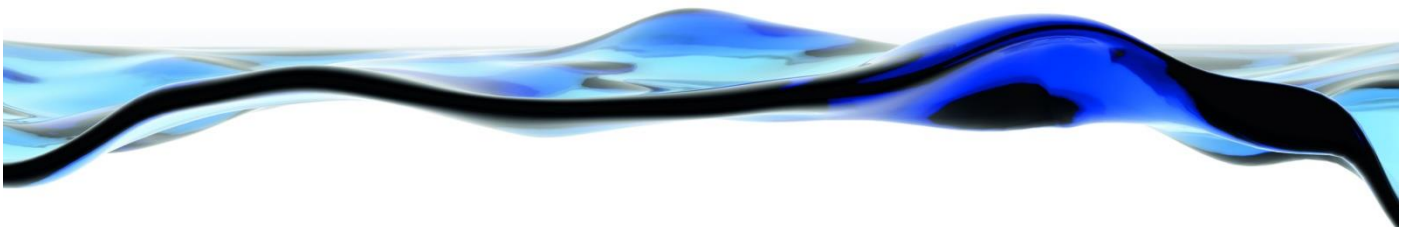


# Pathways for Implementation of Water Sensitive Urban Design Policy in South Australia



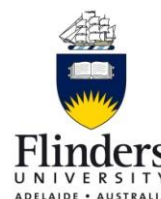
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## Summary

This report outlines the results of a project contributing to a growing body of water sensitive urban design (WSUD) focussed studies which have been conducted by the Goyder Institute for Water Research. It presents the findings of Task 1 of the Goyder Institute's *Water Sensitive Urban Design Project – Phase 2* where the potential pathways for incorporating WSUD into the South Australian development planning processes were investigated by undertaking the following:

- A review of experiences in other Australian jurisdictions for how WSUD has been incorporated in the planning and development process;
- A review of the current policy framework for WSUD in South Australia; and,
- An investigation of potential avenues to better incorporate WSUD principles in the planning process for new developments in South Australia.

The review of experiences of other Australian jurisdictions revealed how WSUD has been integrated in the land use planning and development process outside of South Australia. This highlighted a number of potential insights for the South Australian context. All states have undertaken efforts to incorporate WSUD principles into the planning and development process at state/territory and local government levels. Only Victoria and the ACT have what may be considered a form of mandated WSUD targets at the state level, and these are effectively only for greenfield development. In other cases, state level policies and guidelines provide a framework, but implementation is typically at the local government level through local planning instruments. The focus of WSUD in local government guidelines is often on water quality, with the quantity of water entering minor drainage systems and natural waterways dealt with by Council's engineering technical specifications for drainage.

The mandatory requirements for WSUD in South Australia are limited to the requirement for an alternative water source for new developments and some extensions, typically achieved through the provision of a rainwater tank. This is mandated via the South Australian provisions of the *Australian Building Code*. WSUD is considered in the *Planning Strategy for South Australia* which includes such documents as the *30 Year Plan for Greater Adelaide* which state several targets for WSUD implementation, including the implementation of mandatory WSUD on new development sites. There has been progress on these targets with the release of the South Australian WSUD policy in 2013, which details further specific actions toward WSUD implementation in SA. State Government currently provides principles for 'Water Sensitive Design' in the *South Australian Planning Policy Library*. These are not mandatory and in the absence of quantitative targets for flow quantity and quality control, their interpretation is typically by the approving authority. A number of local governments have gone further to implement WSUD targets for flow quantity and/or quality control using mechanisms including engineering service levels or through amendments to their development plan.

The investigation into potential avenues to better incorporate WSUD principles in the planning process for new developments in South Australia revealed several ways in which WSUD could be implemented using the current South Australian Planning system.

1. Implementation of WSUD in local government development plans. This included three different approaches as follows:
  - a. The application of existing WSUD principles for proposed developments based on existing principles in the Natural Resources section of most development control plans.
  - b. The adoption and application of additional, more specific WSUD principles to development plans using the development plan amendment process.
  - c. The adoption and application of additional, more specific WSUD principles in the South Australian Planning Policy Library for uptake by local governments.
2. Implementation of WSUD objectives and targets into minimum engineering service level standards.
3. Implementation of WSUD into an amended residential code.
4. Implementation of a stormwater quantity and/or quality control service charge.
5. Implementation of further mandatory WSUD requirements into the SA component of the Building Code of Australia.
6. Production of further Minister's Specifications regarding WSUD in new development works.

It was also noted that the South Australian Government was currently undertaking a planning reform process. Based on 22 reforms recommended by the *Expert Panel on Planning Reform* in 2014, and a State government response in 2015, several potential opportunities for WSUD implementation were apparent in this process.

In many cases the potential avenues identified for encouraging greater WSUD implementation in South Australia were likely to be complementary. To achieve the best outcome in a range of development contexts and scales there may need to be a mix of policy instruments that enable WSUD uptake at different levels of the planning hierarchy. At the State level, instruments such as the *SA Planning Policy Library* can provide an efficient approach that will enable local government to uniformly apply WSUD policy in development plans across South Australia.

The broader policy framework could be supported by a range of criteria-led policy that would specify performance targets based on development scale and type. For example, at the scale of infill development WSUD requirements may be implemented through instruments such as the building code and the residential code, however for larger greenfield development, locally relevant principles may be required. Where on-site WSUD is impractical, a more flexible approach to implementation could include an offset scheme, where off-site WSUD is undertaken by council in lieu of on-site measures. However, in some cases site-specific WSUD policies may be required, such as where the catchment drains to a particularly sensitive receiving environment or where local needs are identified in technical studies such as a stormwater management plan. Achieving a balance between adopting broad and locally specific requirements is challenging, however, because the implementation of differing minimum standards and requirements across a region introduces a lack of consistency and this has the potential to drive up costs of development and development approval. It also raises concerns over equity. Conversely, a broad and consistent WSUD policy for all development may not necessarily lead to the most effective or appropriate requirements being implemented.

The review of interstate experiences also showed the importance of supporting WSUD policy with technical guidelines and capacity building programs specific to the South Australian context. An adopted WSUD Policy approach should be clear and unambiguous so that it can be interpreted and applied consistently across different developments and jurisdictions. The planning reform process currently underway in South Australia may help to enable this through reforms such as regionalisation of the planning process and moving to electronic development plans. These reforms may assist in developing consistent WSUD policies across local governments within a catchment.

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# 1 Introduction

This report outlines the results of a project contributing to a growing body of water sensitive urban design (WSUD) focussed studies which have been conducted by the Goyder Institute for Water Research. It presents the findings of Task 1 of the Goyder Institute's *Water Sensitive Urban Design Project – Phase 2*. The overall goal of this research project was:

1. To investigate the pathways for incorporating WSUD into the South Australian development planning processes; and
2. To investigate the technical knowledge needed to incorporate WSUD strategies into stormwater management plans.

This report focuses on the first goal of the research by reviewing Australian planning processes regarding WSUD interstate (Section 3) and in South Australia, including any locally relevant case studies of WSUD implementation (Section 4). Finally, the project identifies a series of potential pathways for the implementation of WSUD into development and planning policy (Section 5). The report concludes by summarising and discussing the relevant merit of each approach and other implications (Section 6).

## 2 Background

The Goyder Institute's *Water Sensitive Urban Design Impediments and Potential: Contributions to the SA Urban Water Blueprint* project (or Goyder WSUD Project - Phase 1) was completed in 2014. The research focused on three main areas: the current implementation of WSUD in SA, and its effectiveness (Tjandraatmadja et al., 2014a), the acceptance of WSUD by stakeholders affected by different types of structural WSUD measures (Leonard et al., 2014) and the effectiveness of WSUD for increasing drainage capacity (Myers et al., 2014). The outcomes of the project identified several impediments to WSUD implementation in South Australia, and opportunities to overcome them. At the end of 2014, the research team conducted a review of these opportunities to overcome impediments. A series of proposed research projects were developed and these were presented to the then project steering committee. This steering committee consisted of practitioners from State Government, Local Government and corporations including SA Water. The committee was asked to rank the projects in order of importance. The project titles and their ranking are shown in Table 1. Following this process, the research goals were refined to achieve the highest priority project.

**Table 1 – Research activities proposed for the Goyder Institute WSUD project – Phase 2 as ranked by practitioners**

Rank	Project / Task
1	Local government stormwater management plans - WSUD guidelines for developers/consultants and assessment tools for local government
2	Quantifying the impact of infill development on flooding, runoff yields and water quality
3	The economic benefits of WSUD
4	WUSD management and maintenance models
5	Review of urban runoff quality data
6	GIS map of catchment areas managed by WSUD measures – quantifying catchment areas
7	Evidence based performance and benefits of rainwater tanks in Adelaide

A component of the highest priority project listed in Table 1 included a review of WSUD related development policy in other Australian states and the identification of how WSUD might be efficiently implemented into policy in South Australia. This research therefore undertook a thorough review of WSUD policies at the national and state government level across Australia, including South Australia. Locally relevant case studies of WSUD implementation at the local government level are then presented. Finally, we present a number of potential pathways for the implementation of WSUD in South Australia based on the reviewed case studies.

## 3 Review of Interstate Policies

### 3.1 Introduction

The following provides a summary of other Australian states' and territories' experience with incorporating WSUD in the planning and development process. A comprehensive review of WSUD legislation and policies across Australian states and territories can be found in Tjandraatmadja et al. (2014b). This review builds on the Tjandraatmadja et al. (2014b) review by focussing on the mechanisms and processes that are available in the different jurisdictions for incorporating WSUD in the planning and development process. This information can then be used as basis for considering the lessons that can be learnt from other Australian States and Territories to inform how WSUD principles and practice can be better integrated into the South Australian planning and development process.

### 3.2 Victoria

#### 3.2.1 Background

Clause 56.07 (Integrated Water Management) of the Victorian Planning Provisions specifies that new residential subdivisions must implement WSUD techniques to achieve best practice targets for runoff from the development. The best practice targets are contained in *Urban Stormwater – Best Practice Environmental Management Guidelines* (Victorian Stormwater Committee, 2006). The targets for the post-construction stage of a new development are:

- Suspended solids - 80% retention of the typical urban annual load
- Total phosphorous – 45% retention of the typical urban annual load
- Total nitrogen – 45% retention of the typical urban annual load
- Flows – maintain discharges for the 1.5 year ARI at pre-development levels

Clause 56 of the Victorian Planning Provisions only applies to residential subdivisions. However, the State Planning Policy Framework (SPPF) contains clauses which pertain to all types of development within Victoria. These clauses provide a basis for Victorian councils to be able to consider WSUD in residential, industrial, commercial and all other development. The SPPF includes the following clauses relevant to WSUD:

- Clause 10 - Operation of the State Planning Policy Framework. Establishes the link between the planning system and state requirements for environmental protection.
- Clause 11 - Settlement. Provides that planning is to recognise the need for, and as far as practicable contribute towards prevention of pollution to land and water; protection of environmentally sensitive areas and natural resources; a high standard of urban design and amenity.
- Clause 12 - Environmental and Landscape Values. Provides that planning should help to protect the health of ecological systems and the biodiversity they support (including ecosystems, habitats, species and genetic diversity) and conserve areas with identified environmental and landscape values.

- Clause 14 - Natural Resource Management. 14.02 Water, includes objectives and strategies pertaining to the protection of water catchments, protection of water quality, and water conservation.
- Clause 19 - Infrastructure, 19.03-2 Water Supply, Sewerage and Drainage, includes strategies to plan urban stormwater drainage systems to include measures to reduce peak flows and assist screening, filtering and treatment of stormwater, to enhance flood protection and minimise impacts on water quality in receiving waters.
- Clause 19 – Infrastructure, 19.03-3 Stormwater, includes the objective to reduce the impacts of stormwater on bays and catchments, and strategies to:
  - support integrated planning of stormwater quality through a mix of on-site measures and developer contributions, and
  - incorporate water-sensitive urban design techniques into developments including to:
    - protect and enhance natural water systems
    - integrate stormwater treatment into the landscape
    - protect quality of water
    - reduce run-off and peak flows
  - minimise drainage and infrastructure costs.
- Clause 19.03-3 also includes as a policy guideline, that planning must consider as relevant, the *Urban Stormwater Best Practice Environmental Management Guidelines* (Victorian Stormwater Committee, 2006).<sup>1</sup>

Melbourne Water manages a *Stormwater Quality Offset Program*, which was introduced in 2006 (Melbourne Water, 2006). Under the *Water Act (1999)* Melbourne Water has introduced two by-laws, which aim to protect water supply systems and catchments (By-law No. 1), and to prevent or minimise interference with flows in waterways and to prevent or minimise pollution of waterways (By-law no. 2). The stormwater offsets are a financial contribution from developers for regional water quality works to offset pollution not treated in the development by WSUD features, which is an addition to the Waterways and Drainage Charge levied on all Melbourne Water's customers (Melbourne Water, 2015b)<sup>2</sup>. These offsets apply when it is not technically or financially feasible to implement best practice WSUD to achieve water quality targets at the development site. The stormwater offset rate is currently set at \$6,645 per kilogram of nitrogen (Melbourne Water, 2014a). The offset contribution is adjusted based on the area developed and the development type. Higher density development types are charged at a higher rate due to the higher level of stormwater runoff and associated nitrogen load discharged to receiving waters. The offset rate is also adjusted for rainfall, with those local governments in higher rainfall zones having a higher rate due to the greater runoff volume that needs to be treated. Table 2 provides some examples of stormwater offset contributions where best practice is not implemented at the development site, with the contribution rate adjusted by the estimated runoff (development density and rainfall) and the percentage of load reductions achieved in the development relative to best practice targets.

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<sup>1</sup> These guidelines, developed by Victorian EPA, Department of Sustainability and Environment, Melbourne Water, Municipal Association of Victoria and local government, include objectives for environmental management of stormwater (reduction in typical annual loads) of: Suspended Solids – 80 per cent; Total Phosphorus – 45 per cent; Total Nitrogen 45 per cent; Litter 70 per cent; and a flow objective to maintain discharges for the 1.5 year average recurrence interval at pre-development levels.

<sup>2</sup> The offset program complements the revenue collected through the Waterways and Drainage Charge that is levied on customers in Melbourne Water's service area, In 2014/15 the minimum Waterways and Drainage Charge for residential customers was \$93 per year.

**Table 2: Examples of stormwater offset contribution rates for a 1 hectare development (different densities and rainfall zones)**

	Low rainfall ~500 mm/year (Melton City)	Moderate rainfall ~650 m/year (Melbourne City)	High rainfall example ~1600 mm/year (Baw Baw Shire)
Low density residential (lots 1,000 to 2,000 m <sup>2</sup> )	\$14,947	\$21,638	\$31,892
Residential (lots 300 to 600 m <sup>2</sup> )	\$18,684	\$27,048	\$39,865
Multi- unit developments	\$21,487	\$31,105	\$45,845
Industrial or commercial	\$24,289	\$35,162	\$51,825

Source: [Melbourne Water Stormwater Offset Calculator](http://www.bom.gov.au/climate/data/index.shtml). Average annual rainfall from: <http://www.bom.gov.au/climate/data/index.shtml>

A recent project, funded by the Smart Water Fund, developed a framework for water quality offsets that could apply across Victoria (Alluvium, 2015). The framework was developed for the purpose of describing how water corporations can assess and implement options for offsetting water quality impacts of wastewater discharges to receiving waters. This framework proposes the criteria that should be used to assess potential offset programs and the likelihood of them achieving net environmental benefits, which were:

- Equivalence – offset has similar impact on beneficial uses to the action being offset
- Alignment with management priorities –offsets need be consistent with short and long term management priorities
- Additional – offsets target priorities that are currently planned but not funded (can bring forward action)
- Timely – offsets can have time limits and review points, and need to provide the benefit at the same time as action increasing risk
- Located appropriately – offsets address impacts to beneficial uses at all geographic scales
- Enforceable – offsets are underpinned by appropriate licence
- Verifiable – offsets should be able to demonstrate outcomes

### 3.2.2 Process

The offset charge is optional in that developers can avoid payment through achieving best practice WSUD targets on the development site. Clause 56.07 applies to all residential subdivisions with the exception of existing dwellings that are subdivided (infill housing). Developments that are 5 hectares or greater do not have the option of paying the stormwater offset as they must meet best practice water quality targets within the development. While developments of less than 0.4 hectares are encouraged to treat stormwater onsite they do not have to meet best practice targets or pay the offset (Melbourne Water, 2015a). The relevant local council determines for each development if stormwater treatment must be provided on site or if compliance can be achieved through contributing offsets.

