of development services schemes will be funded by schemes where upstream development is the cause of the problem.
11.	Melbourne Water or councils will meet the cost of improved flood protection for existing development.
12.	Contribution rates will be structured to balance income and expenditure over the life of a development services scheme.
13.	A robust consultation process will govern the creation of development services schemes.
14.	Development services schemes will be adjusted for innovation works that benefit the scheme.
15.	Development services schemes will have annual financial reviews and engineering reviews at least once every five years.
16.	Development services schemes will include land acquisition costs based on the undeveloped broad acre value

Implementation guidelines

There is a range of implementation guidance for WSUD available in Victoria. Many of these guides are provided by the Melbourne Water and offer support to councils, developers, designers, and asset managers involved in urban stormwater management. Access to policy and guidelines and institutional training and support is available through Clearwater (<https://www.clearwater.asn.au/>).

The Council Alliance for a Sustainable Built Environment (CASBE) also provides on-line tools to assess and rate built form environmental sustainability (<http://www.bess.net.au/>). These are used by councils that have introduced local planning policies for environmentally sustainable development.

The Victorian Planning Authority (formerly the Metropolitan Planning Authority and the Growth Areas Authority) publishes engineering guidance for subdivisions in the growth corridors. These do not include detailed WSUD specifications. A number of regional councils have developed the Infrastructure Design Manual, which includes WSUD Guidance, but this has not yet been incorporated as planning policy.

²⁷ *The Development Contributions Guidelines* Version 5.9 as amended March 2007 require the costs of infrastructure which benefit stakeholders outside a CP catchment to be apportioned so that developers are not subsidising infrastructure benefitting a broader catchment.

WSUD Governance

The Department of Environment, Land, Water and Planning supports the Minister for Planning by providing planning information to councils and the public. It also develops regulatory policy, legislation, and regulations on behalf of the Minister.

Other relevant parties are:

- the Victorian Planning Authority, who carry out precinct planning work in declared growth areas in conjunction with the relevant council. This is an independent statutory body established under the P&E Act, reporting directly to the Minister for Planning. The Victorian Planning Authority works in partnership with councils to prepare and implement plans for key strategic regions and development sites;
- the local council, who is normally the responsible authority for the administration or enforcement of a planning scheme and for considering and determining planning permit applications under the P&E Act. It is also responsible for managing POS under the Subdivision Act and the *Local Government Act 1989*;
- CMAs, which manage river and catchment health, are responsible for regional and catchment planning and coordination, waterway, floodplain, salinity and water quality management. CMAs prepare Regional Catchment Strategies under the *Catchment and Land Protection Act 1994*;
- Melbourne Water Corporation, which is responsible for regional drainage for larger catchments over 60 Ha. It manages Melbourne's water supply catchments, treats drinking and recycled water, removes and treats most of Melbourne's sewage, and manages waterways and major drainage systems in the Port Phillip and Western Port region. It also manages urban floodplains and is a referral authority for a limited range of development proposals under the P&E Act;
- the EPA – the state's environmental regulator under the *Environment Protection Act 1970* – which is responsible for SEPP(WofV) and empowered to develop policy regarding environmental markets; and
- the Department of Health, which is responsible for endorsing the Recycled Water Quality Management Plan for Class A recycled water schemes under clause 56.07 of the VPP.

Disposal of stormwater is a shared responsibility between the property owner, the local council, and Melbourne Water.

While councils have the primary responsibility for administering clause 56.07 (Integrated Water Management), this also involves Melbourne Water as the referral authority (for a subdivision creating more than two lots), the EPA, and Department of Health.

3.5 Western Australia

WSUD Definition

The term 'WSUD' was originally coined in WA (Whelans et al. 1994) and has been applied in a number of key policy documents.

The State Planning Policy 2.9 Water Resources Policy (SPP 2.9) (WAPC 2006), describes WSUD as a framework for minimising the impact of urbanisation on the natural water cycle and a means of addressing water quality, water quantity, and water conservation, together with broader social and environmental objectives (p. 5723). It includes the following WSUD objectives and principles, which closely reflect those under the National Water Initiative (2004):

General objectives of water sensitive urban design are:

1. To manage a water regime.
 - Maintain appropriate aquifer levels, recharge, and stream flow characteristics in accordance with assigned beneficial uses
 - Prevent flood damage in developed areas
 - Prevent excessive erosion of waterways, slopes, and banks

2. To maintain and, where possible, enhance water quality.
 - Minimise waterborne sediment loading
 - Protect existing riparian vegetation
 - Minimise the export of pollutants to surface or groundwater
 - Minimise the export and impact of pollution from sewerage
3. To encourage water conservation.
 - Minimise the import and use of scheme water
 - Promote the use of rainwater
 - Promote the reuse and recycling of wastewater
 - Reduce irrigation requirements
 - Promote opportunities for localised supply
4. To enhance water-related environmental values.
5. To enhance water-related recreational and cultural values.

Principles of water sensitive urban design are:

- Protect natural systems – protect and enhance natural water systems in urban developments;
- Integrate stormwater treatment into the landscape – use stormwater in the landscape by incorporating multiple use corridors that maximise the visual and recreational amenity of developments;
- Protect water quality – protect the water quality draining from urban development;
- Reduce run-off and peak flows – reduce peak flows from urban developments by local detention measures and minimising impervious areas; and
- Add value while minimising development costs – minimise the drainage infrastructure cost of development.

Water sensitive urban design adopts a planning and design approach that aims to integrate the following opportunities into the built form of cities and towns:

- detention of stormwater rather than rapid conveyance;
- use of stormwater to conserve potable water;
- use of vegetation for filtering purposes;
- water-efficient landscaping;
- protection of water-related environmental, recreational, and cultural values;
- localised water harvesting for various uses; and
- localised wastewater treatment systems

WSUD is also defined in the Better Urban Water Management (BUWM) (WAPC 2008, p. 6) as:

The philosophy of achieving better water resource management outcomes in an urban context by using an integrated approach to planning and incorporating total water cycle management objectives into the planning process. The key elements of this design include protection from flooding, management of water quantity and quality to achieve ecological objectives, water conservation, water efficiency, and water re-use.

BUWM identifies specific objectives for WSUD which are described in Table 14 below.

State planning policy for WSUD

WSUD is endorsed under the following provisions of the *State Planning Framework (SPF)*:

- the State Planning Strategy 2050 (WAPC 2014);
- the SPP 2.9, a sub-policy of *SPP 2 Environment and Natural Resources* (WAPC 2003) which outlines detailed policy measures for IWCM and WSUD at all planning scales;
- Liveable Neighbourhoods (WAPC 2009). This is an operational policy applied when assessing regional plans, structure plans, and subdivision of new urban areas in the metropolitan area, country centres, and large urban infill sites;
- the *SPP 3 Urban Growth and Settlement* (WAPC 2006), adopting the principles of Liveable Neighbourhoods; and
- BUWM: a key guidance document designed to implement the SPP 2.9. It provides detailed information, objectives and expectations on the type of water management information and actions that should accompany each stage of a development.

At a regional level, the relevant policies under the *State Planning Framework* include:

- *Directions 2031 and Beyond – Metropolitan Planning Beyond the Horizon* (WAPC 2010). This is a strategy for the Perth and Peel region adopting the BUWM;
- the *SPP 2.10 Swan-Canning River Systems* (WAPC 2006); and
- the *SPP 4.2 Activity Centres for Perth and Peel* (WAPC 2010).

As all provisions of the *State Planning Framework* have been prepared and approved by the WAPC under the P&D Act, they have legal status.

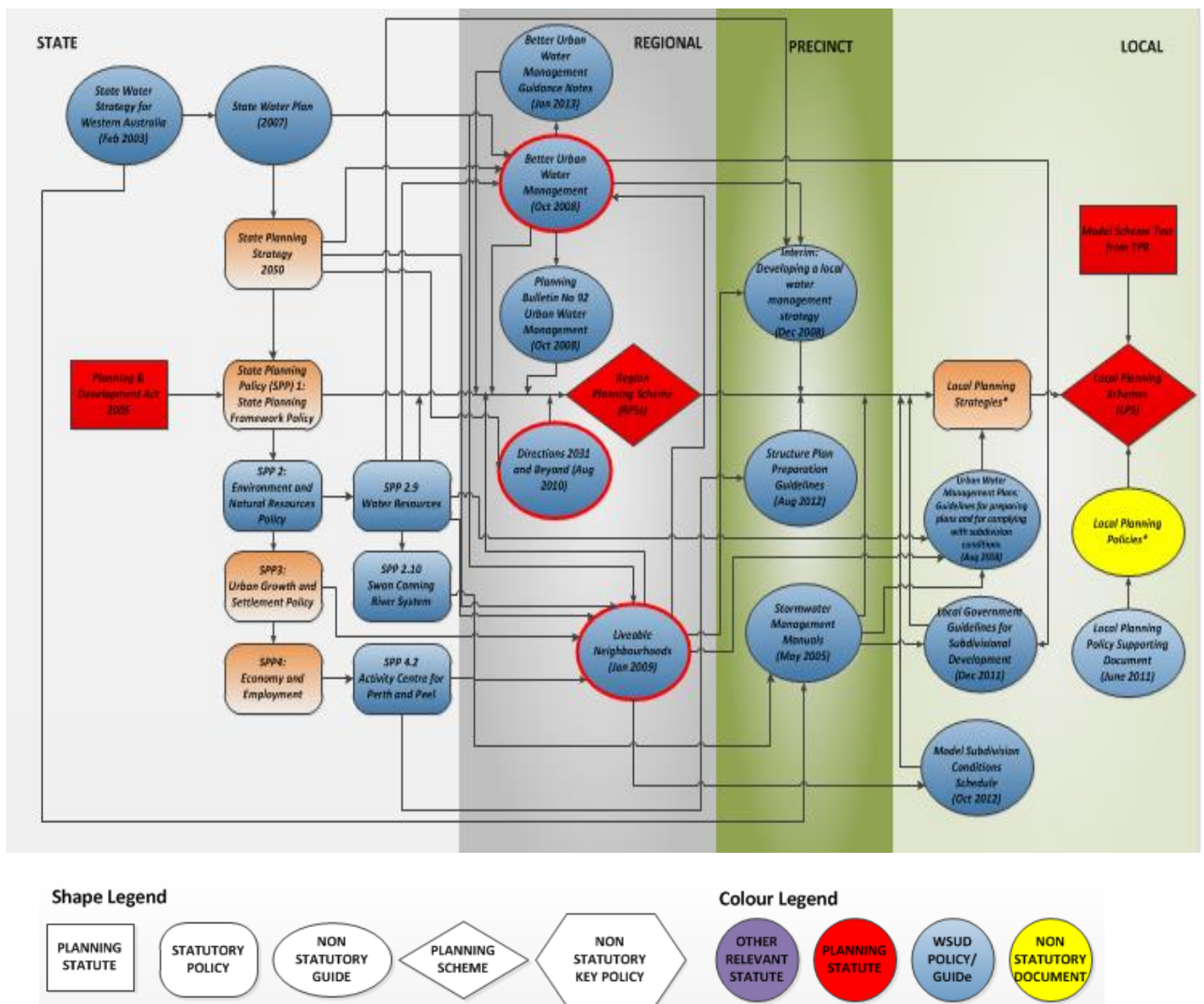


Figure 20: Illustration of planning policies containing WSUD policy and implementation guidance documents (in blue) for WSUD in WA. Key policy document is highlighted with red perimeter line

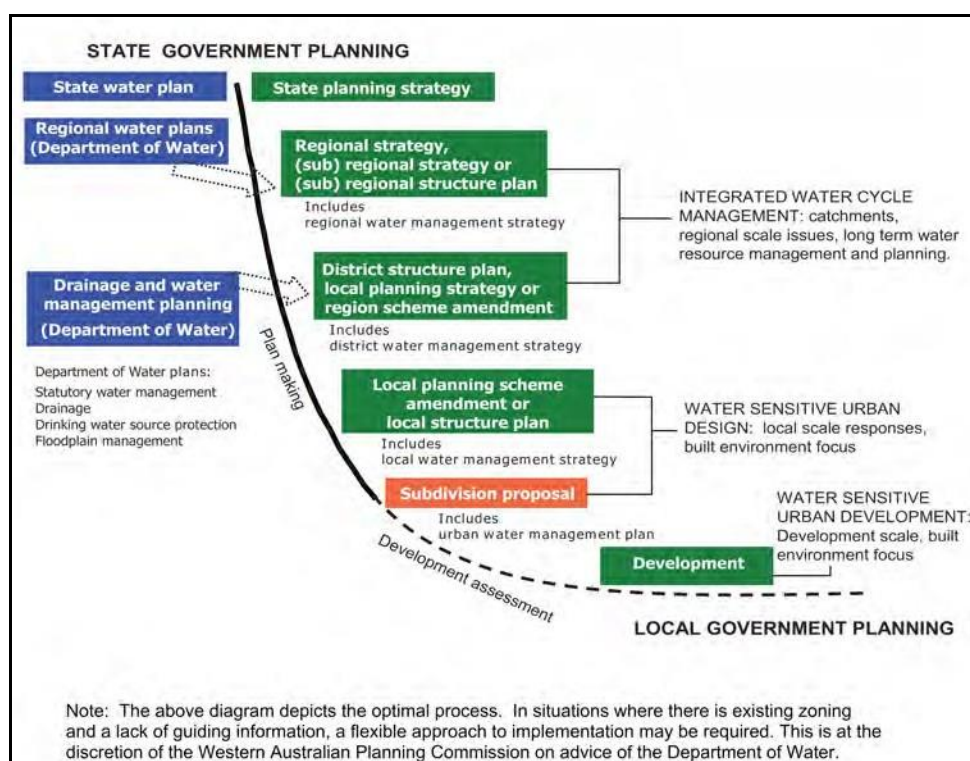


Figure 21: Urban Water Management Plans – Guidelines for preparing plans and for complying with Subdivision Conditions, Integrating water planning with the land planning process in WA (DoW 2008, p. 3)

Table 14: Liveable Neighbourhoods, Application requirements checklist Guide (WAPC (2009) p. 14). 'Required' under the Liveable Neighbourhoods

Information/ detail required: Urban water management	Regional/district structure plan (generally >300 ha)	Local structure plan (generally <300 ha)	Large scale subdivision (generally >20 ha)	Small-medium scale subdivision (<20 ha)
Urban water management strategy (control of stormwater quality and/or quantity at source)	Required*	Required*	May be desirable in circumstances where this aspect is a consideration and mandatory if not completed as part of the local structure plan stage	May be desirable circumstances where this aspect is a consideration and mandatory if not completed as part of the local structure plan stage.
Define best practice planning practices (use of natural stormwater systems)	Required*	Required*	Required*	May be desirable circumstances where this aspect is a consideration and mandatory if not completed as part of the local structure plan stage.
Ongoing management arrangements and responsibilities	Required*	Required*	Required*	May be desirable circumstances where this aspect is a consideration and mandatory if not completed as part of the local structure plan stage.
Drainage and nutrient management plans	N/A	Required*	Required*	Required*

Liveable Neighbourhoods²⁸ and the BUWM are the most important for WSUD. The former is concerned with structure planning and subdivision of urban areas, and describes integrated urban water management as one of the key elements of urban design. Both the BUWM and Liveable Neighbourhoods require developments of various planning scales to be accompanied by a UWMP or UWMS that incorporate the principles of WSUD.

²⁸ Liveable Neighbourhoods is a Western Australian Planning Commission (WAPC) operational policy that guides the structure planning and subdivision for greenfield and large brownfield (urban infill) sites.

Table 15: BUWM, 1.3 Design objectives for WSUD (DoW 2008, pp. 3–4)

WSUD objective	Design criteria
Water conservation	Consumption target for water of 100 KL/person/yr (which is adapted from the State Water Plan) including not more than 40–60 k/person/yr scheme water.
Water quantity management	<p>Ecological Protection – For the critical one year average recurrence interval (ARI) event, maintaining the post-development discharge volume and peak flow rates relative to pre-development conditions in all parts of the catchment. Where there are identified impacts on significant ecosystems, maintain or restore desirable environmental flows and/or hydrological cycles as specified by DoW.</p> <p>Flood Management – Manage the catchment run-off for up to the 1 in 100 year average recurrence interval event in the development area to pre-development peak flows, unless otherwise indicated in an approved strategy or as negotiated with the relevant drainage service provider.</p>
Water quality	<p>Contaminated sites are to be managed in accordance with the <i>Contaminated Sites Act 2003</i>.</p> <p>All other land – if the development's pollutant outputs (measured or modelled concentrations) exceed catchment ambient conditions, the proponent is to achieve water quality improvements in the development area or, alternatively, arrange equivalent water quality improvement offsets inside the catchment. If these conditions have not been determined, the development should meet relevant water quality guidelines stipulated in the <i>National Water Quality Management Strategy</i> (ANZECC and ARMCANZ, 2000).</p> <p>Drainage – Ensure that all run-offs contained in the drainage infrastructure network receives treatment prior to discharge to a receiving environment consistent with the <i>Stormwater Management Manual</i>.</p>
Stormwater modelling	<p>At least 80% reduction of total suspended solids</p> <p>At least 60% reduction of total phosphorus</p> <p>At least 45% reduction of total nitrogen</p> <p>At least 70% reduction of gross pollutants</p>

Nonetheless, the effectiveness of WSUD policy in WA generally depends on whether and to what extent state policies such as BUWM and Liveable Neighbourhoods are incorporated into regional or local planning schemes. The P&D Act merely requires councils to have 'due regard' to any SPP affecting its district when preparing or amending their local planning scheme (P&D Act s 77). Similarly, the *Planning and Development (Local Planning Schemes) Regulations 2015 (P&D Regulations)* requires councils to give 'due regard' to a range of matters in considering an application for development approval within its scheme area.

The application of WSUD policies in WA remains discretionary. The policy framework does not constitute a mandatory code, but is given effect in a discretionary manner.

Table 16: Summary of planning controls relevant for WSUD in WA

Planning scale	Source	Objective/strategy	Mandatory (Y/N)
Regional/ sub-regional	Directions 2031	Adopts the BUWM and the Stormwater Management Manual	N
	SPP 2.10	<ul style="list-style-type: none"> Land use changes should not result in further water quality degradation but should, if possible, improve the situation (cl 7.2.2) Incorporated WSUD principles in proposed developments (natural flow regimes generally preferred) (cl 7.2.9). Refers to the Stormwater Management Manual for guidance on the design of stormwater systems (cl 7.2.10) 	N
PSP	SPP 4.2	<ul style="list-style-type: none"> Planning considerations should include use of waterwise plants and stormwater management through investigating opportunities to apply WSUD principles to manage stormwater from roads and open space and to incorporate other integrated water systems (cl 6.2) Activity centre structure plan to establish the targets for stormwater and greywater use (cl 6.4) 	N
	SPP 2.9	<ol style="list-style-type: none"> Water resources in the area should be mapped according to the best available information at the time of preparing the planning strategy or structure plan Identify the hierarchy/significance of each type of water resource Where specific water resources have been identified as significant in either a state, regional, or local context, identify appropriate setbacks and/or buffers from significant water resource Where the significance of water resource is unknown this should be identified and recognised as such until relevant information is available Identify and map the groundwater and surface water catchments and sub-catchments in the area Take account of drinking water source protection plans Identify all floodplains and flood paths to avoid development on those areas Identify developable and non-developable areas based on environmental constraints identified above Identify and protect public open-space network including remnant vegetation, natural drainage lines, recreational, cultural, and environmental features Locate land use that are incompatible with objectives for water resource protection an appropriate distance from the water resource 	N
	Liveable Neighbourhoods	<ul style="list-style-type: none"> Incorporate urban water management strategy with respect to control of quality and/or quantity of stormwater, definition of best planning practices and ongoing management arrangements and responsibilities Drainage and nutrient management plan and wastewater re-use management plan are also required 	N
	BUWM	All district and local structure plans to be accompanied by a district and local water management and implementation strategy respectively [refer Table 15 above as to WSUD objectives]	N
Subdivision	Liveable Neighbourhoods	Refer strategies below	N
	BUWM	Urban WMP to accompany the application	N
	Model Subdivision Conditions Schedule	Urban WMP to be prepared and approved in consultation with the DoW, consistent with any approved Local Water Management Strategy/Drainage or Water Management Plan.	N
Infill	SPP 2.9 & Liveable Neighbourhoods	Consideration of the policies under the SPP 2.9 and the Liveable Neighbourhoods encouraged	N
Lot scale	R-Codes	All dwellings to demonstrate compliance with the Stormwater Management Design Principles ('stormwater is managed on-site wherever	Y

Planning scale	Source	Objective/strategy	Mandatory (Y/N)
		possible') and deemed-to-comply provisions (all water draining from roofs, driveways, communal streets and other impermeable surfaces shall be directed to garden areas, sumps, or rainwater tanks within the development site where climatic and soil conditions allow for the effective retention of stormwater on-site)	

Table 17: Summary of key policies/guidance relevant for WSUD in WA

Policy document	Relevant section	Objectives	Applicable planning scale	Legal Status	Effect on preparing and amending a planning scheme	Statutory Effect on development applications
SPS 2050	Strategic Direction 2.2 Water	To support WA's growth and development by managing the availability and quality of water sustainability. The urban water cycle should consider all urban water flows as a potential resource and recognise the interconnectedness of water supply, groundwater, stormwater, wastewater, flooding, water quality, wetlands, watercourses, estuaries, and coastal waters.	Multiple Scales	Made pursuant to section 14 of the P&D Act	No explicit requirement to give it 'due regard' under the P&D Act but would be relevant consideration as an approved WAPC strategy	One of the matters to be considered under MP, Schedule 1, cl 67(e)
SPP 2 Environment and Natural Resources	Water Resources CI 5.2(iii)	<ul style="list-style-type: none"> To integrate environment and natural resource management with broader land use planning and decision-making; To protect, conserve and enhance the natural environment; and To promote and assist in the wise and sustainable use and management of natural resources 	Multiple Scales	Statutory Policy Created under the P&D Act and part of the SPF	WAPC and councils are to have 'due regard' under s 77 of P&D Act	One of the matters to be considered under MP, Schedule 1, cl 67(c)
SPP 2.9: Water Resources	CI 4	<ul style="list-style-type: none"> Protect, conserve and enhance water resources that are identified as having significant economic, social, cultural and/or environmental values; Assist in ensuring the availability of suitable water resources to maintain essential requirements for human and all other biological life with attention to maintaining or improving the quality and quantity of water resources; and Promote and assist in the management and sustainable use of water resources. 	Multiple Scales	Statutory Policy Created under the P&D Act and part of the SPF	WAPC and councils are to have 'due regard' under s 77 of P&D Act	One of the matters to be considered under MP, Schedule 1, cl 67(c)
SPP 2.10 Swan Canning River System	CI 7.2.9	WSUD principles should be incorporated in proposed developments. In doing so, natural flow regimes are to be generally preferred over artificial systems.	Swan and Canning Rivers and their immediate surroundings	Statutory Policy Created under the P&D Act and part of the SPF	WAPC and councils are to have 'due regard' under s 77 of P&D Act	One of the matters to be considered under MP, Schedule 1, cl 67(c)
	CI 7.2.10	Stormwater management systems should be designed in a manner that will enhance the environmental quality of the river through the use of WSUD.				

Policy document	Relevant section	Objectives	Applicable planning scale	Legal Status	Effect on preparing and amending a planning scheme	Statutory Effect on development applications
SPP 3 Urban Growth and Settlement	CI 5.1	Proper consideration of the environment, recognising the need to restore and enhance as well as protect biodiversity and to minimise development impacts on land, water, energy, minerals, basic raw materials, agriculture, and other natural resources that help sustain urban economies and society.	Applies throughout WA	Statutory Policy Created under the P&D Act and part of the SPF	WAPC and councils are to have 'due regard' under s 77 of P&D Act	One of the matters to be considered under MP, Schedule 1, cl 67(c)
	CI 5.4	Applies the Liveable Neighbourhoods principles which include an integrated approach to the design of open space and urban water management.				
SPP 4.2	CI 6.2 Water	Planning considerations should include use of water wise plants, stormwater management through investigating opportunities to apply WSUD principles to manage stormwater from roads and open space, and to incorporate other integrated water systems.	Perth and Peel Region activity centres – PSPs	Statutory Policy Created under the P&D Act and part of the SPF	WAPC and councils are to have 'due regard' under s 77 of P&D Act	One of the matters to be considered under MP, Schedule 1, cl 67(c)
Directions 2031	'A Sustainable City – Way forward'	Directions 2031 promotes the application of WSUD principles as the most effective way to manage stormwater in an urban setting, to achieve more efficient and effective use of water and better outcomes for the environment and urban form. This approach is based on total water cycle management which recognises the interconnectedness of all water, including water supply, ground water, stormwater, wastewater, flooding, wetlands, watercourses, estuaries, and coastal waters. The urban water cycle should be managed as a single system in which all urban water flows are recognised as an important natural asset and potential resource.	Multiple Scales	Made pursuant to section 14 of the P&D Act	No explicit requirement to give it 'due regard' under the P&D Act but would be relevant consideration as an approved WAPC strategy	One of the matters to be considered under MP, Schedule 1, cl 67(e)
Liveable Neighbourhoods	Element 5 (Urban Water Management)	Urban Water Management objectives cover: <ul style="list-style-type: none"> • best planning practices; • WSUD; • creating a sustainable urban form; • protecting and managing water quality; • infrastructure requirements; • integrating stormwater treatment into the landscape; • water conservation; • interface with adjacent natural areas; • maintenance; 	District structure plans, subdivision of new urban areas	Made pursuant to section 14 of the P&D Act	No explicit requirement to give it 'due regard' under the P&D Act but would be relevant consideration as an approved WAPC strategy	One of the matters to be considered under MP, Schedule 1, cl 67(e)

Policy document	Relevant section	Objectives	Applicable planning scale	Legal Status	Effect on preparing and amending a planning scheme	Statutory Effect on development applications
BUWM	All	Provide guidance on the implementation of the SPP 2.9 and aimed at ensuring that 'appropriate level of consideration' is given to total water cycle at each stage of the planning system.	Policies provided for each level/scale of development	Made pursuant to section 14 of the P&D Act	No explicit requirement to give it 'due regard' under the P&D Act but would be relevant consideration as an approved WAPC strategy	One of the matters to be considered under MP, Schedule 1, cl 67(e)

Table 18: Summary of SPP 2.9's WSUD policies and strategies

Proposed strategies/measures
<p>5.1 General Measures include:</p> <ul style="list-style-type: none"> • Protect significant environmental, recreational, and cultural values of water resources. • Aim to prevent or, where appropriate, ameliorate the potential impacts on the health of riparian landscape, soil condition, waterways, and wetlands. • Promote improved outcomes in water quality, condition of water resources, restoration of natural flow regimes, and variability. • Inform planning actions by identifying all above and below ground water resources and prioritising their significance as state, regional or local. • Recognising and taking into account state government management strategies for water resources issues as provided under Schedule 3 of the document. • Recognise and take into account water resources management plans as required by the Rights in <i>Water and Irrigation Act 1914</i>. • Recognise and take into account relevant accredited natural resource management strategies, endorsed by state government statutory authorities.
<p>5.3 Wetlands, waterways and estuaries which include:</p> <ul style="list-style-type: none"> • Protecting, managing, conserving and enhancing their environmental functions and values. • Adequate and appropriate buffering of the aforementioned features is to be achieved by applying information provided in Schedule 2 of the policy.
<p>5.2 Surface and groundwater resources include:</p> <ul style="list-style-type: none"> • Recognising the hydrological importance of groundwater and surface catchments with regards to water management and the associated value of catchment planning on a regional, district and local scale. • Protecting, managing, conserving, and enhancing surface and groundwater catchments and recharge areas supporting significant ecological features or having identified environmental values through management or limiting inappropriate land use.
<p>5.4 Total water cycle management</p> <ul style="list-style-type: none"> • Take into account total water cycle management and WSUD principles... and ensure that development is consistent with current best management and planning practices for the sustainable use of water resources, particularly stormwater. • Seek to achieve no net difference in water quality and quantity, unless necessary to meet identified environmental water requirements, such that post-development water quality and quantity conditions are equal to or better than pre-development conditions. • Promote management of the urban water cycle as a single system in which all urban water flows are recognised as a potential resource and where the interconnectedness of water supply, stormwater, wastewater, flooding, water quality, wetlands, waterways, estuaries, and coastal waters is recognised. • Maximise the opportunities for compliance with best practice stormwater management, including infiltration/detention of stormwater on site/at the source. • Promoting water conservation mechanisms that increase the efficiency of the use of water, including stormwater. • Incorporate the re-use and recycling of water, particularly stormwater and grey water, consistent with state water strategy recycling objectives. Black water reuse and recycling should be considered where deep sewerage is not available. Alternative non-potable water sources should be considered where appropriate for fit-for-purpose use. • Promote the retention and use of local native vegetation in developments to minimise water use and maximise filtration, particularly where landscaping is proposed.

Proposed strategies/measures
<p>6. Implementation</p> <p>Implementation of the policy is to be primarily through local planning strategies, structure plans and LPSs and ‘the day-to-day consideration of zoning, subdivision, strata subdivision and development proposal and applications, together with the actions and advice of agencies in carrying out their responsibilities.’</p>
<p>The SPP 2.9 includes schedules, which provide guidance for:</p> <ul style="list-style-type: none"> ▪ incorporating the policy measures into planning mechanisms and decision-making for regional, district and local planning strategies, planning schemes, structure plans, subdivision and development control, by way of recommended minimum requirements; ▪ the determination of appropriate buffering of waterways and estuaries; ▪ information sources for water resources, groundwater, drinking water, wetlands, waterways and estuaries and total water cycle management; and ▪ principles of total water cycle management and WSUD.

WSUD at different scales

Precinct Structure Planning and Residential Subdivision

WA's policy framework supports the development and use of UWMPs and UWMS at various scales as a planning tool to manage stormwater runoff and prevent contamination of ground water on which the state relies as a resource.

Liveable Neighbourhoods and the BUWM contain WSUD policy for PSPs and subdivisions of urban areas. The former describes integrated urban water management as one of the key elements of urban design. Both BUWM and Liveable Neighbourhoods require developments of various planning scales to be accompanied by a WMP or Water Management Strategy (district or local) that incorporates the principles of WSUD.

Under BUWM, a District WMS should:

- recognise the principles, objectives, and requirements of total water cycle management as outlined in the SPP 2.9 and the Stormwater Management Manual, including the decision process for stormwater management;
- state the water quantity and quality management objectives to be achieved, which address all elements of the total water cycle;
- discuss potential water sources for drinking water and other uses, including irrigation of POS;
- demonstrate understanding of appropriate WSUD best management practices;
- provide strategies and recommendations for planning precincts to guide and control land uses and development where necessary;
- recommend strategies and responsibilities for local ecological, surface water and groundwater monitoring, both pre and post-development, including data analysis, presentation and reporting mechanisms; and
- recommend an implementation framework identifying funding and ongoing maintenance responsibilities, including monitoring and technical review of the district-level strategy.

