DEEMED TO COMPLY SOLUTIONS FOR SOUTH EAST QUEENSLAND – A SIMPLER AND FASTER WAY TO DESIGN AND ASSESS STORMWATER QUALITY MEASURES FOR SMALL, LOW RISK DEVELOPMENTS

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Abstract

The *Deemed to Comply Solutions – Stormwater Quality* (the Solutions) have been developed as a means to fast-track the design and assessment of the stormwater quality aspects of small, low risk developments. Developed to address a range of barriers to sustainable urban water management (SUWM), the Solutions reduce design and assessment timeframes and improve the compliance of small scale and low-risk developments with urban stormwater quality management objectives. The Solutions provide: regional consistency; reporting/assessment checklists and detailed design and assessment guidance including a comprehensive step-by-step process and supporting guideline - the *"Deemed to Comply Worked Solutions and Examples – Stormwater Quality"*. This supporting guideline presents the Solutions in illustrative form, demonstrates how the checklists should be used and provides example detailed plans. Development of the Solutions has been undertaken as part of a broader capacity building framework of guidelines, training, organisational strengthening and policy development through the Water by Design program. The South East Queensland Healthy Waterways Partnership has developed the Solutions in consultation with State and local government partners and industry groups. This collaborative development process has ensured that the Solutions are practical and have statutory relevance through State policy and local government planning schemes. The methodology adopted for the development of Solutions as well as the guidelines themselves are transferable to other regions beyond South East Queensland.

INTRODUCTION

A new regulatory framework for urban stormwater management has been created for South East Queensland and proposed state-wide reforms are expected to take effect within 12 months. These directive reforms set targets for urban stormwater quality and hydrologic management. Brown et al (2005) noted, however, that "setting policy targets in isolation from improving other institutional capacities are insufficient for creating sustained change". It is therefore imperative that strong and integrated capacity building initiatives are delivered at local, regional and state levels.

For this reason the Water by Design program of the South East Queensland Healthy Waterways Partnership (SEQHWP) has developed and is implementing a comprehensive capacity building plan for the region. The Water by Design Business Plan spans across the following elements of capacity building: knowledge building, professional development, organisational reforms, directive reforms and incentives (Brown et al 2005) ensuring the delivery of a broad-based and coordinated suite of initiatives.

The *Deemed to Comply Solutions for South East Queensland – Stormwater Quality* (the Solutions) are part of that broader capacity building effort. The Solutions offer an effective and efficient means to address stormwater quality design objectives for small developments, which comprise the majority of development applications in the region, and overcome key barriers to WSUD at the development assessment level.

Development Assessment Barriers

The Solutions were developed to address a range of barriers experienced by Queensland local government authorities (LGA's). The majority of development applications are for small scale and often low risk developments (Water by Design, 2009) so local government resources, particularly assessment officer's time, is consumed with these applications.

Tight regulatory time frames in the integrated development assessment system (IDAS) coupled with developer and councillor driven pressures for faster approvals (see UDIA, 2006 for example), further limit local government capacity to ensure best practice water sensitive urban design (WSUD) is implemented in developments. The pressure for faster development processes would likely have detrimental results for our waterways or built environment unless supported by other capacity building initiatives including adequate regulatory mechanisms. If simple compliance measures were established to address the small, low risk developments, then assessment effort could focus predominantly on large scale applications and deliver improved environmental outcomes.

These compliance measures ought to have regional application to overcome consistency issues and the "tyranny of distance" described by Morison (2008), whereby local government's capacity to implement sustainable urban stormwater management diminishes from an epicentre of innovation - usually a capital city.

Regulatory Framework

The current legislative framework for WSUD in SEQ is presented in Figure 1. The *South East Queensland Regional Plan 2009-2031 Plan* sets legislative requirements for total water cycle management through the principles and policies of *Desired Regional Outcome (DRO) 11 - Water management*, and *DRO 2 - Natural environment*. Implementation advice for these policies is addressed in part via the *South East Queensland Regional Plan 2009-2031 Implementation Guideline No. 7: Water Sensitive Urban Design* which sets stormwater management objectives for the region. The objectives are for stormwater quality management, and for hydrologic management for both waterway stability and in-stream ecology.