A recent review of the stormwater offset rate found that the value of the rates collected by Melbourne Water from developers was less than the cost to construct future treatment works

required to offset stormwater impacts of development (Melbourne Water, 2014b). The increase in the stormwater offset rate was endorsed by the peak industry body, the Urban Development Institute of Australia, and was approved by the regulator (the Essentials Services Commission).

Melbourne's inner city local governments have developed an Inner Melbourne Action Plan, which addresses key issues for the liveability of the inner Melbourne region<sup>3</sup>. The action plan includes the amendment of the Planning Schemes to promote the achievement of WSUD best practice in existing and small-scale developments that do not require a subdivision permit, which triggers Clause 56.07 of the Victorian Planning Provisions. An amendment to the Port Phillip Planning Scheme (C78 Local Policy, Stormwater Management (Water Sensitive Urban Design)) was approved by the State Planning minister in 2014. This amendment requires all applications for all new buildings, extensions to buildings greater than 50 m<sup>2</sup> in floor area and subdivisions in business zones to address best practice targets for WSUD as detailed by the Victorian Stormwater Committee (2006). The inner Melbourne Region local governments considered this amendment as necessary until such time as either the Building Council of Australia or State Sections of the planning schemes are amended to include WSUD principles. While the policy encourages compliance with best practice guidelines, where it is not achieved, the local government will consider in the development application if reasonable effort has been made to incorporate WSUD principles given the opportunities and constraints of a particular site.

The assessment of a development plan against best practice targets can be undertaken with modelling software, with the modelling results submitted to local governments with development applications. Local governments have commonly recommended the use of the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) to assess the performance of WSUD assets in improving stormwater quality (For example see: Melbourne Water (2009b)). Melbourne Water has developed detailed guidance for the use of MUSIC to design and assess WSUD approaches, which includes input parameters (e.g. soils) (Melbourne Water, 2010).

The Water Sensitive Urban Design Guidelines (Melbourne Water, 2009b) specify the approval process for including WSUD in a planning application to Council:

1. Pre-application consultation between applicant and Council to discuss proposed compliance with Council's WSUD requirements.
2. Submission of conceptual design of WSUD treatments with planning application, which includes a report on WSUD design intent and how it complies with Council-specific WSUD requirements. This includes outputs from the MUSIC or other approved modelling tool that demonstrate how the WSUD approach will achieve best practice targets.
3. Submission of detailed design of WSUD treatments for construction purposes, which is provided after the planning permit is issued and prior to works commencing.

In addition to MUSIC there are a range of other tools that can be applied to demonstrate best practice compliance. Melbourne Water has developed an online assessment tool – the STORM calculator<sup>4</sup>, shown in Figure 1. This tool is straightforward to use so it can be used by people with no formal training or experience in stormwater modelling, which makes it appropriate for small-scale developers who are likely to have limited resources to engage consultants.

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<sup>3</sup> see: <http://imap.vic.gov.au/>

<sup>4</sup> See: <http://www.storm.melbournewater.com.au/Default.aspx>

(a) **The STORM Calculator**  
 Welcome to the STORM Calculator.  
 You now need to submit details relating to your development site.  
 \* Required field

Municipality: \*

Rainfall Station: \*

Click [here](#) to find the location of a rainfall station (closest to your development)

Total Site Area: \*  (m<sup>2</sup>)

Address:

Suburb / Postcode:  /

Assessor:

Development Type: \*

You now need to list every impervious area (Hard surfaces e.g. roof, road) on your site and detail your planned treatment measures.  
 All hard surface areas must be listed with their area - if there is no treatment choose NONE in the treatment field box.

- You can add or delete rows by selecting the Add Treatment Row and Delete Selected Rows buttons.
- Once you have finished select Calculate.
- Select Restart to clear all details and begin again.

Impervious Area Names	Impervious Area (m <sup>2</sup> )	Treatment Type <a href="#">More information...</a>	Treatment Size (m <sup>2</sup> or L)	Estimated Number of Occupants	Delete Row
<input type="text" value="driveway"/>	<input type="text" value="50"/>	<input type="text" value="Raingarden 300mm"/>	<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="checkbox"/>
<input type="text" value="roof"/>	<input type="text" value="100"/>	<input type="text" value="Rainwater Tank"/>	<input type="text" value="2000"/>	<input type="text" value="2"/>	<input type="checkbox"/>

(b) **STORM Calculations Results**

**STORM Calculation Results**

Storm Rating: 112%

Required Water Quality objectives achieved

Select Report Format:

**Results for individual treatments:**

Impervious Area Names	Impervious Area (m <sup>2</sup> )	Treatment Type	Treatment Size (m <sup>2</sup> or L)	Occupants / Number of Bedrooms	STORM Rating (%)	Tank Water Supply reliability (%)
driveway	50	Raingarden 300mm	1	0	130.2	0
roof	100	Rainwater Tank	2000	2	102.4	97

Figure 1: Example of (a) input and (b) results using Melbourne Water's STORM calculator tool

### 3.2.3 Legislation

The WSUD best practice targets are supported by the State Environment Protection Policy (SEPP) (Waters of Victoria), under the Environmental Protection Act 1970. The SEPP specifies the minimum statutory requirements for managing the quality of stormwater (Corbett, 2010). The Port Phillip Bay Study (outlined below) led to the revision of the SEPP that established a target of reducing nitrogen discharge to Port Phillip Bay by 1,000 tonnes per year.

### 3.2.4 Justification

The importance of reducing stormwater pollutants in Melbourne was quantified during the Port Phillip Bay environmental study (Harris, 1996). This four year study in the 1990's aimed to determine the ecological health of Port Phillip Bay, which is the receiving environment for stormwater discharged from Melbourne's catchments. The study found that while the Bay was healthy by world standards, nitrogen loads posed an ecological risk through increased algal blooms, which could lead to eutrophication (Corbett, 2010). The environmental risk posed by nitrogen loads from catchment runoff and treated wastewater led to the recommendation of a 1,000 tonne reduction in the annual nitrogen load discharged to the Bay, with 50% of the reduction from stormwater controls and the other 50% from upgrades to wastewater treatment plants (Corbett, 2010).

The stormwater offset scheme uses the best practice target for total nitrogen as it is considered the limiting pollutant. If the best practice target for nitrogen is achieved it is assumed the targets for suspended solids and phosphorous will also be achieved.

### 3.2.5 Evaluation

There is lack of published monitoring studies that evaluate the effectiveness of best practice stormwater management in addressing water quality and quantity objectives. A study in South East Melbourne compared the effectiveness of three WSUD measures (two wetlands and a raingarden) in improving water quality (Adams & Jayasuriya, 2014). This study found that the wetlands were not functioning as well as expected in terms of reducing turbidity. The authors make the point that WSUD devices are often sized in MUSIC without reference to site-specific water quality data (Adams & Jayasuriya, 2014). Fletcher et al. (2004) undertook monitoring of stormwater wetlands designed to reduce pollutant loads reaching Port Phillip Bay. The study monitored 8 storm events and 24 dry weather events. The authors found that during wet weather the loads of TSS, TP and TN were reduced by an average of 54, 64 and 17% respectively (Fletcher et al., 2004). During dry weather

flows TN was reduced by 47%. The authors highlighted the need for greater understanding of how to improve wetland performance.

### 3.3 New South Wales

#### 3.3.1 Background

In NSW the uptake of WSUD is not mandated by any State Government legislation or policy (Greater Sydney Local Land Services, 2014). However, there are a range of policies at the state and local government levels that are encouraging the adoption of WSUD. In the 1990s the NSW Government delivered the *Waterways Package*. The *Urban Stormwater Program*, which was part of this package, received \$82 million in funding over a five year period. The program, which was administered by the now defunct Stormwater Trust, delivered Stormwater Management Plans (SMPs) for local government catchments.

The *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011* (SEPP) specifies that developments in the Sydney drinking water catchment must have a neutral or beneficial effect (NorBE) on water quality. This is to ensure the protection of water quality in the drinking water catchment. The NSW SEPP<sup>5</sup> requires all new developments to gain consent under the responsible local government's environmental plan that demonstrates NorBE on water quality. The SEPP applies to all developments that have the potential to impact on water quality in Sydney's drinking water catchments.

Local councils have implemented WSUD policies using instruments such as Local Environment Plans (LEPs) and Development Control Plans (DCPs). Examples of these policies enacted in local governments are summarised below. The *Local Government Amendment (Stormwater) Act 2005* provides local governments with the option to levy for managing stormwater services. The upper limit for the annual stormwater levy on residential properties is \$25 per 350 m<sup>2</sup>. The *Local Government (General) Regulation 2005* (Clause 125A) regulates that the amount levied by a local government cannot exceed actual stormwater management costs. Local governments can use their discretion in deciding if rebates or discounts for the stormwater levy are applied to properties with on-site stormwater management, such as WSUD approaches (Department of Local Government, 2006). A review of the stormwater management service charge found that initially (2006/07) 43 councils implemented the charge, which increased to 64 councils in 2007/08 and 77 in 2008/09 (Office of Environment and Heritage, 2011).

The requirement for new dwellings to receive BASIX (Building Sustainability Index) certification has been a major driver for the adoption of household rainwater tanks in NSW. The BASIX scheme requires all new dwellings and redevelopments to achieve a 40% reduction in mains water consumption (Greater Sydney Local Land Services, 2014). It is implemented via regulation under the New South Wales Environmental Planning and Assessment Act (1979).

#### 3.3.2 Process

Development applications submitted in the Sydney Water Catchment need to take the following steps to demonstrate neutral or beneficial effect on water quality:

1. Discuss planning application with local council

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<sup>5</sup> In NSW SEPP is State Environment Planning Policy, while in Victoria SEPP is State Environment *Protection* Policy



2. Prepare a development application. The application must include a water cycle management plan. For small subdivisions of less than 4 lots, the impact of the development on stormwater can be assessed using a Small Scale Stormwater Quality Model (SSSQM). A SSSQM is available on the Sydney Catchment Authority website<sup>6</sup>. For larger scale developments MUSIC is the preferred tool to determine NorBE on water quality (Sydney Catchment Authority, 2011).

The Sydney Catchment Authority developed a clause that can be used by councils in their development control plans. The clause provides for the inclusion of a water cycle management study (including erosion control and sediment management during the construction phase). The NorBE guideline also provides guidance on modelling for different development types, with the model outputs used for the assessment and approvals process.

Landcom (2009) presented a case study of WSUD being integrated in the master planning process. The site, Renwick, is located in Mittagong, within Sydney's water supply catchment. Therefore under the SEPP for development to proceed there was a need to demonstrate neutral or beneficial effects for Sydney Water catchments. The WSUD targets required to meet this NorBE test were:

- Water conservation – 40% reduction of potable demand on base case<sup>7</sup>
- Water quality – 65% reduction in the mean annual loads of total nitrogen; 84% reduction in the mean annual loads of total phosphorus; and, 91% reduction in the mean annual loads of total suspended solids.
- Flow management – post development storm discharges to be maintained at pre-development flows for a 1.5 year ARI

### 3.3.3 Case studies

As noted previously, the uptake of WSUD is not mandated by any State Government legislation or policy in NSW (Greater Sydney Local Land Services, 2014). However, there are a range of policies at the state and local government levels that are encouraging the adoption of WSUD. Two case studies of local government implementation are presented below.

#### *Penrith City Council*

Penrith City Council released a WSUD policy in 2013. The objective of the policy is to provide developers and Council with a framework to implement WSUD into new developments (residential, industrial and commercial) and redevelopments (Penrith City Council, 2013). For residential development, Penrith's WSUD policy applies to developments of five or more dwellings<sup>8</sup>. The criteria used to assess stormwater quality performance are:

- 90% reduction in the post development mean annual load of total gross pollutants (greater than 5 mm)
- 85% reduction in the post development mean annual load of total suspended solids (TSS)
- 60% reduction in the post development mean annual load of total phosphorus (TP)
- 45% reduction in the post development mean annual load of total nitrogen (TN)

Stormwater quantity requirements specify that the post development stream forming flows should be no greater than 3.5 times the pre-developed duration of stream forming flows. Onsite detention

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<sup>6</sup> See: <https://www.s3qm.com.au/about>

<sup>7</sup> Compared to a benchmark building in the same area, but base case is not specified

<sup>8</sup> For commercial, retail and industrial Penrith's WSUD Policy applies to developments greater than 2,500 m<sup>2</sup> site area

is covered in the Council's *Engineering Specifications and Stormwater Drainage for Building Developments* documents.

The WSUD policy is not yet part of a development control plan. The process for a developer in preparing supporting WSUD documentation for a development application or construction certificate is:

- Engage qualified and experienced practitioners for the design of WSUD strategies
- Pre-application consultation with Council to agree on general WSUD design approach
- At the Development Application stage proponents must provide a WSUD strategy that includes detailed MUSIC model outputs describing how WSUD performance targets will be met.

WSUD Technical Guidelines provide supporting information for selecting WSUD approaches, and include MUSIC modelling parameters specific to Penrith.

#### *Blacktown City Council*

Blacktown City Council has developed an Integrated Water Cycle Management (IWCM) Development Control Plan (DCP) (Blacktown City Council, 2006). This DCP has the purpose of mitigating the impact of urban development on local waterways. The DCP includes targets for the reduction of stormwater pollutants, which are: TSS 85%, TP 65%, gross pollutants 90% and total hydrocarbons 90%. The DCP is supported by a comprehensive developer handbook for WSUD that assists developers in implementing the controls related to water conservation, water quality and waterway stability.

The WSUD DCP does not apply to single dwelling or dual occupancy development.

#### **3.3.4 Legislation**

The adoption of WSUD in NSW is not mandatory under State legislation or policies (Greater Sydney Local Land Services, 2014). The framework for the adoption of WSUD in local government planning and development processes is established under the Environmental Planning and Assessment Act, 1979 (EP&A Act) and the Local Government Act 1993 (Greater Sydney Local Land Services, 2014). The EP&A Act provides for State Environment Protection Policies (SEPPs) and Regional Environmental Plans (REPs). The SEPPs and REPs guide the development of local planning instruments such as Local Environment Plans (LEPs) and Development Control Plans (DCPs) (Greater Sydney Local Land Services, 2014). The NorBE test was established under the State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011.

### **3.4 Australian Capital Territory (ACT)**

#### **3.4.1 Background**

In 2004, the ACT Government released the *think water, act water – a strategy for sustainable water resource management*, which specified the following objectives for the ACT:

- A 12 per cent reduction in per capita mains water use by 2013, and increasing to 25 per cent reduction by 2023 (based on 2003 levels of water use);
- An increase in the use of treated wastewater from 5% to 20% by 2013;
- The level of nutrients and sediments entering waterways is no greater than would occur from stormwater off a well managed rural landscape; and,

- A reduction in the intensity and volume of stormwater flows that limits 0.25 year ARI to pre-development flows.

