South East Queensland Regional Plan 2005–2026

Implementation Guideline No. 7

DRAFT

Water sensitive urban design: Design objectives for urban stormwater management

December 2008
Acknowledgements

This project was initiated, funded and managed by the Department of Infrastructure and Planning (DIP) and the South East Queensland Healthy Waterways Partnership. DIP’s John Rush and the Healthy Waterways Partnership’s Dr David Newton managed the project. Ecological Engineering Pty Ltd (now associated with EDAW Consulting) prepared much of the technical material on which the Guideline is based.

South East Queensland’s local governments—prior to the amalgamation of the state’s local governments—and state government agencies, particularly the Environmental Protection Agency and the Department of Natural Resources and Water, had input to the Guideline. The time and effort they spent helping to develop and review the Guideline is appreciated.
## Contents

1 Introduction ................................................................................................................................... 1  
   1.1 Context ................................................................................................................................... 1  
   1.2 Water sensitive design ........................................................................................................... 1  
   1.3 Purpose .................................................................................................................................. 2  
   1.4 Consultation ........................................................................................................................... 2  
2 Regional policy coordination ...................................................................................................... 2  
   2.1 The strategy for WSUD in South East Queensland ............................................................ 2  
   2.2 Framework for urban stormwater management ................................................................. 3  
   2.3 Demonstrating policy consistency ......................................................................................... 4  
   2.4 Environmental values and water quality objectives ........................................................... 4  
3 Design objectives for urban stormwater management ............................................................... 5  
   3.1 Scope of the design objectives .............................................................................................. 5  
   3.2 Origin of the design objectives ............................................................................................. 5  
   3.3 The design objectives and when they should be applied .................................................... 6  
   3.4 Use in local government planning frameworks .................................................................... 7  
   3.5 Use in state and regional planning frameworks ................................................................. 7  
4 WSUD references and resources ................................................................................................. 12  
   4.1 Download this guideline ....................................................................................................... 12  
   4.2 Technical documents ........................................................................................................... 12  
   4.3 Planning documents ............................................................................................................. 12  
5 Addendum December 2008 ........................................................................................................ 12  
   5.1 Emerging policy frameworks ............................................................................................... 12
1 Introduction

1.1 Context

The *South East Queensland Regional Plan 2005–2026* (SEQ Regional Plan) recognises that it is necessary to manage the natural water cycle to ensure the environmental, social and economic sustainability of South East Queensland (SEQ).

Cycles of droughts and floods and a changing climate highlight the need for all sectors of the community to work together to support effective water management. This will help ensure that adequate and sustainable supplies of clean water are available to meet the needs of the regional community and the natural environment.

Through the principles and policies of *Desired Regional Outcome (DRO) 11 Water management*, and *DRO 2 Natural environment*, the SEQ Regional Plan adopts a total water cycle management approach as the framework for managing urban water quality in SEQ.

As part of this approach, the SEQ Regional Plan endorses the adoption of water sensitive design.

1.2 Water sensitive design

In SEQ, water sensitive design currently focuses on urban developments and management of urban stormwater. A growing body of research—known as *water sensitive urban design* (WSUD)—being generated and applied in SEQ, interstate and internationally—supports the design approaches being used.

The Australian Government's National Water Initiative, defines WSUD as ‘*the integration of urban planning with the management, protection and conservation of the urban water cycle, that ensures urban water management is sensitive to natural hydrological and ecological systems*’.

At the development scale, WSUD is a planning and design approach that integrates water cycle management into the built form of houses, allotments, streets, suburbs, master-planned communities and structure plan areas. Its aim is to avoid or minimise the effects of development on the natural water cycle and environmental values by:

- protecting and enhancing the intrinsic values of the natural water cycle by minimising disturbance to natural landforms, wetlands, watercourses and riparian zones
- protecting the quality of surface and groundwater to maintain and enhance aquatic ecosystems and enable reuse opportunities
- reducing downstream flooding and the effects of drainage on aquatic ecosystems by managing stormwater runoff and peak flows
- promoting more efficient use of water by reducing the demand for potable water and encouraging use of alternative water supplies
- minimising the generation of wastewater and ensuring it is treated to a sufficient standard to enable the effluent to be reused and/or released into receiving waters
- controlling soil erosion during the construction and operational phases of development
- using stormwater to maximise the visual and recreational amenity of developments (e.g. by using it for landscaping ) and to promote an understanding of water in the urban environment.

---

1 Schedule B(i), National Water Initiative, Australian Government.
2 Structure plan areas generally refer to areas identified for integrated local planning in a regional plan or local government planning scheme.
3 See Policy 11.5.4 and Notes in SEQ Regional Plan p.103.
4 For example, harvesting stormwater runoff for outside watering.
1.3 Purpose

This guideline presents a suite of design objectives for best practice urban stormwater management, which is a key component of WSUD, and describes how they should be adopted. How the design objectives were developed is described in detail in the associated technical report.\(^5\)

The objectives are to:

- ensure that both government and industry in SEQ take a consistent best practice approach to managing urban stormwater
- reduce the ambiguities and inconsistencies associated with concentration-based criteria for the discharge of stormwater\(^6\)
- make it simpler to demonstrate and assess consistency or compliance with relevant local, regional and state water management policies (see Section 2.2)
- effectively contribute to maintaining and improving regional water quality and waterway health to protect assigned environmental values according to government policy (see Section 2.3).