Under BUWM, local water management strategies (WAPC 2008, p. 27) should address the following:

- site constraints and opportunities (such as water dependent environments, remnant vegetation, landscape and landform), identifying the critical issues and proposals as how they are to be managed;
- potential impacts on surface and groundwater quality and quantity;
- potential impacts on ecosystems and biodiversity;
- potential impacts on existing land use in the vicinity;
- any likely engineering constraints and impacts on infrastructure; and
- cumulative impacts.

The requirements under the BUWM are detailed and may have influenced approaches subsequently developed in other states, including Victoria's PSP Guidelines.

Table 19: Summary of Liveable Neighbourhoods' WSUD policies and strategies

Objectives	Proposed strategies/measures
<p>Element 4: Public Parkland</p> <p>To integrate urban water management functions with POS.</p>	<p>Public parkland should:</p> <ul style="list-style-type: none"> • Incorporate drainage wherever practicable using contemporary urban water management principles (Element 5); and • Accommodate water-sensitive urban design in public parkland areas where usability for recreation purposes has not been compromised or where conservation values are enhanced. <p>Integration of stormwater and public parkland is to be achieved through following design considerations:</p> <ul style="list-style-type: none"> • The location and design of POS, where it incorporates urban water management measures, should promote the detention of run-off through the use of swales, depressions, contour banks, rock channels, pebble paths, sedges, reed beds or other suitable measures without compromising the principal function of the POS. • Sports grounds, passive recreational areas and other moderately flood-sensitive land uses may be included as part of an urban water management system to provide temporary detention areas during storm events. • Where POS areas include open water bodies for urban water management purposes, the water body may be used as a reservoir for the irrigation of adjacent areas. • The construction of permanent or semi-permanent water features in parks may be permitted for amenity value, recreation, and/or urban water management function, subject to implementation of a suitable management plan agreed to by the council. • The detention of storm water during and immediately following a greater than five year average recurrence interval may be permitted in POS. • The detention of stormwater for a greater than one year average recurrence interval may be permitted in restricted use POS.
<p>Element 5: Urban Water Management</p> <ul style="list-style-type: none"> • To encourage best practice in the use and management of land and water resources, reduce reliance on potable water wherever practicable and improve at source protection of water quality. • To encourage water conservation by maximising the retention, detention and re-use of stormwater, by maximising local recharge of groundwater and by wastewater re-use and water harvesting. • To protect the built environment from flooding, inundation and stormwater damage. • To maintain and where possible improve the surface and groundwater quality. • To prevent adverse effect upon natural environments that may be sensitive to changes in the natural water cycle. • To integrate appropriate water management measures in an efficient urban structure and range of parkland types. • To enable minor adjustments to streams, gullies, wetlands and marginal flood plains to provide for a compact, walkable and efficient urban form. • To provide an urban water management system that is suitable and that arrangements are in place for on-going maintenance and management. 	<p>Under this Element the following information/details are required for all structure plans and subdivisions:</p> <ul style="list-style-type: none"> • urban water management strategy with respect to control of stormwater quality and/or quantity at source; • definition of best planning practices, i.e., use of natural stormwater systems; • ongoing management arrangements and responsibilities. <p>For large scale subdivisions (greater than 20 ha), an urban water management strategy is 'mandatory' if not completed as part of the local structure plan stage. For small to medium subdivisions, (less than 20 ha), the above information is 'mandatory' if not completed as part of the local structure plan stage.</p> <p>For local structure plans and subdivision applications, drainage and nutrient management plan and wastewater re-use management plan are required.</p> <p>Integration of urban water management measures is to be achieved by:</p> <ul style="list-style-type: none"> • provision of areas of open space established for urban stormwater management that do not compromise efficient urban structure; • linear parks along drainage lines; • retaining and enhancing natural watercourses, wetlands and riparian vegetation, while also recognising that minor alignment modifications may be appropriate; • flood ways taking the form of a natural waterways, an augmenting parallel channel, a constructed open channel, a roadway reserve or POS; • streets and road reserves acting as flood ways or elements of the overland flow route taken by floodwaters. Flood depths and velocities should be limited in the interests of safety, and floodwaters should be diverted from streets and road reserves as soon as practically possible; • detention and retention basins being incorporated to reduce on-flow flood peaks and provide increased flood protection for downstream areas; • incorporating sports grounds and other less flood-sensitive areas; and • placing detention and retention basins and swales in POS and selected streets for amenity and function. <p>The Urban Water Management Element also seeks to include maintenance costs as an important design consideration, and that on-going maintenance is included as part of the approval process.</p>

Urban infill Development

Liveable Neighbourhoods also applies to 'large urban infill sites' and therefore the same policies and requirements as outlined for PSPs and subdivisions apply. The BUWM suggests that its approaches should be applied to urban renewal projects where residential, commercial, industrial, and rural residential uses and development are proposed. However, there are no mandatory WSUD targets or requirements.

Lot Scale Development

The Residential Design Code 2015 (**R-Code**) provides statutory planning controls for residential developments throughout WA. The R-Code is an SPP that has been prepared under section 26 of the P&D Act and forms part of all planning schemes (P&D Regulations, Schedule 1, Part 4, cl 25).

Under the P&D Regulations, development approval of the council is not required for the erection or extension of a single dwelling on a lot if the R-Code applies to the development and the deemed-to-comply provisions of the R-Code are met (Schedule 2, Part 7, cl 61).

Under the R-Code all dwellings are to demonstrate compliance with the deemed-to-comply provisions under Part 5. The deemed-to-comply provisions for stormwater management require any water runoff from the development site to be retained on site 'where climatic and soil conditions allow for effective retention'. If the proposal does not meet the deemed-to-comply provisions, merit based assessment under the corresponding design principles is required. (R-Code, Part 5, cl 5.3.9). The deemed-to-comply provision C9 states:

All water draining from roads, driveways, communal streets and other impermeable surfaces shall be directed to garden areas, sumps or rainwater tanks within the development site where climatic and soil conditions allow for the effective retention of stormwater on-site.

Stormwater discharge objectives

While water quality targets are identified as an important matter in policy under BUWM, application of such policy to planning decisions remains discretionary. The four *Environmental Protection Policies* established under the *Environment Protection Act 1986* related to water quality for specific areas do not provide water quality targets for urban stormwater quality and environmental values.

For stormwater quality and flow targets, planners and designers are directed to BUWM (section 1.3 Design Objectives for WSUD) and the *Stormwater Management Manual for Western Australia* (Department of Water 2004). These documents are planning policy documents that apply in a discretionary manner. Water quality objectives are not well integrated into BUWM.

Funding WSUD

Development contributions are determined in accordance with the P&D Regulations and the *SPP 3.6 Development Contributions for Infrastructure* (WAPC 2009) and implemented through development contribution plans. The amounts to be levied for development contributions are not prescribed or capped.

The POS requirements for subdivision of land are found in Liveable Neighbourhoods with the WAPC given discretion to vary the minimum requirement of 10% of the gross subdivisible area.

The cost of main drain services is recovered by the Water Corporation through a combination of an annual charge paid by customers and headworks charges (for extending the capacity of the main drainage system for new developments) levied on developers under the *Water Services Act 2012*. There is some evidence the costs of drainage upgrades for servicing new developments are subsidised by water charges levied to customers with only 40% of costs being charged to developers (Economic Regulation Authority 2008). In comparison, water authorities in other states recover 100% of costs of new drainage infrastructure through drainage schemes.

Implementation guidelines

There is a range of WSUD guidance available in WA, most of which is provided by Department of Water and New WAter Ways (see Appendix 1 for a list). New WAter Ways (<http://www.newwaterways.org.au/>) provides a reference point for resources, training, and dialogue on WSUD and IWCM in WA. It has an excellent resource

catalogue including a range of WSUD fact sheets, WQIPs, model provisions for local planning schemes and a comprehensive list of case studies.

The Department of Water plays a central role in setting water quality design and management objectives and formulating water policies. It provides WSUD brochures, which include information on various WSUD approaches and references on design and installation of water sensitive systems, aimed at councils, consultants, and developers. The two-page brochures, all published 23 June 2011, cover the following topics:

- Swales and Buffer Strips;
- Stormwater Design Considerations;
- Soakwells;
- Rainwater Storage and Reuse Systems;
- Pervious Paving;
- Living Streams;
- Litter and Sediment Traps;
- Infiltration Basins and Trenches;
- Dry or Ephemeral Detention Areas;
- Constructed Wetlands for Stormwater Management; and
- Biofilters.

WSUD Governance

The following bodies share planning responsibilities:

- the WAPC, which has state-wide responsibility for urban, rural, and regional land-use planning and land development matters. It responds to the strategic direction of state government and is responsible for the strategic planning of WA. Any policies and strategies prepared by the WAPC pursuant to the P&D Act are relevant matters to be considered in an application for planning approval;
- the Department of Planning, which supports the Minister for Planning and WAPC with all aspects of decision making, including assessment of all subdivision applications on behalf of the WAPC;
- the Metropolitan Redevelopment Authority, which is a government organisation that acts as a 'Place Manager', developer and planning regulator. Its functions and powers are guided by the *Metropolitan Redevelopment Authority Act 2011* and the *Metropolitan Redevelopment Authority Regulations 2011*. The Metropolitan Redevelopment Authority undertakes redevelopment projects in certain parts of the Perth metropolitan area by combining the responsibilities and projects formerly undertaken by the East Perth, Subiaco, Midland, and Armadale redevelopment authorities and is responsible for the Elizabeth Quay project;
- the Swan River Trust, which has planning management and protection responsibility for the area around the Swan and Canning Rivers under the *Swan and Canning Rivers Management Act 2006*; and
- councils, which are normally the responsible authority for the administration or enforcement of a planning scheme and thereby the responsible body for considering and determining planning permit applications and for ensuring compliance with the planning scheme, permit conditions, and agreements entered into under the state's planning Act.

Drainage management in the metropolitan areas is spread across a number of bodies – councils, the Water Corporation, the Swan River Trust, the Department of Water and the Economic Regulation Authority. The Economic Regulation Authority licenses the operation of drainage service providers and specifies water quantity criteria and outcomes. The Department of Water plays a central role in setting water quality design and management objectives and formulating water policies.

Section 4 Inquiries and reports relating to WSUD

Introduction

This section provides a summary of previous key inquiries relating to WSUD that have been led by governments, institutions, peak bodies, and/or industry. These inquiries demonstrate that while the implementation of WSUD has been and continues to remain on Governments' agendas across the jurisdictions, many recommendations provided in previous inquiries or reports remain unimplemented.

The previous inquiries also suggest that B5.1's Review and policy reform themes it identifies are generally consistent with the observations in the inquiries.

Government inquiries and initiatives

4.1 *Intergovernmental Agreement on a National Water Initiative (Council of Australian Governments 2004)*

On 25 June 2004, the Council of Australian Governments (**COAG**) signed the Intergovernmental Agreement on a National Water Initiative – principal water policy agreement designed for providing 'Australia's enduring blueprint for water reform'. The Intergovernmental Agreement sets out to achieve a nationally compatible market, regulatory, and planning based system to manage surface and groundwater resources for rural and urban use and optimise economic, social, and environmental outcomes.

Relevantly for WSUD, the 'Urban Water Reform' agreement aims to:

- provide healthy, safe, and reliable water supplies;
- increase water use efficiency in homes;
- encourage the re-use and recycling of wastewater where cost effective;
- facilitate water trading between and within the urban rural sectors;
- encourage innovation in water supply sourcing, treatment, storage, and discharge; and
- achieve improved pricing for metropolitan water.

To support these outcomes, the parties to the agreement agreed to undertake the following actions:

Demand Management

91. States and Territories agree to undertake the following actions in regard to demand management by 2006:

- (i) legislation to implement the Water Efficiency Labelling Scheme (WELS) to be in place in all jurisdictions and regulator undertaking compliance activity by 2005, including mandatory labelling and minimum standards for agreed appliances;
- (ii) develop and implement a 'Smart Water Mark' for household gardens, including garden irrigation equipment, garden designs and plants;
- (iii) review the effectiveness of temporary water restrictions and associated public education strategies, and assess the scope for extending low level restrictions as standard practice; and
- (iv) prioritise and implement, where cost effective, management responses to water supply and discharge system losses including leakage, excess pressure, overflows and other maintenance needs.

Innovation and Capacity Building to Create Water Sensitive Australian Cities

92. The Parties agree to undertake the following actions in regard to innovation:

- (i) develop national health and environmental guidelines for priority elements of water sensitive urban designs (initially recycled water and stormwater) by 2005;
- (ii) develop **national guidelines for evaluating options for water sensitive urban developments, both in new urban sub-divisions and high rise buildings by 2006;**
- (iii) **evaluate existing 'icon water sensitive urban developments' to identify gaps in knowledge and lessons for future strategically located developments by 2005;**
- (iv) **review the institutional and regulatory models for achieving integrated urban water cycle planning and management, followed by preparation of best practice guidelines by 2006;** and
- (v) review of incentives to stimulate innovation by 2006.

The national guidelines for evaluating options for WSUD were issued in July 2009.²⁹ These provide a good analysis of technical options available in 2009. However, the summary of guidance available in each state is now out of date.

4.2 The Senate Environment and Communications Reference Committee's Report *Stormwater Management in Australia* (Environment and Communications Reference Committee 2015)

In 2015, the Senate Environment and Communications Reference Committee (**ECR Committee**) conducted an inquiry into stormwater management in Australia by investigating the following matters (ECR Committee 2015, 1):

- the quantum of stormwater resource in Australia and impact and potential of optimal management practices in areas of flooding, environmental impacts, waterways management, and water resource planning;
- the role of scientific advances in improving stormwater management outcomes and integrating these into policy at all levels of government to unlock the full suite of economic benefits;
- the role of stormwater as a positive contributor to resilient and desirable communities into the future, including 'public good' and productivity outcomes;
- model frameworks to develop economic and policy incentives for stormwater management;
- model land use planning and building controls to maximise benefits and minimise impacts in both new and legacy situations;
- funding models and incentives to support strategic planning and investment in desirable stormwater management, including local prioritisation;
- asset management and operations to encourage efficient investments and longevity of benefit;
- the role of innovation in supporting desirable outcomes and transparent decision-making, including access to information and novel technologies for planning, design and implementation; and
- any related matters.

The inquiry found that while Australia's urban environments and rain events generate significant volume of runoff, this is surprisingly under-utilised and cities are still largely reliant on traditional conveyance of stormwater into a network of drains and waterways. Other than the missed opportunity to improve water security in the cities by reusing stormwater, the inquiry found that the traditional conveyance method also causes significant environmental damage due to the pollutants and waste in the runoff from city streets and other urban surfaces that are transferred into waterways.

The inquiry confirmed that while the primary responsibility for stormwater often fell to councils, they were limited in their capacity to make decisions beyond their municipal boundaries and could be impacted positively or negatively by activities in neighbouring councils.

In regards to WSUD and water sensitive cities, submissions to the inquiry identified a number of issues, which were affecting widespread adoption of WSUD including:

²⁹ <https://www.environment.gov.au/system/files/resources/1873905a-f5b7-4e3c-8f45-0259a32a94b1/files/wsud-guidelines.pdf>

- lack of nationally consistent WSUD guidelines to provide a 'consistent approach for managing stormwater in an integrated way' and lack of council resources to implement WSUD principles (eWater);
- decline in support for scientific research to support innovative WSUD technologies and their uptake;
- lack of willingness from developers (Adelaide and Mount Lofty Ranges NRM Board);
- insufficient project experience in WSUD – for example in Adelaide, knowledge about WSUD projects is 'confined to a limited number of individual and organisation' (Water Sensitive SA); and
- lack of awareness and application of existing WSUD technical guidelines, which was highlighted as an issue in SA (Water Sensitive SA).

While recognising the limits of the Commonwealth's role in urban water management, the ECR Committee suggested that the Australian Government can 'facilitate coordination between the states and the sharing of lessons learnt from stormwater policies and project' to help achieve best outcomes nationwide.

Based on the findings from the inquiry, the ECR made five key recommendations as follows:

- the Australian, State and Territory Governments work together to develop and implement a National Stormwater Initiative which will provide a national policy framework for stormwater management;
- conduct audits to inform the National Stormwater Initiative which should include establishing the scope of stormwater harvesting opportunities and collating stormwater knowledge into a central repository to aid future decision-making processes;
- the Australian Government place water policy on the agenda of an upcoming meeting of the COAG and the benefits of improved stormwater management is recognised in this forum;
- All Governments should consider new funding models and financial incentives to facilitate economically efficient stormwater management outcomes; and
- the Australian Government 'restore funding for stormwater research' and consider ways to attract co-investment from other government levels and private sector to support and expand government funded research activities.

In October 2016 the Australian government responded to the recommendations of the Senate report. It agreed in principle with recommendations 1–4, regarding the establishment of the National Stormwater Initiative and agreed in part with recommendation 5 that relates to the restoration of funding of stormwater research.³⁰

4.3 Review of National Urban Water Planning Principles (2013–2014)

The National Urban Water Planning Principles were developed by COAG in 2008 as an outcome of the National Water Initiative. These were reviewed in 2013–2014. The review found the 2008 principles remained useful and identified areas for improvement.³¹

The principles are outlined in Figure 22, below:

1. Deliver urban water supplies in accordance with agreed levels of service
The service level for each water supply system should specify the minimum service in terms of water quantity, water quality, and service provision (such as reliability and safety).
Levels of service should not apply uniformly, but rather should be set for each supply system and potentially for different parts of an individual supply system. Agreement on levels of service will allow the community to understand how seasonal variability and climate change will impact on supply into the future and how different levels of service relate to costs. Measures undertaken to minimise risk and maximise efficiency in supplying water should be in accordance with agreed levels of service.
2. Base urban water planning on the best information available at the time and invest in acquiring information on an ongoing basis to continually improve the knowledge base
Up-to-date information on current and future water resources, water supplies, and water demand is critical for effective urban water planning. Information on possible future changes, such as population growth and climate change, is also important in understanding the ongoing water supply/demand balance and to determine an acceptable level of risk due to uncertainty.
Knowledge of existing customers (including who is using water, how much, and for what end uses, and an understanding of the differences between customers and geographic locations) is important when forecasting future water demands by end users in a particular category of use and the impact of possible demand management measures under consideration.

³⁰ <http://www.agriculture.gov.au/about/reporting/obligations/government-responses/senate-committee-report-stormwater-management-australia#response-to-committee-recommendations>

³¹ <http://www.agriculture.gov.au/water/urban/policy-reform-urban-water/review-national-urban-water-planning-principles>

Urban water planning should be based on scenario planning, incorporating uncertainty in supply and demand, as well as integrated with future economic development and land use planning to ensure full knowledge of the availability of water supplies and water savings opportunities.

Where possible, information should be gathered in such a way that it enables improved information-sharing and research coordination between jurisdictions.

3. Adopt a partnership approach so that stakeholders are able to make an informed contribution to urban water planning, including consideration of the appropriate supply/demand balance

Stakeholder input is essential to ensure that the proposed levels of service and the supply and demand management options required to deliver that level of service are considered in terms of consumers' attitudes, including willingness and ability to pay.

Community information and education programs should be an integrated part of urban water planning and should be designed appropriately, based on community input, to increase knowledge, understanding, and informed participation in urban water planning, as well as increase water efficient behaviours.

Urban water planning should be based on a process that is transparent and inclusive, recognising different consultation approaches are appropriate in different circumstances.

4. Manage water in the urban context on a whole-of-water-cycle basis

The management of potable water supplies should be integrated with other aspects of the urban water cycle, including stormwater management, wastewater treatment and re-use, groundwater management and the protection of public and waterway health.

The risks associated with different parts of the urban water cycle (such as trade waste, stormwater, etc) should be considered and managed.

Water quality of potable supplies should be protected through appropriate catchment management practices and management of wastewater. This will involve a range of activities, from land use planning and management that protects the quality of natural water resources, through to addressing the disposal, treatment, and reuse phases of the water cycle.

Such an approach should result in delivery of diverse water supplies which are fit-for-purpose and optimise the use of water at different stages of the urban water cycle.

5. Consider the full portfolio of water supply and demand options

Selection of options for the portfolio should be made through a robust and transparent comparison of all demand and supply options, examining the social, environmental and economic costs and benefits and taking into account the specific water system characteristics. The aim is to optimise the economic, social, and environmental outcomes and reduce system reliability risks, recognising that in most cases there is no one option that will provide a total solution. Readiness options should also be identified as part of contingency planning.

Options considered could include the following:

- optimising the use of existing infrastructure through efficiency measures;
- residential, commercial, and industrial demand management initiatives;
- purchasing or trading water entitlements from other sectors; and
- development of additional centralised and/or decentralised water supply options, including manufactured water sources (such as recycling and/or desalination), where appropriate.

By considering the full range of options, access to a range of sources should be able to be optimised dynamically (even on a short term basis) through the availability of diverse infrastructures that may include both centralised and decentralised water supply schemes. These sources would be drawn upon in differing combinations depending on the local and regional climatic conditions and the mix of sources selected would be those resulting in the lowest environmental, social, and economic costs over the long term.

6. Develop and manage urban water supplies within sustainable limits

Ensuring the ongoing protection of the environment and waterway health is an integral part of urban water planning. Natural water sources for all water supplies, such as surface and groundwater supplies, should only be developed within the limits of sustainable levels of extraction for watercourses and aquifers.

Sustainable levels of extraction should be established through publicly available water plans prepared at a catchment and/or basin scale for all water use, including environmental requirements. In determining the sustainable extraction levels, consideration should be given to the inter-relationships of different water sources.

To ensure sustainability, extraction levels should also be monitored over time and periodically re-assessed to reflect changes in scientific knowledge and climate variability.

7. Use pricing and markets, where efficient and feasible, to help achieve planned urban water supply/demand balance

Tariff structures for water supplies should be designed to signal the full value of finite water resources to end users to encourage efficient water use. The price charged for urban water services should be transparent and linked to the level of service provided.

Rights to urban water supply should be clearly defined to the extent that it is economically efficient, cost-effective, and feasible to do so, at the various levels of the supply chain. This in turn will facilitate the use of markets and trading where appropriate. This could include developing bulk water and wastewater markets, removing barriers to competition and institutional, structural, and governance reforms.

8. Periodically review urban water plans

Recognise that there is a need for periodic review of urban water plans and their underpinning assumptions. All parties involved in the development of an urban water plan should be committed to ensuring that the plan can adapt as necessary to reflect additional information/knowledge and changing circumstances.

Planning should recognise that some demand/supply responses are short-term and are required to be adaptive, while other responses such as water infrastructure planning and investment have a longer planning horizon because the assets have a considerable lifespan.

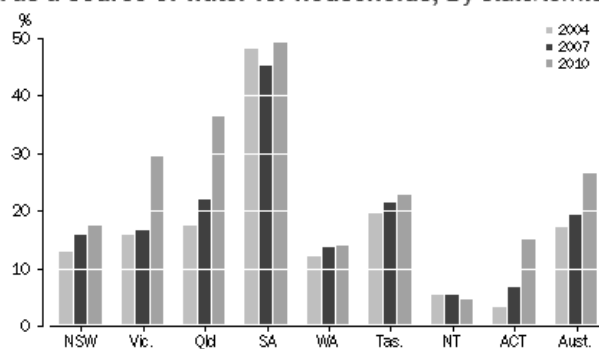
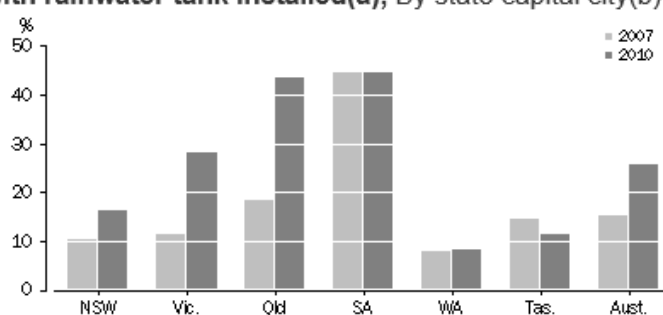
Figure 22: National Urban Water Planning Principles (COAG 2008)

4.4 Australian Bureau of Statistics Publication 4602.0.55.003 Water Use and Conservation, March 2010

This publication provides a useful insight into the use of rainwater tanks by Australian households, and changing trends between 2007 and 2010. It provides a possible insight into the effectiveness of environmental policy and incentives in supporting the increased up-take of tanks during that period.

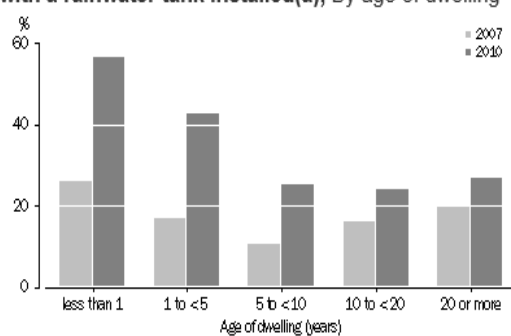
Key points arising from this report include the following:

- The location of a dwelling is a factor that influences the sources of water used by Australian households. Mains or town water continued to be the most common source of water for Australian households in 2010, with 93% of households being connected to either mains or town water. Nearly all households in capital cities (99%) were connected to mains or town water compared with 84% of households outside the capital cities.
- Rainwater tanks were the most popular source of water for South Australian households residing outside of Adelaide (83%). Victorian households residing outside of Melbourne also had a high prevalence of rainwater tanks (47%). Bores/wells were a common source of water for households in Perth (26%).
- The prevalence of rainwater tanks as a source of water for Australian households continues to increase. 26% of households used a rainwater tank as a source of water in 2010 compared with 19% of households in 2007 and 17% in 2004. South Australia continues to have the highest proportion of households with a rainwater tank (49%) but there was a marked increase in the proportion of households with a rainwater tank in Queensland and Victoria.
- Households that use a rainwater tank as a source of water in Queensland increased from 22% in 2007 to 36% in 2010. Similarly, rainwater tank use in Victoria increased from 17% in 2007 to 30% in 2010.
- In March 2010, 32% of households with a dwelling suitable for a rainwater tank had a rainwater tank installed compared with 24% in 2007. During this period, households in capital cities experienced the greatest increase in the proportion of rainwater tanks installed at their dwelling (15% in 2007 and 26% in 2010).
- Almost half of Australian households (45%) used mains or town water as their main source of water for gardening. The Northern Territory had the highest proportion of households (76%) to use mains or town water for gardening and both Queensland and Victoria had the lowest (32%). Queensland and Victoria had the highest proportion of households that used water from a rainwater tank as their main source of water for gardening (20% and 19% respectively).
- Queensland and Victoria also had the highest proportion of households that relied on rainfall for gardening or did not water the garden (31% and 29% respectively).
- 42.7% of households has a received a rebate for rainwater tanks in Queensland, compared with 23.3% in Victoria and 27.6% in NSW, 1.5% in WA and 8.8% in SA.

Rainwater tank as a source of water for households, By state/territory - 2004 to 2010**Households with rainwater tank installed(a), By state capital city(b) - 2007 and 2010**

(a) Includes only dwellings suitable for a rainwater tank.

(b) No regional split between capital city and balance of state/territory for the NT and ACT as the sample does not support any breakdown beyond the whole territory.

Households with a rainwater tank installed(a), By age of dwelling - 2007 and 2010

(a) Includes only dwellings suitable for a rainwater tank.

Figure 23: Households with rainwater tanks installed, by state/territory, state capital city and by age of dwelling (ABS 2010)

12**HOUSEHOLDS WHO RECEIVED A GOVERNMENT REBATE OR INCENTIVE IN THE LAST 12 MONTHS(a), By product type—2010**

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
NUMBER ('000)									
Rainwater tank	27.6	23.3	42.7	8.8	**1.5	—	—	**0.8	104.6
Washing machine/dishwasher	98.4	*8.0	58.2	54.9	30.9	np	np	—	251.4
Water efficient taps/shower heads	42.2	112.0	48.9	14.9	*4.6	np	np	*1.2	224.9
Dual flush toilet	*5.1	10.5	*7.3	7.1	np	—	np	*2.3	32.8
Other(b)	—	19.0	*6.4	18.4	*6.1	np	np	np	50.8
Total households(c)	161.3	160.2	142.8	95.9	40.5	*0.9	*1.5	4.4	607.5
PROPORTION (%)									
Rainwater tank	17.1	14.5	29.9	9.2	**3.7	—	—	**17.3	17.2
Washing machine/dishwasher	61.0	*5.0	40.8	57.3	76.4	np	np	—	41.4
Water efficient taps/shower heads	26.2	69.9	34.2	15.6	*11.4	np	np	*28.5	37.0
Dual flush toilet	*3.2	6.5	*5.1	*7.4	np	—	np	53.4	5.4
Other(b)	—	11.9	*4.5	19.2	14.9	np	np	np	8.4
<p>* estimate has a relative standard error of 25% to 50% and should be used with caution</p> <p>** estimate has a relative standard error greater than 50% and is considered too unreliable for general use</p> <p>— nil or rounded to zero (including null cells)</p> <p>np not available for publication but included in totals where applicable, unless otherwise indicated</p> <p>(a) Includes households that have either received a government rebate/incentive or are currently in the process of applying.</p> <p>(b) Other also includes grey water system and mulch.</p> <p>(c) Totals do not equal the sum of items in each column as more than one product can be reported.</p>									

Figure 24: Households who received a government rebate or incentive, by state, in 2010 (ABS 2010)**4.5 Evaluation of Clause 56.07–4 of the Victorian Planning Provisions (Environment and Land Management Pty Ltd and Hussey 2013)**

Commissioned by the Office of Living Victoria and Melbourne Water, this report assesses the implementation of Clause 56.07–4 of the VPP.

The findings and recommendations of the report are based on a research program to understand how well the Clause 56.07–4 provision is working from the user's perspective in different geographic and urban growth settings. The research involved two online qualitative surveys, for local government councils (158 responses) and the development industry (49 responses), in-depth interviews with four councils and Victorian representatives of peak bodies, and discussions with government stakeholders and the water industry.

The report also provides a literature review of the legal framework around stormwater management and the existing resources available for policy makers and practitioners.

The key opportunities and challenges associated with operation of the clause to date are identified as including the following:

- elements of clause drafting;
- the complexities of implementing integrated water management at local level and resourcing of this by councils; and
- significantly different levels of commitment, incentive and expertise identified within the development industry and across councils.