To support the achievement of these objectives the ACT Government released a code for WSUD that includes mandatory WSUD targets (ACT Planning and Land Authority, 2009). These targets apply to all greenfield developments, redevelopment and urban infill. The targets include commercial, institutional and industrial developments. The mandatory development targets for WSUD are:

- A reduction in mains water consumption by 40% compared to 2003 levels. Mains water savings can be demonstrated using outputs from on-line tools developed by the ACT Planning and Land Authority, or by using the NSW Government's BASIX planning tool or Green Star rating tools developed by the Green Building Council of Australia.
- Stormwater quality targets specify the following load reductions:
  - A reduction in average annual suspended solids of 60%
  - A reduction in average annual total phosphorus of 45%
  - A reduction in average annual total nitrogen of 40%
- For 0.25 year ARI a reduction of runoff peak flow to no more than the predevelopment levels and detained flow released over 1 to 3 days
- For 5 year to 100 year ARI reduce peak flows to predevelopment levels

### 3.4.2 Process

The code outlines the following steps to apply WSUD in the planning and development process:

1. Select the WSUD criteria applicable to the development type and scale
2. Identify the available WSUD measures or sequence of measures
3. Assess the likely effectiveness of these measures against applicable WSUD targets
4. Undertake the sizing and design for each WSUD measure
5. Document the WSUD measures, complete the checklists and confirm the WSUD targets are met

The documentation detailing how WSUD targets will be achieved is then included with material submitted for development applications and building approvals (ACT Planning and Land Authority, 2009).

The code directs users to design guidelines for each of the WSUD approaches presented. This includes ACT Government design standards for urban infrastructure, as well as other guidelines that detail current practice, including:

- Melbourne Water (2004) WSUD Engineering Procedures: Stormwater, prepared by Ecological Engineering, WBM, Parsons Brinkerhoff, June. ([www.wsud.melbournewater.com.au](http://www.wsud.melbournewater.com.au))
- Argue J (2004) WSUD: Basic Procedures for 'Source Control' of Stormwater: A Handbook for Australian Practice, Ed JR Argue, 1st Edition, prepared by the Urban Water Resources Centre, University of South Australia
- Engineers Australia (2006), Australian Runoff Quality, A Guide to Water Sensitive Urban Design, Ed THF Wong, Canberra, April.

MUSIC is the recommended assessment tool for demonstrating compliance with stormwater quality targets. However, other tools can be used with the agreement of the ACT Planning and Land Authority (ACT Planning and Land Authority, 2009). The code provides recommended parameters for the application of MUSIC in the ACT.

### 3.4.3 Legislation

The implementation of mandatory WSUD targets in the ACT is supported by the following legislative and policy framework:

- The *Water Resources Act 1998* provides the foundation for the management of water resources in the ACT. Under this act the *think water, act water* strategy was tabled as a Water Resources Management Plan.
- The *Territory Plan* is the key statutory planning document in the ACT. This establishes the detailed planning policy framework for the ACT including the use of planning controls, and the broad objectives for water management. It also must be consistent with the *National Capital Plan*, which provides a general policy framework for planning and land development in the ACT.
- The *Environmental Protection Act 1997* provides for the protection of the environment. This Act lists water quality required for different water uses or environmental values.

### 3.4.4 Justification

The long-term plan for sustainable water resource management in the ACT was released in 2004. At the time the strategy was being developed there was considerable pressure on the availability of water resources due to the impact of the Millennium drought. Also there were problems with water quality in catchments due to the aftermath of bushfires in 2003 (ACT Environment and Planning Directorate, 2012). These events raised the urgency to develop a strategy that protected catchment water quality and secured water supply.

### 3.4.5 Evaluation

In 2012 a review was undertaken of the ACT's long-term water strategy - *think water, act water*. This review found that a potable water savings target of 12 per cent was on track to be achieved by 2013. A key objective of the original strategy was to facilitate the incorporation of WSUD in new developments. The review noted that progress has been made through the implementation of WSUD guidelines and retrofitting of WSUD devices in established suburbs. However, there is the need to review the effectiveness of the WSUD code in meeting water quality and quantity objectives (ACT Environment and Planning Directorate, 2012).

A recent detailed review of WSUD in the ACT was undertaken (ACT Environment and Planning, 2014). Key findings from this review included:

- The WSUD code and related WSUD development requirements may be inhibiting innovation by limiting options available, suggesting a need to expand acceptable options (e.g. for stormwater retention and detention);
- Need to revise code and WSUD design standards to reflect current best practice;
- WSUD requirements need to consider changing urban form such as smaller lot sizes;
- Need for greater monitoring of WSUD that can inform improvement in design options; and,
- Document maintenance and handover procedures to ensure continued efficient operation of WSUD assets. WSUD assets are handed over to the ACT's Territory and Municipal Services (TAMS) for ongoing maintenance. The review notes that there is a need to address the

difficulties faced by TAMS in managing an increasing WSUD asset register without a related increase in funding (ACT Environment and Planning 2014).

## 3.5 Western Australia

### 3.5.1 Background

In Western Australia (WA) land use and water planning have been integrated in State and local planning policy. This was a key recommendation that came out of the Securing Our Water Future: a state water strategy and the State Water Plan. The State Water Plan is a strategic document that is not binding. In most cases water planning in Western Australia is non-statutory (Aurecon, 2012). The State Planning Policy 2.9 Water Resources (Western Australian Planning Commission, 2006) identifies that WSUD principles need to be considered in the development processes. Best management and planning practices can be applied with the objective of achieving post-development water quality and quantity that is equal or better to pre-development conditions, which is analogous to the NorBE target in NSW. The implementation of the planning policy is primarily through local planning strategies, structure plans and town planning schemes, and development proposals and applications (Western Australian Planning Commission, 2006).

The Western Australian Planning Commission (2008) developed a detailed document, *Better Urban Water Management*, which provides a strategy for implementing WSUD in the Swan Coastal Plain that includes metropolitan Perth. It is recognised that the planning process outlined for integrating WSUD in this document is an ideal process but that in many cases there will need to be flexibility in the application to deal with local conditions. If the planning process outlined is implemented as stated then it will be consistent with the *State Water Plan* (Western Australian Planning Commission, 2008).

### 3.5.2 Process

In WA WSUD is implemented in the planning and development process at the local government level using instruments such local planning scheme amendments and local water management strategies (Aurecon, 2012). Examples of the application of WSUD in local government planning processes are provided in local government case studies below.

*Better Urban Water Management* provides guidance on the appropriate level of consideration that should be given to total water cycle planning at each stage of the planning process. Figure 2 depicts the broad process for how water management and WSUD are integrated in the planning process, which is summarised in the following points:

1. Development of an overarching regional strategy. This is developed at the level of more than one local council and will address regional catchment issues and provide for long-term water resource management and planning.
2. District Water Management Strategy (DWMS) – These generally cover an area greater than 300 hectares and can involve more than one local government. This strategy will identify catchment objectives and define best practice management.
3. Local Water Management Strategy (LWMS) - These are generally developed for an area less than 300 hectares. This is developed by the developer to support rezoning and/or local structure planning.
4. Urban Water Management Plan (UWMP) – These are developed during subdivision applications and demonstrate how the developer will implement the overarching LWMS in the development.

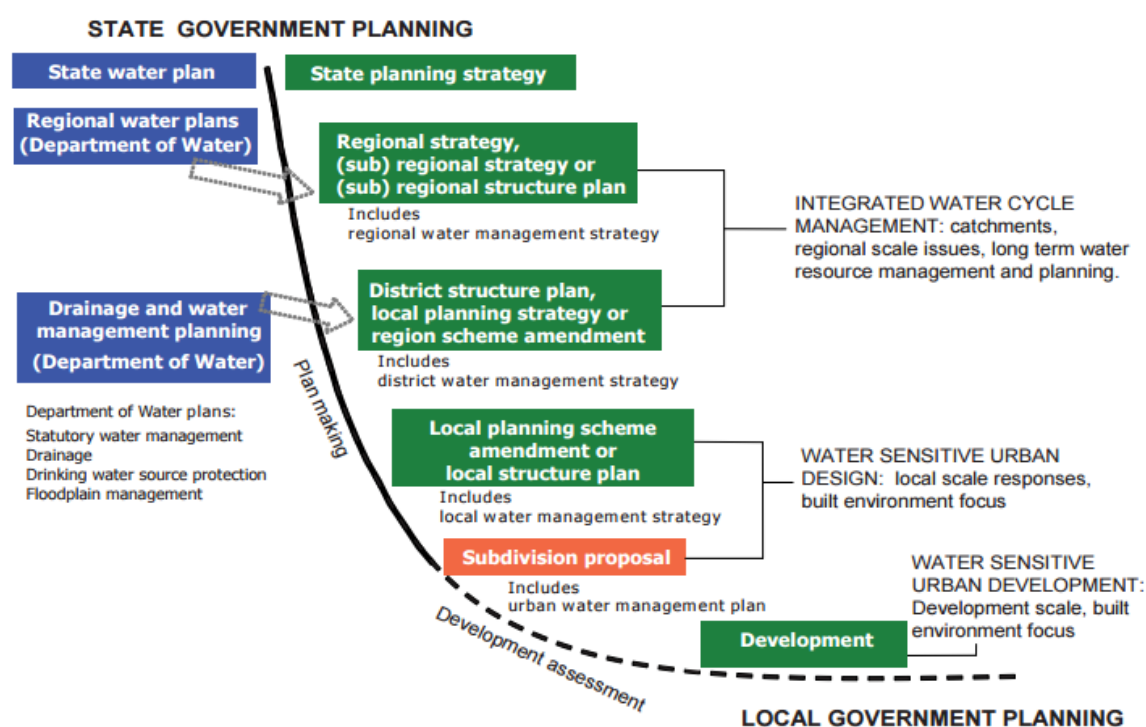


Figure 2. Optimal Process for integrating water planning with the land planning process in Western Australia<sup>9</sup>

### City of Busselton

The City of Busselton has released WSUD guidelines for individual lots, infill developments and subdivisions (City of Busselton, 2014). The guidelines provide information on how development proponents can meet the City's requirements for stormwater management. The guidelines provide information on different WSUD treatment approaches, and then worked case studies that provide examples of how WSUD elements can be configured for a development to meet the Council's WSUD rating scheme (STORM). It is proposed that an online calculator will be developed to enable developers to easily assess proposed WSUD elements against the required STORM rating (City of Busselton, 2014).

### City of South Perth

In the City of South Perth detailed guidelines were developed to provide information for development proponents (Aurecon, 2012). The guidelines provide guidance on how best practice WSUD approaches can be implemented in new developments as part of the planning process. To support the commitment to WSUD a policy was developed. This WSUD policy applies to all development in the City of South Perth but does not contain binding WSUD targets that must be met for development to be approved by Council. However, the Council has committed to considering all development applications on how they address the objectives in the WSUD Policy (Policy P211).

### 3.5.3 Legislation

The incorporation of WSUD in local government planning and development processes is enabled under the State Planning Policy 2.9 Water Resources (2006). This policy provides a framework that

<sup>9</sup> Source: Department of Water Department of Water 2008, Urban Water Management Plans - Guidelines for preparing plans and for complying with subdivision conditions Page 3



requires water resources to be considered as part of the land use planning and development process.

There are also a number of strategies supporting the implementation of WSUD in Western Australia, which include:

- State Sustainability Strategy (2003)
- Securing our Water Future: a state water strategy for Western Australia (2003)

In addition, natural resource management regional strategies help to define water management objectives at the regional level.

## 3.6 Northern Territory

### 3.6.1 Background

In the Northern Territory (NT) undertaking WSUD approaches in new developments is not yet mandatory. There is no quantitative targets for developments to achieve in minimising the downstream impacts of runoff (Aurecon, 2011). However, there are a range of policies and strategies that encourage the adoption of WSUD in developments located in priority environmental management areas. Development around Darwin Harbour has been a particular focus for the adoption of WSUD.

The Darwin Harbour is the ultimate receiving environment for the Darwin and Palmerston urban areas, which are the two most populated and fastest growing urban areas in the NT. It was identified there was need to consider the impact of urban development on the health of the region's waterways (McAuley & McManus, 2009). A stormwater strategy was developed to improve the quality of stormwater discharged to Darwin Harbour. It is estimated that human activities have doubled the input of nitrogen to the Harbour, with the majority of the nitrogen increase attributable to stormwater (NT EPA, 2014). The NT EPA identified that a key objective of the strategy was to address inadequacies in the current regulatory framework (NT EPA, 2014). A key issue was improving the coordination of responsibilities between the *Waste Management and Pollution Control Act* and the *Planning Act*.

### 3.6.2 Process

The NT Planning Scheme (Clause 11.4.1) specifies that development applications that are proposing to subdivide rural or unzoned land need to include a land suitability assessment and stormwater management plan. The land suitability categories include drainage assessment, erosion risk and flooding (Northern Territory, 2014). There is no explicit mention of managing nutrients in stormwater runoff.

A WSUD planning guide was developed for the NT's Department of Planning and Infrastructure (McAuley & McManus, 2009). This guide includes proposed objectives for WSUD in new developments and recommendations for how WSUD Strategies can be part of the development assessment process. It is noted for WSUD to be adopted in subdivisions there is the need to include WSUD requirements within the existing NT planning framework. This would include amending the NT Planning Scheme (McAuley & McManus, 2009).

At present, while there is no mandatory provision for WSUD, a number of NT local governments have issued WSUD guidelines. For example, the City of Palmerston provides guidelines and recommendations for developers to include WSUD in subdivisions (City Of Palmerston, 2007). The

guidelines state that developers need to provide a development application that describes the WSUD approaches that have been adopted and provide a justification if WSUD approaches have been excluded (City Of Palmerston, 2007).

### 3.6.3 Legislation

The legislative framework for the management of stormwater in the planning and development process in the NT is set by the following:

- Northern Territory Water Act (2004) - Governs water resource management in the Northern Territory.
- Northern Territory Planning Act (2008) - Governs land development. Greenfield development applications need to include a stormwater management plan. In priority Environmental Management areas conditions can be placed to ensure that the subdivision will not have a detrimental impact on the environment.
- Environmental Assessment Act (2013) – This Act enables the Northern Territory Environment Protection Authority to evaluate development proposals to determine if they pose a risk to the environment.

## 3.7 Tasmania

### 3.7.1 Background

The Tasmanian *State Policy on Water Quality Management 1997* (SPWQM) sets the water quality management objectives for Tasmania including stormwater (Department of Primary Industries Parks Water and Environment, 2012). The SPWQM states that stormwater controls should be specifically addressed at the design stage of proposals for new developments, and that planning schemes should include provisions for stormwater management strategies for development proposals that could generate polluted stormwater runoff offsite.

To address the clauses in the SPWQM the Tasmanian *State Stormwater Strategy* was developed. This Strategy sets out the key principles and standards for stormwater management in Tasmania, which includes identifying accepted guidance documents (Department of Primary Industries Parks Water and Environment, 2010). This Strategy provides guidance on managing stormwater in both the construction and operation stages of a development, as well as for stormwater management in established urban areas. Stormwater targets have been set to be consistent with other Australian states, such as those from the Victorian Stormwater Committee (2006). These targets only apply to new developments that create more than 500 m<sup>2</sup> of impervious area.

The Stormwater Strategy notes that water quantity (beyond drainage and flood management required by the local authority) should be managed where the runoff discharges to a creek or other natural watercourse (Department of Primary Industries Parks Water and Environment, 2010). This discharge can be directly or by piped runoff. The guidelines recommend focussing flow management on lowering the peak flow for frequent minor storms (0.25 ARI).

Best practice WSUD guidelines to achieve the targets in the Stormwater Strategy are provided in: *Water Sensitive Urban Design – Engineering procedures for Stormwater management in Tasmania* (Department of Primary Industries Parks Water and Environment, 2012). The guidelines build upon Derwent Estuary Program's *WSUD Engineering Procedures: Stormwater for Southern Tasmania* (2004) and Melbourne Water's *WSUD Engineering procedures: Stormwater* (2004). The guidelines



also include hydrologic design regions for Tasmania to assist with the sizing of WSUD elements in different regions of Tasmania.