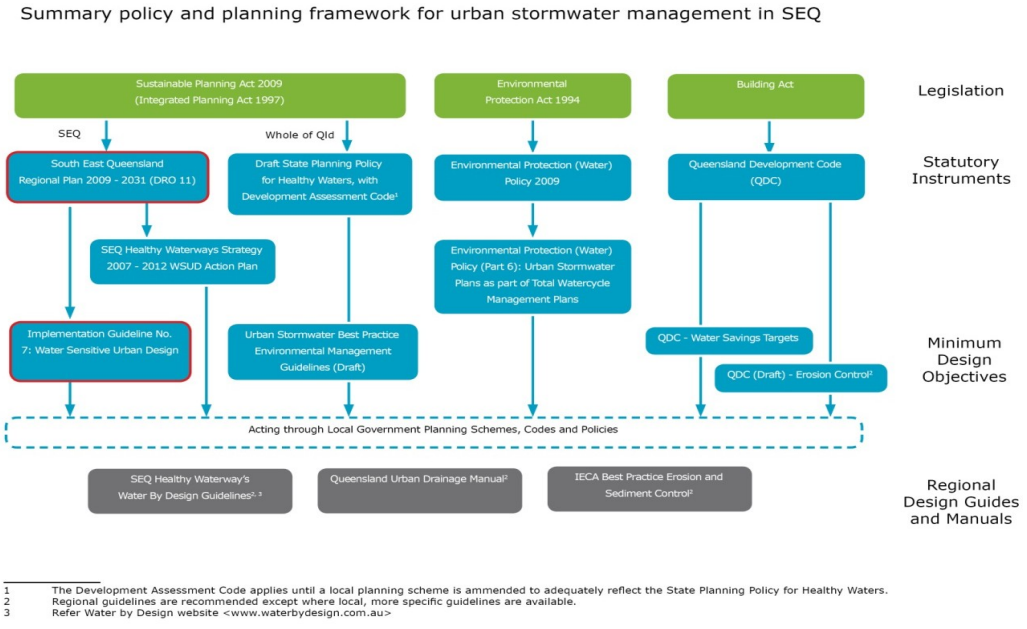

Figure 1: Queensland regional legislative framework

This policy framework is being expanded state-wide by the Queensland Department of Environment Resource Management (DERM) with the release of the draft *State Planning Policy for Healthy Waters (2009)* and its supporting documentation (the draft SPP) and a complimentary draft development assessment code for urban stormwater management. The code provides direction on urban stormwater management for new development in Queensland and the policy, if adopted, would require local authorities to implement State code provisions directly through the development assessment process until such time as local compatible planning scheme provisions are finalised by each individual local authority.

Existing Guidelines and Resources

The Water by Design program has developed a suite of guidelines to assist with the planning, design, assessment, construction, establishment, handover, operation and maintenance of WSUD assets. This current suite of documents is presented in Figure 2, which shows where each of the guidelines is most relevant along the asset lifecycle. The Deemed to Comply Solutions can be used in lieu of formal stormwater quality modelling and detailed stormwater management plan preparation, and so are an alternative to the use of MUSIC Modelling Guidelines and Technical Design Guidelines. The remainder of the guideline suite is intended to be considered in conjunction with the Deemed to Comply Solutions.