To address these issues, the report makes a number of recommendations including:

- regulatory reform of integrated water management 'to apply current performance requirements for the management of stormwater more broadly' including effective and efficient use of existing regulatory systems;
- clarifying the roles and responsibilities for implementing integrated water management and regulatory provisions;

- addressing information, knowledge gaps, and capacity building including boosting commitments to integrated water management and technical expertise within organisations.
- providing incentives for local government, industry, and property purchasers.

4.6 The Moonee Valley C108 Panel Report

The planning panel considering Amendment C108 to the Moonee Valley Planning Scheme made extensive comments on the subject of WSUD³². The panel found that (section 2.8, p. 10):

Having reviewed the State and local planning policy framework for the Amendment and noting specific policies identified above, the Panel considers that the planning policy framework is supportive of the Amendment and of specific policies related to WSUD being incorporated into the Moonee Valley Planning Scheme.

The Panel notes that WSUD principles are already in a number of provisions in the planning scheme. However, the Panel accepts that the existing policy, zones and overlays in the planning scheme are not sufficient in addressing the stormwater quality issue that the proposed Amendment is designed to achieve.

The Panel further accepts that there is considerable strategic support for the introduction and implementation of the policy resulting from substantial background investigations and studies into WSUD at Moonee Valley and through the IMAP Councils.

The Panel is of the view that the implementation of the proposed Amendment will fill a gap that currently exists in the planning scheme, given the development that currently occurs that does not need to take into account good stormwater design and management.

Evidence led by the council was summarised (p. 12) as follows:

Expert witness for Council, Dr Sara Lloyd, stated that a number of benefits are associated with the policy. Some of these benefits have been identified through findings from analysis of implementation of the Bayside Planning Scheme Clause 22.10 and voluntary uptake of WSUD across councils where STEPs/SDS and STORM tools are used.[10] She provided information that the combined results for MVCC, Stonnington, Yarra, and Port Phillip were:

- 45 ml of runoff is prevented from being discharged into local waterways;
- 20,770 kg of sediment is prevented from being discharged to local waterways; and
- 36 kg of sediment and 202 kg of nitrogen are prevented from being discharged to local waterways and Port Phillip Bay.

This data was obtained from the analysis of 668 development applications submitted to Councils over a 2 year period (2011–2012) using STORM data.

Along with STORM data, the City of Yarra provided data relevant to the 25 most recent planning permit applications since July 2012 (and one application was submitted to Council in February 2012). These development applications were for larger scale developments. Of the 25 development applications submitted to Council, 24 committed to using a rainwater tank with a storage capacity of up to 128 kL, totalling 568 kL. [13] In terms of indoor demands for toilets in large scale developments, the removal of stormwater from the local drainage system prevents 2,357 kg of sediment, 4.8 kg of Total Phosphorus and 33 kg of Total Nitrogen from entering local waterways. [14]

In her presentation to the panel, Dr Lloyd concluded (p. 12) that:

- Uptake of the policy is required to achieve SEPP policy compliance, particularly in terms of protecting waterways; and

³² Moonee Valley C108 PSA [\[2013\] PPV 81](#)

- A case study of residential extension in MVCC showed that if policy measures are implemented in the planning phase of a project, the option will exist to choose between including an additional treatment measure or altering site layout to achieve policy compliance.

Dr Lloyd estimated the cost of installing WSUD measures to be approximately \$4,100 for a single dwelling and dual occupancy dwelling, and between \$3,900 and \$6,927 for an extension to a single dwelling. [16] The cost of installing WSUD measures for mixed use development (commercial and retail) would be approximately \$4,000, and for multi residential development would be \$1,300 per unit.

The council accepted that it would be preferable if there was a state-wide control for WSUD, and argued that in the interim its local policy should be supported. In relation to this, the approved version of the policy includes a sunset clause in the following terms (Appendix C, cl 22.03–7):

This policy will expire when superseded (as determined by the Minister for Planning) by Water Sensitive Urban Design provisions in the Victoria Planning Provisions or the Building Code of Australia Regulations, whichever happens first.

The Housing Industry Association made submissions in relation to Amendment C108 which were addressed by the Panel (p. 13).

In response to council's submission, Mr Stuart Grigg, representing the Housing Industry Association (HIA), objected to the mandatory requirements imposed by the Amendment, and in particular considered that such requirements would impose an unfair burden on applicants. He stated the following:

- The Amendment will be inequitable as only landowners who require a planning permit to develop their land will be subject to the policy, rather than all land within the municipality as submitted by Council;
- Individual landowners will be required to meet the costs of implementing the policy, and that the financial burden of the policy will be unfairly distributed to individual land owners who will need to apply for a planning permit for development; and
- Inconsistencies will exist across municipalities as the Amendment will apply only to Moonee Valley. These inconsistencies will be in terms of different building requirements and building compliance costs depending on the municipality.

It answered those submissions as follows (p. 14):

The Panel accepts that implementing the proposed policy into the Moonee Valley Planning Scheme will result in increased costs to some home owners for applications and WSUD measures. Some figures for the WSUD measures were provided by Dr Lloyd but the full impact is not clear when time, application advice and other factors are included. For a dwelling extension of, for example \$100,000 value, on the midpoint of Dr Lloyd's figures (\$5,413) this amounts to a cost of approximately 5.5% without consideration of additional application or advice costs.

However, the Panel also accepts that there is substantial strategic work and expert advice that clearly establishes the broader community benefit that can be achieved through improved infrastructure, environmental and amenity outcomes of WSUD. The Panel also accepts that there should be longer-term benefits to landholders implementing WSUD features (or at least improved on-site storage and use features) in reduced reliance on mains water and thus costs. This may prove to be a significant benefit in a time of rapidly increasing water bills.

Should the costs be borne by the whole community by a precinct wide or suburb wide approach? Possibly, but in an inner urban, fully developed municipality, this is not clear, and there is no evidence before the Panel to suggest that it should be an approach pursued at the expense of this Amendment.

The Panel also accepts the submission of HIA and the BDAV that the proposed policy will lead to inconsistencies and potentially inequity within Moonee Valley due to the application of the policy only to properties applying for planning permits. It also accepts the inconsistency between Moonee Valley and other Councils.

However, the Panel considers that the Amendment represents a proactive response by Council to addressing an issue that has been earmarked by Council in strategic policies since the 1990s, and to meet Council's obligations under the SEPP [18].

That the policy will only affect those properties applying for permits is perhaps not ideal. However it is a function of the planning system that it is both strategic and reactive. An approach which attempts to 'retrofit' the policy to all existing dwellings could not and should not in the Panel's view be attempted as this would be to attempt to take the planning system in a direction that it is not intended to go.

The planning system is intended to manage, direct, and sometimes facilitate change. It generally does this incrementally and this Amendment is no different. That the proposed policy will only affect those landholders wishing to undertake development is not an argument in this instance for a 'do nothing' approach to WSUD.

The Panel notes that fourteen other Councils have endorsed the use of STEPs and encourage its use for planning permit applications for residential developments. [19] In addition to this, four Councils have submitted a similar LPP to the Minister for approval.

There are other municipalities where a similar LPP has been introduced in relation to industrial subdivisions such as Hume, but as industrial subdivisions are uncommon in Moonee Valley, it has not been incorporated into this policy.[20] The policy has been proposed by MVCC because Council believes it is necessary due to significant amount of development that currently takes place in Moonee Valley, and due to the cumulative impact of stormwater pollutants, which is increasing with urban consolidation, is having significant impacts on already stressed aquatic ecosystems, as well as the amenity and liveability values of local waterways and Port Phillip Bay.[21]

The Panel accepts Council's submission that WSUD has arisen in a number of VCAT cases and providing clarity in local planning policy will contribute to greater consistency in assessing permit applications in MVCC.

The Panel was not called on to compare the costs of providing WSUD infrastructure on a 'lot by lot' approach with the average costs imposed on developers as part of Melbourne Water DSSs.

4.7 The Environmentally Efficient Design Panel and Advisory Committee

In 2014, a Planning Panel and Advisory Committee reported to the Minister for Planning in relation to a suite of proposed local planning policies exhibited by five inner-suburban councils (*Environmentally Efficient Design Local Policies* (AC) [\[2014\] PPV 40](#)) (**EED PAC**). The proposed local policies sought to introduce 'best practice' measures for environmental sustainability, which also include requirements relating to water efficiency and stormwater management.

The Councils' lead expert provided economic evidence regarding the cost effectiveness of introducing 'best practice' policy requirements that went beyond the minimum requirements of the BCA. The policies were opposed by some industry associations who expressed concerns regarding compliance costs, 'red tape', and the effect on housing affordability. Some industry associations expressed a preference for a state-led approach, rather than a proliferation of local policies.

The panel report includes a summary of the net economic benefits associated with the policies for different development typologies as set out below, based on the cost benefit evidence lead by councils:

Table 20: Results of cost benefit analysis (Environmentally Efficient Design Local Policies (AC) [2014] PPV 40, p. 88)

Building type	Present Value of Benefits (at 7% real discount rate)	Present Value of Costs (at 7% real discount rate)	Present Value of Net Benefits (at 7% real discount rate)	Benefit Cost Ratio ³³
Small Multi-Dwelling Residential Building	\$168	\$35	\$134	4.9
Small Residential Extension	\$141	\$46	\$95	3.1
Large Multi-Unit Residential	\$123	\$18	\$105	6.8
Small Commercial Building	\$198	\$65	\$133	3.1

The expert evidence lead in relation to stormwater management and water efficiency found that application of 'best practice' water management requirements would result in:

- a positive benefit cost ratio (**BCR**) of 2.1 (small multi-unit residential buildings);
- a positive BCR for large multi-unit residential developments of 4.9;
- a BCR of 1.6 for small commercial buildings; and
- a BCR of 5.4 for water efficiency for large commercial developments

While a net cost was recorded for stormwater, the analysis of water efficiency BCRs need to be read together with the costing of stormwater measures because benefits associated with the use of water tanks were recorded as water efficiency benefits. When the costs for rainwater tanks are incorporated into the water efficiency BCR this would still result in a positive BCR for these building typologies.

The PAC found that:

There are clear positive economic, social and environmental benefits to be gained through improved sustainable development outcomes in planning.

The proposed Local Policies are unlikely to impose an unreasonable impost on the resources and administrative costs of participating Councils.

The proposed Local Policies are unlikely to impose an unreasonable regulatory cost burden on applicants.

The consideration of 'affordability' should extend beyond construction and consider ongoing servicing costs.

The PAC supported the adoption of the policies exhibited by the councils, and accepted a suggestion that the policies include a sunset clause where the policies were superseded by reforms to the Victorian Building Regulations. At the time of writing the Victorian Minister for Planning was yet to make a decision in relation to the proposed planning scheme amendments.

4.8 Measuring the Regulatory Burden of Water Sensitive Urban Design in South East Queensland (Queensland Competition Authority 2012)

In December 2012, the QCA commissioned Mainstream Economics to prepare a report entitled '*Measuring the regulatory burden of Water Sensitive Urban Design in South East Queensland*'. This report did not purport to assess longer term or non-monetised benefits of WSUD against capital costs (including, for example, savings on water use for future occupiers).

³³ A cost benefit ratio higher than 1 is considered a positive cost benefit – ie the benefits outweigh the costs.

In relation to provision of rainwater tanks, this report states (p. 38):

For detached dwellings, the substantive cost of WSUD per property is in the range of around \$4,900 to \$8,200, although the most likely cost is around \$6,000. For attached dwellings, the cost of WSUD per property is in the range of \$4,100 to \$6,900, with costs more likely to be around \$5,000. These costs are significantly dominated by capital costs.

It is to be noted that this cost is comparable to the equivalent per lot cost of Development Services Schemes administered by Melbourne Water in Melbourne.

The report states (p. 7):

MainStream's analysis indicates that, for detached dwellings:

- WSUD potentially adds 1.2% to the average price of a new home (with a range of 1.0–1.6%).
- The tradeoff with building an additional area of the actual house within the same budget is around 3.0 m² (with a range of 2.5–4.1 m²).

In relation to larger scale WSUD infrastructure for water quality treatment (bioretention basins and detention basins), the following assessment is provided, based on analysis by Water by Design (Water by Design 2010, p. 26):

The key points to note are:

- for detached houses, capital costs of WSUD infrastructure ranges from \$1,870 to \$2,530 per property;
- for townhouses and flats, capital costs of WSUD infrastructure ranges range from \$1,330 to \$1,800;
- capital cost estimates are based on optimal lowest cost WSUD solutions as determined by experts for the Business Case for Best Practice Urban Stormwater Management. However, it should be noted that developers often use higher capital cost WSUD interventions (e.g. constructed wetlands) as they may result in a significant price premium in the residential land market.

	Low	Medium	High
Detached houses			
Bioretention basins	\$1,870	\$2,200	\$2,530
Detention basins	\$213	\$250	\$288
Total	\$2,083	\$2,450	\$2,818
Townhouses / flats			
Bioretention basins	\$680	\$800	\$920
Underground detention tanks	\$612	\$720	\$828
Detention basins	\$34	\$40	\$46
Total	\$1,326	\$1,560	\$1,794
Source: MainStream analysis based Water by Design 2010, <i>A Business Case for Best Practice Urban Stormwater Management, and consultation</i> , Healthy Waterways Partnership, Brisbane.			

Figure 25: Water by Design's estimate of capital costs of WSUD interventions per property (Water by Design 2010, p. 26)

The report also includes an analysis of the effect on development yield

Sub-region	Bioretention system		Constructed wetland	
	With RWT	Without RWT	With RWT	Without RWT
Greater Brisbane	3.3%	4.5%	12%	18%
North Coast	4.2%	6.3%	18%	24%
West Region	2.7%	3.9%	9%	12%
South Coast	3.9%	5.4%	15%	21%

Source: MainStream analysis based on Water by Design (2010) *Deemed to Comply Solutions — Stormwater Quality Management (South East Queensland)*, Healthy Waterways Partnership, Brisbane.

Figure 26: Water by Design's estimate of potential loss of developable land – small developments (WSUD solution footprint as % of catchment area)

The report then notes (Water by Design 2010, p. 29) that:

For larger developments, WSUD requirements can sometimes be incorporated into broader greenspace requirements, with significantly greater opportunities for efficient design. Therefore, the relative area for bioretention systems is generally around 1% of the catchment for the works and up to 3% for the total footprint.

The key points to note are:

- Footprints for bioretention systems range from less than 3% of the area up to 6%. Given the deemed-to-comply solutions only apply to smaller developments (maximum 20 lots), reductions in the number of developable lots are negligible (if any), while reductions in average marketable lot size are marginal.
- Footprint requirements for constructed wetlands are significantly higher, but much of the area could be creditable greenspace with appropriate consideration by regulators. In addition, the presence of wetlands will enhance the amenity value of development, which translates into higher, realisable land prices.
- Bioretention systems are generally preferred over constructed wetlands by developers for smaller developments as they require less competition with marketable land areas.
- The opportunity costs (based on area) are generally higher in high rainfalls sub-regions of SEQ.
- The use of rainwater tanks reduces the footprint for bioretention systems and constructed wetlands as they provide a partial substitute.

The Project notes that in some cases, reports focus on up-front capital costs of WSUD items, without including the long term water efficiency benefits from provision of rainwater tanks, or the public benefits that bioretention systems offer. By comparison, the approach to cost benefit analysis in the Environmentally Efficient Design Panel report included resource savings to future occupiers of houses with tanks. As developers are not always focused on resource efficiency for future occupiers, policy makers are strongly encouraged to also have regard to longer term benefits and resource savings when assessing the costs and benefits of WSUD infrastructure.

4.9 Water by Design

Off-Site Stormwater Quality Solutions Discussion paper (Water by Design 2014)

This discussion paper identifies the merits and risks of off-site approaches to management of stormwater quality, noting that there is growing interest in stormwater quality offset schemes in Queensland. It includes an assessment of the cost effectiveness of offset schemes and provides some useful marginal cost abatement curves for different technical solutions at varying scales.

Section 4.2.2 refers to the EO Act noting (Water by Design 2014, pp. 12–13) that:

- water quality is not a prescribed environmental matter for the purposes of the offsets framework under the EO Act, although there are some circumstances where prescribed environmental matters may benefit from water quality improvements;
- DEHP has developed a framework for voluntary market-based mechanisms for nutrient management titled ‘Flexible Options for managing Point Source Water Emissions’ (DEHP 2014) but this focuses on point sources such as sewage treatment plants;
- mandatory conditions requiring payment for offsets may contravene sections 347(1) and 626 of the SP Act.

The report makes reference to the offset scheme run by Melbourne Water and notes that it is yet to achieve full cost recovery.

Cost abatement curves are shown in the figures below:

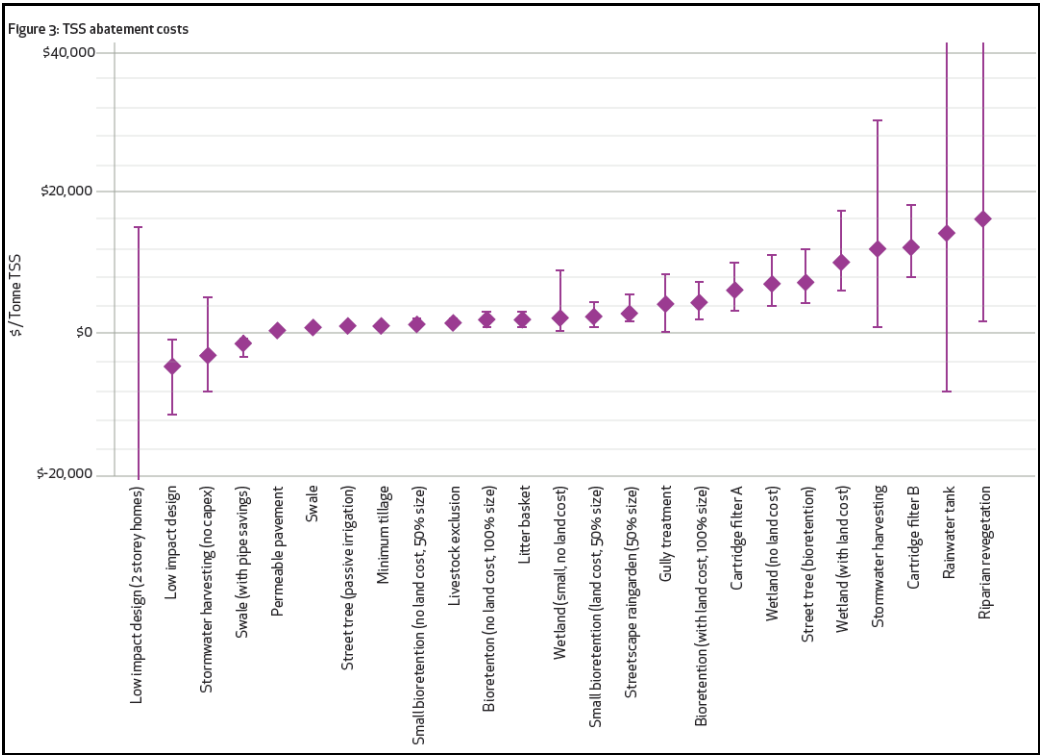


Figure 27: Water by Design TSS abatement costs (Water by Design 2014, p. 16)

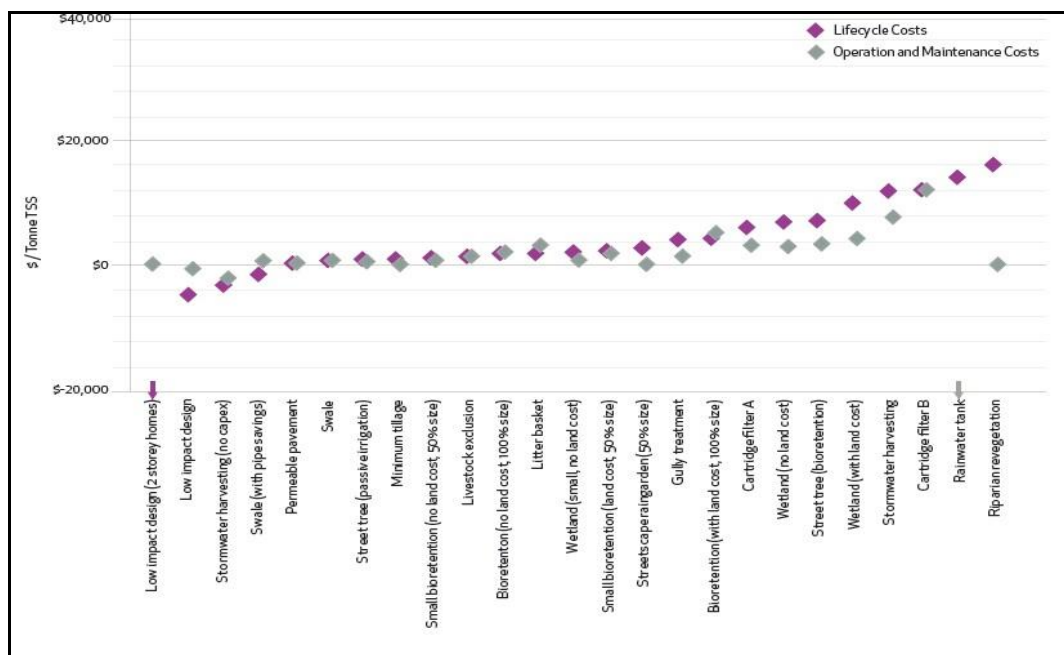


Figure 28: Water by Design's comparison of the Present Values of Lifecycle and Operation and Maintenance costs (Water by Design 2014, p. 17)

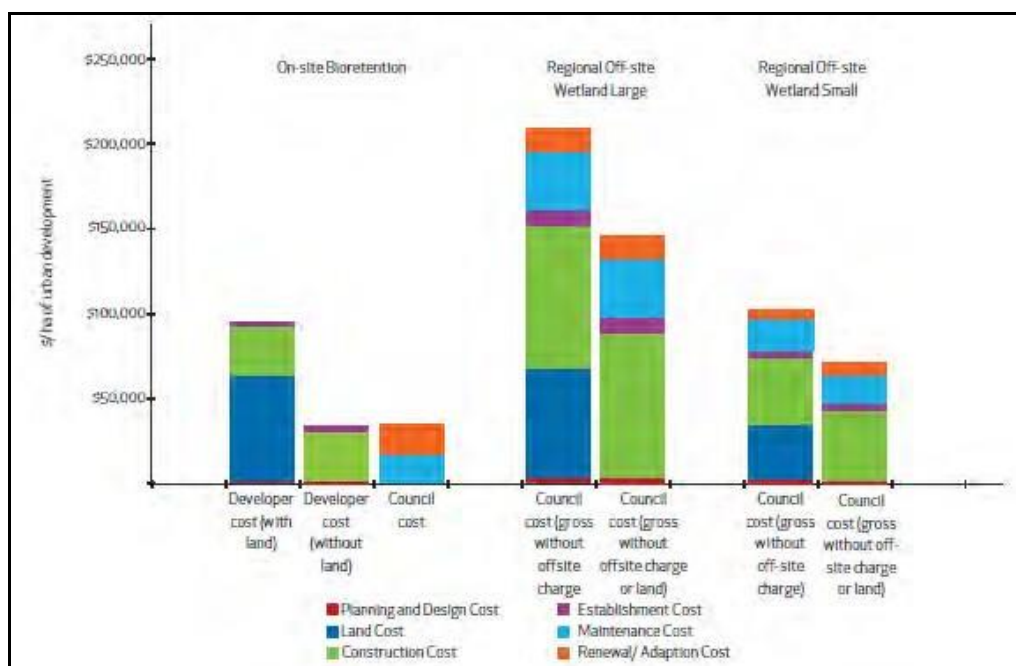


Figure 29: Water by Design's comparison of the Cost of On-site Bioretention Systems and Small and Large Regional Wetlands (Water by Design 2014, p. 19)

4.10 The Status of Water Sensitive Urban Design Schemes in South Australia (Goyder Institute for Water Research 2013)

This report summarises the status of WSUD in SA from stakeholder interviews and a literature review. It also includes an inventory of WSUD sites in SA. The report suggests that the implementation of WSUD at development level largely falls under the jurisdiction of councils who have wide discretion to formulate their DPs and policies according to their needs (p. 10).

The inventory shows that in SA, WSUD uptake has largely been focused on stormwater management features implemented by councils, with flow management being the primary driver for WSUD uptake to control flooding and reduce peak flows. As of January 2013, there were 176 documented sites with a range of WSUD features in SA which include wetland sites, bioretention system sites, ponds, greenroofs, permeable pavements, wastewater reuse and harvesting reuse schemes (p. 17).

4.11 Water Sensitive Urban Design Impediments and Potential: Contributions to the SA Urban Water Blueprint: Post-implementation assessment and impediments to WSUD (Goyder Institute for Water Research 2014)

Building on the findings of *The Status of Water Sensitive Urban Design Schemes in South Australia* as discussed above, this report contains the following:

- summary of the institutional and legislative arrangements for WSUD in SA;
- detailed assessment of SA legislation for WSUD and a comparative analysis with other Australian states;
- interviews and mapping of key WSUD stakeholders in SA; and
- post-implementation assessment undertaken on seven WSUD scale studies in Greater Adelaide, which evaluates the outcomes of WSUD implementation and the impediments that the projects faced.

The report suggests that a number of common themes emerge ‘when considering strategies to address impediments for the greater mainstream adoption of WSUD in SA’, including the need to (pp. x–xi):

- apply WSUD in a consistent and coordinated manner when planning frameworks and development approvals processes. The planning of WSUD needs to consider how the design can best achieve these objectives, and make clear where there is a trade-off between objectives. There is a need to develop transparent and efficient processes for incorporating WSUD objectives in development planning approvals;
- improve a council’s capacity to develop WSUD guidelines and implement WSUD, particularly at a broader catchment-level;
- set clear state level WSUD targets and policy which are lacking in SA;
- develop SA’s knowledge base for WSUD which is largely based on interstate guidelines and monitoring data; and
- improve understanding of how small-scale, distributed implementation of WSUD, particularly in urban consolidation context can address catchment level objectives.

Section 5 Local case studies and exemplars

Local policies and initiatives

Capacity building programs in each state provide a wealth of information on local case studies and exemplar projects³⁴. A list of local planning policies relevant to urban stormwater and WSUD are set out in Appendix 2. Additional case studies were also identified through the Literature Review for each state. Further details are contained in the Literature Reviews. From an industry perspective, the EnviroDevelop website provides an extensive list of projects accredited under the industry lead scheme.³⁵

In some cases, planning policy for best practice stormwater management has converged with best practice policy for Environmentally Sustainable Development. There are a number of useful examples that include web based development assessment tools developed by local government that provide a basis for assessing best practice sustainability and urban water management using accredited software and ratings tools. The Council Alliance for a Sustainable Built Environment (**CASBE**) also provide on-line tools to assess and rate best practice built form environmental sustainability (<http://www.bess.net.au/>).

These examples illustrate the benefits of using software and ratings tools as a medium to support consistent adoption and implementation of best practice built form sustainability practices, just as the building system has adopted and accredited ratings schemes to achieve compliance with the sustainability requirements in the National Construction Code. Such schemes are now broadly accepted by leading developers and have become a normal part of doing business in many areas. Jurisdictions that have not adopted accredited software for modelling and rating development tend to be less advanced in the adoption of best practice sustainable development.

Melbourne Water Offsets Scheme

Melbourne Water operates an offsets scheme focused on growth areas which allows some developers to pay money in lieu of providing physical works to achieve best practice standards on their own land. The scheme applies outside areas covered by DSSs but also inside some scheme areas.

The scheme is integrated with the planning system. According to Melbourne Water the council determines whether the compliance with clause 56 is required on site, or whether an offset can be provided.

Variable offset rates apply based on the applicable 'development density ratio' calculated by Melbourne Water. The current charge is based on a rate of \$6645/kg Nitrogen removed plus an 8.9% administration fee. The rates are reviewed every two years.

This system also allows some developers to pay offsets in lieu of providing on-site solutions for the purposes of complying with clause 56.07 in circumstances where the responsible authority (usually the council) is prepared to accept an off-site solution. However, it is not compulsory where clause 56.07 does not apply (e.g. commercial and industrial development).

The water quality offsets scheme allows some developers to pay money instead of delivering water quality treatment within the subdivision. The Schemes apply in areas where additional treatment is required. Offsets are available for sites less than 1 hectare. For residential subdivision subject to clause 56.07, the following summary explanation is provided by Melbourne Water:

³⁴ See for example: <https://www.clearwater.asn.au/>; <http://www.newwaterways.org.au/>

³⁵ http://www.envirodevelopment.com.au/01_cms/details.asp?ID=57

Residential Subdivisions – developments subject to Clause 56

Melbourne Water Greenfield Schemes			
Regional water quality treatment provided within the scheme	No water quality provided within the scheme	Development outside of Greenfield Schemes	Development in Redevelopment Schemes
<ul style="list-style-type: none"> Developer can contribute a financial contribution to treatment provided within the scheme Reductions in contributions for on-site treatment 	<ul style="list-style-type: none"> Developer must provide water quality treatment within the subdivision in accordance with Clause 56 Offsets are available for sites less than one hectare 		
Hydraulic contributions required		No hydraulic contributions required	Hydraulic contributions required

Figure 30: Explanation of stormwater offsets for residential subdivisions subject to clause 56.07 (Melbourne Water 2017)

While offsets for water quality are recognised by Melbourne Water they have no official status under the planning framework. Victoria does not have a statutory environmental offsets framework.

Other stormwater offset schemes

A number of councils have supported stormwater offsets, in lieu of on site management of stormwater. Examples include Kingston CC, Logan CC, Gold Coast CC. The Office of Living Victoria and Queensland Health Waterways have commissioned research on the development of governance arrangements for broader based offset schemes.

However, while most states have developed specific legislation to facilitate environmental offsets, these often do not expressly support stormwater offset schemes developed by local government. As a supplier of offsets, competition policy would suggest that local governments and the private sector should be able to compete with other public land managers to supply offsets so as to maximise competition and reduce the cost of regulation. Better integration of state and local stormwater offsets schemes would require further work by government.

It is recognised that offsets may not be supported or considered necessary for land with sufficient capacity to manage and detain stormwater on-site. In some peri-urban areas for example, larger lot sizes tend to prevail. Policy considerations may prefer to manage this stormwater within the catchment so as to reduce runoff volumes in lower lying and more flood prone areas, or to augment water supply using tanks. The Report considers that offsets are more suited to highly developed, lower lying urban areas with high imperviousness, or where it is not practicable to meet imperviousness benchmarks.