### 3.7.2 Process

A number of local governments and regions have developed WSUD development guidelines and practice notes to assist developers with implementing WSUD approaches. For example, Hobart City Council provides guidance for possible WSUD configurations for different development types (Hobart City Council, 2006).

The Final Draft for the Launceston Interim Planning Scheme mentions WSUD as a performance criterion that can be considered in assessing the capacity of public drainage system to accommodate runoff from the development. In addition, a specific development plan for an area known as The Green, stipulates that development must provide for on-site detention of stormwater and apply the principles of WSUD. However, no performance criteria are given (Tasmanian Planning Commission, 2015).

### 3.7.3 Legislation

The following policies and strategy provide a framework for the implementation of stormwater management in the Tasmanian planning and development process:

- State Policy on Water Quality Management (1997) – Requires local governments to undertake stormwater management plans where urban runoff threatens downstream environmental values. Requires the setting of Protected Environmental Values and Water Quality Objectives for Tasmania
- Land Use and Planning Approvals Act (1993) – Governs land use and planning processes in Tasmania
- Tasmanian State Stormwater Strategy (2010) - Sets out the key principles and standards for stormwater management in Tasmania

## 3.8 Queensland

### 3.8.1 Background

Queensland has seen a number of legislative changes in recent years, which has affected how WSUD is incorporated in the planning and development process. Until 2012, the *Queensland Development code MP4.2* contained the requirements that new dwellings had to achieve minimum water saving targets which was typically achieved by the installation of a rainwater tank system. The *State Planning Policy 4/10 Healthy Waters* was repealed and replaced with the State Planning Policy for Water Quality (2014), which is now the key policy document that guides the management of stormwater quality in the planning and development process.

The *State Planning Policy* (SPP) provides a framework to guide local and state government in land use planning and development assessment based on the state's interest. The SPP Water Quality addresses the State's interest that environmental values and quality of Queensland's waters are protected and enhanced. There are nine policies in the SPP related to water quality, which cover (Department of State Development Infrastructure and Planning, 2014):

- Protection of the environmental values of receiving water;

- Requiring developments to be designed, constructed and managed to minimise impacts from changes to stormwater flows or quality, and to minimise the release of nutrients that may result in algal blooms;
- Adapting stormwater management design to the relevant climatic zone; and
- Developing innovative and locally appropriate solutions for urban stormwater that achieve relevant urban stormwater design objectives.

The SPP requires any amendments to the planning scheme to consider if receiving waters have Environmental Values (EVs), which are listed in the *Environmental Protection (Water) Policy 2009*. Water Quality Objectives (WQOs) may also apply. WQOs define the water quality required to protect the EVs (Department of State Development Infrastructure and Planning, 2014).

The SPP Water Quality policy guidelines indicate that WSUD principles can be incorporated in the planning and development process, and notes that planning amendments can cite best practice guidelines such as:

- Water by Design Technical Guidelines (Water by Design, 2006) and Deemed to Comply Solutions<sup>10</sup>;
- Queensland Urban Drainage Manual (Department of Energy and Water Supply, 2013); and,
- Queensland Water Quality Guidelines (Department of Environment and Heritage Protection, 2009).

A local government can reflect the SPP in the planning scheme amendment by:

- Including performance criteria for water quality treatment in the sub-catchment;
- Including the capacity for offsets for water quality treatment elsewhere in the catchment; and,
- Develop locally appropriate solution, which can be included in the local government infrastructure plan.

The SPP provides stormwater management design objectives for the post construction phase which are shown in Table 3. These are consistent with the stormwater quality objectives in the *Queensland Water Quality Guidelines* (urban) for post-development phases (Department of Environment and Heritage Protection, 2009). The SPP has tried to simplify the application of water quality objectives by excluding the need for developments with less than 25% impervious area to demonstrate through modelling how they will achieve the targets. Instead of modelling, the default bio-retention area to comply with load reduction targets for all areas of Queensland is 1.5% of the contributing catchment.

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<sup>10</sup> See: <http://waterbydesign.com.au/deemedtocomply/>

**Table 3: Queensland State Planning Policy - Post-construction stormwater management design objectives**

Climatic region	Total suspended solids (%)*	Total phosphorus (%)*	Total nitrogen (%)*
South East Queensland	80	60	45
Central Queensland (south)	85	60	45
Central Queensland (north)	75	60	40
Dry tropics	80	60	40
Wet tropics	80	60	40
Cape York (FNQ)	80	60	40
Western Queensland	85	60	45

\* Minimum reductions in mean annual load from unmitigated development

Source: State Planning Policy (Department of State Development Infrastructure and Planning, 2014), page 75.

Local governments (e.g. Mackay, Gold Coast, Townsville and Brisbane) have developed technical guidelines for WSUD implementation at the local level. For example, Mackay Regional Council is soon to release *WSUD Deemed to Comply Solutions for the Mackay Region* (Mackay Regional Council, 2015). The document will provide specific advice for the development industry on WSUD solutions. This is designed to simplify the design, compliance, development assessment and implementation process for managing stormwater quality in small-scale developments (Mackay Regional Council, 2015).

### 3.8.2 Process

The SPP guideline for Water Quality describes how stormwater policies can be assessed in the development application process. The Queensland Urban Drainage Manual is cited as the reference document for matters to be addressed in the development application. The manual assists engineers and stormwater designers by providing details on the technical and regulatory aspects to be considered during the planning, design and management of urban stormwater drainage systems. The development application should demonstrate how stormwater treatment has been designed to achieve locally relevant Water Quality Objectives<sup>11</sup> (Department of State Development Infrastructure and Planning, 2014). The guidelines recommend a number of tools and guidelines that can be used to demonstrate compliance. This includes the Water by Design *Deemed to Comply Solutions* and WSUD Technical Guidelines for South East Queensland.

### 3.8.3 Legislation

In Queensland Water Sensitive Urban Design is regulated under the following acts:

- *Environmental Protection (Water) Policy 2009* –The purpose is to protect Queensland’s waters while allowing for ecologically sustainable development. This Policy specifies the Environmental Values (EVs) and Water Quality Objectives (WQOs).
- *Sustainable Planning Act 2009* – The Act provides the overarching framework for Queensland’s planning and development systems. The implementation of the Act is

<sup>11</sup> Water quality objectives (WQOs) are the long term goals for water quality management to support environmental values identified for different waters. For example, WQOs may specify to maintain existing water quality in a specific receiving water the total phosphorous concentrations needs to be less than 20 micrograms per litre.

supported by the *Sustainable Planning Regulation 2009*. The SPP expresses the State's interest in land use planning and development, which then informs regional plans and local planning schemes.

### 3.9 Summary

The review of experiences of other Australian jurisdictions and how WSUD has been integrated in the land use planning and development process highlights a number of potential insights for the South Australian context.

Across all the states and territories there has been efforts made to incorporate the principles of WSUD in the planning and development process at both the state and local government levels. In many cases state level policy and guidelines provide the overarching framework for the consideration of WSUD, but the actual implementation in the planning and development process is left to local government through local planning schemes. The exceptions to this are Victoria and the ACT, which have both developed mandatory WSUD targets to be achieved by some new developments. In other states, such as NSW and WA local governments have introduced amendments to planning schemes that formalise the consideration of WSUD in the development process. However, in many cases local government guidelines highlight WSUD principles and best practice approaches but do not specify performance targets that need to be achieved in terms of reduced pollutant load in runoff or maintaining pre-development flows. Often the focus of WSUD in local government guidelines is on water quality, with the quantity of water entering minor drainage systems and natural waterways dealt with by Council's engineering technical specifications for drainage.

## 4 Review of South Australian WSUD Policies

This section of the report provides an overview of development and planning policy in South Australia. The review focuses on the general approach to development for private developers, and specifically excludes consideration of local, state and federal government infrastructure projects. Where possible, current requirements for and references to WSUD are stressed.

### 4.1 Background

#### 4.1.1 Overview

At present, there are limited mandatory requirements for WSUD in SA. A mandatory requirement to reduce mains water usage demand is required by the Building Code of Australia (see Section 4.3), however there is no mandatory runoff quantity or runoff quality target or policy.

Development and planning in SA is implemented by the *Development Act 1993*, and is administered by the Department for Planning Transport and Infrastructure (DPTI). ‘Development’ is defined in Part 1, Section 4 of the Act, however the review of South Australian policy focuses on the following types of development:

- building work
- a change in the use of land
- the division of an allotment
- the construction or alteration of a road, street or thoroughfare

It is important to note also that the construction of roads, streets and thoroughfares by council or the Crown is exempt from the definition of ‘development’ in the South Australian *Development Act 1993* and these are not considered as part of this report. Furthermore, there are other forms of development that are not captured by the Act, including some residential works such as paving of yards. The effect of this over an entire catchment can be significant from a water management perspective.

The Development Act 1993 is supported by a wide range of legislative and guidance documents. The Development Regulations 2008 provide more detail to the framework established by the Development Act 1993 and are periodically upgraded. The *Development Act 1993* does not make explicit reference to WSUD, but Schedule 1 Section 17A does indicate that a development plan may include a requirement that development:

*‘comply with any requirement relating to the sustainability of a building, or of the occupation or use of a building, from an environmental perspective, including so as to provide efficiencies with respect to the use of water, electricity or other resources or forms of energy, to reduce greenhouse gas emissions or the use of resources or energy, or to provide a rating system to facilitate the assessment of proposed development or to regulate the use or development of any building in accordance with prescribed standards.’*

There are a range of non-statutory policy and strategy documents to plan for development across SA. These include *South Australia’s Strategic Plan* (Government of South Australia, 2011) (Section 4.1.2) and *The Planning Strategy for South Australia* (Section 4.1.3), as well as *Structure Plans* (Section 4.1.4) and *Precinct Plans* (Section 4.1.5).

#### 4.1.2 South Australian Strategic Plans

The *SA Strategic Plan* (Government of South Australia, 2011) is the 'primary directional document' for SA. The plan is not a statutory document, but the plan's objectives and targets are considered in all State Government decision making. The plan contains 98 specific targets. WSUD is not specifically considered in the plan, but several of the 98 targets may be considered to relate to WSUD goals. These include:

*Goal: We want Adelaide to grow up more than out.*

*Target 68: Urban development - By 2036, 70% of all new housing in metropolitan Adelaide will be being built in established areas (baseline: 2010).*

While not a WSUD target, this target sets a goal for greater urban infill development in Adelaide which may influence water demand, wastewater generation and runoff in existing urban areas that must be appropriately managed.

*Goal: We care for our oceans, coasts and marine environments.*

*Target 71: Marine biodiversity - Maintain the health and diversity of South Australia's unique marine environments (baseline: 2011)*

This target does not mention WSUD, but relates to consideration for water quality for developments which drain to marine ecosystems. For example, wastewater and stormwater runoff in the Adelaide metropolitan area drains to the coast. The *Adelaide Coastal Waters Study* (Fox et al., 2007) identified the impacts of poor water quality on Adelaide's coast, and suggested measures for improved water quality have been identified in the *Adelaide Coastal Water Quality Improvement Plan* (McDowell & Pfennig, 2013).

*Goal: South Australia has reliable and sustainable water resources and is a leader in wastewater, irrigation, stormwater and groundwater management.*

*Target 73: Recycled stormwater - South Australia has the system capacity to harvest up to 35 GL of stormwater per annum by 2025 (baseline: 2009)*

*Target 74: Recycled wastewater - South Australia has the system capacity to recycle up to 50 GL of wastewater per annum by 2025 (baseline: 2009)*

These two targets specifically relate to the WSUD objectives to reduce water demand and provide beneficial use of wastewater and stormwater. Diversion of wastewater and stormwater will also reduce the load of pollutants being transported to receiving waters.

#### 4.1.3 The Planning Strategy for South Australia

The *Planning Strategy for SA* is a requirement of the *SA Development Act 1993* and it sets out the broad direction for planning and development. There are several volumes of the planning strategy for South Australia, each covering a different geographic region. WSUD tends to be mentioned in more recent plans, including the *30 Year Plan for Greater Adelaide* (2010), the *Limestone Coast Region Plan* (2011) which includes Mount Gambier, the *Far North Region Plan* (2010) which includes Port Augusta, the *Mid North Region Plan* (2011) which includes Port Pirie, and the *Kangaroo Island Plan* (2011). In addition to these, additional plans for regional centres such as Mount Gambier, Port Augusta and Andamooka also exist. References to WSUD in these plans are broad and indicate an intent to implement WSUD. For example, in the *30 Year Plan for Greater Adelaide*, Section titled 'Water' under the 'Policy and Targets' area the following objectives were proposed:

1. *Incorporating WSUD techniques in new developments to achieve water quality and efficiency benefits.*

2. *Require WSUD techniques to be incorporated in Structure Plans and Precinct Requirements for State Significant Areas*
3. *Mandate WSUD for new developments (including residential, retail, commercial, institutional, industrial and transport developments) by 2013 (consistent with Water for Good).*

This is also reinforced by the Section titled 'Biodiversity', Target E:

*Minimise the discharge of stormwater, pollution and nutrients to freshwater, coastal and marine environments through the adoption of appropriate Water sensitive urban design (WSUD) and Adelaide Coastal Water Quality Improvement Plan policies and targets into development plans.*

Several documents in the planning strategy include references to mandating WSUD targets, as originally proposed in the SA Government's Water for Good (2011) document. The nature of the intended targets was not presented by Water for Good, however it was proposed that an effective means of mandatory WSUD requirements would be implemented by 2013 for new residential and commercial urban developments. The Department of Environment, Water and Natural Resources (DEWNR) has subsequently led the development of the South Australian WSUD policy including recommended WSUD targets. The policy, titled *Water Sensitive Urban Design – Creating more liveable and water sensitive cities in South Australia* was released in October 2013. It stated that the aim of WSUD in South Australia is that (SA Department of Environment Water and Natural Resources (DEWNR), 2013):

*'Urban landscapes are planned, designed and managed to be 'water sensitive' and in doing so contribute to the liveability of South Australia's urban environments and the wellbeing of South Australians'.*

The plan details objectives, performance principles, performance targets and the primary focus of these targets (the development type to which the target is suitable). The targets were based on interim WSUD targets for water quality and quantity management recommended by the Goyder Institute for Water Research (Myers et al., 2011).

The SA Government's *Strategic Infrastructure Plan for SA* (2005) is one of several plans that facilitate reaching SA Strategic Plan targets. This plan was last presented in 2005 and included some references to WSUD concepts. For example, strategic objectives included the development of cost effective opportunities to recycle wastewater (p.141):

*'The State Government, working closely with local government, is to prioritise a future work program including accounting for emerging trends of urban consolidation, and achieving improved quality of stormwater discharged to the environment supported by appropriate harvesting of stormwater flows for urban amenity or beneficial reuse, where economically feasible'*

The Strategic Infrastructure Plan for SA is currently under review for the 2014/2015 period.