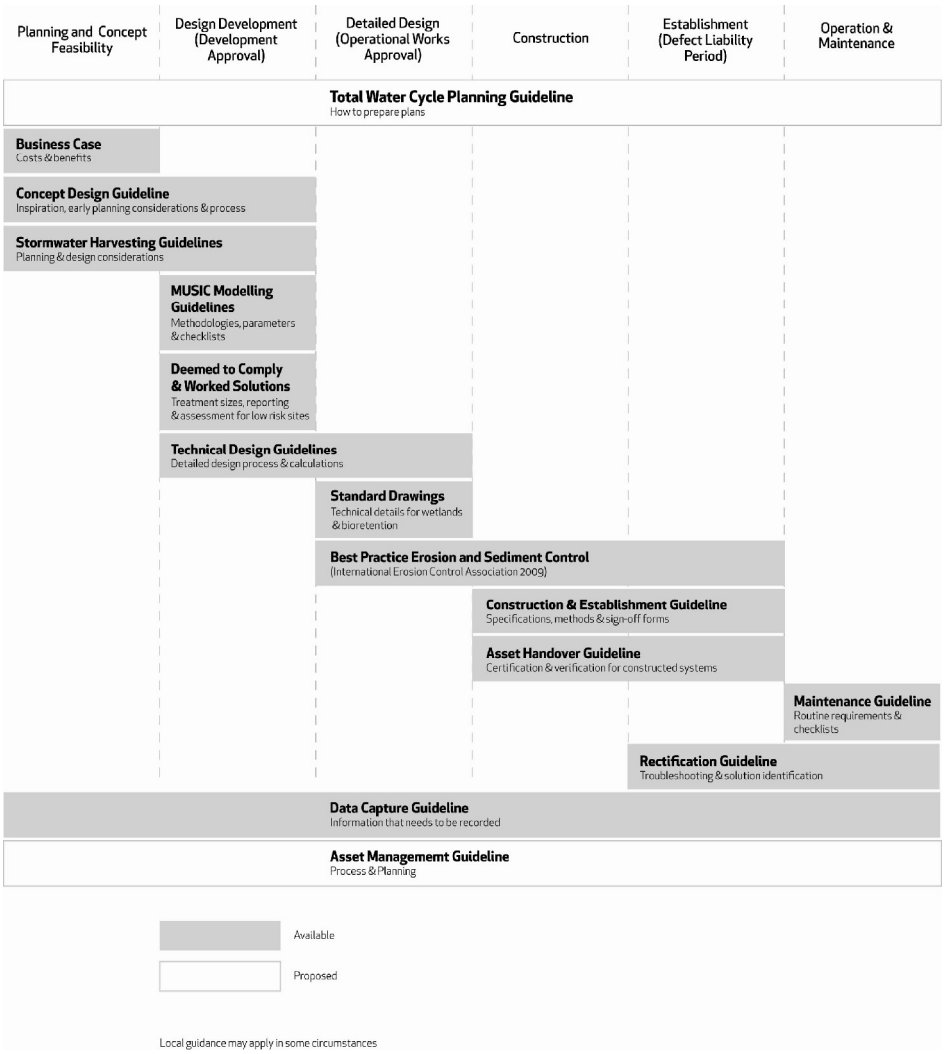

Figure 2: Outline of the suite of Water by Design guidelines and resources

METHODOLOGY

Consultative Framework

In September 2008 the SEQ HWP sent invitations to a range of organisations requesting representation on a working group to steer the development of three key interrelated products namely: the Deemed to Comply Solutions; a set of "worked solutions and examples" to demonstrate acceptable solutions, and an accompanying set of standard drawings demonstrating technical detail.

Active working group members included representatives from the Queensland Department of Environment Resource Management (DERM), the Institute of Public Works Engineering Australia Queensland (IPWEAQ), the Local Government Association of Queensland (LGAQ) and eight of the ten Council's in the region. The group initially met to determine the scope of the three projects and review and endorse project briefs.

Close collaboration between the project managers (Water by Design), the working group and the project consultants harmonised understanding of the scope between all parties. The working group was consulted throughout the drafting process and concerns were responded to in writing. A final endorsement meeting was held with all parties, which helped ensure subsequent endorsement at a CEO level.

Project Scope

Geographic scope

The Solutions were developed for 4 climatic subregions of SEQ and for 8 major climatic zones across the rest of Queensland (consistent with the draft SPP zones). The solutions for SEQ have been published ahead of the Solutions for the rest of the state because the SEQ Regional Plan 2009-2031 provided an existing head of power.

Design Objectives:

The Solutions address stormwater quality management and not the hydrologic management design objectives (waterway stability and frequent flow). The reasons for this are twofold:

1) The stormwater quality design objectives are applicable to all developments above the threshold size, whereas the hydrologic objectives only apply to developments discharging to erodible streams or those with relatively intact ecologies. Addressing stormwater quality only is consistent with the philosophy underpinning the solutions of addressing the most common issues in order to reduce design and assessment requirements.

2) At the time of drafting the Solutions, the Water by Design program and DERM were resolving a set of frequent flow and waterway stability hydrologic management objectives and implementation advice. Given that technical studies on the hydrologic management objectives were still being undertaken, there would have been a substantial delay if they were included in the solutions.

Development types:

The Solutions address small scale residential, industrial and commercial developments, as outlined in Table 1. The Solutions cover a range of scales up to 20 lot subdivisions and developments up to 12,500 m², with the intention being that these capture the majority of applications, and set maximum upper bounds beyond which detailed stormwater management plans would definitely be required.

It is expected that State, Regional or local government regulations would specify the particular thresholds for

a) when stormwater quality needs to be considered (cut in threshold), and
b) when detailed stormwater management plans are required (cut out threshold)(for example the design objectives under the SEQ Regional Plan 2009-2031 apply to developments six lots or larger).