Section 6 International context and perspective

Introduction

In late 1990s, WSUD emerged in Australia as an alternative to the traditionally siloed approach to water supply, flood control, and urban stormwater management for the purpose of achieving better environmental outcomes. With increasing convergence of the world's population in urban areas and more frequent extreme weather events such as drought and flash flooding due climate change, many cities around the globe have also been seeking alternative ways to achieve sustainable water management for a number of years. Some suggest that many countries around the world have been rising to these challenges by redefining urban design and planning to encompass the concept of resilience and liveability that integrates the total water cycle, energy use, natural ecology, aesthetics, use and reuse of materials, and sociological and economic inputs into the urban fabric (Donofrio et. al. 2009). WSUD and integrated water management are therefore seen as an important, if not a necessary component of urban planning globally.

While a comprehensive survey of WSUD approaches outside Australia is beyond the scope of B5.1, this section provides an overview of the approaches adopted for WSUD in countries from four different continents for the purpose of setting the international context for WSUD and the discussions relating to policy reforms recommended by this report.

The overviews are provided for United Kingdom (**UK**), Israel, United States of America (**USA**) and Singapore, all of which, apart from Singapore, provide similarly decentralised planning systems and hierarchies to Australia. However, each of these four countries adopts different terminology for WSUD and regulatory approaches for implementing policy. Low Impact Development (**LID**) in USA is largely focused on stormwater treatment and adopts a more permit based and compliance focused approach, driven and encouraged by the federal EPA. Israel is yet to develop an effective WSUD policy and regulatory framework to implement policy, whereas Singapore implements WSUD through the Active Beautiful and Clean (**ABC**) Waters Program. In the UK, where councils are given discretion to develop local planning policy, the uptake of WSUD is promoted through the 'Sustainable Drainage Systems' (**SUDs**) planning policy. This is a relatively recent policy, which took effect from 6 April 2015 and applies to new developments 'wherever this is appropriate' and requires planning authorities to give priority to SUDs in planning applications.

Approaches to WSUD outside Australia

6.1 United States

Low Impact Development

The United States' (**US**) planning system is similar to Australia's in many respects. The federal government has limited involvement and responsibilities for urban planning but can influence it at different levels through conditions on grant funding and federal legislation such as environmental laws. The state's planning system varies from jurisdiction to jurisdiction as each state is responsible for managing land use planning and establishing the enabling legislation and policy within which this occurs. Some states require local authorities to prepare plans that are consistent with its state and or regional plan whereas others do not provide comprehensive planning requirements and allow local authorities to have more discretion in plan making.

Unlike Australia, however, WSUD or 'Low Impact Development' (**LID**) as its commonly referred to in the US, is primarily promoted at the federal level by the US Environmental Protection Agency (**USEPA**) and implemented through a discharge permit program established under the *Federal Water Pollution Control Act* (commonly called the 'Clean Water Act' (**CWA**)).

The LID is defined as 'systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration or use of stormwater in order to protect water quality and associated aquatic habitat' (USEPA) and has three main focuses:

- regional stormwater management with focus on water quality by aiming to keep raw sewage and pollutants carried by stormwater out of the nation's waters;
- reducing the overall compliance cost to the community by considering all wastewater and stormwater management obligations in an integrated fashion; and
- meeting the goals of the CWA, which provides the framework for regulating discharges of pollutants into the US waters and regulating quality standards for surface waters.

The CWA aims to 'restore and maintain the chemical, physical and biological integrity' of the 'waters of the US' (navigable waters, tributaries to navigable waters, interstate waters, oceans out to 200 miles, and intrastate waters) and establishes five main elements:

- a system of minimum national effluent standards for each industry;
- water quality standards;
- the National Pollutant Discharge Elimination System which is a permit program for regulating discharges of pollutants to receiving waters and translates the water quality standards into enforceable limits (s 402);
- provisions for special problems such as toxic chemicals and oil spills; and
- revolving construction loan program for publicly owned treatment works.

The CWA requires the USEPA to establish effluent limitations for the amounts of specific pollutants that may be discharged by municipal sewerage plants and industrial facilities. Pursuant to section 309(b) of the CWA, the US EPA has the power to commence a 'civil action for the appropriate relief' in the relevant district court, which includes injunctions and civil and criminal penalties, if it finds non-compliance to the requirements regarding:

- effluent limitations (s 301);
- water quality (s 302);
- national standards of performance (s 306);
- toxic and pre-treatment effluent standards (s 307);
- aquaculture (s 318); or
- disposal of sewage sludge (s 405).

What if you could ...
...preserve environmental quality...reduce infrastructure construction and maintenance costs
.....enhance community awareness.....and lower development costs?

You can, if you apply the principles of ...

LOW-IMPACT DEVELOPMENT

Low-Impact Development (LID) presents a new philosophy in site development and environmental protection. LID *is not* a growth management program. LID *does not* rely on density restrictions or clustering. Instead.....LID focuses on how the developed area of a site is planned and designed to minimize hydrologic impacts. LID uses a variety of site design and pollution prevention techniques to create a hydrologically functional and environmentally sensitive landscape.

What are the benefits?

Environmental

- Reduced wetland impacts & associated impact fees
- Multiple regulatory credits for environmental protection
- Reduced downstream erosion
- Improved groundwater recharge
- Reduced uplands habitat impacts

Costs

- Development cost savings as much as \$5,000 per lot
- Reduced site infrastructure and associated costs
- Reduced infrastructure maintenance costs
- Potential gains in lot yields

Other

- Improved site aesthetics
- Enhanced public awareness
- Applicability to retrofit/urban revitalization areas
- Potential for reduced taxes & fees
- Potential increases in property values

Low-Impact Development, St. Mary's County, MD

Runoff Retention Using On-lot Bioretention;
Runoff Retention Using Modified Open Drainage Swale

Forest Conservation Through Site Fingerprinting Reduced Imperviousness Through Narrow Road Widths; Open Drainage Swales

Runoff Retention Using Rainbarrel

Runoff Retention Using On-lot Bioretention

Plan View Schematic of Low-Impact Development Residential Lot

Low-Impact Development for Commercial Property, Prince George's County, MD

Public Participation Through Homeowner BMP Maintenance

Figure 31: The definition of Low Impact Development and its benefits. Source: <http://lowimpactdevelopment.org>

Local stormwater regulation and stormwater utilities

Stormwater discharges from municipal sources are referred to as 'municipal separate storm sewer systems' (MS4s) and refer to a conveyance system owned by a state, city, town, village, or other public entity, designed or used to collect or convey stormwater, not a combined sewer and not part of a sewage treatment plant or publicly owned treatment works. Each operator of MS4s is required to obtain an NPDES permit and develop stormwater management programs with states having the responsibility of monitoring the day-to-day activities in their jurisdiction.

In meeting the obligations under an NPDES permit, the USEPA promotes integrated planning approaches to municipal wastewater and stormwater management and 'strongly encourages the use of green infrastructure and related innovative technologies, approaches, and practices to manage stormwater as a resource, reduce, reduce sewer overflows, enhance environmental quality, and achieve other economic and community benefits' (USEPA 2011).

To provide further guidance for developing and implementing effective integrated plans, the USEPA has developed the *Integrated Municipal Stormwater and Wastewater Planning Approach Framework* (US EPA 2012). The application of the Framework, which identifies the operating principles and essential elements of an integrated plan, is discretionary. However, if a municipality decides to 'take advantage of the Framework', then the integrated plan can provide information to inform the permit and enforcement processes and can support the development of conditions and requirements in permits and enforcement orders.

In March 2015, the *Clean Water Compliance and Affordability Bill* was introduced to the Senate to direct the USEPA to carry out a pilot program to work with municipalities seeking to develop and implement integrated plans to meet wastewater and stormwater obligations under the CWA. The pilot program is to be carried out in accordance with the Framework (s 2(b)).

The US EPA publishes guidance which assists local stormwater utilities with developing funding arrangements to support stormwater infrastructure required to achieve compliance with the Clean Water Act. For example, its 2009 'Funding Stormwater Programs' publication notes that some 800 communities across the USA had adopted a stormwater utility to help fund the costs of stormwater programs, including regulatory compliance costs, planning, maintenance, capital improvements, and repair or replacement of infrastructure. According to the publication, the South Burlington stormwater utility in Vermont applies the following fee structure as of 2009:

User fees are based on the amount of impervious area on a property. The monthly fee per equivalent residential unit (ERU) was set using a scientific process. This process determined that a typical single-family home in South Burlington had 2,700 square feet of impervious surface. A single-family home is assessed a fee of \$4.50 per month, whereas duplexes and triplexes are assessed fees of \$2.25 and \$1.50 per month, respectively. All other properties are assessed a fee depending on the amount of impervious surface. The utility funds a comprehensive program bringing in more than \$1 million annually.

A range of different funding mechanisms (usually given effect through local statutes) are available in the USA ranging from:

- Service fees;
- Property taxes;
- Regional funding mechanisms;
- System Development charges; and
- Grants/Low Interest Loans.

According to the US EPA there are various rates of imposing charges:

The ERU method (also known as the Equivalent Service Unit (ESU) method) is used by more than 80% of all stormwater utilities. It bills an amount proportional to the impervious area on a parcel, regardless of the parcel's total area. It is therefore based on the effect of a typical single family Residential (SFR) home's impervious area footprint.

A representative sample of SFR parcels is reviewed to determine the impervious area of a typical SFR parcel. This amount is called one ERU. In most cases, all SFRs up to a defined maximum total area are billed a flat rate for one ERU. In some cases, several tiers of SFR flat rates are established on the basis of an analysis of SFR parcels within defined total area groups.

A tiered SFR flat rate approach improves the equitability of the bills sent to homeowners. The Impervious areas of non-SFR parcels are usually individually measured. Each non-SFR Impervious area is divided by the impervious area of a typical SFR parcel to determine the number of ERUs to be billed to the parcel.

An alternate means of imposing charges by stormwater utilities is based on the concept of 'Intensity of Development':

Intensity of Development (ID)

This stormwater cost allocation system is based on the percentage of impervious area relative to an entire parcel's size. All parcels, including vacant/undeveloped parcels, are charged a fee. For developed parcels, fees are based on their *intensity of development*, which is defined as the percentage of impervious area of the parcel. Vacant or undeveloped parcels contribute to runoff and are assigned a lower fee. Rates are calculated for several ID categories and are billed at a sliding scale, as shown in the table below. For example, an SFR parcel, which is categorized as *moderate development*, would pay \$0.16/month/1,000 square foot (ft²) (or \$1.60 for a 10,000 ft² lot).

Category (impervious percentage range)	Rate per month per 1,000 square feet of total served area (impervious plus pervious)
Vacant/Undeveloped (0%)	\$0.08
Light development (1% to 20%)	\$0.12
Moderate development (21% to 40%)	\$0.16
Heavy development (41% to 70%)	\$0.24
Very heavy development (71% to 100%)	\$0.32

Figure 32: The Intensity of Development (ID) system (US EPA 2008).

More recently the US EPA announced its National Pollutant Discharge Elimination System (NPDES) which regulates stormwater discharges from municipal stormwater systems, construction activities, and industrial activities.³⁶ There are now more than 6000 municipal stormwater systems subject to the permit regime.

6.2 Singapore

Urban planning is highly centralised in Singapore with the Urban Redevelopment Authority (**URA**) being the designated national planning authority. The URA is responsible for administering the Planning Act and subordinate legislation, which set the general governing rules for Singapore's urban planning process and the development control system. It is also responsible for preparing both the Concept Plan and the Master Plan, which provide the comprehensive framework for planning and development across the country.

The *Concept Plan 2011* is a strategic policy document which contains the Singapore Government's long-term planning intentions and the context for the preparation of Master Plan. This is not a statutory document and does not contain any specific policy regarding WSUD or water sensitive planning. The *Master Plan 2014* is the statutory land use plan, which guides Singapore's development in the medium term (10–15 years). It is reviewed every five years and translates the long-term strategies of the Concept Plan into detailed plans to guide the development of land and property.

Singapore implements WSUD through the ABC Waters Program, which is the Public Utilities Board's (**PUB**) initiative launched in 2006, for 'integrating the drains, canals and reservoirs with the surrounding environment in a holistic way' (PUB 2014). It is aimed at providing a holistic urban water management master plan with short-term and long-term solutions to provide flood protection and drinking water collection while new public

³⁶ <https://www.epa.gov/npdes/npdes-stormwater-program>

recreational spaces and biodiversity in the city. 'Blue-green' infrastructure in parks along the waterways, floating wetlands, rain gardens, swales, wetlands, cleansing biotopes, naturalized canal edges, and detentions ponds.

6.3 United Kingdom

The UK land use planning process is established under the *Town and County Planning Act 1990 (TCPA 1990)* and is tiered under the *National Planning Policy Framework (NPPF)*, Local Development Framework and site level assessment.

The NPPF (Department of Communities and Local Government 2012) contains the UK's national level policies which must be taken into account in the preparation of local and neighbourhood plans and is a 'material consideration' in planning decisions (*Planning and Compulsory Purchase Act 2004* s 19(2)(a), 38(6), TCPA1990 s 70(2)). The NPPF 'provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities'.

Local planning authorities are responsible for the preparation of local development plan frameworks, which include 'core strategy' and other development plan documents. They are also responsible for managing and determining most applications for planning permission.

The UK system is described as a 'plan-led' process whereby requirements contained in local plans prevails unless a 'material consideration' applies (Baker 2006 p. 28) and this means each development is subject to 'a highly discretionary process of local deliberation'. Nonetheless, some suggest a strong centralised planning appeals systems supported by independent inspectors whose role is to assess the Local Plan against the relevant legal requirements adds weight to the implementation of national planning policies (Gurran 2011 p. 41).

In respect to WSUD, the UK promotes its uptake through the SUDs planning policy, which took effect from 6 April 2015 and applies to new developments 'wherever this is appropriate'. NPPF require planning authorities to give priority to SUDs in planning applications. Local planning policies and decisions on planning applications relating to major development (developments of 10 dwellings or more or equivalent non-residential or mixed development) are to ensure that SUDs for the management of run-off are put in place, unless demonstrated to be inappropriate.

The philosophy of SUDs is about 'maximising the benefits and minimising the negative impacts of surface water runoff from developed areas' (Construction Industry Research Information Association (CIRIA) 2015, p. 19). This is to be achieved by 'harvesting, infiltrating, slowly, storing, conveying, and treating runoff on site and, where possible, on the surface rather than underground making water visible and tangible part of the built environment for everyone's enjoyment.' The *CIRIA SuDS Manual 2015* provides detailed outline of the philosophy of SUDs, approach and implementation methods including case studies of where SUDs have been successfully implemented.

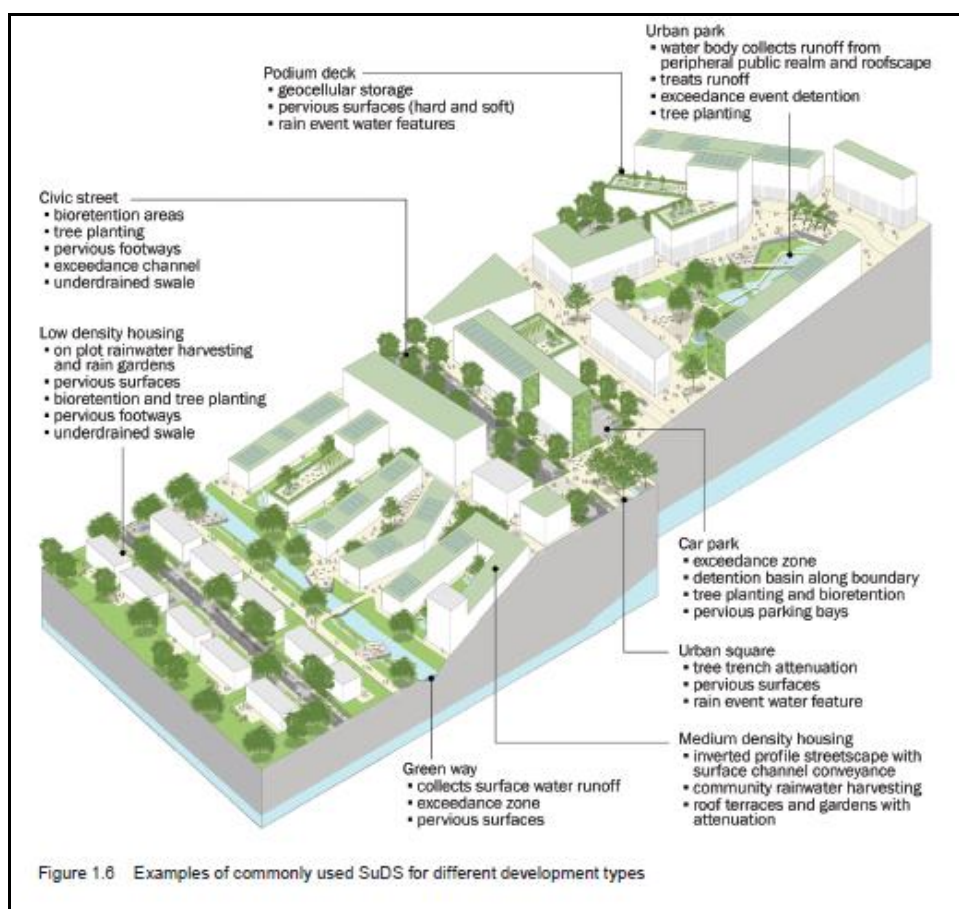


Figure 33: Example of commonly used SuDS for different development types (*CIRIA SuDS Manual 2015 p.30*)

6.4 Israel

Israel has a centralised land-use planning system, which combines ‘top-down planning with bottom-up initiatives’ (Alterman 2007 p. 272). Central government has the power to oversee local planning decisions and make binding national land-use plans. The *Planning and Building Law of 1965* establishes four tiers of plans – National, District, Local Outline Plans, and optional Detailed Plans. The lower level plans must be consistent with all higher-level plans.

‘Water sensitive planning’ policy in Israel is focused on:

- Improving the planned environment for its users;
- Augmenting water resources and improving their quality;
- Reducing the negative impacts of stormwater;
- Preserving ecosystems; and
- Achieving these goals in a cost-effective way with citizen involvement.

In August 2012, the Water Authority’s Planning Division published *Long-Term Master Plan for the National Water Sector (Water Authority Policy 2012)* in which ‘runoff management and drainage’ was a key focus. The Water Authority Policy 2012 stated ‘consideration will be given to the transfer of responsibility for managing runoff and drainage in urban communities to the municipal water and sewage corporations’.

The second stage identified in the Water Authority Policy 2012 was the ‘implementation plan’ however this has not yet been realised.

The Ministry of Environmental Protection recommended advancing water-sensitive planning to cope with the effects of climate change on Israel's water sector in February 2014. The Ben-Gurion University of the Negev's website also suggests that its researchers are joining with colleagues from other universities to develop a new program called 'Creating Water Sensitive Cities in Israel' (BGU 2015).

Section 7 Project consultation outcomes

Introduction

Between December 2015 and May 2016, Project B5.1 consulted across the five jurisdictions to obtain feedback on reform priorities. The consultations were largely based on B5.1's Issues Paper, which contained a questionnaire for discussions and feedback.

The consultations took various forms – workshops and meetings in Perth, Sydney, and Brisbane, a seminar and on-line survey in Adelaide, and individual meetings and correspondence in Melbourne. The Project invited participation from a broad range of professionals in the urban planning sector to ensure cross sectional input. In particular, participation was sought from:

- senior strategic and statutory planners in councils (these personnel were seen as priority group for consultation);
- civil engineers and urban water management in councils;
- urban planning and urban water policy advisors in state government agencies;
- water authorities and utilities; and
- CRC industry partners.

The participation level in the project consultations was generally high, and from a broad range of groups across the jurisdictions. In general, however, most councils were represented by urban water managers and engineers rather than planners or a combination of both.

This section provides an overview of the project consultations and some of the key observations arising from the process, followed by a summary of consultation outcomes from each jurisdiction.

Overview of stakeholder views

Perhaps unsurprisingly, in states where WSUD policy framework is more developed (WA, Victoria, and Queensland), participants identified finer grained issues or barriers to the implementation of WSUD. By comparison, NSW participants identified the lack of state-wide policy on WSUD as a key issue.

Overall, the project consultation outcomes from all jurisdictions supported the reform themes and issues identified in the Issues Paper. That is, they generally:

- supported the use of a mandatory policy framework for WSUD with some flexibility provided at the local level for achieving policy objectives under performance based standards. Many agreed that discretion to apply policy was impeding the wider and consistent uptake of WSUD;
- supported water quality targets in principle but were concerned about them leading to narrow, prescriptive or inflexible engineering solutions;
- suggested that clear WSUD policy and controls at different planning scales were lacking, in particular for urban infill developments, and this presented challenges for most councils across the jurisdictions;
- suggested that current funding mechanisms were inflexible and inadequate for implementing and maintaining WSUD assets in the public realm; and
- better integration of NRM and catchment based planning processes with planning processes was needed.

WA was the only jurisdiction where a clear consensus did not emerge in relation to the desirability of a mandatory framework and water quality targets. Here, opinion was split on whether best practice urban water management and WSUD was a regulatory and policy issue, or 'capacity' and 'interpretation' issues at the local level. Many at the workshop believed targets were inappropriate or problematic for the WA context due to the state's variable ground conditions and legacy nutrients, resulting from the high degree of surface and groundwater interaction and shallow groundwater. Consequently, they suggested that targets were difficult to

enforce and apply in practice. But many also suggested that the case-by-case approach to applying WSUD policy adopted by the jurisdiction was potentially impeding the consistent uptake of WSUD.

While the WA Government clearly supports WSUD under the SPP 2.9 and provides a broad policy framework for its implementation at precinct and subdivision scales, most participants suggested that the decision-making framework was not as clear and transparent as it could be. They suggested that the decision making processes had largely evolved through convention ('it's always done that way') rather than through a clearly established regulatory framework, and therefore application of policy and innovation was still largely dependent on 'champions' in councils and organisations as well as the 'right' political and economic conditions.

In regards to planning reform priorities, most jurisdictions identified the need for reforms to state planning policy, binding stormwater targets and the provision of WSUD policy targeted at different scales as the top three reform priorities. Integration of NRM and catchment-planning policies with planning process also featured as a prime concern for many participants (refer Figure 33).

NSW participants identified the need for state planning policy for WSUD as the top reform priority. The Sydney consultation suggested that the lack of overarching state planning policy on WSUD, other than BASIX, has led to wide variability between councils in their approaches to and knowledge of WSUD practices. For some councils, particularly the smaller councils, the concept of WSUD was yet to be established while others such as the Blacktown City Council had well developed local WSUD policy and established practices. While many conceded that the sheer numbers of councils with varying sizes and the fragmentation of drainage governance could be contributing factors to the variability, all participants suggested that the lack of state leadership on WSUD was the key reason for the lack of uptake of WSUD in the jurisdiction.

Victoria and Queensland also identified the need for a state-wide planning policy for WSUD as one of the top three reform priorities, but for different reasons to NSW. In Victoria, where the implementation of WSUD is relatively advanced, most participants suggested an overarching state policy for WSUD was needed to address gaps in the coverage of clause 56.07, and to address catchment boundary issues and enable strategic opportunities for WSUD to be identified and explored at scale across the jurisdiction. Although clause 56.07 and the BPEM Guidelines have provided the basis for many councils to develop local WSUD policy to capture a broader range of developments, the lack of an 'even playing field' and imbalance created by this approach was a primary concern.

In Queensland, participants questioned whether the current SPP, *State interest – Water quality* was a 'true' WSUD policy given its focus on stormwater management and pollutant load reduction targets. Some suggested that there was '*no WSUD policy framework, just a framework that requires ... TSS, TN & TP reductions*' which has led to '*perverse outcomes, and has not resulted in [the] delivery of WSUD*'. To this extent, all suggested that the SPP should be reviewed to include a full range of WSUD objectives and requirements to achieve more holistic and balanced outcomes.

Most participants across the five jurisdictions supported stormwater targets in principle and identified them as one of the top three reform priorities. While some doubted that the use of targets would yield WSUD outcomes, most participants believed that mandatory targets would assist in achieving the greater uptake of WSUD if they were part of a broader WSUD policy framework. They suggested that WSUD guidelines, robust decision-making frameworks and appropriate tools should support targets to ensure that they did not lead to narrow engineering outcomes.

Some suggested rethinking the concept of 'best practice' and questioned whether single a set of targets should define this (Melbourne Water 2016). In Victoria, Melbourne Water representatives suggested that although the BPEM Guidelines have been instrumental in the implementation of best practice approaches to WSUD, the current policy framework was not delivering the kind of environmental outcomes needed to materially improve waterway health.³⁷ It suggested that 'best practice' and targets should aim at place-based solutions and align with broader catchment or regional water strategy to provide outcomes, which achieve net environmental and hydrological benefits. For example, the *Healthy Waterways Strategy* should identify priority waterways for

³⁷ Discussion with Melbourne Water on 31 August 2016 at the 2016 National Stormwater Conference, Gold Coast, Queensland.

additional stormwater protection and set out conditions, goals, and priorities for waterways. Case studies of solutions may also play a role setting out benchmarks for certain areas and allowing industry to respond with placed base solutions.

Attitudes to market mechanisms such as water quality offset schemes were mixed across the jurisdictions. Similar to stormwater targets, participants generally supported them in principle but were concerned about unwanted side effects such as 'lazy decision making' and achieving regulatory efficiency at the expense of improved environmental outcomes.

A thematic summary of the responses is provided below.

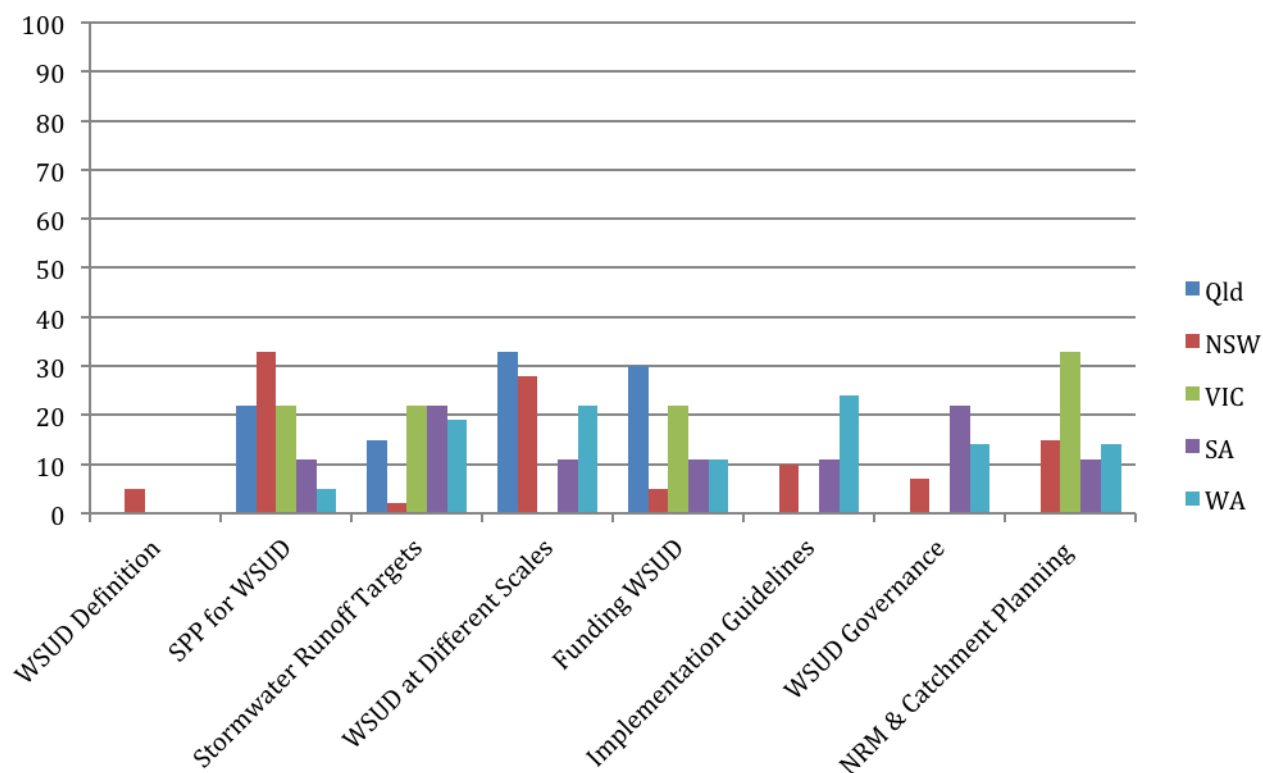


Figure 33: Summary of reform priorities nominated by the workshop/survey participants (vertical bar represents % of the responses)

Table 21: Summary of responses from each jurisdiction

Questions	Qld	NSW	Victoria	SA	WA
SPP for WSUD					
<i>In your view, is it preferable that WSUD obligations be set by the State, or at the local level, or by a combination of both? In your answer please explain how the preferred option assists with the implementation of WSUD?</i>	Set by the State with flexibility for adapting to local conditions	The State should set the overarching WSUD standards with scope to vary them at the local and regional level.	The State should set the overarching framework and 'ambitious minimum standards' for WSUD.	The State should set minimum requirements and the overarching framework with flexibility for local variations.	Some saw mandatory policy framework as a 'one size fits all' approach that was inappropriate for the WA context while others supported it on the basis that the current approach was ineffective.
<i>Discretionary frameworks may allow competing policy objectives to be balanced or traded off against the other in the exercise of discretion. A mandatory framework doesn't allow for such discretion but may provide for flexible (performance based) approaches to compliance. Do you believe the planning policy framework for WSUD should be based on mandatory or a discretionary policy framework?</i>	As above.	Most preferred a mandatory framework with scope for flexibility in the implementation at the local and regional level.	Two responses supported mandatory framework with performance-based standards. A discretionary framework was seen as 'a recipe for poor decision making and lost opportunity'. Two suggested a combination approach with mandatory minimum standards with discretionary implementation options.	A mandatory framework which allows some flexibility for how the standards are achieved was preferred as the current discretionary framework has 'hindered implementation' of WSUD.	As above. All agreed on the need for flexibility in WA due to its variable ground conditions.
<i>Is the WSUD policy framework in your jurisdiction working well? If not, what changes would you would like to see to improve it?</i>	Not working well. The SPP is too narrowly focused on water quality targets and therefore does not support the full range of WSUD objectives.	Not working well – primarily due to lack of leadership and support at the State level. Lack of legal framework and capacity for councils to ensure compliance to WSUD requirements and maintenance of WSUD assets was also cited as an issue. Other key issues were fragmentation of drainage ownership and management and lack of integration between catchment management and land use planning processes.	Three responses said generally working well but there was room for improvement: e.g. providing an overarching State policy that captures developments in IMAP councils and updating the BPEM Guidelines 'in line with industry knowledge and standards'. Two responses said not working well as councils do not have the budget to	Not working well 'because it is discretionary and no one has to do anything if they choose not to.'	It was suggested that review of the subdivision approval process and the timing of UWMPs needed.