#### 4.1.4 Structure Plans

In addition to regional planning documents, *Structure Plans* are developed for areas of new urban growth. Once developed and accepted they form the basis of a Development Plan Amendment (DPA) which will modify a council Development Plan and usually include rezoning. There are three current examples of structure plans, including the *Playford Growth Structure Plan*, the *Inner Metro Growth project* (which is for several areas along main transport corridors in the Adelaide metropolitan area) and the *Kangaroo Island Structure Plan*. As an example of the content that may



relate to WSUD, the SA Department of Planning, Transport and Infrastructure's *Playford Growth Structure Plan* (2013) is reviewed in more detail. This plan was prepared as a result of the identification of new greenfield development areas in the *30 Year Plan for Greater Adelaide*, and incorporates areas of Angle Vale, Playford North, Virginia and Greater Edinburgh Parks. The desire to include WSUD has been mentioned throughout the plan. For example the plan adapts the wording of the *Playford Community Vision* by stating (p.10):

*Playford will be at the forefront of new water technologies, with reticulation pipes and water sensitive urban design principles rolled out to new housing developments to secure our long term water supplies.*

Subsection 5.5 Environmental Assets includes several aims that relate to WSUD:

- *maximising neighbourhood- and precinct level water and energy efficiency through optimising orientation to suit energy efficient housing, and including stormwater solutions and water-sensitive urban design principles and techniques*
- *restoring, rejuvenating and reinforcing urban waterways to achieve better stormwater management, while increasing the community's awareness of, and engagement in, ways to contribute to a healthy urban biodiversity*
- *introducing wetland sites to contribute to the broader water strategy and public open spaces*
- *capitalising on opportunities to achieve integrated, water-sensitive urban design initiatives within redevelopment sites to contribute to the sustainability, amenity and character of the public realm/streetscapes*
- *maximising opportunities to re-establish natural waterways to better manage stormwater quality and extreme weather event flows*

Subsection 5.6 Infrastructure section contains a WSUD reference:

- *incorporating water-sensitive urban design principles and techniques, greenways, green streets, green roofs/walls and other forms of green infrastructure.*

It should be noted however that the content of this and other plans does not reflect a mandatory requirement for the inclusion of WSUD in the final development. The WSUD related content of the plan would have to be included and approved as part of the development plan amendment that implements the plan (the development plan amendment process is described further in Section 5.1.2).

#### 4.1.5 Precinct Plans

In addition to structure plans, precinct plans may be developed under the *Urban Renewal Act 1995*. The Minister for Housing and Urban Development may declare an area as a precinct for redevelopment to occur. A 'Precinct Authority' may be appointed and a *Precinct Plan* prepared for the area to guide its renewal. The Precinct Authority singularly manages all aspects of planning, design and infrastructure delivery of a major development project. A series of fact sheets have been prepared to guide the process. A template which has been developed to develop the business case for a precinct plan includes consideration of stormwater management. It does not have any direct references to WSUD, but the business case template states:

*'The Business Case also enables the Government to evaluate the proposal to ensure... it is consistent with the directions, policies and targets of the Planning Strategy'.*



The current Planning Strategy (e.g. the *30 Year Plan for Greater Adelaide*) does have specific WSUD policies and targets enables government to ensure WSUD principles be considered. At present, there are no examples of precinct plans.

## 4.2 Process

While the Development Act is primarily administered by DPTI the assessment and approval process for a development is undertaken by a “relevant authority”. In the majority of cases this is local government. Large or complex developments including such developments involving land divisions are lodged and assessed by the Development Assessment Commission (DAC) which is an independent statutory body established under the Development Act. The DAC also assesses “major developments” which are proposals “considered to be of major economic, social or environmental importance” and Crown developments which are usually significant infrastructure projects.

Under the Development Act a *Development Plan* is prepared by the Minister in conjunction with each council. The *Development Plan* is used to guide development and assessment within the relevant area. It contains zones, maps and policies. A list of current local government development plans is maintained online<sup>12</sup>. Development plans incorporate various modules of the *South Australian Planning Policy Library* (South Australian Department of Planning Transport and Infrastructure (DPTI), 2011), a series of modules which are intended to encourage ‘best practice policy application and a consistent development plan format across the state’<sup>13</sup>. Provisions for Water Sensitive Design are included in the South Australian Planning Policy Library, Version 6, under the General Section on Natural Resources, Principles of Development Control, Section 8. These are reproduced in Appendix A. These principles have been incorporated into 19 of the 27 development plans which apply in Greater Metropolitan Adelaide<sup>14</sup>. It is however left up to each individual council to determine how they interpret and apply these principles to each development.

To streamline the development approval process for common developments in South Australia, DPTI developed the *Residential Code*. Developments to which the code applies include most examples of residential structures such as sheds, carports, verandahs, rainwater tanks, single-storey additions and alterations to existing homes and new single-storey and two-storey detached and semi-detached homes. Details on development which complies with the residential code are provided by DPTI in a background document (SA Department of Planning Transport and Infrastructure (DPTI), 2012a), and checklist (SA Department of Planning Transport and Infrastructure (DPTI), 2012b). Neither document makes mention of WSUD objectives or principles such as those in the planning policy library (Appendix A). In addition to the development plan content, some local governments have implemented additional WSUD objectives or targets. Case studies of these are presented below.

### 4.2.1 City of Onkaparinga

The City of Onkaparinga applies minimum engineering service levels for development in the council area. These service levels have been documented and approved by council as part of the corporate asset management plan, and include WSUD measures. The WSUD measures have been applied to

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<sup>12</sup> <http://www.sa.gov.au/topics/housing-property-and-land/local-government/development-plans/online-development-plans>

<sup>13</sup> <https://www.sa.gov.au/topics/housing-property-and-land/industry-professionals/planning-professionals/south-australia-s-planning-policies>

<sup>14</sup> ‘Greater Metropolitan Adelaide’ includes the plans listed within this boundary listed here: <http://www.sa.gov.au/topics/housing-property-and-land/local-government/development-plans/online-development-plans>

new developments (regardless of development type e.g. industrial/residential) which create 20 or more allotments (including community title) and/or a new public road. The standards are not currently applied to small scale (e.g. 1 into 3) land divisions. The minimum standards may be amended on a case-by-case basis according to the location and impact of each development, such as the capacity of major and minor systems (including limitations in gutter flow velocity and drainage capacity). The City of Onkaparinga minimum standards also include requirements for protecting water quality, as follows:

*'...water quality in outflows from new development shall have load reduction (when compared to untreated Stormwater outflows) improvement equivalent to:*

- 80% reduction in suspended solids
- 60% reduction in total nitrogen
- 45% reduction in phosphorous
- 90% reduction in litter.'

These water quality targets were provided in response to the development of regional NRM plans and the outcomes of the Adelaide Coastal Waters Study (Fox et al., 2007). Assessment is typically undertaken using the MUSIC modelling tool, to which the local government provides a template for assessment using the MUSIC-Link platform, which specifies default catchment and treatment parameters considered appropriate for the local government area.

In addition to these targets, the service standards describe a service charge. The charge is administered in a commercial agreement with a developer, as a charge for carrying out work at a person's request, pursuant to section 188 (1)(c) of the South Australian Local Government Act. The fee is paid into the City of Onkaparinga drainage reserve fund and is used to assist with the delivery of strategic water quality improvement facilities to obtain maximum value for the investment (which may not be in the same catchment as the development).

The service charge is offered as an alternative where:

- it is considered that there is a benefit in not having water quality improvement within the development (e.g. the site would be small and difficult/expensive to maintain) and
- non-compliance with City of Onkaparinga service levels will not adversely impact on downstream systems – i.e. City of Onkaparinga does not offer the service charge as an alternative where there is direct discharge into a receiving water/creek etc.

The funds are only applied to new capital works, and can be used as a contribution, or stand alone. The funding is not used for planning, policy development, investigation works, community awareness, education nor maintenance activities. According to the service levels document, measures are being taken to quantify the impact of this measure to assess the improvement of runoff quality:

*'A Council wide model will be developed to identify our total load for the nominated pollutants, and to then assess the level of load reduction based on water quality improvement works constructed'.*

Targets also exist in the engineering service levels document to preserve environmental flows (by limiting harvesting to 75% of the stormwater flow) and to maintain pre-development peak flow rates following development. The council has a service level standard to maintain the minor drainage system at a 5 year ARI standard for residential areas and to a 10 year standard for commercial areas (in addition to a major system capacity of 1 in 100). To maintain existing peak flow conditions, the post development peak flow rates shall not exceed those in pre-development conditions. In some

cases, on-site detention tanks may be stipulated for development and minimum service standards are provided which include a guide on how the system should be connected to the street.

#### 4.2.2 City of Marion

The City of Marion has included an additional principle under the 'water sensitive design' section of the City of Marion Development Plan. This was put in place via a development plan amendment. The additional principle outlines the principle for detention systems on residential development north of Seacombe Road in the City of Marion (City of Marion Development Plan, Natural Resources, Principles of Development Control, Section 17). Unique to the City of Marion Development Plan, it was put in place with the support of a study by Kinhill Engineers. The additional principle includes specific, quantitative measures and is as follows:

*On land north of Seacombe Road, all new buildings and building extensions of 40 square metres or more in floor area, should incorporate sufficient on-site stormwater detention/retention to limit the rate of stormwater runoff from the subject land so that flows determined using the following runoff coefficients are not exceeded:*

1. *within residential zones*
  - i. *5 year average return interval flood event (runoff coefficient 0.25)*
  - ii. *100 year average return interval flood event (runoff coefficient 0.45)*
2. *within non-residential urban zones*
  - i. *5 year average return interval flood event (runoff coefficient 0.65)*
  - ii. *100 year average return interval flood event (runoff coefficient 0.85).*

According to correspondence with the City of Marion, the higher coefficient for non-residential areas (such as commercial and industrial areas) was adopted because, in general, the existing developments in non-residential areas have a high percentage impervious area, producing higher runoff coefficient value. For new developments, lower runoff coefficients were adopted to reduce runoff to a reasonable discharge value.

For land divisions, City of Marion has negotiated off-site solutions using the above text as a guide, but the solution must be within the same catchment. These off-site solutions have included both cash contribution and off-site capital works, such as an extension to downstream detention basin capacity.

On-site solutions have largely been limited to detention tanks, but more recently and consistent with the *Stormwater Management Plan - Coastal Catchments Between Glenelg and Marino* (Tonkin Consulting, 2013), City of Marion has been asking for larger retention tanks plumbed into toilet and laundry to capture first flush runoff, increase the volume of water reuse and mitigate peak stormwater discharge utilising one third of the capacity of the retention tank.

#### 4.3 Legislation

As noted previously, there are no mandatory WSUD targets for water quality or water quantity in state legislation. While the *SA Planning Policy Library* contains default objectives and principles relating to 'Water Sensitive Development' for incorporation into local government development plans, it is the responsibility of individual councils adopt these in a development plan and to interpret them accordingly during the development approval process.

The Building Code of Australia (Australian Building Codes Board (ABCB), 2013) is a primary means of detailing the current mandatory requirements reducing mains water use in South Australian residential development. For example, according to the SA requirements of the Code, it is currently mandatory for all new residential dwellings and some home additions to include an alternative water supply in addition to mains water. In the absence of a recycled water source (such as recycled wastewater or harvested stormwater from a municipal scale scheme) this is typically achieved by implementing a minimum one kilolitre rainwater tank that must be plumbed into the hot water system, laundry cold water outlets or a toilet.

There are also Minister's Specifications referred to in the South Australian Development Regulations 2008 that are applicable for retention (infiltration) systems. *Ministers Specification SA 78AA On-Site Retention of Stormwater* (2003) was developed to provide cost effective technical information for the design and implementation of systems for the retention of roof runoff in SA where a relevant authority has directed the applicant to incorporate on-site stormwater retention devices. It should be noted that these Ministers Specifications are for design and implementation, but the requirement for them should come from the approval authority, such as a local government, and the specification does not preclude the use of other approaches or proprietary systems.

#### 4.4 Justification

The implementation of mandatory alternative water sources on new development in South Australian was originally announced in 2004. At the time, the driver for the implementation was *Attaining Sustainability*, one of the six key objectives of South Australia's then current State Strategic Plan (Government of South Australia, 2004).

The 'water sensitive design' principles in the *SA Planning Library* include principles of development control, however there is no reference to supporting information. It should be noted however that there has been a significant body of work which has identified the need for runoff quantity and quality control in the Adelaide metropolitan area. The Adelaide Coastal Waters Study (Fox et al., 2007) (ACWS) was an Environment Protection Authority South Australia (EPA SA) lead project which commenced in 2001 and 'sought to develop the understanding needed to redress the issues of seagrass loss, seafloor instability and poor water quality along Adelaide's metropolitan coast' by focussing on water quality, sea grasses and sediments. It identified significant modification and degradation of Adelaide's coastal and marine environment as a result of input of nutrient rich, turbid and coloured water and wastewater. It specifically found that nitrogen (mainly in wastewater and industrial discharge, but also from stormwater runoff) played a key role in nutrient enrichment of coastal waters and that reduced light due to turbidity and coloured dissolved organic matter, mainly associated with stormwater discharges, were also a contributing factor to seagrass decline. The report contained 14 recommendations, much of which relates to water sensitive urban design. For example, it indicated that steps should be taken to reduce the volume of wastewater and stormwater reaching the coast (Recommendation 1) and the load of nitrogen from 2400 tonnes (in 2003) to 600 tonnes (Recommendation 2). In addition, a 50% reduction in sediment from 2003 levels was indicated (Recommendation 3) and a reduction in Coloured Dissolved Organic Matter.

The *Adelaide Coastal Water Quality Improvement Plan* (McDowell & Pfennig, 2013) builds on the key findings of the ACWS and provides a strategy for achieving several of its recommendations. It advocates for the application of WSUD to reduce stormwater volumes and sediment discharge to coastal waters.

## 4.5 Evaluation

Evaluation of WSUD policy and effectiveness in South Australia has previously been conducted by the Goyder Institute for Water Research project *Water Sensitive Urban Design Impediments and Potential: Contributions to the SA Urban Water Blueprint* project described in Section 2. *Water Sensitive Urban Design Impediments and Potential: Contributions to the SA Urban Water Blueprint* project (or Goyder WSUD Project - Phase 1) was completed in 2014. Tjandraatmadja et al. (2014a) examined the status of WSUD uptake and impediments to mainstream implementation. The report recommended:

1. WSUD implementation should be more consistent and coordinated in planning frameworks and development approval processes.
2. There is further development of local government WSUD capacity required.
3. State level targets and policy are required to assist implementation (as opposed to in-principle support).
4. Further development of the WSUD knowledge base in South Australian conditions.
5. Improved understanding of how small-scale distributed WSUD systems can address catchment-level objectives.

Leonard et al. (2014) examined the community acceptance of WSUD in South Australia using six case study WSUD sites ranging from storm water reuse schemes to small scale WSUD systems including street scale rain gardens and WSUD focussed building developments. The study found strong support for WSUD, however there were some barriers to successful projects identified including:

1. Poor functioning of the WSUD systems (often occurring soon after installation) making developers, residents, and councils reluctant to invest in them.
2. Inadequate maintenance and ongoing management
3. Lack of community consultation, highlighting cases where communities cannot support WSUD facilities if they do not know that they exist.
4. Uncertainties about costs, where all residents in the new sites had paid extra for their home with WSUD and other features; however poor design, functioning and maintenance, changes in water pricing, and attempts to retrofit had all led to unexpected costs.
5. Lack of knowledge and understanding, where a lack of community information about WSUD features and how to use water sustainably, and a lack of industry and government knowledge contributed to a lack of appreciation of the value of WSUD.

## 4.6 Summary

The mandatory requirements for WSUD in South Australia are limited to an alternate water source for new developments and some extensions, typically achieved by applying a rainwater tank. This is mandated via the South Australian provisions of the *Australian Building Code*. WSUD is considered in the Planning Strategy for South Australia. This includes the *30 Year Plan for greater Adelaide*, which included several targets for WSUD implementation, including the implementation of mandatory WSUD on new development sites. There has been some progress on this with the release of the South Australian WSUD policy in 2013, which includes further specific actions toward WSUD implementation. At present, however, State Government provides principles for 'water sensitive design' in the *South Australian Planning Policy Library*. These are not mandatory and in the absence of quantitative targets for flow quantity and quality control, their interpretation is typically by the approving authority. A number of local governments have implemented WSUD targets for flow

quantity and/or quality control using engineering service levels or through amendments to their development plan.