By establishing the Solutions along these lines means they are relatively resilient to minor changes in policy and can be used by a variety of local governments even though they may have different thresholds in their planning schemes (eg applying stormwater quality objectives to single residential lot developments).

Table 1: Development types/scenarios that form the basis of the Deemed to Comply Solutions

Land use	Development scenario	Scale
Residential	Residential greater than 2 lots up to 20 lots	N/A
	Residential greater than 2 dwellings (townhouse style up to 2 storeys)	≤ 12,500 m^2
	Residential high density multiple dwelling apartments (flats, high-rise)*	≤ 12,500 m^2
Commercial and/or Industrial	Commercial and/or Industrial	≤ 12,500 m^2

* May comprise commercial/retail in building

Treatment Solutions:

The solutions adopt current 'best practice' non-proprietary stormwater management measures for the treatment of stormwater, namely:

- bioretention basins (with and without rainwater tanks)
- constructed wetlands (with and without rainwater tanks)

Each solution provides:

- rainwater tank requirements: the minimum size of water tanks where required by the Queensland Development Code
- stormwater treatment system size: the appropriate size of bioretention basin or constructed wetland area required to meet the stormwater quality objectives.

Stormwater treatment system sizes are provided for each of the climatic regions based on detailed stormwater quality modelling (using the Model for Urban Stormwater Improvement Conceptualisation 'MUSIC' Version 3 - eWater) for the specific development and treatment scenarios. The sizes are presented as a percentage (%) of the catchment area. A contingency is included in the treatment size to allow for variation in climate within the climatic regions and to allow some flexibility for the design of treatment measures (i.e. bioretention basin applied in road reserves may only be able to adopt an extended detention of 200 mm rather than the preferred 300 mm). The solutions relate to simple and efficient treatment trains (bioretention systems or wetlands as the main treatment measure, with and without pretreatment with rainwater tanks).

Table ***2*** below provides a typical example of a stormwater treatment sizing table. Importantly, the total footprint of the treatment measure must be defined when integrating the treatment solution into the development design. The total footprint for each treatment measure must be defined to account for batters and coarse sediment management as well as the functional stormwater treatment area. This is best defined through the development of suitably detailed concept drawings and the Deemed to Comply solutions document provides guidance in this regard. As a starting point, for small bioretention basins and constructed wetlands the following total footprint are suggested:

- bioretention basin total footprint area = 3 x filter media area
- constructed wetland total footprint area = 3 x macrophyte zone area.

Table 2: Example Deemed to Comply Stormwater Treatment Solution for "Residential greater than 2 dwellings (Townhouse style up to 2 storeys) ≤ 12,500m²

Region	Rainwater Tanks	Bioretention Basin Filter Media Area (% of catchment area)
Eastern Cape York	Detached dwellings 5kL Attached dwellings 3kL	1.5
Central and Western Cape York (north)		1.5
Central and Western Cape York (south)		1.3
Wet Tropics		1.3
Dry Tropics		1.4
Central Coast (north)		1.4
Central Coast (south)		1.1
South East Queensland Greater Brisbane North Coast West Region South Coast		 1.1 1.4 1.0 1.3
Western Districts		1.0

Design & Reporting Requirements:

To streamline the design and assessment of stormwater quality measures in small scale developments, reporting requirements are designed to convey the important design outcomes in a simple manner. For development applications, the following reporting is required:

- development assessment checklist(s) – simple but comprehensive checklists which are to be completed for each stormwater treatment catchment/measure
- conceptual drawings - suitably scaled and annotated plan and section views which illustrate the stormwater treatment measure will integrate within the proposed development plan
- site details
- development details
- stormwater treatment measure plan and sections

Document Design

The Solutions are to provide a clear framework for design and assessment and are therefore needed to:

- communicate key considerations and design requirement succinctly
- ensure easy navigation through the stormwater treatment selection process
- provide clear reporting requirements
- avoid the repetition of guidance related information that is common to all solutions

This was achieved by splitting the Solutions into two parts.

1. The main body of the document provides information that is common to a range of solutions:
    - context and policy drivers for the solutions
    - description of the solutions
    - solution design considerations
    - step by step advice on treatment measure selection, design and reporting
    - reporting checklists to support rapid communication of the design for development assessment

2. The treatment measure sizing tables (refer
3. Table ***2*** above) are provided as addendums to the guidance document. The step-by-step advice in the body of the document refers to these sizing tables. Once users become familiar with the step-by-step advice they will simply refer to the addendums when doing a design and complete the checklists for development application.