Questions	Qld	NSW	Victoria	SA	WA
			support WSUD outcomes and local WSUD policies or requirements are open to challenge by developers as they are not state-wide requirements.		
<i>Do you think software tools (such as MUSIC) assist in mainstreaming WSUD and therefore should be reflected in planning policy? Why/why not?</i>	No, there was a risk of it being misused or making the development assessment too focused on compliance through its use.	Yes, but most weren't convinced that prescribing particular software was a good idea as it could be misused and become outdated.	Yes, but they need to be appropriate and useful tools.	Yes, but this would depend on the knowledge of users therefore would only be a part solution to the 'WSUD puzzle'.	No responses received.
Stormwater targets					
<i>Do you believe a state-wide mandatory stormwater targets would assist in the implementation of WSUD?</i>	Yes, if they were part a larger and more holistic policy framework that implemented the full range of WSUD objectives to avoid pure engineering outcomes.	Yes, because they offer effective means to address broad catchment and environmental issues. Some did not support targets as flexibility was required at the local level but suggested there should be state-wide guidance or 'default targets' for the catchment.	Yes, as demonstrated by the BPEM Guidelines which 'has given backbone to WSUD planning implementation' in Victoria. However, one suggested that targets should be expanded to include other pollutants toxic to the aquatic environment.	Yes, but may need to be varied depending on the development scale and location.	Generally yes but most were apprehensive about how targets would be monitored and enforced in the WA context where grounds conditions are widely variable.
<i>If you answered yes to above, to what class or classes of developments do you believe the targets should apply?</i>	No responses.	All but 'minor' developments	All developments. One suggested 'larger subdivisions – may be 50 lots+'.	Generally to commercial, industrial, residential subdivisions and large urban infill projects	No responses.
WSUD at Different Scales					
<i>Do you feel that there is a WSUD policy gap for particular planning or development scales in your State?</i>	A number of policy gaps exist, in particular for infill, small scale and high-density developments.	A number of policy gaps exist – the absence of State policy on WSUD and a clear regulatory framework to implement policy, particularly for small and infill developments.	For all developments not captured by Clause 56.07 – infill, small lot scale which can form the bulk of developments in inner city councils.	For all planning scales with 'urgent need' to address small-scale infill developments as these form large part of planning in urban areas.	For infill developments and high-density developments and identified number of barriers. But there was lack of consensus on what the key issues or barriers were.
<i>Are there any regulatory barriers that hinder the uptake of WSUD at any particular development scale?</i>	<ul style="list-style-type: none"> Narrow focus on water quality and conversely not enough policy or control on other aspects of WSUD; Conflicting policies (e.g. 	The 'Exempt and Complying development' category because it includes 'the erection of new factories up to 20,000m ² as complying development with no specific WSUD requirements.' Others that are captured under the	Maintenance and operation of WSUD assets which can range from on-site wastewater systems, rainwater tanks on individual lots to WSUD assets managed by body corporate.	The Residential Code.	The timing of UWMPs and sequencing of the residential subdivision approval process needed to be reviewed. Also, many lot scale developments were currently exempt from the R-

Questions	Qld	NSW	Victoria	SA	WA
	<p>affordable housing policy v WSUD) and codes;</p> <ul style="list-style-type: none"> Misaligned governance between water utilities and councils. Lot scale developments generally are not subject to planning controls. 	<p>category can include small-scale infill developments with no regard to its site context.</p> <p>The application of SEPP - for example, councils are unable to impose more onerous water saving requirements to BASIX.</p> <p>The definition of 'supplier' of recycled water and allocation of risks under the <i>Water Industry Competition Act 2006</i> limits cost effective and innovative solutions for using recycle water.</p>			Code
<i>Are there particular scale or scales of development where flexible approaches to the application of WSUD important?</i>	Small-scale developments.	Important to all development scales, but particularly relevant to small developments.	No responses	Important at all planning scales	No responses
Funding WSUD in the Public Realm					
<i>Is the current regulatory framework in your State working well for funding WSUD infrastructure in the public realm or could it be improved? If you think it could be improved what changes you would like to see?</i>	Not working well. The LGIP's definition of 'trunk infrastructure' was limited and open to different interpretations by different councils. Councils bear the burden of water quality improvement and maintenance costs and liabilities associated with WSUD assets, which are often poorly delivered.	<p>Absence of a regulatory framework for funding WSUD in the public realm in NSW and dealing with maintenance of WSUD assets on handover.</p> <p>The current development contribution for new dwellings, which is capped at \$20,000, is 'well below costs to council' with many other priorities such as open space, roads and community facilities, competing for the contribution.</p> <p>Asset management in councils needs to become more transparent and move away from 'business as usual single-issue asset management'.</p>	Insufficient if not 'woeful'. Councils need to rely on general rates and or grant funding to cover any costs of WSUD in the public realm not covered under developer contributions.	<p>Not working well because it is negotiated on a 'case-by-case basis' and there is 'no regulatory framework'.</p> <p>The Stormwater Management Fund could be used to assist in the implementation of WSUD in the public realm but the SMA's decision-making process lacks transparency.</p>	Not working well because DCPs are costly to prepare and implement.

Questions	Qld	NSW	Victoria	SA	WA
What would you suggest are appropriate scale or scales of development for delivering WSUD solutions in the public realm?	All classes of developments.	All scales on a case-by-case basis	For all scales but depended on the issues at hand and councils would need to determine it on a case-by-case basis. One response suggested precinct scale system with 20–100 ha catchments.	For 'neighbour to suburb' scale developments but also for renewal projects.	No responses
Would you support the expansion of market-based approaches for stormwater (e.g., water quality offset schemes)? Why/why not?	Yes, if a robust and accountable framework were in place to ensure that the levy was being used for WSUD outcomes in the public realm. This doesn't exist at present	Yes, but concerned about it creating 'outs' for developers and also 'soften the drive for integration of WSUD within all aspects of future development'	Qualified yes but concerned that it can lead to 'lazy decision making'	Yes	No responses
Is WSUD integrated into public open space planning in your jurisdiction? If not, what changes, if any, would you like to see to better integrate it into public open space planning?	Generally done in a piecemeal way and not integrated with WSUD.	Three responses said there was sufficient integration in their council.	Two responses said this is done reasonably well in their council but there was room for improvement.	Not to the extent that is required to 'move away from the traditional detention basin as a solution'.	Better integration with POS planning and guidance on maintenance costs, along with consideration of WSUD as an integral part of POS or drainage management systems were needed.
Implementation Guidelines					
Do you believe consolidation of WSUD policy guidance into a single code would make it easier to plan and deliver WSUD?	No responses	Generally yes but some were unconvinced that this was a good idea as WSUD includes diverse approaches and disciplines and a single code would 'cause a lot of conflict and confusion'.	Yes	Yes but could also make it 'unwieldy'.	Some suggested that education and training was a priority rather than developing more guidelines
Are there gaps in WSUD guidance that you believe need to be addressed? (E.g. policy guides, cost benefit analysis, etc.)	No responses	Policy, 'economic data', state-wide WSUD definition or objectives, design guidelines for WSUD structures. EXCEL based tool or guidelines for life cycle costing of WSUD assets would be helpful.	Guidance regarding costing was 'the elephant in the room'. Assets assessment and maintenance including maintenance costing, multi-benefit analysis, cost benefit analysis.	Cost benefit analysis and policy guidance.	For infill developments and policy implementation.

Questions	Qld	NSW	Victoria	SA	WA
WSUD Governance					
<i>What changes, if any, would you like to see in the current governance structure relating to WSUD? Why?</i>	There is a need to develop a governance structure for WSUD, which is lacking at present. Generally this needs stronger leadership from the State and oversight of council's decision-making processes and actions and a more collaborative approach to design and implementation of WSUD between practitioners, developers and councils.	No specific WSUD governance issues. Two responses said a special body should be created or nominated to support the implementation of WSUD policy and green infrastructure	Range of responses. WSUD governance was 'non-existent' and the state government was 'missing in action'. There was a need to clarify roles and responsibilities of various public bodies in regards to funding stream. It was more of coordination rather than a governance issue.	The current governance structure is fragmented and lacks leadership.	No responses
NRM and Catchment Planning					
<i>Do you think NRM policies and catchment planning should play a greater role in the implementation of WSUD? Please explain how this can be achieved?</i>	Yes – to identify strategic opportunities to deliver environmentally beneficial outcome at the catchment level.	Yes. Catchment management is currently spread across a number of government agencies and having a single body to manage such issues would be helpful. Developing an integrated NRM and catchment management strategies for the Parramatta River, Georges River, Lane Cover River, Cooks River and Hawkesbury-Nepean Rivers was also seen an important issue.	Yes. All planning should begin from catchment planning to identify strategic opportunities for water management.	Yes, but would need to be 'sound and truly addresses integrated water management no just pay lip service to it'	No responses
WSUD Definition					
<i>Would you support the National Water Initiative's working definition and principles of WSUD as the basis for a 'statutory' definition of WSUD? Please elaborate if there are any principles that you believe should be added or omitted.</i>	The definition should be revised and updated to align more with wider sustainability and liveability objectives of WSUD.	Limited or qualified support. It should be simplified to use simpler and more accessible language that better resonate with community values	Two out of three responses supported the definition	Generally yes if some of its aspects were updated and brought in line with the current thinking on WSUD.	No responses

Section 8 Benchmarking best practices

Summary

The existence of diverse policy landscapes for WSUD across the five jurisdictions raises a number of questions about what the best practice policy framework should be. These include:

- what is an appropriate range of policy tools for achieving not only effective and consistent WSUD outcomes, but also accommodating local variations and promoting innovation?
- what is the right balance between regulatory efficiency and flexibility in applying WSUD policy?
- should water quality objectives be identified as key drivers for the implementation of WSUD?
- how can infrastructure funding policy framework better support the implementation of WSUD?

Given the difference in regulatory approaches to statutory planning across the jurisdictions and views on how flexible WSUD policy should be, answers to the above questions and the concept of 'best practice' will vary from state to state. Nonetheless, it is useful to consider the characteristics of good regulatory system and best practice policy framework for WSUD in general terms to identify benchmark policies and planning practices.

The *Australian Government Guide to Regulation* (Commonwealth Australia 2014) defines regulation as 'any rule endorsed by government where there is an expectation of compliance' (p. 3). Rules can be in many forms and are not restricted to 'black-letter' law.

The *Victorian Guide to Regulation* (Victorian Government 2014) describes the characteristics of good regulatory systems and recommends the use of risk assessment in determining the level of regulatory intervention that is appropriate to address specific issues. The stated characteristics of good systems are said to include:

- effectiveness;
- proportionality;
- flexibility;
- transparency;
- consistency and predictability;
- accountability; and
- subjectivity to appeal.

Figure 34, endorsed in the *Victorian Guide to Regulation*, is regarded as a useful guide in assessing different regulatory approaches. It suggests that in general terms, a good regulatory approach for WSUD in the context of statutory planning is one which offers consistency and predictability through clearly binding policy whilst also offering flexibility through the adoption of performance based standards or targets able to accommodate changing circumstances and different local contexts. It also suggests that performance based regulation requires a 'high level of guidance' to minimise uncertainty, which is consistent with the Review's finding that detailed implementation guidelines and assessment tools can play an important role in implementing targets in a holistic manner to achieve broader liveability objectives.

	Advantages	Disadvantages
Prescriptive rules	<ul style="list-style-type: none"> • Certainty and clarity – requirements are set out in detail; standardised solutions; ease of enforcement • The decision to prosecute can be made on objective criteria 	<ul style="list-style-type: none"> • Inflexibility in meeting regulatory objectives • High administration and compliance costs • Unsuitable in industries subject to changing circumstances (e.g. due to technological change), where prescriptive rules may be rendered obsolete
Performance-based standards	<ul style="list-style-type: none"> • Suitable for industries subject to changing circumstances (e.g. due to technological change) • Greater flexibility in dealing with technical matters • Encourages least-cost means of achieving the outcome • Lower compliance costs • May encourage continual improvement through innovations 	<ul style="list-style-type: none"> • May lead to uncertainty as to whether actions undertaken satisfy standards set by regulation • Generate uncertainty because circumstances giving rise to prosecutions may be determined subjectively • May require high levels of guidance • Increased risk of non-compliance because standards may not be uniform across the industry
Process-based regulation	<ul style="list-style-type: none"> • Suitable for controlling substantial but diverse risks • Can be applied to complex areas of different operations subject to technological change • May promote innovation in the development of risk mitigation practices • May encourage greater ownership and accountability for risk mitigation practices 	<ul style="list-style-type: none"> • May be costly to administer (particularly for small firms) • There is a risk of regulatory creep where scope of risks covered or standards of controls required increase over time • Potential for overlap with other general regulation
Targeted regulatory requirements	<ul style="list-style-type: none"> • Suitable where regulated entities or activities pose varying risks • Enables proportionate targeting of regulatory requirements (and focussing of enforcement activity) on the basis of risk • Effective in ensuring that regulatory burden faced by regulated entities is not disproportionate/excessive 	<ul style="list-style-type: none"> • May only be feasible where there is a detailed understanding of the risk profile and ability to differentiate risk across regulated activities

Figure 34: Victorian Guide to Regulation Toolkit 1: Purposes and Types of Regulation (Government of Victoria 2014, p. 9)

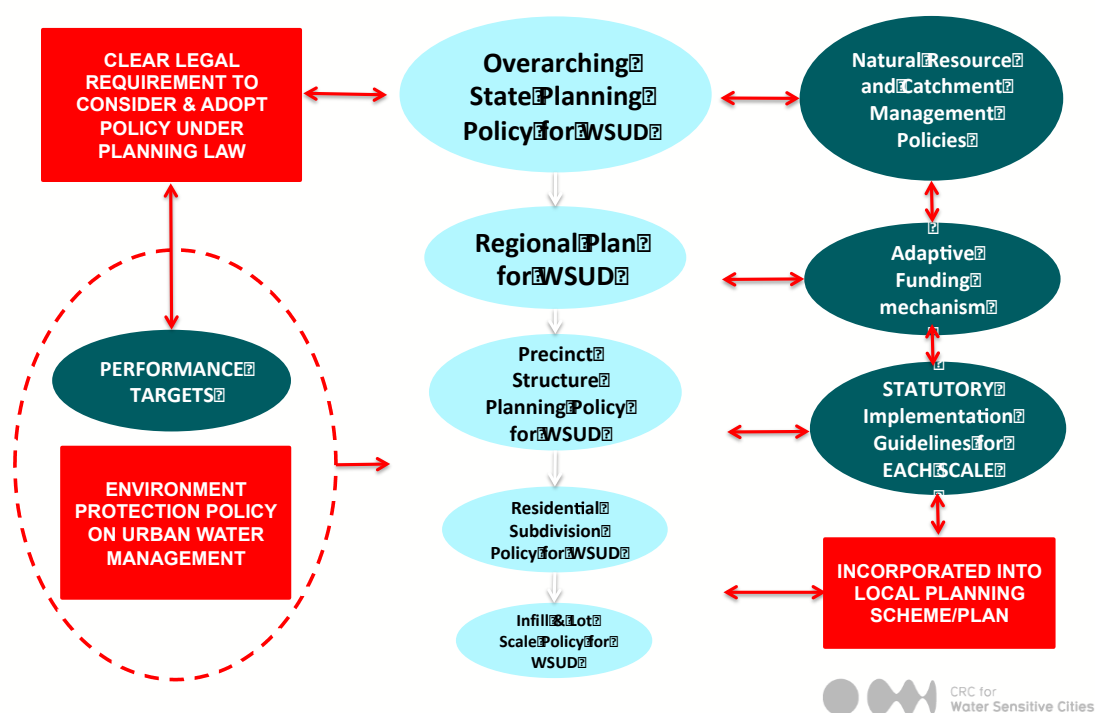


Figure 35: Diagram of a possible model for best practice policy framework for WSUD (Choi 2016)

The role of state planning policy for WSUD in best practice policy framework for WSUD

A clear legal policy framework is central to ensuring that decision-makers consider and implement policy at the local level in a transparent, predictable and consistent manner. As outlined in earlier sections of this report, each jurisdiction adopts a different regulatory approach to implementing WSUD policy. There is variability from council to council. Policy inconsistency is a common complaint among industry stakeholders. But there are varying views as to the effectiveness of discretionary approaches to WSUD policy.

Victoria's approach to WSUD, as far as it applies to new residential subdivision and urban growth areas, is mandatory and performance based. In comparison, other states adopt a more discretionary approach and provide broader state planning policy for WSUD that apply across various development scales. As discussed under above, WA has a comprehensive policy framework that is designed to be performance based, but it remains discretionary. It supports the implementation of WSUD at structure planning and residential subdivision scales by providing a detailed policy framework under the Liveable Neighbourhoods and the BUWM. Similarly in Queensland, WSUD is clearly supported under the SPP and the SEQ Regional Plan.

Queensland's planning system is not purely discretionary as there is a clear expectation and legal obligation for councils to integrate the provisions of the SPP into their planning schemes. Under the Planning Act which is to replace the SP Act in 2017, a planning scheme must 'coordinate and integrate the matters dealt by the planning scheme, including State and regional aspects of the matter' (s 16(1)(c)). Similar to Victoria, Queensland also provides the Queensland Planning Provisions (QPP) (to be replaced by a 'categorising instrument' under the Planning Act which forms the basis of all planning schemes. However, unlike Victoria, the QPP does not contain WSUD policy or references to the *State interest 3 – Water quality* and the SEQ Regional Plan.

In WA, section 77 of the P&D Act provides that the SPPs are to be given 'due regard' by responsible authorities in preparing and amending a local planning scheme. Similar obligations apply to the State Administrative Tribunal (the state's court with the jurisdiction to review planning decisions) when considering an application for

review (P&D Act s 241). While some WA participants in the project consultations did not consider this provision as being discretionary, the courts have consistently confirmed that the requirement to give 'due regard' requires the decision maker to consider policy but not to make decisions that are consistent with policy. In *City of South Perth v ALH Group Property Holdings Pty Ltd* [2016] WASC 141,³⁸ the court considered the meaning of 'due regard' and concluded that the phrase 'proper genuine and realistic consideration' was preferred to the phrase 'active and positive consideration' because the latter might suggest it created an obligation to reach a decision that was consistent with policy under consideration (paragraph 46). Put simply, this does not support the mainstreaming of WSUD practices.

SA also adopts a discretionary framework for applying policy. Whilst the new PI&D Act is a significant departure from its predecessor as it establishes a range of statutory planning instruments, the status of SA WSUD Policy under the new planning regime remain as unclear as under the current system.³⁹

8.1 Stakeholder views

A majority of stakeholders consulted across all jurisdictions generally supported mandatory policy framework for WSUD with flexibility for adopting to regional and local conditions with some suggesting that the state should set 'ambitious minimum standards' for WSUD. Some had reservations about a mandatory framework as this represented a 'one size fits all' solution which they considered inappropriate, particularly where hydrological conditions are highly variable.

Notwithstanding the difference in opinions, stakeholders from Queensland, SA, WA and NSW agreed that the current WSUD policy framework was not working well in their jurisdiction, largely due to lack of appropriate state policy on WSUD and mandatory requirement to apply policy.

The role of performance based standards

For industries subject to changing circumstances such as WSUD and urban water management, the *Victorian Guide to Regulation* suggests that performance standards are suitable as it:

- offers greater flexibility in dealing with technical matters;
- encourages least-cost means of achieving the outcome;
- provides lower compliance costs; and
- may encourage continual improvement through innovations.

A common theme in policy frameworks is complexity. Unless policy frameworks are structured in a clear hierarchy using a performance based approach supported by implementation tools, the policy may not be effective. Planners simply may not understand how to give effect to the policy. Planners are time poor and often have heavy workloads. It is, ultimately, unreasonable to expect planners to navigate unduly complex policy frameworks that are not supported by appropriately targeted implementation guidance and tools.

Commonly applied performance standards for WSUD have related to maximum allowable volume of pollutants in a particular body of water and flow rates of stormwater runoff from developments. All five jurisdictions identify water quality targets (stormwater runoff targets in particular) as one of the key objectives for WSUD policy, but only Victoria and Queensland impose state-wide mandatory targets (albeit limited to certain development types).

For other states, urban run-off targets are generally adopted under planning policy rather than environmental protection policy. In Queensland stormwater management objectives, including quantifiable targets, are contained in the SPP and form part of the interim development assessment requirements for developments on

³⁸ See also *Tah Land Pty Ltd v Western Australian Planning Commission* [2009] WASC 196; *Marshall v Metropolitan Redevelopment Authority* [2015] WASC 226.

³⁹ The PD&I Act does include a 'Planning and Design Code' which will incorporate a scheme that includes standard zones, overlays, policies and rules governing the use and development and prescribes 'principles of good planning' which includes 'sustainability principles' that suggest 'policies and practices should promote sustainable resource use, reuse and renewal and minimise impact of human activities on natural systems that support life and biodiversity'.

land which is 2500 m² or greater. Interim development assessment requirements apply where the provisions of the SPP are yet to be integrated into the planning scheme. Queensland's regulatory approach to stormwater management is not too dissimilar to Victoria's in the sense that these targets are mandatory and the EPP Water plays a similar role to the SEPP(WofV) by providing the state's environmental value and water management objectives for Queensland waters.

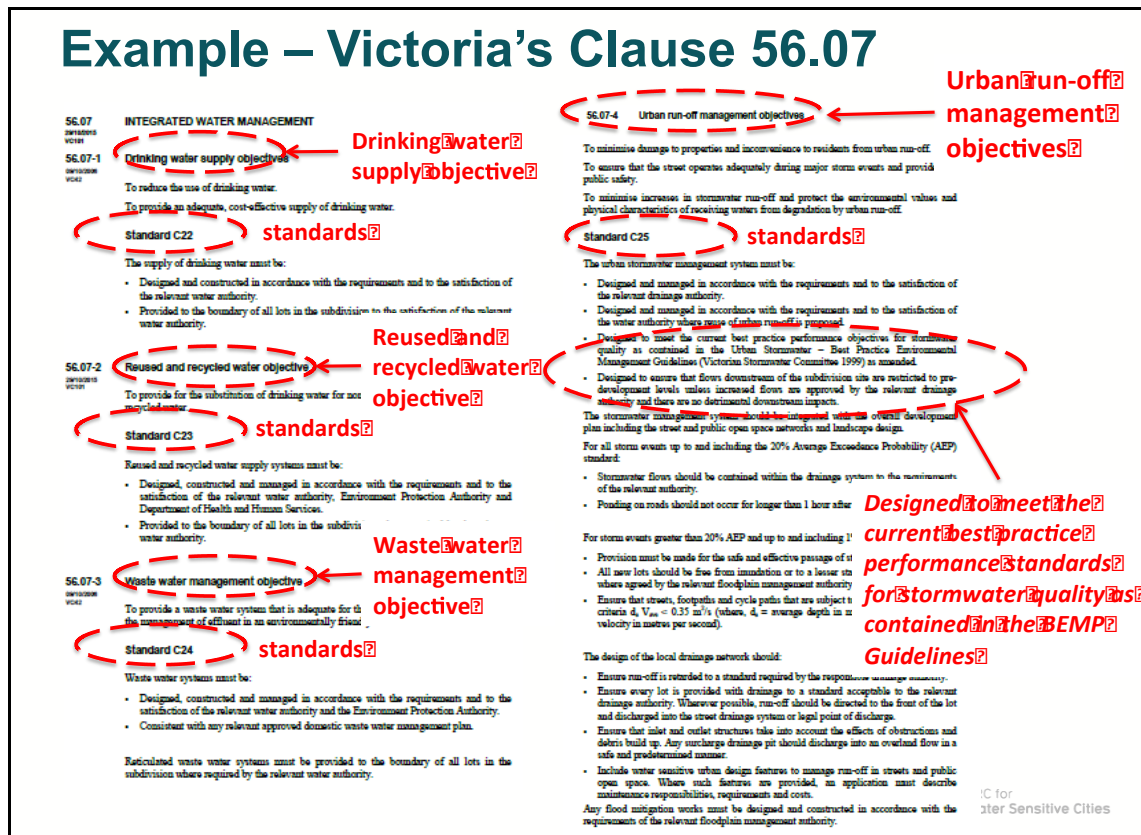


Figure 36: Illustration of clear regulatory aspects of Clause 56.07 Integrated Water Management (Choi 2016)

Infrastructure funding

There are a number of trade-offs and constraints on the ability of councils and other planning authorities to levy funds for infrastructure and POS. Some councils prefer to invest resources into WSUD in the public realm to achieve economies of scale, to enhance liveability outcomes and the amenity of POS, waterways, and streetscapes, rather than focusing exclusively on private land. Securing land to deliver WSUD outcomes is also an important planning consideration for strategic and statutory planners alike. It is therefore important to consider the range of funding options, including market mechanisms such as water quality offset schemes available to councils in each jurisdiction, in addition to how POS planning is integrated into this process.

In 2011, the Productivity Commission examined the infrastructure delivery and funding mechanisms of Australian states and territories as part of the investigation into *Performance Benchmarking of Australian Business Regulation*. In it, the Productivity Commission enumerated the following principles as being 'leading practice' for levying developer contributions:

- use upfront charges to finance **major shared infrastructure**, such as trunk infrastructure, for new developments where the incremental costs associated with each development can be well established and where such increments are likely to vary across developments. This would also accommodate 'out of sequence' development;

- **infill development** where system-wide components need upgrading or augmentation that provide comparable benefits to incumbents should be funded out of borrowings and recovered through rates or taxes (or the fixed element in periodic utility charges);
- for **local roads, paving and drainage**, it is efficient for developers to construct them, dedicate them to local government and pass the full costs on to residents (through higher land purchase prices) on the principle of 'beneficiary pays';
- for **social infrastructure** which satisfies an identifiable demand **related to a particular development** (such as a neighbourhood park) the costs should be allocated to that development with upfront developer charges and appropriate financing mechanism; and
- for **social infrastructure where the services are dispersed** more broadly, accurate cost allocation is difficult if not impossible and should be funded with general revenue unless direct charges (such as for an excludable service like a community swimming pool) are possible.

Though it will generally be simpler to require a developer to build drainage assets at the subdivision scale, wherever practicable the IWM planning should occur at the precinct scale to identify the best opportunities for management of water in the public realm and to conserve natural features and waterways. This may warrant construction of infrastructure on public land around waterways, or land owned by a number of different developers.

Where a drainage system is to be constructed by public authorities, development economics may mean that permanent drainage infrastructure may not be constructed for many years, until sufficient revenue from levies has been collected. Development contribution schemes need to be flexible enough to respond to the conditions of the relevant sub-catchment, and allow for temporary drainage works in such circumstances.

In all jurisdictions development contributions (whether by way of up-front cash payment or work-in-kind) play a central role in funding trunk infrastructure in growth areas. But, as confirmed by the Productivity Commission's report *Performance Benchmarking of Australian Business Regulation* (2011), there is marked variability in the rates that can be charged and the approach to levying development contributions across the jurisdictions.

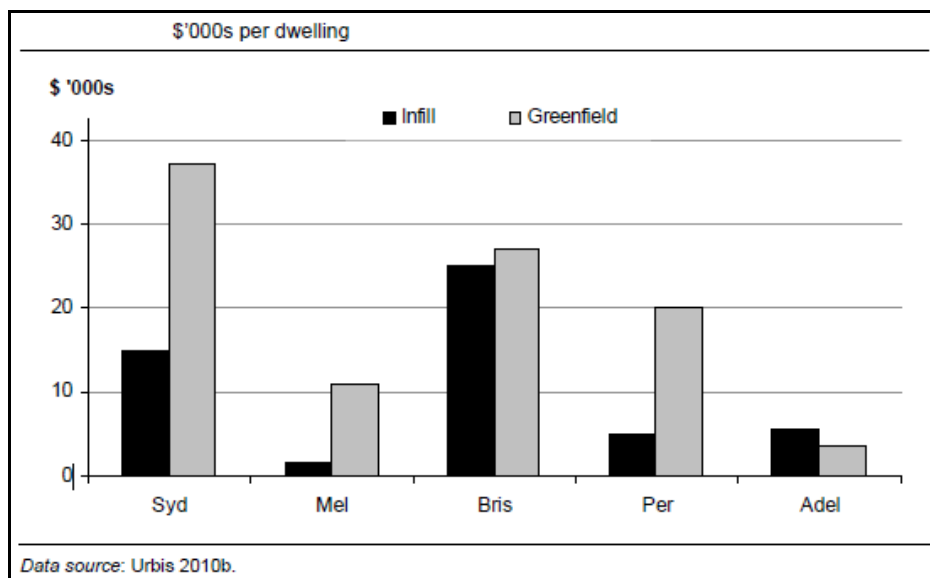


Figure 37: Residential infrastructure charges infill and greenfield 2009–10 comparison between five cities (Productivity Commission 2011, p. 212)

Both Victoria and WA allow development contributions in addition to the headwork charges but in practice their capacity to levy development contributions to fund WSUD infrastructure is constrained by a number of factors. In Victoria, the P&E Act allows a planning scheme to include one or more Infrastructure Contributions Plans for the purpose of levying contributions for 'community infrastructure' or 'development infrastructure'. However, in metropolitan Melbourne it is uncommon for such plans to include levies to fund trunk drainage infrastructure and in most cases, proposal to fund WSUD upgrades through a DCP is subject to a contested hearing before a planning panel. The council will, as far as is possible, require the developer to incorporate stormwater

infrastructure within the subdivision. This can mean that the opportunities to plan and fund public realm IWM outcomes across a precinct can be limited.

Similarly, councils in WA can levy 'standard development contributions' for the costs of 'standard requirements for infrastructure' and 'community infrastructure' in both greenfield and infill developments. Standard provisions include POS contribution, on-site and off-site capital infrastructure works, and the 'planning and implementation of urban water requirements'. Where councils are seeking development contributions beyond the standard provisions, they must be supported by a DCP, which identifies the need for such infrastructure for the relevant development and contribution area or by a voluntary agreement between a developer and the relevant council.

Councils in other jurisdictions are similarly constrained in their capacity to levy development contributions for WSUD as WSUD upgrades or infrastructure are still largely considered as 'non standard' infrastructure even where there is state planning policy for WSUD. Queensland councils are required to include a PIP/LGIP in their planning scheme to identify their plans for trunk infrastructure that are necessary to service urban development at the 'desired standard in a coordinated, efficient and financially sustainable manner' (Department of State Development, Infrastructure and Planning 2015). Councils that do not have a PIP/LGIP or plans for trunk infrastructure attached to their resolutions will have limited condition powers for trunk infrastructure.