## 5 Pathways for South Australian WSUD Policy

Section 4 of this report provided an overview of the development, planning and building approval processes in South Australia. Based on the findings of that review, there were several opportunities that were identified which could provide potential avenues for the implementation of WSUD as a policy for new developments. These included:

- Implementation of WSUD in Local Government Development Plans (Section 5.1)
- Implementation of WSUD in Minimum Engineering Service Level Standards (Section 5.2)
- Implementation of WSUD in the Residential Code (Section 5.3)
- Implementation of a Stormwater Quality/Quantity (Section 5.4)
- Implementation of WSUD in the Building Code (Section 5.5)
- Development of Further WSUD Specific Minister's Specifications (Section 5.6)
- Implementation of WSUD in the SA Planning Reform Process (Section 5.7)

The following sections describe in more detail the ways in which WSUD could be implemented into development, planning and building policy in South Australia.

### 5.1 Implementation of WSUD in Local Government Development Plans

#### 5.1.1 Background

As described in Section 4.2, South Australian local development plans specify the type of development that can occur in zones across local government areas. In practice, when reviewing a proposed development, a local government has the ability to place development conditions on a proposed development based on relevant sections of the local development plan. Some of the most relevant statements in the planning policy library used by most local governments to encourage WSUD are stated in the Natural Resources section cited in Section 4.2.

At present, the extent to which conditions are placed on a development based on these recommendations is unclear. There are no stipulations requiring a development to implement a particular WSUD solution type or size, nor are there quantitative performance measures against which any WSUD implementation can be assessed. Exceptions to this rule do occur in cases where local governments have put in place additional performance measures using a development plan amendment process (see Section 4.2.2). There are however very few examples of a development plan amendment process taking place for WSUD measures. One example is the City of Marion Development Plan for which the amendment was described in Section 4.2.2.

#### 5.1.2 Potential Pathways

There are three potential pathways identified which may encourage implementation of WSUD using the existing arrangements for South Australian development plans. These include:

1. The application of existing WSUD principles for proposed developments based on existing planning controls within the Natural Resources section of most development control plans.
2. The adoption and application of additional, more specific WSUD principles to development plans using the development plan amendment process.

3. The adoption and application of additional, more specific WSUD principles in the South Australian Planning Policy Library for uptake by local governments (the approach specified by Action 2 of the SA WSUD policy).

#### *Application of WSUD Based on Existing Planning Controls*

The first potential pathway to implementation is to encourage local government planning staff to implement development conditions on the basis of the existing principles in Development Plans. As noted previously, principles for 'water sensitive design' have been incorporated into 19 of the 27 development plans which apply in Greater Metropolitan Adelaide. There is an opportunity to apply WSUD using these existing principles, although this approach runs counter to Action 2 of the SA WSUD policy (SA Department of Environment Water and Natural Resources (DEWNR), 2013). These principles were produced several years before the SA WSUD policy was produced and may be interpreted to produce recommendations which are not aligned with SA policy.

The nature of the existing principles are such that each individual council must determine how they interpret and apply to proposed development. Consultation with various local government staff has indicated that there is limited willingness within local government organisations to interpret the existing requirements with quantifiable requirements. It is also understood that there is concern among planning professionals that interpreting the existing requirements reproduced in Appendix A may not be defensible should the development approval requirement be challenged. There is little evidence on which to confirm or deny this - based on a review of records using the Australasian Legal Information Institute database<sup>15</sup>, there were no clear cases of WSUD requirements proceedings before the South Australian Environment, Resources and Development Court (ERD Court).

Based on these findings, however, if this approach is adopted, it is recommended that consultation and training is undertaken to enable planning staff to adequately interpret the existing principles. It is also important that planning staff understand the reason behind the principles.

#### *Application of WSUD via Development Plan Amendment*

The second potential pathway to improve the implementation of WSUD through local government development plans exists through the use of a development plan amendment. This process would effectively require no changes to state government policy, and would be effectively following the implementation pathway like that being adopted in NSW (see Section 3.3) where individual council(s) adopt WSUD on a needs basis. It is however contrary to Action 2 of the SA WSUD policy (SA Department of Environment Water and Natural Resources (DEWNR), 2013).

A Development Plan Amendment (DPA) in South Australia may be undertaken when either a local government (single or in combination with other local governments) or the State Government Minister for Planning seek to make amendments to a Development Plan under Sections 25 or 26 of the Development Act 1993. Typically, one or more councils will seek to make a DPA where it relates solely to all or part of council area(s). Ultimately, the Minister for Planning approves DPAs. The process for making a DPA is described in a guide to development plans and development plan amendments by Department of Planning Transport and Infrastructure (2013). A successful development plan amendment would typically include sufficient technical, economic or social justification to be approved by the Minister.

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<sup>15</sup> <http://www.austlii.edu.au/>



In some circumstances, minor changes can be made to a Development Plan without following the formal process. Broadly, the circumstances under which this may occur is:

- Policy which is enforced by another Act and applies in the Development Plan provision being amended.
- Minor changes to text to reduce irrelevant material, duplication, errors or inconsistency.
- Changes relating to designation of a Heritage Place.
- Changes relating to designation of an area under a Precinct Master Plan under the Urban Renewal Act 1995.

None of these circumstances would appear to apply to the implementation of new or altered requirements for WSUD. The need for a DPA may however arise from a number of activities. These might include (Department of Planning Transport and Infrastructure, 2013):

- A direction from the SA Planning Strategy.
- Recommendations from a Strategic Management plan conducted by council<sup>16</sup>.
- Recommendations in a study undertaken by council.
- A suggestion or request from an Elected member of the council, or from the public.
- The need to address an issue or improve a policy that is identified by staff or the Council development Assessment Panel to be inadequate.

There may be sufficient support for implementing WSUD based on these criteria. For example, the desire to implement WSUD is already published in the *SA Planning Strategy*. For example the *30 year plan for Greater Adelaide* (South Australian Department of Planning and Local Government (SA DPLG), 2010) includes plans and targets for WSUD such as water quality improvement targets, a requirement for WSUD in Structure Plans and Precinct Plans and reduced water demand in new developments through WSUD implementation. Several stormwater management plans (as a study undertaken by council) have also been undertaken for South Australian catchments which recommend the implementation of WSUD to reduce runoff quantity and improve stormwater quality. Two examples are the *Stormwater Management Plan – Coastal catchments between Glenelg and Marino* (Tonkin Consulting, 2013) and the *Port Road Rejuvenation stormwater management Plan* (Connell Wagner, 2007). It should be noted that the *Adelaide Coastal Water Quality Improvement Plan* also included significant social and technical justification to reduce stormwater runoff and improve stormwater quality. Importantly, a council must first undertake ‘preliminary investigations’ (Department of Planning Transport and Infrastructure, 2013):

*‘...to work out whether changing the Development Plan is the appropriate action to implement the idea and, if so, the DPA’s likely nature and scope. Such investigations may not only identify actions that are required in respect to Development Plan policy, but may also highlight other ways in which council could achieve its objectives’.*

The benefits of following the DPA process within a local government or as a collection of local governments is that with appropriate backing, the WSUD strategy being proposed can be specifically *tied to local need*, whether it be around stormwater quality and/or quantity. However, this may also produce variation in WSUD principles and their application across and within local government jurisdictions. The implementation of broadly differing minimum standards and requirements may

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<sup>16</sup> This may be a reference to local government strategic directions reports – which are detailed here: <http://www.dplg.sa.gov.au/html/files/GuideStrategicDirectionsReports.pdf>

produce a lack of consistency which can potentially drive up costs for development approval, and also raises concerns over regional equity. Conversely, a consistent approach may not necessarily lead to the most effective or necessary requirements applied to specific areas or regions.

Another important feature of implementing quantitative WSUD principles into development plans is the need to implement a straightforward means of demonstrating attainment of such principles and a means of assessing them by planning staff and development engineers. In the case studies presented for Victoria and NSW, for example, WSUD targets are assessed using online calculators (STORM calculator and the SSSQM model) or using MUSIC. MUSIC modelling is also supported with detailed guidelines in both cases so the model is applied consistently. Such tools and guidelines do not currently exist for South Australia and would be an important consideration for any DPA process.

#### *Application of WSUD via the SA Planning Policy Library*

The third potential pathway to improve the implementation of WSUD through local government development plans exists through amendment to the SA Planning Policy Library. The former example requires individual councils or groups of councils to implement WSUD policies on a needs basis. However, an agreed 'baseline' set of WSUD principles may also be implemented in the SA Planning Policy Library for uptake by councils. This would enable all local government entities to adopt a consistent basis to consider WSUD which can then be applied or waived according to the needs of the catchment in which development is taking place.

The South Australian WSUD policy (SA Department of Environment Water and Natural Resources (DEWNR), 2013) recognises this approach in Action 2:

*Purpose: To ensure that the WSUD policy is an essential element of the State's land-use planning system.*

*How: The Department of Planning, Transport and Infrastructure (DPTI), with Department of Environment, Water and Natural Resources (DEWNR) support, will adopt Statewide WSUD objectives and performance principles in structure plans, and local Council development plans. As part of this process, DPTI will review and update the current WSUD and Natural Resources Management related provisions contained within the South Australian Planning Policy Library.*

Scheduled for completion in 2014, this has not been undertaken, but represents an efficient way to improve WSUD implementation uniformly under the current planning system. It would also be a way to uniformly enable the completion of targets in the *Planning Strategy for SA* described in Section 4.1.3.

In some respects, this approach may be considered as similar to Victoria, where SEPP 56 implements water quality and quantity targets state wide for residential subdivisions (see Section 3.2) (other forms of development are covered by more general clauses). However, rather than a mandatory requirement set by state government, implementation in South Australian development plans would then be at the discretion of the approval authority (such as local government or a private certifier where relevant).

Important considerations which need to be overcome are similar to the previous example, where a clear means of assessment needs to be considered.

## 5.2 Implementation of WSUD in Minimum Engineering Service Level Standards

### 5.2.1 Background

During consultation with local government engineering personnel, it was made apparent that development approval is generally issued with development conditions and engineering conditions. Development conditions are issued based on the local government development plan. Engineering conditions are issued based on minimum engineering service levels, which are standards developed by and approved internally by local government.

### 5.2.2 Potential Pathway

Where there is a sufficient, technical justification for implementing WSUD objectives to all or part of a local government area, an opportunity exists for local government to implement WSUD objectives and targets as part of their internally developed and approved minimum engineering service standards. An example of the extent to which this can be applied successfully was provided for the City of Onkaparinga in Section 4.2.1.

While this has been applied successfully, the inclusion of WSUD requirements in minimum engineering service standards of individual councils may be perceived as problematic for the development industry. Without appropriate consultation across local governments, differing minimum standards and requirements may be set which produce a lack of consistency which can potentially drive up costs for development approval. Conversely, a consistent approach may not necessarily lead to the most effective or necessary requirements applied to specific areas or regions.

## 5.3 Implementation of WSUD in the Residential Code

### 5.3.1 Background

The Residential Code in South Australia simplifies planning approvals for some common forms of residential development. It applies in most cases of the following types of development:

- common residential works and structures such as sheds, carports, verandahs and rainwater tanks
- single-storey additions and alterations to existing homes
- new single-storey and two-storey detached and semi-detached homes.

The residential code applies in certain areas of South Australia. By demonstrating compliance with a checklist of requirements to demonstrate a compliant development, development approval becomes faster and easier. The only WSUD requirement of the current residential code is the mandatory alternative water source on new homes or additions greater than 50 m<sup>2</sup>, which is typically achieved using a one kilolitre rainwater tank (see Section 4.3).

### 5.3.2 Potential Pathway

With adequate technological, economic and/or social support, it may be possible to implement WSUD measures for new homes and significant additions in the residential code. The benefits of such a measure are that this would produce a uniform means of WSUD implementation for common residential developments. However, it is important that any measure applied to all complying development within the residential code should take into account available space for the types of development which are currently complying with the residential code. Other influences include underlying soils (which may restrict infiltration measures) and proximity to existing drainage

systems. Overall, measures should be achievable, cost effective, able to be maintained and most importantly effective at achieving a stated WSUD goal.

## 5.4 Implementation of a Stormwater Quality/Quantity Offset Charge

### 5.4.1 Background

Discussion with local government engineers and planners indicated that the opportunity to implement on site WSUD in residential areas presents several challenges. For example, current infill development trends produce allotments with high impervious area coverage presenting challenges for even simpler WSUD measures like rainwater and detention tanks. This represents a significant proportion of development in South Australia, and is set to continue being a characteristic form of development in light of the *SA Strategic Plan* which aims for 70% of housing development in the Adelaide metropolitan area to be infill development by 2036.

### 5.4.2 Potential Pathway

The implementation of an offset charge for developers who are unable to achieve WSUD targets on site has been successfully applied in Victoria (see Section 3.2.1 and 3.2.2) and locally in the City of Onkaparinga. There may be an opportunity to supplement any WSUD planning policy principles and/or targets with an offset system that may be used for WSUD works within a council boundary, or even outside the boundary by negotiation. Such a system could be implemented on a case by case basis across local governments, particularly those experiencing high levels of infill development and may allow for construction and maintenance of larger scale WSUD systems or smaller scale systems in areas of need.

One example of where such a policy is already implemented for similar purposes at a state government level in SA is in the case of the open space contribution scheme. This is referenced within the Development Regulations (2008), Division 3, Section 56. In summary, a developer makes a contribution into a fund held by the Local Government for future open space works in cases where the development is too small to provide sufficient area for public open space. The funds must be spent on open space development within the local government area.

## 5.5 Implementation of WSUD in the Building Code

### 5.5.1 Background

The Building Code of Australia is produced by the Australian Building Codes Board with a goal to produce a nationally consistent minimum safety standard for building construction in Australia. It is given the status of building regulation by all state governments in Australia, including South Australia.

In 2004, the SA State Government announced initiatives for environmental reform, including initiatives to improve the sustainability of new housing. As part of a suite of measures to improve sustainability, changes were implemented into the Building Code on 1 July 2006 which included a requirement for new homes and significant additions to existing homes to have a second water supply installed to the home. In the absence of a municipal third pipe scheme (such as that in Mawson Lakes) this is typically achieved by implementing a minimum 1 kL rainwater tank. These changes were implemented in the Building Code of Australia (Volume 2) (2006), Part SA 2, and the South Australian Housing Code – Amendment 13, Clause D.11. It is not clear whether there has been any follow up study on the implementation of these measures and the extent to which water demand for new homes may have changed as a result.

### 5.5.2 Potential Pathway

Based on existing changes to the Building Code and South Australian Housing Code, it may be possible to implement additional WSUD measures to this code given appropriate considerations such as technical, economic and social support for implementation. However, the measures implemented would typically have to be suitable only for housing, thus restricting the WSUD measure to residential areas and allotment scale measures. Such measures may include changes to current rainwater tank requirements, on site wastewater or grey water treatment and/or reuse systems, on site retention, on site detention, lot scale rain gardens and permeable paving.

The South Australian WSUD policy (SA Department of Environment Water and Natural Resources (DEWNR), 2013) makes reference to this approach in Action 3:

*Purpose: To ensure that the State's building approval process supports WSUD to the extent that this is relevant and justified by the net social, environmental and economic benefits it would provide.*

*How: DPTI, with DEWNR support, to encourage WSUD through the building consent approval. This will involve consideration of the potential for introducing new South Australian variations to the Building Code of Australia that support the State's aim and objectives for WSUD.*

Technical proposals were intended to be approved in 2014 for implementation in 2015.

## 5.6 Development of Further WSUD Specific Minister's Specifications

### 5.6.1 Background

Minister's Specifications are issued by the Minister for specific building issues that require attention in South Australia. They are referenced in the *Development Regulations* (2008) or in South Australian variations to the Building Code. An example of a WSUD related Minister's Specification exists in SA 78AA *Onsite retention of stormwater*. This document outlines specific design requirements for the use of on-site infiltration in proposed development works.

### 5.6.2 Potential Pathway

The Ministers Specification presents a unique opportunity to apply WSUD to development with an existing planning instrument. If used effectively, a deemed-to-comply Minister's Specification could be produced for several key WSUD features. This would simplify the building approval process where WSUD is involved, and also present a series of options that may be referred to during the approval process. As an example, a Minister's Specification for an allotment rain garden or underground detention would provide both developers and approval authorities with immediate deemed-to-comply WSUD solutions for allotment scale development (but it need not be restricted to lot scale). Such a measure would produce more consistent requirements with respect to development type.