A supporting guideline - the *"Deemed to Comply Worked Solutions and Examples – Stormwater Quality"* has also been published to demonstrate how the Solutions and checklists should be used by applying them to real case study projects.

A set of Standard Drawings for common WSUD elements was concurrently produced by Water by Design and published with the Institute of Public Works Engineers Queensland (IPWEQ). This provides further support to designers in developing design documentation and construction drawings.

DISCUSSION

Regulatory Adoption

Regulatory adoption of the Solutions by state and local government is essential to realise their potential benefits. Of greatest importance is the referencing of the Solutions in State policy, regional plans and in local government planning schemes. As noted above, the Solutions are referenced in the *SEQ Regional Plan Implementation Guideline No. 7: Water Sensitive Urban Design* (DIP, 2010) and in the *Draft State Planning Policy for Healthy Waters* (DERM 2009) documents.

The Water by Design program developed a policy recommendation via the Urban Stormwater Quality Working Group to the Chief Executive Officers Committee on Natural Resource Management in South East

Queensland for the adoption of the Solutions at a local government level. This recommendation has been supported by the Committee which provides further momentum for their implementation via local government planning schemes.

There is evidence that some local governments in SEQ are already applying the Solutions in development assessment (Rowlands and Ellis, Pers Comm).

Development Assessment Timeframes

By utilising the Solutions, design and assessment teams can be more confident complying with regulations. The Solutions are expected to significantly reduce resubmission of designs particularly as design teams and assessment officers become more comfortable with using this tool.

Although the Solutions are not intended to remove the need for skilled engineering input into concept design and detailed design of stormwater management they are intended to reduce reporting requirements, thereby reducing assessment timeframes.

Furthermore, the Solutions provide a clear framework for design and assessment. As outlined above the framework includes step-by-step advice on design, reporting and a series of checklists. Few (if any) Council's in the region previously provided formal stormwater management reporting guidance and with the supporting worked solutions and examples and standard drawings, these regional standards are expected to substantially improve the quality and reduce the timeframes for stormwater design and assessment.

Existing online systems provide an opportunity to further reduce assessment timeframes. The two tools adopted by local governments in the region include PDOnline[1] for online registration and tracking of applications, and RiskSmart[2] which is used to fast track low risk applications.

Given that the types of applications channelled through RiskSmart vary across local government boundaries such integration would need to be undertaken at a local level.

Risks and Issues with a Deemed to Comply Approach

The most significant factor impacting the Solutions is the release of the new modelling software MUSIC Version 4 by eWater. Version 1 of the Solutions is based on MUSIC Version 3, and MUSIC Version 4 includes changes to bioretention treatment algorithms which result in different predictions of treatment performance to the earlier versions of the software.

This highlights two key issues:

- Firstly there are problems with coupling design objectives to the treatment performance predictions of a single piece of software. Current design objectives are based on the point of diminishing return on treatment size-performance curves generated using MUSIC. Changes in MUSIC predictions currently have ramifications for policy and practice that need to be managed to maintain industry confidence (ie the timing of changes to the software and changes in policy are not aligned).
- Generating Deemed to Comply Solutions at a regional or state level makes the process of updating solutions relatively simple and cost effective.

[1] See for example http://pdonline.ipswich.qld.gov.au/pdonline/user/home/default.aspx accessed 20 Sept 2010
2 http://www.dip.qld.gov.au/local-area-planning/the-risksmart-initiative.html accessed 20 Sept 2010

Any changes to the water savings targets for new developments mandated in the *Queensland Development Code* (QDC) (Queensland Government, 2009b), which sets the size and performance of rainwater tanks in the Solutions, would necessitate a revision of the Solutions.

CONCLUSION

The Deemed to Comply Solutions help streamline the design and assessment of stormwater quality measures for small, low risk developments. This reduces the amount of time assessment officers need to spend on considering the large volume of low risk development applications, and allows the limited assessment resources to focus on larger, high risk applications.

The Solutions have been developed in close consultation with key stakeholders, specially state and local government regulatory and compliance staff, to ensure relevance with existing and proposed stormwater regulations. A broad suite of capacity building resources support the Solutions, including a set of worked examples and WSUD Standard Drawings.

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