In Queensland typical trunk infrastructure remains narrowly defined under the *Statutory Guideline 03/04, Local Government Infrastructure Plans*. The Guidelines provide no reference to WSUD apart from land or work for water storage facilities (e.g. reservoirs) and bio-retention swales. While these are part of an 'indicative' list of what the state considers as 'typical trunk infrastructure', a survey of the 'plans for trunk infrastructure' under the Brisbane City Plan suggests pipes and backflow prevention devices remain dominant type of stormwater projects.⁴⁰

In Victoria there is no specific charge relating to imperviousness. Charges for residential dwellings in Queensland do not include a separate levy for stormwater based on site imperviousness. Schedule 1 to the SPR Provision (adopted charges) allows a maximum adopted charge of \$10 per m² of impervious surface for stormwater for a range of uses relating to commerce, industry, education, entertainment, essential services, sports and recreation, with exemption applying to rural industries and agriculture. In NSW, council can charge a \$25/dwelling or \$25/350 m² stormwater levy for business properties but this can only be levied when a council is providing additional or a higher level of stormwater management service to eligible land.

8.2 Offsets

Market mechanisms such as water quality offset schemes have the potential to unlock developable land and increase development yield in infill context, and the funds from such schemes can be used to deliver stormwater infrastructure on public land to achieve water quality outcomes and public benefits (e.g. amenity) that might not otherwise be realised. Although a number of councils across the jurisdictions are implementing a localised water quality off set scheme, market mechanisms are not in place at the state level in all jurisdictions apart from Victoria.

8.3 Stakeholder views

All stakeholders across the jurisdictions suggested that the current regulatory framework in their own jurisdiction was not working well. A common concern raised by councils was the increasing maintenance burden attached to WSUD assets that are handed over to councils. In Queensland, consultation participants noted that councils tended to bear the burden of water quality improvement and maintenance costs of WSUD assets that were often poorly delivered.

In NSW, the current capped amount for development contribution for residential dwellings was seen as being 'well below costs to councils' due to other competing interests such as POS, roads, and community facilities towards which the contributions needed to be applied. In WA, councils suggested that many councils were reluctant to use the DCPs to fund WSUD in the public realm as they were costly to prepare and implement.

⁴⁰ See Part 4.6.2.1 (Schedule of Works) of BC Plan, which reveals that 52 of 54 funded stormwater projects are for pipes and backflow prevention devices.

While most supported the use of market mechanisms in principle, many were concerned about it leading to 'lazy decision-making'⁴¹ in the absence of a rigorous and transparent policy framework.

Public open space planning

The implementation of WSUD would benefit from better integration of WSUD policy into POS planning. Councils require a suite of policy tools to give POS planning an effective role in the implementation of WSUD, rather than merely the power to levy POS contributions. This is because councils across all jurisdictions are subject to the pressure of using the contribution to provide active POS or the funds from it to embellish community infrastructure. Arguably, this is the case in Queensland, NSW, and SA. Despite the councils' relatively wide discretion to set the POS quantum in those jurisdictions, their ability to apply to do so and implement WSUD may be constrained by lack of policy support or requirement to prioritise WSUD and IWCM in the POS design.

In Victoria, POS provision in growth areas is generally determined through a PSP and DCP process where the council will generally fund the acquisition of POS as part of the DCP arrangements. PSP Guidelines provide relevant standards for 'open space and natural systems' (p. 34), which encourage WSUD to be considered and embedded in the design of POS early in the planning process to achieve integrated water management as required under clause 56.07. POS allocations may be in excess of 20%, well over the 10% allocation rate recommended under the PSP Guidelines and allowable in some other states, if there is encumbered land. Encumbered land includes linkages along waterways, undevelopable flood plain land, and land constrained by native vegetation or easements, and is often gifted to councils free, low cost, or in return for a credit against DCP liabilities. This system therefore allows councils to prioritise the application of DCP funds and POS levies on acquisition of developable land for 'active' POS, which provide recreational and community benefits.

While WA adopts a similar approach to Victoria, its effectiveness for WSUD may be limited by the state's subdivision approval process and lack of a clear and transparent framework within which councils may 'guide' the setting of POS quantum by the WAPC. In WA, for a plan of subdivision that creates three or more lots, WAPC is the approval authority. It may therefore set a condition that a portion of the land be set aside and vested in the Crown for parks, recreation grounds, or open spaces generally, or pay the council a sum that represents the value of the portion in lieu (s 153). Section 152(1) of the P&D Act provides that if the WAPC has approved a subdivision subject to a condition that one or more areas of land shown on a plan of the subdivision are to be set aside for any one or more of the following purposes, the subject land vests in the Crown:

- conservation or protection of the environment;
- an artificial waterway;
- a pedestrian accessway;
- a right-of-way;
- a reserve for water supply, sewerage, drainage, foreshore management, waterway management, or recreation; or
- a public purpose specified in the condition and related to the subdivision.

POS contribution quantum is set at 10% of the gross subdivisible area under the SP 3.6, Liveable Neighbourhoods and the *Development Control Policy 2.3 Public Open Space in Residential Area*, and may comprise:

A minimum of 8% active and passive recreational purposes where the remaining 2% (of the overall minimum 10%, or one-fifth) comprises 'restricted use POS' uses.

The 'restricted use POS' is considered to be:

- natural areas and cultural features;
- urban water management measures such as swales and/or detention areas;
- artificial lakes/permanent drainage ponds; and

⁴¹ During B5.1's consultation across the five cities this was a common concern for many LGAs in regards to market mechanisms.

- natural wetlands.

The Liveable Neighbourhoods suggests 'restricted use POS' may exceed the maximum 2% as defined above, where an 'appropriate management plan' is agreed by the WAPC in consultation with the council and the developer. It also suggests that WAPC 'will be guided' by the council, particularly on matters relating to the size and distribution of POS, landscape design, and park maintenance arrangements. While in theory these provisions provide councils with some latitude to vary and consider the POS contributions quantum on a case-by-case basis, stakeholders have suggested that in practice, councils have little opportunity to do so because they are generally not closely involved in the approval process.

These different jurisdictional approaches, therefore, suggest that the allocation of encumbered areas for drainage and passive open space for IWM purposes should be the subject of further policy development and benchmarking.

8.4 Stakeholder views

Stakeholders suggested that POS planning was currently done in a piecemeal way and insufficiently integrated with WSUD policy in their jurisdiction. They also suggested there was a need to review the POS policy and the minimum requirement under the Liveable Neighbourhoods and the SPP3.6 against a range of issues councils must consider in relation to POS planning, including increasing demand for active POS, rising land values, and falling revenues.

Section 9 Conclusions

Summary of opportunities and issues

There are many issues that present opportunities for harmonisation of policy and adoption of best practice. Some states are strong in some areas, but weaker in others. In broad terms the issues can be categorised thematically as follows:

- National standards, and policy harmonisation and consolidation
- Use of mandatory, performance based approaches to regulation
- Policy integration and leadership (role of the state and local government)
- Use of market based instruments and water quality offsets
- Infrastructure funding
- Role of cost benefit assessments
- Governance reform and institutional capacity.

National standards and policy harmonisation

The Project has identified that policy development at the state and local levels has resulted in publication of a diverse array of policies, guides, and technical documents. The task of a planner trying to navigate the policy WSUD framework is currently not simple. Whereas policy guidance for environment protection and road planning generally sits within a discrete statutory hierarchy, policies for urban water management tend to be set out in multiple locations and often are not included within a hierarchical statutory policy framework. This makes it difficult to know what role each policy should play or how it should be applied within particular planning scales.

Unlike comparable areas such as road engineering and plumbing, we don't have national standards for WSUD planning, engineering, design, construction, and maintenance. A national benchmarking exercise is warranted, so that cash strapped local governments do not have to reinvent the wheel when it comes to WSUD policy development. A national approach will also support mainstreaming of WSUD practice because it will challenge the arguably outdated notion that WSUD is unconventional. Perhaps that may have been the case 10–15 years ago, but WSUD is now an entrenched aspect of the planning landscape, with varying degrees of adoption across different jurisdictional boundaries.

Many policies are out of date, due for review, or have been partly or wholly superseded. There is an opportunity for state and federal government to conduct a review of WSUD policies with a view to achieving better harmonisation, simplification, and ease of access. This may involve development of 'one stop shop' websites in each state that explain the policy hierarchy and application of different publications at varying planning scales. Inherent in such an approach, however, must be recognition that state policy should provide leadership and that local governments need to develop supplementary local policy frameworks for WSUD.

Use of mandatory performance based approaches to regulation

The Project has found that there is great variability in the implementation of WSUD across the jurisdictions and most governments are yet to harmonise and incentivise WSUD practice. Many jurisdictions have developed WSUD policy at the state level to guide further planning at the local level, rather than setting out a state-wide code based approach that minimises the need for local policy to give effect to state WSUD policy.

In most states application of WSUD policy remains discretionary and generally unsupported by binding codes or standards with specific targets. While water protection targets such as pollutant load reduction targets and stormwater flow targets are usually identified as being important in a policy sense, most jurisdictions apply them within a discretionary framework which can lead to inconsistent outcomes.

B5.1's research reveals that each jurisdiction has a different approach in developing WSUD policy and adopts different policy tools to achieve this balance. Most jurisdictions support the use of local policy approaches, as

accommodating flexibility for local variations to the implementation of WSUD. Largely, decision makers are applying discretionary policy frameworks with varying approaches to setting targets.

However, as the project consultation outcomes suggest, consistent uptake of WSUD across the jurisdictions may be difficult to achieve within a discretionary framework where competing interests can override WSUD policy.

Policy integration and leadership

If WSUD is to continue its growth as an increasingly mainstream urban design methodology, there is a need for consistent and clear regulatory obligations to guide future planning that rely less on the articulation of local policy responses and the exercise of discretion. A performance based code approach with general application is recommended. Such an approach should, wherever practicable and appropriate, be supported by the use of modelling software which gives effect to prescribed water quality objectives (e.g. STORM and MUSIC tools). Flexibility in achieving mandatory objectives can be provided by articulating 'deemed to satisfy' measures (adopted, as necessary, in many residential design codes and the NCC).

Such an approach is to be preferred over the reliance on local planning policy responses. This can accommodate local variations, provided that the state policy framework articulates the mandatory requirements, and offers decision tools that allow developers to find compliant solutions at least cost.

Water quality objectives and targets can play a key role in the implementation of WSUD if supported by detailed implementation guidelines and a clear legislative requirement to achieve targets through WSUD. Targets should form part of an overarching catchment or regional level urban water management strategy and, where possible, be implemented through place based planning processes to ensure that net environmental benefits are achieved at scale. Performance targets can achieve flexible and innovative outcomes in the context of WSUD and urban water management if they are supported by a performance based policy framework with implementation tools that provide for consistent modelling and assessment methodologies.

WSUD policy and controls should be provided at each planning scale as they play important and different roles in the implementation of WSUD.

Regional plans can outline regional and catchment level water quality and integrated water cycle management objectives to identify broader strategic opportunities for achieving them through urban planning. Precinct planning can play a central role in identifying spatial opportunities for WSUD early in the planning process in greenfield or large brownfield sites, if there are clear requirements to incorporate WSUD in the design of structure plans. It also requires a clear set of standards against which the precinct design can be prepared and assessed.

Given the lack of planning controls on lot scale developments in most jurisdictions, appropriate WSUD requirements need to be embedded in all residential design codes and building regulations.

Market based instruments and stormwater offsets

While concerns around offsets leading to lazy decision making are recognised, the Project considers that they have an important role to play in areas with high imperviousness, where the opportunities to retrofit WSUD infrastructure at scale may be limited. The underlying value of a market-based approach is that it can re-direct investment to the location where it can have the most impact.

It ought not follow that this will always come at the expense of on-site solutions. Provision of on-site WSUD features is to be encouraged in greenfield areas for a range of reasons, but we should also recognise that in greenfield areas IWM is often delivered in the public realm. In areas where larger lot sizes prevail (e.g. established rural residential areas in peri-urban areas), on-site solutions may be preferable.

Policy makers should be encouraged to identify areas where investments in WSUD technology can have the most impact. Market based instruments are seen as being most useful in established areas with small lot sizes and/or high imperviousness, where the net benefits of on-site solutions may be lower, and where economies of scale can be achieved through provision of water management infrastructure in the public realm. Market based

approaches can assist in funding infrastructure at scale and can be integrated with other levies and charges that may apply to existing development.

Infrastructure funding

Many jurisdictions are implementing capped development contribution levies and measures to make the infrastructure funding system more transparent and consistent. Nonetheless, opportunities to fund WSUD in the public realm through development contributions remain limited for councils as the scope of standard trunk infrastructure is yet to be broadened to expressly include WSUD and align with WSUD objectives.

The ability of planning authorities to use development contributions to fund water infrastructure is constrained. It often relies heavily on the role of a water authority that is not responsible for local drainage to deliver and fund water infrastructure. As planning policy is often not well aligned with water infrastructure planning, there is a significant likelihood that opportunities to achieve synergies between planning infrastructure and water infrastructure are not realised. Planning often excludes drainage and WSUD from infrastructure funding charges, on the basis that they will either be delivered as part of the local drainage system, or by the water authority. Unless there is an IWM Plan included as part of a growth area planning framework and the relevant precinct structure plan or master plan, then councils and water authorities may have minimal incentive to align their efforts to achieve WSUD.

While WSUD can be delivered as part of a subdivision, or on each lot, this may not always be the most economically efficient approach. In some cases, it will be more cost effective for WSUD assets to be paid for by the developer, and delivered on public land that is to vest in the council or another public authority with waterway or drainage management obligations (and thereafter be maintained by the council). Such an approach requires explicit support in infrastructure charging rules, otherwise the tendency will continue to be reliance on traditional conveyance approaches to stormwater management – approaches driven by the single objective of managing flood peaks, that fail to achieve multiple urban design outcomes.

Benchmarks for open space planning (and in particular, use of passive open space for waterway and drainage functions) do not exist at the national level. Approaches to planning for drainage easements and passive open space for drainage purposes vary markedly from state to state. Planners would be assisted by the development of a National Environment Protection Measure, or similar, that provides national guidance on best practice, adopting a WSUD approach to waterway protection, water quality management, and drainage design.

Cost benefit analysis

While there have been many studies on cost benefit analysis of WSUD in varying contexts, too often the cost benefit analysis has to be done on a project by project basis. Local planning authorities would be assisted by an holistic and independent cost benefit assessment of WSUD stormwater infrastructure as a basis for making future funding and planning decisions.

As outlined above, cost benefit analysis have not always considered the long term resource efficiencies and public benefits of infrastructure. Policy makers need to be cautious and should not accept approaches that focus excessively on up front capital costs. Drainage infrastructure is often planned over 30+ year time horizons. Cost benefit analysis often focuses on the capital costs of providing alternative water supplies, but is not often tailored to the needs of local government in funding stormwater infrastructure. Through the proposed National Stormwater Initiative there is an opportunity to develop cost benefit analysis that can be used by local planning authorities and pricing regulators, which provides a broader basis for acceptance of WSUD approaches, and which counters 'perceptions' and fears about costs associated with new forms of infrastructure.

Governance and institutional capacity

The problems of fragmented management of stormwater has been recognised for many years and was noted through the National Water Initiative and recent reviews by the Commonwealth. However, little has been done to address this challenge at the state level.

It is considered that there is an important distinction to be made between centralised planning and decentralised delivery and implementation of WSUD policy. The Review contends that greater state leadership and policy harmonisation is warranted. It does not follow, however, that implementation needs to be centralised.

Greater coordination of policy development and delivery can be facilitated by aligning planning processes and infrastructure delivery by water authorities and local government where there is a synergy to be achieved.

At the same time, local governments need a fair and equitable funding capacity to deliver, maintain, and repair infrastructure. There is a concern among some local governments that state governments are shifting management obligations to local government, while at the same time constraining local government's ability to raise revenue.

Stormwater projects are often contingent on grant funding by the water sector or the state government. If funding is not assured, the potential for WSUD engineering capacity within local government to grow consistently cannot be assured in a constrained revenue environment. Governments should consider how local government can better fund stormwater planning and services.

Issues to consider include:

- reform of special charge schemes;
- allowing councils to adopt a 'fee for service' approach to stormwater management;
- re-allocation of revenue from sustainability levies charged by water authorities to local government; and
- reviewing legislation to better align planning, funding, and delivery of drainage and water infrastructure between the water sector and local government.

It is important to provide councils and planners with capacity and resources to assess, monitor, and enforce targets. However, over time, WSUD should be seen as a core skill of urban planners and water professionals involved in the development sector. Building institutional capacity should be seen, in part, as a transitional issue that reflects the reality that WSUD is a contemporary approach that challenges entrenched views about traditional water engineering.

Section 10 Recommendations

All jurisdictions

National standards

1. COAG to support development of a National Environment Protection Measure or Australian for IWM and WSUD that addresses the matters arising in these recommendations relevant to all jurisdictions.
2. Develop a National WSUD definition that can be adopted in each state, or as basis for future legislation and policy development.
3. Develop a National technical standard for WSUD infrastructure that can be accredited for the purposes of the National Construction Code and for town planning purposes.
4. In applying the proposed NEPM referred to above, empower the Australian Building Codes Board to develop a national performance requirement and technical standards for minimising off-site stormwater discharges that can be adopted as part of the NCC (subject to variations in each state), and for potential use in the NCC and local development codes applicable to developments not requiring planning permission, with flexibility to allow payment for off-site discharge by agreement with the relevant drainage authority.
5. Review the National Construction Code to specify revised minimum water efficiency standards for apartment developments with multiple tenants or owners corporations, where tenants have limited ability to select water efficient fittings.
6. Develop a model governance framework for the development of water quality offset schemes by water authorities and local governments.
7. Further develop capacity building programs and web based platforms that act as a 'one stop shop' for WSUD guidance.

Harmonise and consolidate policy and guidance

8. Review and consolidate existing guidance WSUD policy and technical guidance.

Governance and institutions

9. In order to overcome fragmented management responsibilities, promote centralised regional planning for IWM and de-centralised delivery, supported by appropriate funding mechanisms, market based instruments, and development contributions regimes.
10. Review legislative arrangements relevant to urban stormwater planning, delivery, and funding to better align the water sector with the urban planning framework. In particular, alignment of medium and long term planning of capital investments and infrastructure at the regional and catchment scale is required to align investment in IWMN infrastructure.
11. Develop specific legislation for the management of urban stormwater, with clearly defined statutory duties, functions, and powers for relevant public authorities, with clear linkages to existing legislation relevant to the water sector and local government.

Planning policy

12. Review imperviousness standards based on scientific modelling of risks to catchment and receiving waters as a basis for developing and refining planning standards for urban water management, with regard to predicted future rainfall patterns.
13. Incorporate performance based codes into state planning policy to minimise the burden placed on local governments to develop WSUD policy with respect to smaller developments (including single detached dwellings), and to reduce uncertainty associated with discretionary policy approaches to WSUD.
14. Policy frameworks should include application requirements for medium and large scale development applications to provide assessments on the basis of identified quantitative standards for flood risk and water quality, supported by accredited stormwater modelling tools.
15. Policy frameworks for smaller developments including single dwellings should provide simple compliance tools that do not require the applicant to engage external consultants. Self-assessment should be facilitated by the identification of practicable deemed-to-comply measures.
16. The use of accredited modelling software as a tool for strategic planning and development of IWM plans (e.g. MUSIC and STORM) should be supported and expanded.
17. Develop benchmarks for the minimum provision of setbacks from waterways, and provision of passive open space available for water management purposes, for planning at all relevant scales.
18. Policy should recognise that land encumbered for drainage purposes is not developable for land valuation purposes.
19. Develop metropolitan and catchment scale infrastructure priorities for IWM that can be integrated with metropolitan planning strategies, catchment planning, and precinct scale planning processes. Identify medium and long term planning and infrastructure funding processes to deliver priority infrastructure that requires collaboration across municipal and catchment boundaries (e.g. an IWM opportunities atlas).
20. Consider how the use of strategic environmental impact assessment processes under the EPBC Act and accredited assessment processes under bilateral agreements can be promoted for the specific purpose of better integrating urban water management and town planning in growth areas and strategic development areas, to support biodiversity outcomes for Matters of National Environmental Significance.

NRM and catchment planning

21. Better integrate NRM and catchment planning using statutory linkages (by requiring planning schemes to incorporate and give effect to prescribed instruments relevant to urban water management, where these form part of a catchment planning framework).
22. Better link catchment planning with regional planning processes, to provide a clearer linkage between catchment planning into structure planning processes relevant to IWM.

Infrastructure funding and market based instruments

23. Apply revised imperviousness standards (metropolitan scale) as a basis for setting developer charges and offset payments (for areas where it is not practicable to achieve the imperviousness standard on-site).
24. Consider the use of modelling software at the city and catchment scale to model areas where high levels of imperviousness create externalities that can be priced and used in market based approaches to stormwater regulation.

25. Expand the use of market based approaches and stormwater quality offset schemes in areas where it is not possible or practicable to achieve imperviousness standards for new and existing buildings. Ensure offset schemes do not undermine the delivery of WSUD on-site where it is appropriate to require on-site delivery (e.g. established areas with relatively low imperviousness or large lot sizes).
26. Consider financial mechanisms (levies, service rates, and incentives) to target older housing stock that is beyond the reach of the planning system, that has high levels of site imperviousness and contributes to water quality degradation.
27. Review existing environmental levies in each state for opportunities to better target and align allocation of funding between the water sector and local government, promoting economies of scale in capital investment in stormwater and WSUD by local government and state agencies.
28. Subject to the provision of a sustainable long term funding model that would allow councils to fund compliance with a new regulatory obligation, consider the merits of regulating discharges from stormwater drainage. Such a reform would need to ensure that local government was not unfairly exposed to unrecoverable costs and sanctions, given that it ultimately cannot physically prevent discharge of pollutants to the stormwater system by landowners. Consideration should be given to the US EPA regulatory approach and funding model for local stormwater utilities, applying the Polluter Pays Principle.
29. Past experience shows that in some cases cost benefit analysis of WSUD items has focused solely on up-front capital costs of WSUD items, without including the long term water efficiency benefits from provision of rainwater tanks, or the public benefits that bioretention systems offer. Ensure that cost benefit assessments of IWM proposals and IWM plans includes resource savings and other public benefits that accrue into the future (after the development process has been completed). Assessments should include cost savings to future occupants.
30. A national model for cost benefit analysis tailored to the planning system should be developed as part of the National Stormwater Initiative.
31. Environmental accounting standards should be further developed for use in costing urban water infrastructure, to assist evaluation of policy options.

Rainwater tanks

32. Further research should be conducted to consider the contribution that rainwater tanks can make to reducing peaks in unseasonal flows and water quality degradation.
33. Consider how rainwater tanks and rainwater harvesting schemes can be used in conjunction with PSP processes, in areas where there is inadequate room for stormwater basins to detain and treat runoff.
34. Through COAG, establish medium and long term goals for increased use of rainwater tanks as supply options for non-potable water.

Stormwater harvesting and recycled water

35. State environmental regulators to consider the costs and benefits of regulating stormwater discharges, as a basis for driving investment in the urban stormwater network, underpinning market based approaches that minimise reliance on public revenue.
36. Develop economic models that underpin a business case for licensing of use of stormwater and discharges into urban stormwater systems, in order to mitigate constraints on local governments' ability to manage stormwater discharges to receiving waters.

37. Consider the use of a price signal or service levy for management of stormwater discharges for existing development that does not meet imperviousness benchmarks. For example, local governments should be empowered to impose a 'service charge' for receipt and disposal of stormwater.
38. Support water authorities, and councils to expand reticulated recycled water supply systems:
 - a. to growth areas and large scale urban renewal precincts (short–medium term); and
 - b. to established areas (medium–long term).

Queensland

It is recommended that Queensland consider:

1. integrating WSUD policy into a standard instrument that is incorporated or referenced into all local planning schemes;
2. clarifying and strengthening the status of *Environment Protection (Water) Policy 2009* and the legislative basis for urban water quality targets within the planning policy framework;
3. better supporting urban water management targets under the SPP and the SEQ Regional Plan with WSUD implementation guidelines and a clear requirement to apply WSUD to achieve targets;
4. broadening the scope of the *State interest 3 – Water quality* under the SPP and the SEQ Regional Plan to include full range of WSUD objectives;
5. revising the definition of 'trunk infrastructure' to include WSUD for Local Government Infrastructure Planning purposes;
6. ensuring guidance and technical support is available free of charge;
7. reviewing the cost benefit analysis carried out by the QCA that leads to the removal of MP4.2 to the QDC; and
8. developing policy for the broader application of water quality offsets as a means of providing WSUD outcomes at least cost as the state's Environmental Offsets Framework.

New South Wales

It is recommended that NSW consider:

1. development of a state-wide SEPP on IWM and WSUD and a clear legislative requirement for its adoption into the Local Environmental Plans (**LEPs**);
2. clarifying the legislative basis for enforcing urban water quality targets and objectives. The Protection of the Environment Policies (**PEPs**) could be used to implement state policy on urban stormwater quality and flow;
3. creating a statutory requirement to give effect to the relevant Water Quality Improvement Plan (**WQIP**) in planning and development decision-making processes to better integrate catchment planning with land use planning; and
4. expanding the range of implementation guidelines for WSUD and making them easier to locate.

Victoria

It is recommended that Victoria consider:

1. amending the VPP to provide an overarching planning framework based on clause 56.07 and the PSP Guidelines that unify planning for WSUD and IWCM across all planning scales;
2. developing an IWM and WSUD opportunities atlas, to identify priority water management projects that provide benefits across municipal and catchment boundaries;
3. developing a regional plan for funding water infrastructure, so councils and Melbourne Water can develop policy for discrete sub-catchments and development fronts. A catchment based approach to

investment in regional WSUD infrastructure is worthy of some consideration so that opportunities to maximise the public benefit in WSUD investments are not hindered because of institutional boundaries;

4. providing a cost benefit analysis for WSUD investments tailored to local council needs and costs curves for different WSUD technologies at varying scales;
5. considering how funds from the Environmental Contributions Levy and other drainage charges collected by water authorities could be used to support regional and sub-regional integrated water management priorities identified through planning processes; and
6. developing a statutory environmental offsets framework to expand use of a market-based approach to urban stormwater quality.

South Australia

It is recommended that South Australia consider:

1. clarifying the legal status of the SA WSUD Policy by requiring councils to adopt it into the Development Plans;
2. giving the Planning Strategy and the SAPP Library a clearer role and statutory weight;
3. integrating the state's water and stormwater management policies, along with the Stormwater Management Fund, into the planning policy framework; and
4. reviewing the SA council's power to levy funds for WSUD through developer contributions.

Western Australia

It is recommended that Western Australia consider:

1. integrating WSUD policy into the Model Provisions for local planning schemes and the Region Schemes, which could assist in a transition to a more efficient and consistent policy framework;
2. giving the state's *Environmental Protection Policy* a more central role to establish the legislative basis for enforcing urban water quality targets and objectives currently contained in the BUWM and the Stormwater Management Manual;
3. the development of a city wide performance based, code based approach to development of WSUD policy, supported by accredited water modelling software tailored to local conditions;
4. reducing reliance on each local government planning authority to develop WSUD policy by providing a code of general application which can include local variations, where appropriate;
5. funding the development of modelling products that can be used in development assessments tailored to the particular groundwater conditions that affect urban development in Perth;
6. changing the timing of UWMPs to be prepared prior to the subdivision approval rather than as a condition of the subdivision approval; and
7. consolidating and harmonising responsibilities for urban stormwater management to assist in achieving integrated approaches to water management and land use planning.

Appendix 1 Summary of project consultation

Queensland

The Queensland project consultation workshop was co-hosted by Healthy Waterways and held at its office, 200 Creek Street, Spring Hill on Friday 18th March 2016. Three councils, two regional councils, the Department of Environment, Heritage and Protection, and Unity Water attended the workshop.

Reform priorities

Workshop attendees were asked to nominate their top three reform priorities for Queensland by marking against the reform themes identified in B5.1's Issues Paper.

From this exercise, state planning policy, WSUD at different scales, and funding were nominated as top reform priorities. Refer to Figure 38, below.

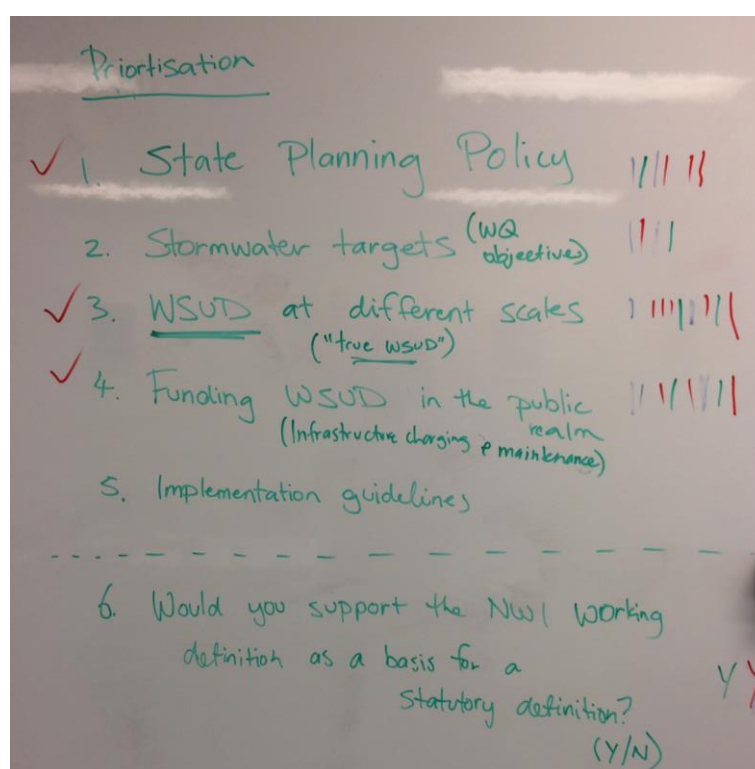


Figure 38: QLD top reform priorities

State Planning Policy for WSUD

WSUD obligations should be set by the state to achieve a consistent uptake and provide leadership for councils. However, there should be flexibility for adapting to local conditions and achieving liveable and innovative outcomes that address the full range of WSUD objectives.

The state WSUD policy framework is not working well. The SPP was too narrowly focused on water quality targets and therefore did not support the full range of WSUD objectives.