## 5.7 Implementation of WSUD in the SA Planning Reform Process

### 5.7.1 Background

There is at present a planning reform process underway by the South Australian State Government. In February 2013, an 'Expert Panel on Planning Reform' was appointed which undertook a review of planning legislation. The panel researched the planning system and undertook broad consultation with over 2 500 participants. A final report was produced in December 2014 titled *The Planning System We Want* (South Australia's Expert Panel on Planning Reform, 2014) which included 22 recommendations for reform. In March 2015, the South Australian Government produced a response to the recommendations (Government of South Australia, 2015) including an indication of the

intended progress. Several reforms have received the support of state government and many have a bearing on the implementation of WSUD principles. For example, the Government has provided in principle support for the reshaping of planning documents on a regional basis (Reform 6). The long term vision of this reform is to implement an 'e-planning' system, which will replace paper based development plans with an online database. Local government may still be able to implement local principles, however this may or may not be affected by another reform with in-principle support which recommended replacing local plans with regional plans (Reform 2).

#### 5.7.2 Pathway to Implementation

Legislation has been introduced into SA State Parliament during this project which was not within the scope of the initial review work. This was a first phase of legislation which is likely to be ongoing, in coming years. As such, an overview of impacts was prepared based on the Response of the South Australian Government to the Expert Panel on Planning Reform (Government of South Australia, 2015). There were a variety of ways in which WSUD may be implemented as part of the process. While almost all of the 22 reforms may present opportunities for consideration of WSUD, reforms considered most significant are discussed below.

##### Reform 6

State Government provided in principle support for Reform 6 which seeks to reshape planning to occur at a regional level and to replace existing development plans with a searchable, online database referred to as 'e-planning'. Local plans will effectively be extracts from the online database, and there is a potential for future regionalisation of planning legislation to have an impact on this process. An important consideration in this process is the ability of any existing WSUD principles in developments plans, and any additional measures, to be carried through to the e-planning system.

##### Reform 7

State Government supports Reform 7 which seeks to establish a single, state-wide menu of planning rules. It is noted that current development plans account for over 22 000 pages of documentation, and that this represents a barrier to investment. It is proposed that State Government provide a menu of planning rules that includes design standards and guidelines. This represents an opportunity for WSUD implementation by advocating for the inclusion of current or additional WSUD principles in the proposed 'menu' of planning rules and inclusion of design standards for WSUD. It is understood that proposed reforms include the development of a *Planning and Design Code* supported by practice directions and practice guidelines.

##### Reform 10

The State Government provides 'in part' support for Reform 10 which seeks to provide clear and simple development pathways. This was developed in light of the fact that 90% of development is subjected to the full merit based assessment process. Among a variety of proposed improvements, new, simple assessment pathways were recommended and supported by State Government. Incorporation of WSUD principles into relevant proposed assessment pathways should be considered.

##### Reform 16

The State Government provides support for Reform 16 which seeks for reinforcement and expansion of precinct planning for neighbourhood regeneration. This includes opening up precinct redevelopment opportunities to the private sector and producing more scalable precinct development processes such that it may suit small-scale redevelopment sites. Importantly, the opportunity for adaptation to climate change, incorporation of green infrastructure and water



sensitive design is noted as a driver. This reform may see the adoption of WSUD for urban infill or redevelopment sites improved providing 'water sensitive design' principles are applied.

#### *Reform 17*

The State Government provides support for Reform 17 which seeks to deliver an infrastructure funding framework for providing infrastructure including 'essential services, public realm and environmental works'. While it is not intended to fund the whole life of assets solely from the first users for the asset, this reform may be a good opportunity to include the construction and/or maintenance of local or state government WSUD assets which improve the life of existing drainage infrastructure or provide amenity and environmental benefit.

#### *Reform 18*

The State Government provides in principle support to the integration of open space and public realm in the planning system. This will include a review of the existing open space scheme to include streetscapes, green infrastructure and urban vegetation. This reform also involves consideration for green infrastructure approaches with a focus on improving management of urban vegetation and financial contributions which are better related to public space and improvements to existing public realm assets. This reform may result in strong links for consideration of WSUD in the planning system, particularly where WSUD can be commensurate with green infrastructure (such as through vegetated WSUD systems or provision of harvested water for irrigation of green infrastructure and open space assets when required).

## **5.8 Summary**

The investigation into potential avenues to better incorporate WSUD principles in the planning process for new developments in South Australia revealed several ways in which WSUD could be implemented using the current South Australian Planning system.

1. Implementation of WSUD in local government development plans. This included three different approaches as follows:
  - a. The application of existing WSUD principles for proposed developments based on existing planning controls within the Natural Resources section of most development plans
  - b. The adoption and application of additional, more specific WSUD principles to development plans using the development plan amendment process led by local government
  - c. The adoption and application of additional, more specific WSUD principles in the South Australian Planning Policy Library for uptake by local governments, in line with Action 2 of the SA WSUD policy to produce a more efficient and consistent uptake pathway.
2. Implementation of WSUD objectives and targets into minimum engineering service level standards
3. Implementation of WSUD into an amended residential code
4. Implementation of a stormwater quantity and/or quality control service charge
5. Implementation of further mandatory WSUD requirements into the SA component of the Building Code of Australia
6. Production of further Minister's Specifications regarding WSUD in new development works.

It was also noted that the South Australian Government was currently undertaking a planning reform process. Based on 22 reforms recommended by the *Expert Panel on Planning Reform* in 2014, and a State government response in 2015, several potential opportunities for WSUD implementation which were apparent in this process were highlighted.



## 6 Discussion

The experiences of other jurisdictions with WSUD implementation indicated a variety of approaches throughout Australia (Section 3). In this section, the findings of the South Australian policy overview (Section 4) and subsequent potential pathways for stronger WSUD implementation (Section 5) are considered in more detail, with respect to experiences elsewhere and in other research. As part of this discussion, a review of key components of the implementation of WSUD in South Australia was undertaken and compared with other regions. This included a comparison and discussion of the following:

- Implementation of Mandatory WSUD Principles and Targets
- Scale of WSUD Implementation
- Link between WSUD and Environmental Need
- The Opportunity to Offset On-site WSUD I
- Support for WSUD Implementation
- Other Considerations
  - Evaluation
  - WSUD in South Australian Stormwater Management Plans

### 6.1 Implementation of Mandatory WSUD Principles and Targets

Mandatory WSUD targets are not common to all jurisdictions in Australia. A comparison of the status of mandatory and non-mandatory WSUD principles and/or targets across Australia is presented in Table 4.

**Table 4: Comparison of WSUD implementation in the planning and development process across Australian states and territories – Legislative mandate**

<b>Legislative mandate for WSUD – Is the inclusion of WSUD in the planning and development process a statutory requirement?</b>	
Victoria	Yes, Clause 56.07 of the Victorian Planning Provisions specify WSUD to be implemented for all residential subdivisions (larger scale developments). There is a group of inner urban council areas (Cities of Melbourne, Yarra, Stonnington and Port Phillip) which have implemented WSUD requirements for smaller infill developments.
New South Wales	No, WSUD measures are not mandated by State government, but local governments can use planning instruments such as development control plans to implement WSUD. The State Environmental Protection Policy mandates developments in the Sydney drinking water catchment area are to have neutral or beneficial impact on water quality.
Australian Capital Territory	Yes, WSUD is mandated for all development types but with some limitations; WSUD applies to residential neighbourhoods and estates, and for institutional, commercial & industrial to sites greater than 2000 m <sup>2</sup> .
Queensland	No, the State Planning Policy establishes the State's interest in protecting water quality, and identifies WSUD as an effective measure to protect environmental values, but WSUD is not mandated.
Northern Territory	No
Western Australia	No
Tasmania	No
South Australia	There is a mandatory demand management measure in place using the Building Code, however other aspects of WSUD are not a mandatory requirement by State government. Local governments can use planning instruments such as development plans to implement WSUD. The <i>SA Planning Policy Library</i> includes standard text to support WSUD implementation which is broadly untested in how it can be applied.

In South Australia there are few mandatory requirements in the planning and development process. This is consistent with most other Australian jurisdictions with the exception of Victoria and the ACT. However, WSUD principles have been incorporated in a range of non-statutory planning strategies and development plans, and there are mandatory requirements to implement mains water savings in new developments. There is an opportunity to incorporate WSUD through the development planning process by using existing planning tools and other pathways (see Section 5). There can be a tension in setting state-wide mandatory requirement for WSUD that provides consistency and a legal foundation for developers to implement WSUD. However, there is also the need to enable flexible WSUD implementation that reflects the specific challenges and opportunities of managing stormwater in a catchment.

## 6.2 Scale of WSUD Implementation

A comparison of the scale at which WSUD is implemented across Australian states and territories is presented in Table 5.

**Table 5 - Comparison of WSUD implementation in the planning and development process across Australian states and territories – Geographic scale of implementation**

<b>Scale for implementation and assessment of WSUD – At what scale (State, regional or catchment, or local) are WSUD policies enacted and implemented?</b>	
Victoria	Best practice targets are supported by State government planning policy. Local governments implement through the development application process.
New South Wales	WSUD measures are implemented by local councils in development control plans
Australian Capital Territory	WSUD measures are implemented by the Territory planning department
Queensland	State Planning Policy provides the framework but implemented at local government level through amendments (an active capacity building program supports WSUD in SE Queensland).
Northern Territory	A number of local governments have issued WSUD guidelines and recommendations for developers
Western Australia	Implemented and assessed at the local government level
Tasmania	Local governments provide guidance for WSUD, a draft of the Launceston Interim Planning Scheme mentions WSUD can be used as performance criterion for assessing drainage plans.
South Australia	WSUD principles are implemented by local councils in development plans and, in some cases, through minimum engineering service levels.

The scale for the implementation and assessment of WSUD across other Australian jurisdictions mostly occurs at the local government level. This reflects the fact that in most cases the process for proposing planning scheme amendments and approving development applications is the responsibility of local government. However, in Australia state government policy usually provides the overarching planning policy framework, and often in the case of high-profile and/or large-scale developments planning decisions are made at the state government level and implemented locally. In South Australia the planning policy library could provide a benchmark for determining how WSUD is to be considered in developments. Local governments could choose how to implement the planning policy library depending on the specific development context.

In addition to the scale at which WSUD is implemented in government, another key factor is the geographic scale and location at which WSUD is stipulated. In South Australia and elsewhere, a heavily urbanised coastal local government where current development is predominately small-scale urban infill and renewal is likely to have different opportunities and capacity for WSUD compared to large-scale greenfield development in urban growth corridors. Implementing WSUD for small-scale developments may provide challenges in terms of the types of measures that can be applied, and also in understanding how individual WSUD elements at small sites contribute to broader water quality and quantity objectives in the catchment.

Incorporating mandatory WSUD requirements in the planning process may provide a burden for small-scale infill development, as the policy would require interpretation by local planning officials and for the development proponent to demonstrate how they meet WSUD requirements. In the

case of Victoria, Clause 56.07 (integrated water management provisions) under the Victorian Planning Provisions specifically notes that for residential subdivisions of less than 1 hectare site conditions can make it difficult to demonstrate best practice stormwater management. The provisions suggest a number of options where best practice cannot be demonstrated using a simplified method for calculating performance (STORM software). These options include offset drainage works in adjoining areas or charges paid to the drainage authority to offset downstream treatment costs. The Practice Note for the Victorian Planning Provisions notes that it is inappropriate to use a planning permit to require on-site works where they are already provided for under building or plumbing regulations. It makes the point that lot-scale WSUD systems, such as raingardens, should not be implemented through a planning permit process as these permeability requirements should be dealt with under building regulations. In considering potential avenues for better incorporating WSUD in the South Australian planning process it will be necessary to identify any overlap with existing building or residential codes. Policy instruments that support WSUD implementation for small scale development need to be clear, cost effective and efficient for proponents and most importantly effective at achieving stated WSUD benefits for a catchment.

### 6.3 Link between WSUD and Environmental Need

In most jurisdictions, WSUD implementation has been linked with environmental needs. A comparison of the link between environmental need and WSUD implementation is presented in Table 6.

**Table 6 - Comparison of WSUD implementation in the planning and development process across Australian states and territories – Link to Environmental Need**

Is the implementation of WSUD linked to a likely environmental benefit?	
Victoria	Yes, an extensive study found nitrogen was the limiting pollutant for the health of Port Phillip Bay. This was used to set best practice targets supported by State Environment Protection Policy
New South Wales	Development applications in the Sydney drinking water catchment need to assess the impact of the proposed development application on water quality then demonstrate how controls, such as WSUD, will enable the development to have a neutral or beneficial effect on runoff.
Australian Capital Territory	WSUD targets are not explicitly linked to protection of specific local environmental values
Queensland	Yes, WSUD can be linked to water quality objectives required to protect environmental values
Northern Territory	The Darwin Harbour WSUD Strategy has been developed to manage the impacts of development to the environmental values of the Harbour
Western Australia	Not explicitly linked to protection of specific local environmental values
Tasmania	Not explicitly linked to protection of specific local environmental values
South Australia	Yes, WSUD has been linked to water quality objectives including the <i>Adelaide Coastal Water Quality Improvement Plan</i> in the SA Planning Strategy (but measures have not been implemented).

A review of the link between WSUD implementation and identified needs revealed that several jurisdictions do not have an explicit basis for WSUD principles and targets. It reveals that there is no explicit link between uptake and identified need – for example, the ACT does not explicitly link targets to a specific need; instead, it is linked to a general requirement for water conservation and environmental health. A risk-based approach to WSUD can enable implementation and performance targets to be linked with anticipated environmental and social benefits in mitigating or avoiding the impacts of urban runoff.

In South Australia, studies such as the *Adelaide Coastal Water Study* (Fox et al., 2007) and the subsequent *Adelaide Coastal Water Quality Improvement Plan* (McDowell & Pfennig, 2013) provide a justification for WSUD implementation and best practice performance targets based on anticipated environmental benefits. In Victoria the best practice targets are supported by a State Environment Protection Policy, which was revised based on a study that demonstrated the environmental impact of anthropogenic nitrogen inputs to Port Phillip Bay. As previously identified, in some developments it may not be feasible to meet best practice targets due to site limitations. The risk-based approach can be tied to an opportunity to offset works, either by contributing to WSUD treatment works in adjoining land or a financial contribution for downstream treatment of runoff prior to discharge to receiving waters.

#### 6.4 The Opportunity to Offset On-site WSUD Implementation

The review of WSUD implementation in other Australian states identified that a number of jurisdictions provide the opportunity to offset on-site WSUD through adjacent works or a financial contribution. The opportunity to offset may be useful where it is technically difficult or financially inefficient to implement on-site WSUD works. A comparison of these opportunities is presented in Table 7.

**Table 7 - Comparison of WSUD implementation in the planning and development process across Australian states and territories – Opportunity to offset**

<b>Opportunity to offset – Is there the opportunity to provide a financial contribution to compensate for the downstream impact of development runoff?</b>	
Victoria	Yes, the program is administered by Melbourne Water and applies to their service area only.
New South Wales	Local governments can use discretion in deciding if onsite stormwater management, such as WSUD, can result in a reduction or avoidance of the stormwater levy.
Australian Capital Territory	Yes, the WSUD code allows developers to seek approval to contribute to offsite treatment where it's not feasible onsite.
Queensland	Yes, local governments have the capacity to set offsets for water quality treatment elsewhere in the catchment.
Northern Territory	None identified
Western Australia	None identified
Tasmania	None identified
South Australia	Broadly, no, however offset schemes have been implemented by some local governments.

The opportunity to offset WSUD to other locations in a catchment or local government area has been successfully implemented elsewhere and to a limited extent in South Australia. Offset measures such as financial payments have also been indicated as a desirable method of WSUD implementation in previous studies by the Goyder Institute for Water Research (Myers et al., 2013).