If a software tool for assessing development outcomes were to be reflected in planning policy, there was a risk of it being misused or making the development assessment too focused on compliance through its use.

Stormwater runoff quality and flow targets

Most would support targets if they were part a larger and more holistic policy framework that implemented the full range of WSUD objectives to avoid pure engineering outcomes.

WSUD at different scales

Participants identified a number of policy gaps for WSUD, in particular for infill, small scale, and high-density developments. Key regulatory and policy barriers identified were:

- narrow focus on water quality and conversely not enough policy or control on other aspects of WSUD;
- conflicting policies (e.g. affordable housing policy v WSUD) and codes; and
- misaligned governance between water utilities and councils.

As lot scale developments are generally exempt from planning controls, some councils were developing and implementing local policies to capture them.

All agreed that a flexible approach to WSUD was required for smaller scale developments.

Funding WSUD in the public realm

The current regulatory framework for funding WSUD is not working well. The LGIP's definition of 'trunk infrastructure' is limited and open to different interpretations by different councils. At present, councils bear the burden of water quality improvement and maintenance costs and liabilities associated with WSUD assets, which are often poorly installed and delivered.

Public open space planning is generally done in a piecemeal way and not integrated with WSUD.

All classes of developments could be considered for WSUD in the public realm.

Off set schemes would be supported if a robust and accountable framework were in place to ensure that the levy was being used for WSUD outcomes in the public realm. This doesn't exist at present.

WSUD governance

All believed there was a need to develop a governance structure for WSUD as this was lacking at present. They suggested it needed stronger leadership from the state and oversight of council's decision-making processes and actions and a more collaborative approach to design and implementation of WSUD between practitioners, developers and councils.

Natural Resource Management and Catchment Planning

NRM policies and catchment planning should play a greater role in the implementation WSUD to identify strategic opportunities to deliver environmentally beneficial outcome at the catchment level.

WSUD definitions

The National Water Initiative's working definition should be revised and updated to align more with wider sustainability and liveability objectives of WSUD.

New South Wales

The NSW project consultation workshop was co-hosted by the Parramatta River Catchment Group and held at the Rydalmere Operations Centre, 316 Victoria Road, Rydalmere on 10th December 2015. It was attended by following organisations:

- Auburn City Council;
- Bankstown City Council;
- Blacktown City Council;
- Burwood Council;
- City of Ryde;
- City of Sydney;
- Cooks River Alliance;
- Department of Planning and Environment;
- Greater Sydney Local Land Services (GSLLS)
- Hunters Hill Council;
- Parramatta City Council;
- Parramatta River Catchment Group; and
- Sydney Water.

Four further post workshop responses were received via email from the following bodies and incorporated into the summary below as post workshop comments:

- Fairfield City Council;
- Central Tablelands Local Land Services (**CTLLS**);
- Ku-ring-gai Council; and
- Marrickville Council.

Reform priorities

Attendees were asked to nominate their top three reform themes, which they believe should be prioritised in NSW by placing a coloured dot against each. Refer to Figure 39, below.

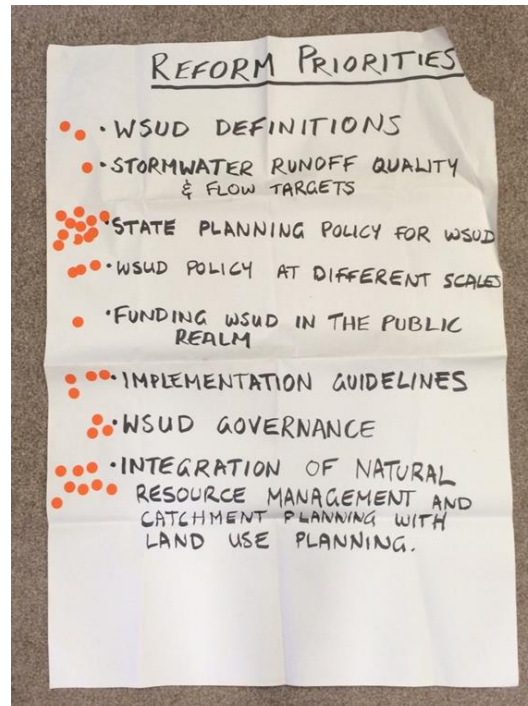


Figure 39: NSW top reform priorities

All agreed that a top down approach is needed in NSW, and providing a clearly mandated state planning policy for WSUD is high priority. Many suggested that reform in other areas would follow suit once the state planning policy is in place.

All reform themes are important and placing them lower on the priority list does not necessarily indicate that those aspects are working well at present. In the workshop, reform themes were discussed generally in the priority order identified by the group.

Responses to the questionnaire contained in the Issues Paper are provided below. It includes both responses provided at the workshop and those received via email.

State Planning Policy for WSUD

The state should set the overarching WSUD standards with scope to vary them at the local and regional level.

Most preferred the planning policy for WSUD to be based on a mandatory framework with scope for flexibility in the implementation at local and regional levels. This should be supported by mandatory reporting mechanisms to ensure policy is being implemented on ground. Some suggested it should be based on a discretionary framework as flexibility is important in the implementation of WSUD and this would allow a case-by-case approach to implementing policy.

All responses suggested that WSUD policy framework in the jurisdiction is not working well. A range of reasons was provided but many attributed it to lack of leadership and support for WSDU at the state level. This meant councils and organisations were reliant on 'champions' to implement WSUD policy and high degree of variability in approaches between local jurisdictions.

Lack of legal framework and capacity for councils to ensure compliance to WSUD requirements and maintenance of WSUD assets were also cited as a barrier to implementing WSUD policy. Some pointed to the fragmentation of drainage ownership and management and lack of integration between catchment management and land use planning processes.

Most agreed that a software tool reflected in planning policy could assist in mainstreaming WSUD. However, most weren't convinced that prescribing particular software was a good idea as it could be misused and become out-dated.

Most agreed that planning policy should play a key role in promoting the use of recycled water planning.

Stormwater runoff quality and flow targets

Most supported mandatory stormwater targets on the basis that they offered effective means to address broad catchment and environmental issues. Some were not supportive of targets because they believed targets were impractical and inflexible. Nonetheless, all suggested there should be a state-wide guidance or 'default targets' for the catchment.

Those who supported targets generally suggested targets should apply to all but 'minor developments'.

WSUD at different scales

All agreed there were a number of policy gaps in NSW including the absence of state policy on WSUD and a clear regulatory framework to implement policy as discussed earlier. Most suggested that the policy vacuum was particularly problematic for small and infill developments. Existing guidelines and policies also did not address the management of stormwater quality at catchment level and receiving waters, which are increasingly impacted by urban growth and development.

The 'Exempt and Complying development' category was identified as a regulatory barrier to implementing WSUD. At present, local WSUD controls and policy cannot be applied to developments captured under this category, which can include 'the erection of new factories up to 20,000 m² as complying development with no specific WSUD requirements.' Others that are captured under the category can include small-scale infill developments with no regard to its site context.

The application of SEPP was identified as another limiting factor in the responses. For example, some councils have been unable to impose more onerous water saving requirements than BASIX.

One response suggested that the definition of 'supplier' of recycled water and allocation of risks under the *Water Industry Competition Act 2006* acted as a barrier to providing cost effective and innovative solutions involving recycled water.

While a flexible approach to the application of WSUD was seen as being important to all development scales, some suggested that this was particularly relevant and important for smaller developments.

Funding WSUD in the public realm

All would 'welcome' a regulatory framework addressing funding WSUD in the public realm, as there is an absence of such framework in NSW. All participants also identified lack of funding and framework to deal with maintenance of WSUD assets on handover to council as a key issue.

The current development contribution for new dwellings, which is capped at \$20,000, was seen as being 'well below costs to council' with many other priorities such as open space, roads, and community facilities competing for the contribution.

One response suggested that the water sector should use the cost benefits from the implementation of WSUD for funding the construction and/or maintenance of assets.

Some suggested that asset management in councils needed to become more transparent and move away from 'business as usual single-issue asset management'. At present, it focuses on minimising risks and fails to consider any new and emerging issues that may relate to changing community needs and the environment. This meant that WSUD tends to be 'relegated to the demonstration pile'.

All scales could be considered for delivering WSUD solutions in the public realm on a case-by-case basis.

Many believed that offset schemes could be beneficial for delivering WSUD in the public realm but were equally concerned about such schemes creating 'outs' for developers and 'soften the drive for integration of WSUD within all aspects of future development'.

Only three responses were received in relation to the integration of WSUD into public open space planning, which suggested that this was not a major concern in their council.

Implementation guidelines

Most supported the idea of consolidating WSUD policy guidance into a single code as it would 'streamline and simplify planning development requirements'. Some were unsure about this proposal, as they believed a single code would 'cause a lot of conflict and confusion' given WSUD encompasses diverse approaches and disciplines. They also believed that such consolidation would have 'small effect on changing the current approach'.

Policy, 'economic data', state-wide WSUD definition or objectives, and design guidelines for WSUD structures were identified as gaps in implementation guidance for WSUD. One response suggested that EXCEL based tools or guidelines for life cycle costing of WSUD assets would be helpful.

WSUD governance

No specific WSUD governance issues were identified in the project consultation. Two responses suggested that a special body should be created or nominated to support the implementation of WSUD policy and green infrastructure.

Natural Resource Management and Catchment Planning

All agreed that NRM policies and catchment planning should play a greater role in the implementation of WSUD and be better integrated into the planning system through change in the governance structure.

Catchment management is currently spread across a number of government agencies and therefore having a single body to manage such issues would be helpful. Another important issue was developing an integrated NRM and catchment management strategies for the Parramatta River, Georges River, Lane Cover River, Cooks River, and Hawkesbury-Nepean Rivers.

WSUD definitions

Support for the National Water Initiative's definition was limited or qualified with some suggesting that the language adopted for the definition should be simplified and modified to better resonate with community values.

Victoria

In Victoria, stakeholders were consulted primarily via email requesting responses to the questionnaire contained in the Issues Paper, to which five councils responded.

Melbourne Water was consulted separately at a small group meeting where the Issues Paper was tabled and discussed.

State Planning Policy for WSUD

There was unanimous agreement that the state should set the overarching framework and 'ambitious minimum standards' for WSUD, as this would achieve a consistent uptake of WSUD across the jurisdiction. Based on this framework, councils can then set specific requirements to suit their individual needs. All believed that the state government was best placed for dealing with catchment issues, which often involve multiple council boundaries.

Two out of five responses supported a mandatory framework with performance-based standards on the basis that a discretionary framework was potentially ‘a recipe for poor decision making and lost opportunity’. Two responses suggested a combination approach with mandatory minimum standards with discretionary implementation options on the basis that this allows for councils to ‘extend themselves, if and when, they are ready to go’.

One response supported a discretionary approach on the basis that the ‘infrastructure funding bucket’ was limited and there was a need to trade-off WSUD infrastructure with other needs.

Three out of five responses suggested that the WSUD policy framework was generally working well but there was still room for improvement. This included providing an overarching state policy that captures developments in IMAP councils and updating the BPEM Guidelines ‘in line with industry knowledge and standards’. One response pointed to inconsistencies in assessment processes within its council.

Two responses said the framework wasn’t working well. Councils currently do not have the budget to support WSUD outcomes and local WSUD policies or requirements were open to challenge by developers, as they are not universal requirements across the state.

All agreed that software tools can play an important role in mainstreaming WSUD by providing a consistent assessment method if reflected in planning policy; however, they need to be appropriate and useful tools. MUSIC has many limitations – it is not appropriate for assessing small scale developments, considers water quality in isolation reinforcing the ‘siloed thinking’, and can be manipulated to achieve desired outcomes. Some suggested that STORM was also too simplistic and ‘falls massively short of any usefulness in development scenarios’.

Planning policy should play an important role in promoting the use of recycled water, as policy should deal with the water cycle in its entirety. It was noted that 19 of the CASBE group of councils have exhibited a planning scheme amendment to introduce ESD policy which, if adopted, will require the developer to address water management in their development application.

Stormwater runoff quality and flow targets

All suggested that state-wide mandatory stormwater targets assist in the implementation of WSUD and this was demonstrated by the BPEM Guidelines which ‘has given backbone to WSUD planning implementation’ in Victoria.

One response suggested that targets should be expanded to include other pollutants toxic to aquatic environments. Most suggested targets should apply to all developments but one response suggested they should only apply to ‘larger subdivisions – maybe 50 lots+’.

Some suggested rethinking the concept of ‘best practice’ and questioned whether a single set of targets should define this (Melbourne Water 2016). In Victoria, Melbourne Water suggested that although the BPEM Guidelines have been instrumental in the implementation of WSUD, the current policy framework was not delivering the kind of environmental outcomes needed to materially improve waterway health.⁴² They suggested that ‘best practice’ and targets should aim at place-based solutions and align with broader catchment or regional water strategy to provide outcomes, which achieve net environmental and hydrological benefits. For example, the *Healthy Waterways Strategy* should identify priority waterways for additional stormwater protection and set out conditions, goals, and priorities for waterways. Case studies of solutions may also play a role setting out benchmarks for certain areas and allowing industry to respond with place-based solutions.

WSUD at different scales

⁴² Discussion with Melbourne Water on 31 August 2016 at the 2016 National Stormwater Conference, Gold Coast, Queensland.

All agreed that there is a WSUD policy gap for all developments not captured by clause 56.07 – infill, small lot scale which can form the bulk of developments in inner city councils. One suggested this was more than just a policy gap in planning but extended to ‘broader community education/engagement in the transition challenge’.

Melbourne Water suggested that a regional plan which references water strategies and policies would help to integrate them into the statutory planning process and materially improve environmental outcomes as discussed above under Section 4.

Other gaps identified related to maintenance and operation of WSUD assets, which can range from on-site wastewater systems, to rainwater tanks on individual lots, and WSUD assets managed by body corporate.

Funding WSUD in the public realm

There was general consensus that at present, WSUD funding was insufficient if not ‘woeful’ in Victoria. Councils are largely reliant on general rates and or grant funding to cover any costs of WSUD in the public realm not covered by development contributions.

Some suggested that WSUD solutions in the public realm should be considered for all scales while others said it depended on the issues at hand and councils would need to determine it on a case-by-case basis. One response suggested precinct scale system with 20–100 ha catchments as the appropriate scale for WSUD in the public realm.

Most responses provided qualified support for the expansion of market based approaches for stormwater and were concerned about it leading to ‘lazy decision making’.

In regards to integration of POP planning with WSUD, two out of the four responses received for this question indicated that this is done reasonably well in their council but there was still room for improvement.

Implementation guidelines

All supported consolidation of WSUD policy guidance into a single code.

In regards to gaps, one response suggested that lack of guidance regarding costing was ‘the elephant in the room’. Others suggested assets assessment and maintenance including maintenance costing, multi-benefit analysis, and cost benefit analysis as gaps in WSUD policy guidance.

WSUD governance

Responses in relation to this theme were diverse and ranged from a view that WSUD governance was ‘non-existent’ and the state government was ‘missing in action’ to a view suggesting a need to clarify roles and responsibilities of various public bodies in regards to funding streams. One suggested that there was more of coordination rather than a governance issue on WSUD.

Natural Resource Management and Catchment Planning

NRM policies and catchment planning should play a greater role in the implementation of WSUD. All planning should begin from catchment planning which should identify strategic opportunities for water management.

WSUD definition

Two out of three responses received for this theme support the National Water Initiative’s working definition and the principles of WSUD.

South Australia

Project consultation in SA was conducted through an online survey consisting of the questionnaire in B5.1's Issues Paper. Three responses were received from this survey from Water Sensitive SA, Environment Protection Authority (SA) (**EPA SA**) and Natural Resources Eyre Peninsula (**NREP**).

State Planning Policy for WSUD

The state should set minimum requirements and the overarching framework with flexibility for local variations as this would assist in providing a 'more even playing field'.

A mandatory framework, which allows some flexibility for how the standards are achieved, was preferable, as the current discretionary framework has 'hindered' the implementation of WSUD.

The current WSUD policy framework in the jurisdiction is not working well 'because it is discretionary and no one has to do anything if they choose not to'. Performance based WSUD targets 'underpinned by a new Planning Design code that incorporates WSUD principles' are needed.

Software tools can be helpful in mainstreaming WSUD but this would depend on how they are used and how knowledgeable the users are and therefore would only be a part solution to the 'WSUD puzzle'.

Planning policy should play a key role in promoting the use of recycled water and this may work for recycled wastewater but at present, the SA water sector has little or no involvement in stormwater.

Stormwater runoff quality and flow targets

State-wide mandatory stormwater runoff targets would assist in the implementation of WSUD but may need to be varied depending on the development scale and location.

Targets should generally apply to commercial, industrial, residential sub-division, and large urban infill projects.

WSUD at different scales

There is a WSUD policy gap for all planning scales with 'urgent need' to address small-scale infill developments as these form large part of planning and development in urban areas.

The Residential Code was seen as a barrier to the uptake of WSUD.

All suggested that a flexible approach to the application of WSUD policy was important at all planning scales.

Funding WSUD in the public realm

The current regulatory framework for funding WSUD in the jurisdiction is not working well because it is negotiated on a 'case-by-case basis' with 'no regulatory framework' to underpin the negotiation.

The Stormwater Management Fund could be used to assist in the implementation of WSUD in the public realm but the Stormwater Management Authority's decision-making process needed to be more transparent.

WSUD in the public realm should generally be considered for 'neighbour to suburb' scale developments but also for renewal projects.

The expansion of market based approaches for stormwater was seen as being useful and therefore would be supported.

WSUD is not being integrated into POS planning to the extent that was required to 'move away from the traditional detention basin as a solution'.

Implementation guidelines

Consolidation of WSUD policy guidance into a single code may be useful to plan and deliver WSUD but could also make it 'unwieldy'. Cost benefit analysis and policy guidance were identified as gaps in WSUD guidance.

WSUD governance

All responses suggested that the current governance structure was fragmented and lacked leadership.

Natural Resource Management and Catchment Planning

NRM policies and catchment planning should play a greater role in the implementation of WSUD but would need to be 'sound and truly address integrated water management, not just pay lip service to it'.

WSUD definition

In general, all supported the National Water Initiative's working definition and principles of WSUD but suggested that some of its aspects needed to be updated and brought in line with the current thinking on WSUD.

Western Australia

In WA, project consultations consisted of a workshop at the Department of Water and two separate meetings with City of Mandurah and Cottera Consulting. The workshop was held on Wednesday 9th March 2016 and attended by three Perth metro councils, the Department of Parks and Wildlife, the Department of Planning, the Office of Land and Housing Supply, the Department of Water, Essential Environment, the Metropolitan Redevelopment Authority, the University of Western Australia, and the Water Corporation.

Reform priorities

Attendees were asked to nominate their top three reform priorities for WA by placing coloured dots against them. Refer to Figure 40, below.

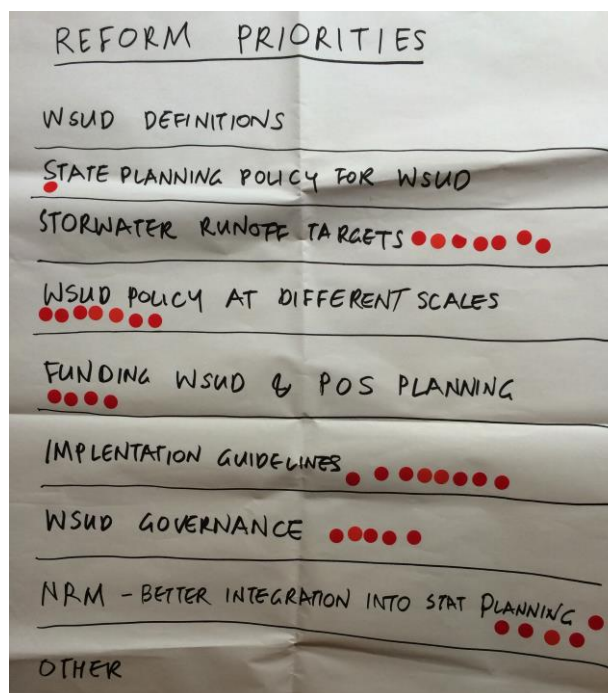


Figure 40: WA reform priorities

State Planning Policy for WSUD

Opinion was divided on:

- whether the policy framework should be mandatory or discretionary. Some saw mandatory policy framework as a 'one size fits all' approach which wasn't appropriate for the WA context while others supported it on the basis that the current approach was ineffective; and
- what role the SPP 2.9 should play in the implementation of WSUD.

There was general agreement on the need for flexibility in WA due to its variable ground conditions and the need to review the subdivision approval process and the timing of UWMPs.

Some suggested that the SPP 2.9 was too broad and high level to be of much relevance at the local planning and development levels. WSUD practice at local level is more impacted and constrained by the Liveable Neighbourhoods and the BUWM framework and 'champions' rather than state planning policy or requirements.

Some also suggested that councils needed better coordination and integration of existing policies to avoid conflict, rather than new policies on WSUD. They cited the new SPP on Bushfire Prone Areas as an example of new policy that conflicts with existing policies where it requires clearing of trees and bushes, while other SPPs and operational policies require tree retention and POS to be green and within walking distance.

Stormwater runoff quality and flow targets

Participants generally supported mandatory WSUD measures and stormwater runoff targets in principle but were apprehensive about how they would be monitored and enforced in the WA context where ground conditions are widely variable. They suggested that any targets would need to recognise the different physical conditions in WA compared with other jurisdictions as infiltration to groundwater is the main mechanism through which stormwater enters the environment. Nonetheless, all agreed that targets should be measurable if they were to be set.

Some suggested that targets should be set as a trial on large residential sites because such sites were easier to monitor and compare the pre- and post-development water quality and levels.

Other key concerns with mandatory targets were:

- developers being overly focused on the need to 'meet the checklist' if there were mandatory targets, rather than identifying WSUD measures that will holistically achieve environmental and liveable outcomes;
- the potential for the installation of WSUD measures that would conflict with other council planning objectives or relocate the problem to elsewhere such as a downstream of catchment; and
- maintenance costs and risks associated with WSUD assets they inherit, particularly if the implementation WSUD were made mandatory.

At present, developers are required to monitor pre- and post-development ground water quality and levels for three years. This data is to be provided to Department of Water and the relevant council and used to set the triggers in UWMPs. However, the Department of Water rarely provides a response and any targets in the UWMPs are not enforced, and therefore targets and monitoring data are not linked. In theory, if a development does not meet targets, the relevant authority can refuse to accept handover but from industry experience this has rarely happened.

WSUD at different scales

While there was lack of consensus on what the key issues or barriers were, all agreed that there were policy gaps for infill and high-density developments. There was also agreement that many lot scale developments were currently exempt from the R-Code and therefore it played little or no role in stormwater management. Consequently, some councils have developed and implemented local policies requiring site retention of stormwater runoff for lots 300 m² or larger.

Some suggested there was a policy gap for dealing with interfacing land uses, such between residential developments and adjoining commercial or industrial uses. While the Liveable Neighbourhoods complements the SPP 2.9 by setting detailed measures for developers, it is only applicable to residential subdivisions.

While the BUWM does not apply to infill, it is often applied to infill developments and therefore some were doubtful that a new infill policy was required.

One response noted that they relied on the Institute of Public Works Engineering Australia WA's *Local Government Guidelines for Subdivisional Development* and the Liveable Neighbourhood for development assessment requirements but developers are often able to challenge the requirements under them because they have no statutory weight.

Structure plans are normally prepared by developers and approved by the WAPC but some felt that the new *Structure Plan Framework* released for review and trial last year erodes councils' roles even further by paring back any detail requirements for structure plans.

Concerns with the current framework for UWMPs

While councils generally rely on UWMPs to address urban water management issues in developments, a number of issues were identified as barriers to the effective implementation of WSUD under the current framework. These included:

- the sequencing of subdivision approval process and the timing of UWMPs. As the requirement to prepare a UWMP is a condition of subdivision approval given by the WAPC, councils are left with few opportunities to influence the design and incorporate any substantial WSUD measures into the subdivision design itself.
- the review process for UWMPs and therefore variability in the quality of UWMPs. The WAPC on advice of Department of Water approves the DWMSs and LWMSs whereas councils approve UWMPs. This approval structure can lead to inconsistencies in water management both within and across councils as the quality of feedback and advice from various government agencies (namely the Department of Water) depends on the reviewer and therefore can vary widely. At present, referral of UWMPs to the Department of Water for review is largely at the discretion of councils as this is not a statutory requirement.
- the council's lack of skill and knowledge in assessing UWMPs effectively, which impacts on the quality of UWMPs. While the BUWM checklist is generally used for the preparation of an UWMP and 'controlled' by the Department of Water, this is done by convention rather than legal requirement and not all developers follow the checklist. However, some expressed concerns about a mandatory requirement to use the checklist as this created the potential for design to focus only on the checklist and therefore result in poorer design outcomes (for example, a situation in which the design achieves good WSUD outcomes but is rejected because it includes a minor culvert, which is not permitted under the checklist); and
- the need to prepare separate UWMPs for each stage of a subdivision, therefore dealing with multiple UWMPs within a project. For a development site with multiple owners or developers, it is difficult to co-ordinate and sequence the implementation of WSUD assets (for example, a downstream development may need the upstream area to be developed to implement their UWMP or the LWMS if this is in place). As a result, potential interface issues between stages were not being identified until stages were being constructed. To this extent, some suggested that the better approach would be to prepare an UWMP which applies to the whole site, rather than the current practice of dealing with each subdivision stage via an addendum to the UWMPs.

Theoretically, it was noted that UWMPs are prepared after the DWMSs and LWMSs have been completed and approved. In reality, however, they play very little role in setting out strategic directions for UWMPs. DWMSs are generally only prepared primarily to support rezoning of land by demonstrating that the subject land has the capacity to support development, and are, therefore, rarely prepared. Further, DWMSs tend to contain high level and generic information such as the 1 in 100 year flow paths and potential location of WSUD assets. While there is no statutory requirement to prepare an LWMS, it is very rare for developers not to do so because the Department of Water can slow down the application process substantially if an LWMS is not submitted.

Funding WSUD in the public realm

The current regulatory framework is not working well for funding WSUD infrastructure in the public realm, as non-standard infrastructure provisions can only be made under a DCP, which is costly to prepare and implement.

Most suggested that better integration with POS planning and guidance on maintenance costs, along with consideration of WSUD as an integral part of POS or drainage management systems, was needed. One response noted that the 10% POS requirement was often in conflict with other policy objectives and was inadequate for managing increased stormwater runoffs while also providing active and passive recreational spaces which is becoming more critical in many areas with increased density.

Implementation guidelines

Most responses suggested that more guidelines on infill developments and policy implementation were needed. Some suggested that education and training was a priority rather than guidelines.

Life cycle costing and maintenance guidelines specific to the WA context were identified as main gaps in WSUD guidance and were seen as high priority for many councils to address, increasing concerns associated with operating and maintenance costs of WSUD assets.

Some identified technical guidance for infill and industrial/commercial developments as possible gaps in implementation guidelines.

WSUD governance

This was not discussed at the workshop due to time constraints and no written responses were received on this topic.

Natural Resource Management and Catchment Planning

This was not discussed at the workshop due to time constraints and no written responses were received on this topic.

WSUD definitions

This was not discussed due to time constraints but one suggested a need for 'consistency of wording across all agencies' in their written response.

Appendix 2 Inventory of policies and guidelines

Queensland

WSUD policies and guidance

Author	Date	Name of Policy/document	Link
EPA	2009	Environment Protection (Water) Policy 2009	https://www.legislation.qld.gov.au/LEGISLTN/.../E/EnvProWateP09.pdf
EPA	January 2009	Urban Stormwater – Queensland Best Practice Environmental Management Guidelines Technical Note: Derivation of Design Objectives	https://www.ehp.qld.gov.au/water/.../urban-stormwater-guidelines.pdf
DEHP	2009	Queensland Water Quality Guidelines	www.ehp.qld.gov.au/water/guidelines/
DEHP	December 2010	Urban Stormwater Quality Planning Guidelines	https://www.ehp.qld.gov.au/water/policy/urban-stormwater-planning.html
DEHP	February 2014	Stormwater Guideline Environmentally Relevant Activities	https://publications.qld.gov.au/dataset/stormwater-guideline-environmentally-relevant-activities
DEWS	October 2013	Queensland Urban Drainage Manual (Provisional Third Edition)	https://www.dews.qld.gov.au/water-supply-regulations/urban-drainage
DIP	July 2009	South East Queensland Regional Plan 2009–2031	http://www.dlg.qld.gov.au/planning/regional-planning/review-of-the-south-east-queensland-regional-plan.html
DIP	December 2009	Statutory Guideline 01/09, Priority Infrastructure Plans and Infrastructure Charges Schedule	http://www.dlg.qld.gov.au/resources-ilgp/fact-sheet-guidelines/statutory-guidelines-for-planning.html
DSDIP	July 2012	State Planning Regulatory Provision (adopted charges)	http://www.dlg.qld.gov.au/codes-policies-and-regulatory-provisions/state-planning-regulatory-provisions.html
DSDIP	July 2014	State Planning Policy	http://www.dlg.qld.gov.au/local-government/planning-ilgp/state-planning-policy.html
DSDIP	August 2014	State Planning Policy Guideline: State interest – Water quality	http://www.dlg.qld.gov.au/local-government/planning-ilgp/state-planning-policy-guidance-material.html
DSDIP	June 2014	Statutory Guideline 03/14, Local Government Infrastructure Plans	http://www.dlg.qld.gov.au/resources-ilgp/fact-sheet-guidelines/statutory-guidelines-for-planning.html
International Erosion Control Association (Australasia)	2008	Best Practice Erosion and Sediment Control	http://www.austieca.com.au/publications/best-practice-erosion-and-sediment-control-bpesc-document
Seqwater	2012	SEQWater Development Guidelines: Development Guidelines for Water Quality Management in Drinking Water Catchments	http://www.seqwater.com.au/water-supply/catchments/planning-development
QCA	December 2012	Measuring the Regulatory Burden of Water Sensitive Urban Design in South East Queensland	http://www.qca.org.au/Search-Results.aspx?searchtext=water+sensitive+urban+design&searchmode

Author	Date	Name of Policy/document	Link
			=allwords
Queensland Water Commission	2010	South East Queensland Water Strategy	https://www.dews.qld.gov.au/water-supply-regulations/security/water-supply-security-assessments/south-east-queensland
Water by Design	June 2006	Water Sensitive Urban Design, Technical Design Guidelines for South East Queensland (Version 1)	http://waterbydesign.com.au/techguide/
Water by Design	January 2007	<i>Lifecycle Costs of Water Sensitive Urban Design Treatment Systems</i>	http://healthywaterways.org/resources/documents
Water by Design	August 2007	<i>Constructed Waterbodies in Urban Areas of South East Queensland: Maintenance Issues and Costs to Local Government</i>	http://healthywaterways.org/resources/documents
Water by Design	December 2009	<i>Concept Design Guidelines for Water Sensitive Urban Design</i>	http://healthywaterways.org/resources/documents
Water by Design	2009	<i>Stormwater Harvesting Guidelines</i> (Draft 01)	http://healthywaterways.org/resources/documents
Water by Design	September 2010	<i>A Business Case for Best Practice Urban Stormwater Management</i> (Version 1.1)	http://healthywaterways.org/resources/documents
Water by Design	December 2010	<i>Total Water Cycle Management Planning Guidelines for South East Queensland</i> (Version 1)	http://healthywaterways.org/resources/documents
Water by Design	2012	<i>Transferring Ownership of Vegetated Assets</i>	http://healthywaterways.org/resources/documents
Water by Design	2013	<i>Waterbody Management Guideline</i>	http://healthywaterways.org/resources/documents
Water by Design	October 2014	<i>Bioretention Technical Design Guidelines</i> (Version 1.1)	http://healthywaterways.org/resources/documents
Water by Design	August 2014	<i>Off-Site Stormwater Quality Solutions Discussion paper</i>	http://healthywaterways.org/resources/documents

Qld Local Planning Policies

Planning Scheme	WSUD policy provision	Link
Brisbane City Plan 2014	Schedule 6 Planning Scheme Policies, infrastructure design, Chapter 7 Stormwater Drainage – refers to WSUD principles.	http://eplan.brisbane.qld.gov.au/
Gold Coast Planning Scheme 03 (2011)	Part 8 Infrastructure, Division 1 Priority Infrastructure Plan.	http://www.goldcoast.qld.gov.au/gcplanningscheme_1111/attachments/planning_scheme_documents/part8_infrastructure/priority_infrastructure_plan.pdf
Ipswich Planning Scheme	Policy 3, Part 9 – Reconfigurations and Site Development, 9.2.3	http://www.ipswichplanning.com.au/_data/assets/pdf_file/0019/1963/ips_plan_scheme_policy3_general_works.pdf
Logan Planning Scheme	Part 3 Strategic Framework – 3.2.11 Infrastructure, 3.13.5 Element – Stormwater Part 9 Development Codes – 9.4.3 Infrastructure Code	http://www.logan.qld.gov.au/_data/assets/pdf_file/0003/315840/Part-3-Strategic-Framework-version-1.1.pdf http://www.logan.qld.gov.au/_data/assets/pdf_file/0010/315856/Part-9-Development-codes-version-1.1.pdf
Toowoomba Regional Planning Scheme (2012)	Part 9 – Development Codes – 9.4.3 Integrated Water Cycle Management	https://pdonline.toowoombarc.qld.gov.au/masterplan/modules/eplan/eplanviewer.aspx#
Redlands Planning Scheme	Part 11, Policy 9 Infrastructure Works, Chapter 6 – Stormwater Management – 9.6.1	http://www.redland.qld.gov.au/PlanningandBuilding/RPS/Documents/V7_Documents/11.09.06.pdf
Sunshine Coast Planning Scheme 2014	Part 3 – Strategic Framework, 3.6.5 Element 4 – Stormwater Infrastructure Schedule 6 – Planning Scheme policy for development works	http://www.sunshinecoast.qld.gov.au/addfiles/documents/planning/scps_text/part_3/ps_3_6.pdf http://www.sunshinecoast.qld.gov.au/addfiles/documents/planning/scps_text/schedule_6/ps_sch6_14.pdf

New South Wales

WSUD implementation guidelines in NSW

Guide	Author	Date	Target audience				Purpose
			Council	Designer/ engineer	Builder	Developer/ land owner	
<i>Local Planning for Healthy Waterways – Using NSW Water Quality Objectives</i>	DEC	June 2006	√				Information on incorporating water quality objectives into strategic planning of development
<i>Managing Urban Stormwater – Harvesting and Reuse</i>	OEH	2005	√	√		√	Provides guidance on different aspects of managing stormwater in the urban environment
<i>Managing Urban Stormwater: Treatment Techniques</i>	EPA	1997	√	√	√		To provide guidance to stormwater planners and designers on the selection and functional (or conceptual) design of a range of structural stormwater quality management practices. These techniques are intended for application in existing and new urban residential areas.
<i>Managing Urban Stormwater: Council Handbook (Draft)</i>	EPA	1997	√				Provides stormwater planning and decision-making systems frameworks for councils
<i>Managing Urban Stormwater: Soils and Construction (Fourth edition)</i>	Landcom	2004	√	√	√		To provide best practice management practice information on soil erosion and sediment control for a range of actors (including developers, consultants and councils) involved in 'non rural land disturbance activities' where more than 250 m ² of land will be affected.
<i>Water Sensitive Urban Design Book 1 – Policy (Draft)</i>	Landcom	May 2009		√	√	√	Provides overview of WSUD and Landcom's WSUD targets.
<i>Water Sensitive</i>	Landcom	May		√	√	√	Provides information urban water best planning and management practices

<i>Urban Design Book 2 – Planning and Management</i>		2009					applicable to Landcom projects
<i>Water Sensitive Urban Design Book 3 – Case Studies</i>	Landcom	May 2009		√	√	√	Provides examples of WSUD in various phases – planning, implementation, and operation phases
<i>Water Sensitive Urban Design Book 4 – Maintenance (Draft)</i>	Landcom	May 2009	√	√	√	√	Provides information on operation and maintenance guidelines of key WSUD elements
<i>Water Sensitive Urban Design Guide for Rural Residential Subdivisions</i>	SCA	2011	√			√	This is a handbook for developers and consultants in the design of proposed subdivisions using appropriate planning and WSUD techniques.
<i>Water Sensitive Urban Design DCP Guide/Template and LEP Clause</i>	Sydney Metropolitan catchment Management Authority	2011	√				To guide councils in preparation or revision of their DPCs and LEPs to incorporate WSUD provisions

South Australia

Author	Date	Name of Policy/document	Link
DEWNR	2012	<i>Water for Good – A Plan to Ensure Our Water Future to 2050</i>	http://www.environment.sa.gov.au/managing-natural-resources/water-use/water-resources/stormwater
DEWNR	2013	<i>Water Sensitive Urban Design – Creating more liveable and water sensitive cities in South Australia</i>	http://www.watersensitivesa.com/document/water-sensitive-urban-design-creating-more-liveable-and-water-sensitive-cities-south
DPLG	2009	<i>Water Sensitive Urban Design Technical Manual Greater Adelaide Region</i>	https://www.sa.gov.au/topics/housing-property-and-land/building-and-development/land-supply-and-planning-system/water-sensitive-urban-design
DPLG	2010	<i>The 30-Year Plan for Greater Adelaide</i>	http://www.sa.gov.au/topics/housing-property-and-land/building-and-development/land-supply-and-planning-system/the-planning-strategy-for-south-australia/plans-for-regional-south-australia
DPLG	2011	<i>South Australian Planning Policy Library Version 6</i>	https://www.sa.gov.au/search?query=South+Australian+Planning+Policy+Library+Version+6&collection=sa-gov-web
DoW	2011	<i>Stormwater Strategy – The Future of Stormwater Management</i>	http://www.environment.sa.gov.au/managing-natural-resources/water-use/water-resources/stormwater
EPA	1998	<i>Stormwater Pollution Prevention Code of Practice for Local, State and Federal Government</i>	www.epa.sa.gov.au/files/47791_govcop1.pdf
EPA	1999	<i>Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry 1999</i>	www.epa.sa.gov.au/files/47790_bccop1.pdf
EPA	2013	<i>Adelaide Coastal Water Quality Improvement Plan</i>	www.epa.sa.gov.au/files/477412_acwgip_brochure.pdf
NRM Council	2012	<i>Our Place, Our Future, State Natural Resources Management Plan 2012–2017</i>	http://www.environment.sa.gov.au/about-us/our-plans
The Adelaide and Mount Lofty Ranges NRM Board	2013	<i>Adelaide and Mount Lofty Ranges Natural Resources Management Plan,</i>	http://www.naturalresources.sa.gov.au/adelaidemtloftyranges/about-us/our-regions-plan

SA local planning policies for WSUD

Council	WSUD policy document	Link
The City of Adelaide	Adelaide (City) Development Plan 2015, Stormwater Management (p. 53), Riverbank Zone (p. 254) The City of Adelaide Strategic Plan 2012–2016 Water Security Action Plan 2011–2016	http://www.adelaidecitycouncil.com/planning-development/city-planning/development-plan/ http://www.adelaidecitycouncil.com/assets/Policies-Papers/docs/STRATEGY-strategic-plan-july-2012-16.pdf http://www.adelaidecitycouncil.com/assets/Policies-Papers/docs/ACTION-PLAN-water-security-2011-16.PDF
The City of Burnside	City of Burnside Development Plan 2014, Environmental Protection Objective 15 (pp. 13–14)	http://www.sa.gov.au/_data/assets/pdf_file/0002/10100/Burnside_Council_Development_Plan.pdf
The City of Campbelltown	Development Information Guide 6 – Residential Zone, Suburban Policy Area 4. Development Information Guide 6 – Urban Corridor Zone Campbelltown Council Development Plan 2014, Natural Resources Policy (pp. 52–3)	http://www.campbelltown.sa.gov.au/webdata/resources/files/14%2048485%20%20Residential%20Zone%20-%20Suburban%20Policy%20Area(2).pdf http://www.campbelltown.sa.gov.au/webdata/resources/files/Urban%20Corridor%20Zone%20(Combined).pdf http://www.sa.gov.au/_data/assets/pdf_file/0019/16516/Campbelltown_Council_Development_Plan.pdf
City of Charles Sturt	Stormwater Infrastructure Asset Management Plan Charles Sturt Council Development Plan 2014, Natural Resources Policy (pp. 57–9)	https://www.charlessturt.sa.gov.au/webdata/resources/files/Asset%20Management%20Plan%20-%20Stormwater%20Infrastructure.pdf http://www.sa.gov.au/_data/assets/pdf_file/0018/33318/Charles_Sturt_Council_Development_Plan.pdf
Town of Gawler	Stormwater (Watercourse) Management Town of Gawler Development Plan 2015, Natural Resources Policy (pp. 47–9)	http://www.gawler.sa.gov.au/webdata/resources/files/Policy%2010-02%20Stormwater%20(Watercourse)%20Management%20Policy%20-%20Adopted%20by%20Council%20July%202014.pdf http://www.sa.gov.au/_data/assets/pdf_file/0017/16361/Gawler_Council_Development_Plan.pdf

Council	WSUD policy document	Link
City of Holdfast Bay	Eco City Plan 2012–2015 Holdfast Bay Council Development Plan 2015, Natural Resources Policy (pp. 63–5)	https://www.holdfast.sa.gov.au/webdata/resources/files/FINAL%20Eco-City%20Plan%202012-15.pdf http://www.sa.gov.au/_data/assets/pdf_file/0014/21227/Holdfast_Bay_Council_Development_Plan.pdf
City of Marion	Landscape Irrigation Policy Marion Council Development Plan 2015, Natural Resources Policy (pp. 63–5)	https://www.marion.sa.gov.au/webdata/resources/files/Draft-Landscape-Irrigation-Policy.pdf http://www.sa.gov.au/_data/assets/pdf_file/0005/21875/Marion_Council_Development_Plan.pdf
City of Mt Gambier	City of Mount Gambier Development Plan 2015, Natural Resources Policy (pp. 48–9)	http://www.mountgambier.sa.gov.au/webdata/resources/files/City%20of%20Mount%20Gambier%20-%20Development%20Plan.pdf
City of Norwood, Payneham and St Peters	City of Norwood, Payneham and St Peters Development Plan 2015, Stormwater Management (pp. 33-7), Residential Zone (p. 90), Residential Character Zone (p. 103)	http://www.sa.gov.au/_data/assets/pdf_file/0018/30069/Norwood_Payneham_and_St_Peters_Council_Development_Plan.pdf
City of Onkaparinga	Onkaparinga Council Development Plan 2015, Natural Resources Policy (pp. 74–6)	http://www.sa.gov.au/topics/housing-property-and-land/local-government/development-plans/online-development-plans/greater-metropolitan-adelaide-development-plans/onkaparinga-council-development-plan
City of Playford	Playford Council Development Plan 2014, Natural Resources Policy (pp. 73–5)	http://www.sa.gov.au/_data/assets/pdf_file/0004/20002/Playford_Council_Development_Plan.pdf
City of Port Adelaide Enfield	Port Adelaide Enfield Council Development Plan 2015, Natural Resources Policy (pp. 73–6)	http://www.sa.gov.au/_data/assets/pdf_file/0008/13310/Port_Adelaide_Enfield_Council_Development_Plan.pdf
City of Prospect	City of Prospect Development Plan 2015, Council Wide Objective 36–38 (pp.19–20) Urban Corridor Zone	http://www.sa.gov.au/_data/assets/pdf_file/0018/11646/Prospect_Council_Development_Plan.pdf http://www.prospect.sa.gov.au/webdata/resources/files/Zone%20Information%20Sheet%2008%20-%20Urban%20Corridor%20Transit%20Living%20Policy%20Area.PDF

Victoria

Victorian policy guidelines for WSUD and IWM

Author	Date	Name of policy/document	Link
CSIRO	May 2006	Urban Stormwater: Best Practice Environmental Management Guidelines	http://www.publish.csiro.au/pid/2190.htm
DSE	October 2006	VPP Practice Note: Using the Integrated Water Management Provisions of Clause 56 – Residential Subdivision, Department of Sustainability and Environment	http://www.dpcd.vic.gov.au/_data/assets/pdf_file/0007/135754/VPP_Clause_56_4-Intwaterman.pdf .
DSE	2005	Activity Centre Design Guidelines	www.dpcd.vic.gov.au/.../132810/Activity_Centre_Design_Guidelines.pdf .
DSE	2004	Design Guidelines for Higher Density Residential Development	http://www.dtpli.vic.gov.au/planning/urban-design-and-development/urban-design-guidelines/higher-density-residential-development
DSE	2005	Safer Design Guidelines for Victoria	
DCPD	May 2009	Guidelines for planning permit applications in open, potable water supply catchment areas	http://www.ruralcouncilsvictoria.org.au/wp-content/uploads/Guidelines_for_permit_applications_in_catchment_areas.pdf .
DPCD	2009	Urban Design Charter for Victoria	http://www.dtpli.vic.gov.au/planning/urban-design-and-development/urban-design-charter .
DELWP	May 2014	Plan Melbourne Metropolitan Planning Strategy	https://www.melbourne.vic.gov.au/BuildingandPlanning/FutureGrowth/ExternalProjects/Pages/MetroPlanningStrategy.aspx
EPA	June 2003	State Environment Protection Policy – Waters of Victoria	http://www.epa.vic.gov.au/about-us/legislation/water-legislation/water-related-policies#seppwov
EPA	May 1991	Construction Techniques for Sediment Pollution Control	http://www.epa.vic.gov.au/~media/Publications/275.pdf
EPA	September 2004	Doing it Right on Subdivisions: Temporary Environment Protection Measures for Subdivision Construction Sites	http://www.epa.vic.gov.au/~media/Publications/960.pdf
EPA	February 1996	Environmental Guidelines for Major Construction Sites – Publication 480	http://www.epa.vic.gov.au/our-work/publications/publication/1996/february/480

Author	Date	Name of policy/document	Link
EPA	April 2008	Maintaining Water Sensitive Urban Design Elements– Publication 1226	http://www.epa.vic.gov.au/~media/Publications/1226.pdf
EPA	October 2015	Guidelines for Environmental Management: Dual Pipe Water Recycling Schemes – Health and Environmental Risk Management – Publication 1015.1	http://www.epa.vic.gov.au/our-work/publications/publication/2015/february/1015-1
EPA	June 2003	Guidelines for Environmental Management: Use of Reclaimed Water – Publication 464.2	http://www.epa.vic.gov.au/~media/Publications/464%202.pdf .
EPA	1991	Construction Techniques for Sediment Pollution Control – Publication 275	http://www.epa.vic.gov.au/our-work/publications/publication/1991/may/275
Victorian Government	1995	Victorian Nutrient Management Strategy	http://www.bing.com/search?q=Victorian+nutrient+management+strategy+government+of+victoria+1995&qs=n&form=QBRE&pg=victorian+nutrient+management+strategy+government+of+victoria+1995&sc=0-38&sp=-1&sk=&cvid=6a8898ef980349bfa722181eeb10fc62
Victorian Government	1998	Victorian Floodplain Management Strategy	http://www.depi.vic.gov.au/_data/assets/pdf_file/0005/266810/VFMS_Draft_v09_26_062014_WEB.pdf .
Local Government and Infrastructure Design Association	September 2014	Infrastructure Design Manual Version 4.3	http://www.designmanual.com.au/download-idm
Melbourne Water	draft	Design, Construction and Establishment of constructed Wetlands: Design manual	http://www.melbournewater.com.au/Planning-and-building/Forms-guidelines-and-standard-drawings/Documents/Constructed-Wetlands-Design-Manual-DRAFT.pdf .
Melbourne Water	February 2011	Developing a Strategic Approach to WSUD Implementation – Guidelines for Councils	https://www.clearwater.asn.au/user-data/resource-files/Strategic-Approach-to-WSUD-Implementation-Guidelines.pdf .
Melbourne Water	2005	Water Sensitive Urban Design Engineering Procedures: Stormwater	http://www.publish.csiro.au/pid/4974.htm
Melbourne Water	October 2013	Water Sensitive Urban Design Life Cycle Costing Data	http://www.melbournewater.com.au/Planning-and-building/Forms-guidelines-and-standard-drawings/Documents/Life%20Cycle%20Costing%20-%20WSUD.pdf .

Author	Date	Name of policy/document	Link
Melbourne Water	May 2013	WSUD Maintenance Guidelines – A Guide for Asset Managers	http://www.melbournewater.com.au/Planning-and-building/Forms-guidelines-and-standard-drawings/Documents/WSUD-Maintenance-manager-guidelines.pdf .
Melbourne Water	May 2013	WSUD Maintenance – Inspection and Maintenance Activity Guidelines	http://www.melbournewater.com.au/Planning-and-building/Forms-guidelines-and-standard-drawings/Documents/WSUD-Maintenance-Inspection-and-maintenance-activity-guidelines.pdf .
MPA (formerly Growth Areas Authority)	2009	Precinct Structure Planning Guidelines	http://www.mpa.vic.gov.au/planning-activities/greenfields-planning/precinct-structure-planning-guidelines/
MPA		Fishermans Bend Strategic Framework Plan	http://www.mpa.vic.gov.au/fishermansbendsfp
MPA	2012	PSP Notes: Integrated Water Management,	http://www.mpa.vic.gov.au/wp-content/Assets/Files/PSP_Guidelines_Notes_Integrated_Water_Management[1].pdf
Office of Living Victoria	July 2013	Melbourne's Water Future	http://www.nwc.gov.au/_data/assets/word_doc/0010/37297/Melbour-Water-Future.doc .

Victorian local planning policies for WSUD and ESD

Planning Scheme	WSUD policy provision	Link
Moonee Valley	Clause 22.03	http://planningschemes.dpcd.vic.gov.au/schemes/mooneevalley
Bayside	Clause 22.08	http://planningschemes.dpcd.vic.gov.au/schemes/bayside
Hume	Clause 22.19 (Industrial Stormwater)	http://planningschemes.dpcd.vic.gov.au/schemes/hume
Yarra	Clause 22.16	http://planningschemes.dpcd.vic.gov.au/schemes/yarra
Stonnington	Clause 22.18	http://planningschemes.dpcd.vic.gov.au/schemes/stonnington
Melbourne	Clause 22.23	http://planningschemes.dpcd.vic.gov.au/schemes/melbourne
Port Phillip	Clause 22.12	http://planningschemes.dpcd.vic.gov.au/schemes/portphillip
Casey	Clause 22.17	http://planningschemes.dpcd.vic.gov.au/schemes/casey
Manningham	Clause 22.10 (ESD)	http://planningschemes.dpcd.vic.gov.au/schemes/manningham
Melton	Clause 22.02 (Sustainability)	http://planningschemes.dpcd.vic.gov.au/schemes/melton
Monash	Clause 22.04	http://planningschemes.dpcd.vic.gov.au/schemes/monash
Yarra Ranges	Clause 42.01 (ESO2 – Little Stringy Bark Creek	http://planningschemes.dpcd.vic.gov.au/schemes/yarraranges

Western Australia

Inventory of policies and guidance documents

Author	Date	Name of policy/document	Link
EPA	March 2015	Environmental Assessment Guideline for Protecting the Quality of Western Australia's Marine Environment	http://edit.epa.wa.gov.au/EPADocLib/EAG%2015%20Marine%20EQMF-March2015.pdf
Department of Premier and Cabinet (DPC)	February 2003	A State Water Strategy for Western Australian	http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CB0QFjAAahUKEwjikamjt-jGAhUkF6YKHQWeADI&url=http%3A%2F%2Fwww.planning.wa.gov.au%2Fdop_pub_pdf%2FState_Planning_Strategy_2050.pdf&ei=9T2sVaLDGqSumAWFvIKQAw&usg=AFQjCNEsrhNmAfMauoDx0g-lql2prEA1w
DPC	2007	State Water Plan 2007	http://www.newwaterways.org.au/files/files/290_State_Water_Plan.pdf
DoW	Feb 2004	Stormwater Management Manual for Western Australia	http://www.water.wa.gov.au/urban-water/urban-development/stormwater/stormwater-management-manual
DoW	August 2008	Urban Water Management Plans – Guidelines for preparing plans and for complying with subdivisions	http://www.newwaterways.org.au/files/files/413_UWMP_guidelines_to_preparing_plans_for_complying_with_subdivision_conditions_SML2.pdf
DoW	Dec 2008	Interim Developing a Local Water Management Strategy	http://www.newwaterways.org.au/Resources/Policy-and-guidelines
DoW	May 2009	Towards a Water Sensitive City: The Urban Drainage Initiative – Phase 2	http://www.water.wa.gov.au/search-results?query=Towards+a+Water+Sensitive+City%3A+The+Urban+Drainage+Initiative+%E2%80%93+Phase+2&collection=wadow
DoW	August 2009	Decision Process for Stormwater Management in WA	http://www.water.wa.gov.au/search-results?query=Decision+Process+for+Stormwater+Management+in+WA&collection=wadow
DoW	June 2011	Water Sensitive Urban Design: Brochures	http://www.water.wa.gov.au/urban-water/urban-development/stormwater
DoW	October 2012	Water Monitoring Guidelines for Better Urban Water Management Strategies and Plans	http://www.water.wa.gov.au/planning-for-the-future/water-and-land-use-planning/better-urban-water-management
DoW	January 2013	BUWM guidance notes	http://www.water.wa.gov.au/planning-for-the-future/water-and-land-use-planning/better-urban-water-management **Scroll to the bottom of the page to access the Guidance notes.

Author	Date	Name of policy/document	Link
IPWEA	2011	Local Government Guidelines for Subdivisional Development (Edition 2.1), Perth, Western Australia	http://www.planning.wa.gov.au/publications/5833.asp
Swan River Trust	2009	Swan Canning Water Quality Improvement Plan	http://www.swanrivertrust.wa.gov.au/docs/river-management/swan-canning-water-quality-improvement-plan.pdf
Swan River Trust	2009	Policy SRT/D4: Stormwater Management	http://www.newwaterways.org.au/files/files/295_srt-d4-stormwater-management.pdf
Swan River Trust	2009	<i>River Protection Strategy for the Swan Canning Riverpark</i> (Draft)	http://www.swanrivertrust.wa.gov.au/swan-river-trust/river-protection-strategy
WAPC	2003	<i>SPP 2.0 Environment and Natural Resources</i>	http://www.planning.wa.gov.au/publications/1161.asp
WAPC	2006	<i>SPP 1 State Planning Framework</i>	http://www.planning.wa.gov.au/publications/1160.asp
WAPC	2006	<i>SPP 2.9 Water Resources Policy</i>	http://www.planning.wa.gov.au/publications/742.asp
WAPC	2006	<i>SPP 2.10 Swan Canning River System</i>	http://www.planning.wa.gov.au/publications/1163.asp
WAPC	October 2008	<i>Better Urban Water Management</i>	http://www.planning.wa.gov.au/publications/741.asp
WAPC	January 2009	<i>Liveable Neighbourhoods – A Western Australian Government Sustainable Cities Initiative</i>	http://www.planning.wa.gov.au/dop_pub_pdf/LN_Text_update_02.pdf
WAPC	August 2010	<i>Directions 2031 and Beyond – Metropolitan Planning Beyond the Horizon</i>	http://www.planning.wa.gov.au/publications/826.asp
WAPC	2010	<i>State Planning Policy No. 4.2: Activity Centres for Perth and Peel</i>	http://www.planning.wa.gov.au/publications/1178.asp
WAPC	August 2012	<i>Structure Plan Preparation Guidelines</i>	http://www.planning.wa.gov.au/publications/823.asp
WAPC	October 2012	<i>Model Subdivision Conditions Schedule</i>	http://www.planning.wa.gov.au/Model-subdivision-conditions.asp
WAPC	2013	<i>SPP 3.1 Residential Design Code</i>	http://www.planning.wa.gov.au/dop_pub_pdf/State_Planning_Policy_3.1-Residential_Design_Codes.pdf
WAPC	August 2013	<i>Development Control Policy 2.2 Residential Subdivision</i>	http://www.planning.wa.gov.au/publications/803.asp
WAPC	2014	<i>State Planning Strategy 2050</i>	http://www.planning.wa.gov.au/6561.asp

Western Australian local WSUD planning policies

Council	Planning Scheme	Link
City of Armadale	Town Planning Scheme No. 4 Part 5 General development Requirements Clause 5.9 – Drainage and water sensitive design Local Planning Scheme PLN 2.6 – Water Sensitive Design	Town Planning Scheme No. 4 http://www.armadale.wa.gov.au/sites/default/files/assets/documents/docs/Planning_and_Land_Use/Town_Planning_Scheme_No4.pdf Local Planning Scheme http://www.armadale.wa.gov.au/sites/default/files/assets/documents/docs/Planning_and_Land_Use/Planning_Policies.pdf
City of Bassendean	Local Planning Scheme No. 10 Local Planning Policy No. 3 – Water Sensitive Design	http://www.bassendean.wa.gov.au/7_info_feedback/pdfs/Local.Planning.Policy.No.3.Water.Sensitive.Design.pdf
City of Bayswater	Town Planning Scheme No 23 'Morley City Centre Scheme' Clause 4 Development standards and requirements Clause 4.8 – subdivision – the incorporation of water sensitive design City of Bayswater District Town Planning Scheme No 24	Town Planning Scheme No. 23 'Morley City Centre Scheme' http://www.bayswater.wa.gov.au/cproot/301/2/TPS-23-text.pdf City of Bayswater District Town Planning Scheme No. 24 http://www.bayswater.wa.gov.au/cproot/302/2/tps-24-june2015.pdf
Town of Cambridge	Town Planning Scheme Policy Manual Policy 5.3 Landscape and Water Sensitive Urban Design	http://www.cambridge.wa.gov.au/files/d8aeea8f-77a1-4f40-a58b-a2a8009eb359/Policy_53_-_Landscaping_and_Water_Sensitive_Urban_Design.pdf
City of Cockburn	Town Planning Scheme No. 3 Schedule 4 – Special Use Zones Local Planning Strategy Clause 2.0 – State and Regional Planning Context Clause 2.1.3 strategies and actions	Town Planning Scheme No. 3 http://www.planning.wa.gov.au/LPS/DATA/Local%20Planning%20Schemes/Cockburn%20-%20City%20of%20(Scheme%203)/Scheme%20Text.pdf Local Planning Strategy http://www.cockburn.wa.gov.au/documents/CouncilServices/CityDevlpmt/LPSAMENDEDAUG2000.pdf
Town of East Fremantle	Town Planning Scheme Part 4 – Zones – Residential Zone Part 10 – procedure for dealing with applications	http://www.eastfremantle.wa.gov.au/uploaded/pdf/scheme%20text%20(updated%20august%202012).pdf
City of Fremantle	Local Planning Scheme No 4 Clause 1.6 – promote the use of water sensitive urban design principles Clause 2.1 Environmental	http://www.fremantle.wa.gov.au/files/4da7a020-26bb-4ba6-a742-a09700c76063/LPS4_July_2012.pdf

Council	Planning Scheme	Link
	Clause 2.1.2 – Water sensitive design	
City of Joondalup	City of Joondalup Local Planning Strategy Clause 4.3 Commercial centres (outside the City Centre) Clause 4.6 Environment	http://www.joondalup.wa.gov.au/Develop/LocalPlanningStrategy.aspx
Shire of Kalamunda	Local Planning Scheme No 3 Clause 5.15 – Commercial zones Clause 5.16 – Industrial zones Schedule 10 – Drainage and Nutrient Management Plan	http://www.planning.wa.gov.au/LPS/DATA/Local%20Planning%20Schemes/Kalamunda%20-%20Shire%20of%20(Scheme%203)/Scheme%20Text.pdf
Shire of Mundaring	Local Planning Scheme No. 4 Part 5 – General Development Requirements Clause 5.7.6 – stormwater drainage Clause 5.7.8 – landscaping requirements	http://www.mundaring.wa.gov.au/ResidentServices/Planning/Documents/Local%20Planning%20Scheme%20No%20%204.pdf
City of Stirling	Local Planning Scheme No. 3 Part 6 – Special control areas Clause 6.2.7 – Maintenance of the Core Area	http://www.stirling.wa.gov.au/development/Schemes-policies-codes-and-legislation/Local%20Planning%20Scheme/Local%20Planning%20Scheme%20No.3%20Scheme%20Text.pdf#search=local%20planning%20scheme
City of Subiaco	General Planning Policies Clause 2.16 – landscaping and water sensitive urban design	http://www.subiaco.wa.gov.au/CityofSubiaco/media/City-of-Subiaco/Planning-and-development/Town-planning-controls-and-policies/2-16-Landscaping-and-Water-Sensitive-Urban-Design.pdf
City of Vincent	Local Planning Strategy Part 1.4 – Strategies and Actions Clause 1.4.9 – Water Management Part 3.1 – Objectives for Managing Water Clause 3.2.4 – Water Sensitive Urban Design	http://www.vincent.wa.gov.au/files/abdf4c21-e62d-4c7f-95a8-a42d010ad43a/LPS2.pdf
City of Wanneroo	Local Planning Policy Local Planning Policy 4.4 Urban Water Management	http://www.wanneroo.wa.gov.au/download/downloads/id/107/urban_water_management_-_lpp_44.pdf

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