## 6.5 Support for WSUD Implementation

In many Australian states there are formal programs that have the purpose of supporting and enabling capacity building for WSUD implementation. A summary of these support mechanisms for WSUD implementation is presented in Table 8.

**Table 8 -Comparison of WSUD implementation in the planning and development process across Australian states and territories – Capacity building program**

<b>Capacity building program - Is the implementation of WSUD supported by a capacity building program?</b>	
Victoria	Yes, the Clearwater program is hosted by Melbourne Water and is funded by Melbourne Water, EPA Victoria, Municipal Association of Victoria and department of Environment and Primary Industries.
New South Wales	Yes, WSUD.org builds capacity for WSUD in the Sydney Metropolitan Catchment area. It was developed by the NSW Catchment management Authority and currently an initiative of greater Sydney Local Land Services.
Australian Capital Territory	No
Queensland	Yes, the Water by Design program established by Healthy Waterways Partnership.
Northern Territory	No
Western Australia	Yes, the New WATERways program is hosted by Western Australian Department of Water. It partners with the Department of Water, Department of Planning, the Western Australian Local Government Association, the Swan River Trust and the Urban Development Institute (WA).
Tasmania	No. Some local councils have developed practice notes and guidelines for their jurisdiction, and the Department of Primary Industries Parks Water and Environment developed the manual on WSUD engineering procedures for stormwater management in Tasmania.
South Australia	Yes, Water Sensitive SA began operating in 2013. It is currently funded by program partners including the Adelaide and Mount Lofty Ranges NRM Board, the Australian Government National Landcare program, six local governments, SA Water, the Local Government Association (SA) and Stormwater South Australia.

The policy instruments for better incorporating WSUD in the South Australian planning and development process need to consider if implementation can be adequately supported by technical guidelines, local capacity and resources for ongoing operation and maintenance. Previous studies have identified that developing capacity for WSUD is critical for the successful implementation of WSUD. The review of experiences in other Australian states identified that WSUD implementation is being enabled through capacity building programs. In South Australia, the *Water Sensitive SA* capacity building program is addressing the need for capacity building to improve the uptake of successful WSUD in South Australia. In Victoria, the uptake of WSUD has been supported through detailed best practice technical guidelines that are cited in the Planning Provisions. There may be a need in South Australia to expand on existing guidelines to ensure that both the approving authority

and development proponents have the required information that is specific to the South Australian context.

The sustainability and effectiveness of these capacity building programs is an issue that should be considered. It is understood that several capacity building programs, including *Water Sensitive SA*, do not have an ongoing source of funding which produces some uncertainty.

## 6.6 Other Considerations

### 6.6.1 Evaluation of WSUD Effectiveness

The review of WSUD implementation in Section 3 showed there has been little verification of the effectiveness of WSUD policy in any Australian jurisdiction. In South Australia, the City of Onkaparinga is intending to undertake evaluation of their WSUD policy implementation (Section 4.2.1) however it is understood to still be in the planning phase. Others have indicated that WSUD implementation should be more closely evaluated to ensure that investment in water quality measures in particular is targeted appropriately (Gardner, 2015).

The need for evaluation is already reflected in the South Australian WSUD policy document. For example, Actions 12 and 13 focus on the monitoring and uptake of WSUD in South Australia, and the Goyder Institute for Water Research provided a basis for monitoring uptake in previous research (Myers et al., 2013) which is intended to be continually updated by Water Sensitive SA, the South Australian Capacity Building program.

### 6.6.2 WSUD in South Australian Stormwater Management Plans

As noted previously, there is a need to ensure that the justification for WSUD policy and implementation is linked to local needs. A pathway for this process already exists in the development of stormwater management plans. Stormwater management plans are developed by a local government or collections of local governments. The plans identify the stormwater management objectives for a specific catchment and the recommended actions to achieve these objectives.

A detailed review of stormwater management plans (Myers et al., 2015) has been undertaken as part of this research project for release as a separate Goyder Institute for Water Research report. It indicates that many plans are already developing policy measures for WSUD in South Australian catchments undergoing infill development or urbanisation. Such policy measures include recommendations for water demand measures (such as recommended rainwater tanks sizes), water quality targets and retention targets for flow management. In the absence of WSUD principles and targets which can be confidently used by approval authorities, local government may be able to adopt relevant policy pathways in Section 5 of this report using the recommendations of stormwater management plans as a technical support, in addition to broader technical justification from the *Adelaide Coastal Water Quality Improvement Plan* (McDowell & Pfennig, 2013).

It should be noted that the SA WSUD policy (Myers et al., 2013) also stressed the importance of stormwater management plans in Action 10:

*Purpose: To facilitate WSUD policy recognition in Stormwater Management Plans.*

*How: DEWNR will liaise with the Stormwater Management Authority, where appropriate in consultation with other stakeholders, with a view to stormwater management planning guidance issued by the Stormwater Management Authority providing effective recognition of the WSUD policy,*



*and of the opportunities for Stormwater Management Plans that are considered by the Authority to promote WSUD.*

This research forms part of that initiative, particularly in the accompanying research report where the technical requirements of assessing WSUD measures in stormwater management plans are evaluated.

## 7 Conclusions and Recommendations

This report has investigated potential pathways for incorporating WSUD into the South Australian development planning processes by undertaking the following tasks:

- Reviewing the experiences in other Australian jurisdictions for how WSUD has been incorporated in the planning and development process;
- Reviewing the current policy framework for WSUD in South Australia; and,
- Investigating potential avenues to better incorporate WSUD principles in the planning process for new developments in South Australia

The review of interstate measures indicated that while Victoria and the ACT have mandatory WSUD measures, other jurisdictions do not. Generally, there are supporting mechanisms from the state level that have enabled local government to pursue WSUD implementation.

This was also found to be the case for the South Australian planning system. While there is a mandatory water demand reduction measure, there are not mandatory requirements to achieve a water quality or runoff quantity performance targets for new developments. Broadly speaking, South Australia recognises a need for WSUD in the current planning strategy, and has developed a non-mandatory WSUD policy as part of this process. Qualitative measures are presented and applied in local government development plans, and the implementation of WSUD in proposed developments varies among local government authorities who are conducting approvals.

The potential avenues identified which might be suitable for improving WSUD implementation in South Australia included:

1. Implementation of WSUD in local government development plans. This included three different approaches as follows:
  - a. The application of existing WSUD principles for proposed developments based on existing planning controls within the Natural Resources section of most development control plans
  - b. The adoption and application of additional, more specific WSUD principles to development plans using the development plan amendment process
  - c. The adoption and application of additional, more specific WSUD principles in the South Australian Planning Policy Library for uptake by local governments (the approach specified by Action 2 of the SA WSUD policy).
2. Implementation of WSUD objectives and targets into local government's minimum engineering service level standards
3. Implementation of WSUD into an amended residential code
4. Implementation of a stormwater quantity and/or quality control service charge
5. Implementation of further mandatory WSUD requirements into the SA component of the Building Code of Australia
6. Production of additional Minister's Specifications regarding WSUD in new development works.

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# Appendix A – WSUD excerpt from the South Australian Planning Policy Library

The following pages are an excerpt of the existing Water Sensitive Design principles in the *South Australian Planning Policy Library*.

## Natural Resources

### OBJECTIVES

- 1 Retention, protection and restoration of the natural resources and environment.
- 2 Protection of the quality and quantity of South Australia's surface waters, including inland, marine and estuarine (*Conversion note: optional text (the words 'and marine and estuarine' only apply to relevant coastal Development Plans))* and underground waters.
- 3 The ecologically sustainable use of natural resources including water resources, including marine waters, (*Conversion note: optional text (the words 'marine waters' only apply to relevant coastal Development Plans))* ground water, surface water and watercourses.
- 4 Natural hydrological systems and environmental flows reinstated, and maintained and enhanced.
- 5 Development consistent with the principles of water sensitive design.
- 6 Development sited and designed to:
  - (a) protect natural ecological systems
  - (b) achieve the sustainable use of water
  - (c) protect water quality, including receiving waters
  - (d) reduce runoff and peak flows and prevent the risk of downstream flooding
  - (e) minimise demand on reticulated water supplies
  - (f) maximise the harvest and use of stormwater
  - (g) protect stormwater from pollution sources.
- 7 Storage and use of stormwater which avoids adverse impact on public health and safety.
- 8 Native flora, fauna and ecosystems protected, retained, conserved and restored.
- 9 Restoration, expansion and linking of existing native vegetation to facilitate habitat corridors for ease of movement of fauna.
- 10 Minimal disturbance and modification of the natural landform.
- 11 Protection of the physical, chemical and biological quality of soil resources.
- 12 Protection of areas prone to erosion or other land degradation processes from inappropriate development.
- 13 Protection of the scenic qualities of natural and rural landscapes.

### PRINCIPLES OF DEVELOPMENT CONTROL

- 1 Development should be undertaken with minimum impact on the natural environment, including air and water quality, land, soil, biodiversity, and scenically attractive areas.

- 2 Development should ensure that South Australia's natural assets, such as biodiversity, water and soil, are protected and enhanced.
- 3 Development should not significantly obstruct or adversely affect sensitive ecological areas such as creeks, wetlands, estuaries and significant seagrass and mangrove communities. *(Conversion note: optional text (the words 'estuaries and significant seagrass and mangrove communities' only apply to coastal Development Plans))*
- 4 Development should be appropriate to land capability and the protection and conservation of water resources and biodiversity.

#### **Water Sensitive Design**

- 5 Development should be designed to maximise conservation, minimise consumption and encourage re-use of water resources.
- 6 Development should not take place if it results in unsustainable use of surface or underground water resources.
- 7 Development should be sited and designed to:
  - (a) capture and re-use stormwater, where practical
  - (b) minimise surface water runoff
  - (c) prevent soil erosion and water pollution
  - (d) protect and enhance natural water flows
  - (e) protect water quality by providing adequate separation distances from watercourses and other water bodies
  - (f) not contribute to an increase in salinity levels
  - (g) avoid the water logging of soil or the release of toxic elements
  - (h) maintain natural hydrological systems and not adversely affect:
    - (i) the quantity and quality of groundwater
    - (ii) the depth and directional flow of groundwater
    - (iii) the quality and function of natural springs.
- 8 Water discharged from a development site should:
  - (a) be of a physical, chemical and biological condition equivalent to or better than its pre-developed state
  - (b) not exceed the rate of discharge from the site as it existed in pre-development conditions.
- 9 Development should include stormwater management systems to protect it from damage during a minimum of a 1-in-100 year average return interval flood.
- 10 Development should have adequate provision to control any stormwater over-flow runoff from the site and should be sited and designed to improve the quality of stormwater and minimise pollutant transfer to receiving waters.

- 11 Development should include stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.
- 12 Development should include stormwater management systems to minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system.
- 13 Stormwater management systems should preserve natural drainage systems, including the associated environmental flows.
- 14 Stormwater management systems should:
  - (a) maximise the potential for stormwater harvesting and re-use, either on-site or as close as practicable to the source
  - (b) utilise, but not be limited to, one or more of the following harvesting methods:
    - (i) the collection of roof water in tanks
    - (ii) the discharge to open space, landscaping or garden areas, including strips adjacent to car parks
    - (iii) the incorporation of detention and retention facilities
    - (iv) aquifer recharge.
- 15 Where it is not practicable to detain or dispose of stormwater on site, only clean stormwater runoff should enter the public stormwater drainage system.
- 16 Artificial wetland systems, including detention and retention basins, should be sited and designed to:
  - (a) ensure public health and safety is protected
  - (b) minimise potential public health risks arising from the breeding of mosquitoes.

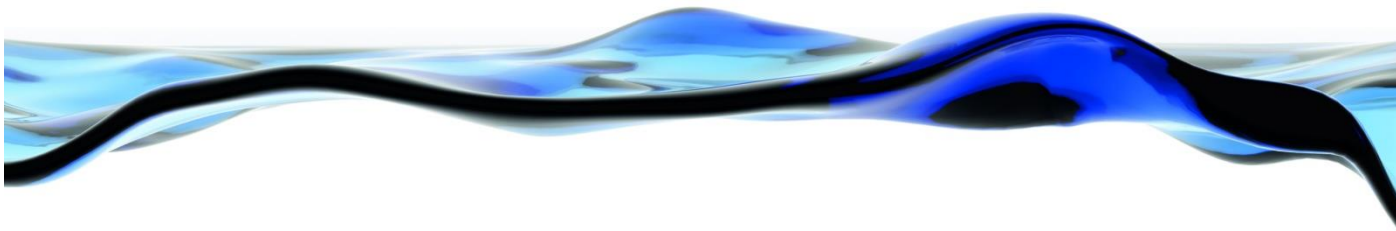
#### **Water Catchment Areas**

- 17 Development should ensure watercourses and their beds, banks, wetlands and floodplains are not damaged or modified and are retained in their natural state, except where modification is required for essential access or maintenance purposes.
- 18 No development should occur where its proximity to a swamp or wetland will damage or interfere with the hydrology or water regime of the swamp or wetland.
- 19 A wetland or low-lying area providing habitat for native flora and fauna should not be drained, except temporarily for essential management purposes to enhance environmental values.
- 20 Along watercourses, areas of remnant native vegetation, or areas prone to erosion, that are capable of natural regeneration should be fenced off to limit stock access.
- 21 Development such as cropping, intensive animal keeping, residential, tourism, industry and horticulture, that increases the amount of surface run-off should include a strip of land at least 20 metres wide measured from the top of existing banks on each side of a watercourse that is:
  - (a) fenced to exclude livestock
  - (b) kept free of development, including structures, formal roadways or access ways for machinery or any other activity causing soil compaction or significant modification of the natural surface of the land

- (c) revegetated with locally indigenous vegetation comprising trees, shrubs and other groundcover plants to filter runoff so as to reduce the impacts on native aquatic ecosystems and to minimise soil loss eroding into the watercourse.
- 22 Development resulting in the depositing of an object or solid material in a watercourse or floodplain or the removal of bank and bed material should not:
- (a) adversely affect the migration of aquatic biota
  - (b) adversely affect the natural flow regime
  - (c) cause or contribute to water pollution
  - (d) result in watercourse or bank erosion
  - (e) adversely affect native vegetation upstream or downstream that is growing in or adjacent to a watercourse.
- 23 The location and construction of dams, water tanks and diversion drains should:
- (a) occur off watercourse
  - (b) not take place in ecologically sensitive areas or on erosion prone sites
  - (c) provide for low flow by-pass mechanisms to allow for migration of aquatic biota
  - (d) not negatively affect downstream users
  - (e) minimise in-stream or riparian vegetation loss
  - (f) incorporate features to improve water quality (eg wetlands and floodplain ecological communities)
  - (g) protect ecosystems dependent on water resources.
- 24 Irrigated horticulture and pasture should not increase groundwater induced salinity.
- 25 Development should comply with the current *Environment Protection (Water Quality) Policy*.

#### **Biodiversity and Native Vegetation**

- 26 Development should retain existing areas of native vegetation and where possible contribute to revegetation using locally indigenous plant species.
- 27 Development should be designed and sited to minimise the loss and disturbance of native flora and fauna, including marine animals and plants, and their breeding grounds and habitats. (*Conversion note: optional text (the words 'including marine animals and plants, and their breeding grounds and habitats' only apply to relevant Development Plans)*)
- 28 Native vegetation should be conserved and its conservation value and function not compromised by development if the native vegetation does any of the following:
- (a) provides an important habitat for wildlife or shade and shelter for livestock
  - (b) has a high plant species diversity or includes rare, vulnerable or endangered plant species or plant associations and communities
  - (c) provides an important seed bank for locally indigenous vegetation
  - (d) has high amenity value and/or significantly contributes to the landscape quality of an area, including the screening of buildings and unsightly views



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