1.4 Consultation

Relevant stakeholders from government, industry, academia and the wider community were consulted as part of the development of this guideline. A consultation report, which identifies the issues raised during the consultation process and how they have been addressed in this guideline, is available\(^8\).

2 Regional policy coordination

2.1 The strategy for WSUD in South East Queensland

Since 2004, the South East Queensland Healthy Waterways Partnership has been working with government, industry and community partners to develop a plan to ensure that the mainstream adopts WSUD. This has been incorporated into the South East Queensland Healthy Waterways Strategy 2007–2012 as the WSUD Action Plan.

Consultations held with stakeholders when the plan was being developed identified that urban stormwater must be managed consistently and effectively across the region if defined outcomes are to be achieved. In response, a suite of best practice design objectives for managing stormwater in urban developments was developed.

---

\(^5\) Water sensitive urban design—Developing design objectives for water sensitive urban development in South East Queensland (Moreton Bay Waterways and Catchments Partnership (now SEQ Healthy Waterways Partnership) and Ecological Engineering Pty Ltd: 2006). Available from the SEQ Healthy Waterways Partnership website—see Section 4 of this guideline.

\(^6\) See Chapter 2, p.3 of the design objectives technical report described above for further details.

\(^7\) See description of relevant policies in Section 2 of this guideline.

\(^8\) The consultation report is available from the Department of Infrastructure and Planning and SEQ Healthy Waterways Partnership websites – see Section 4 of this guideline.
2.2 Framework for urban stormwater management

Figure 1 outlines the current policy and planning framework for managing urban stormwater in SEQ.

The aim of the framework is to ensure that urban stormwater is managed in a way that helps secure the environmental values and water quality objectives for SEQ’s waterways and Moreton Bay, which the Environmental Protection Agency (EPA) established through a community consultative process. The objectives provide targets for the quality of receiving water in ambient conditions to help achieve the objective of the Environmental Protection (Water) Policy 1997 (EPP).

The current framework comprises three state planning instruments acting through local government planning schemes:

- The Environmental Protection (Water) Policy 1997 establishes the state interest in protecting and managing urban stormwater in development assessment and state/regional/local planning. The policy and guidelines establish environmental values and water quality objectives, and specify how these should be taken into account when making decisions.
- The South East Queensland Regional Plan 2005–2026 (the SEQ Regional Plan) endorses considering environmental values and water quality objectives when making decisions about planning and assessments of development (Principles 11.5, 2.5).
- The State Coastal Management Plan 2001 (SCMP) includes water quality and urban stormwater management policies for coastal waters⁹ to be considered in planning and development assessments under the Integrated Planning Act 1997 (IPA). The aim of the SCMP is to maintain and protect the environmental values of coastal waters. Its regional derivative, the South East Queensland Regional Coastal Management Plan 2006, which is consistent with the SEQ Regional Plan, has the effect of a state planning policy under the IPA. The State Coastal Management Plan Implementation Guidelines for Local Government Planning Schemes and Development Assessment¹⁰ include guidelines for managing urban stormwater during the construction stage of development (commonly termed ‘sediment and erosion control’). The SCMP is currently under review and is intended to be operating as the Queensland Coastal Plan by mid-2009.

Table 1 summarises the urban stormwater management guidelines currently available to support the policy and planning framework described in Figure 1 on the next page.

Figure 1: 2007 South East Queensland urban stormwater management framework

---

9 Coastal waters: Queensland waters to the limit of the Highest Astronomical Tide (s.9, Coastal Protection and Management Act).
10 Available from the EPA.
Table 1: 2007 State urban stormwater management (USWM) guides

<table>
<thead>
<tr>
<th>Guide</th>
<th>Manager</th>
<th>Must be considered in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model USQ management plans (statewide)</td>
<td>EPA</td>
<td>Local government corporate plans, planning schemes</td>
</tr>
<tr>
<td>SEQ Regional Plan—WSUD Implementation Guideline</td>
<td>DIP</td>
<td>planning schemes, structure plans</td>
</tr>
<tr>
<td>SCMP Implementation Guideline (statewide)</td>
<td>EPA</td>
<td>State, regional and local planning and development assessment affecting coastal waters</td>
</tr>
<tr>
<td>Queensland Urban Drainage Manual (statewide)</td>
<td>NRW</td>
<td>Urban drainage design</td>
</tr>
</tbody>
</table>

2.3 Demonstrating policy consistency

The Department of Infrastructure and Planning (DIP) and the EPA have jointly proposed that applying the design objectives in this guideline will demonstrate consistency with the relevant aspects of the following urban water quality and urban stormwater management policies under their jurisdiction.

This initiative will also serve the strategic interests of the Department of Natural Resources and Water (NRW) in managing the total water cycle and regional natural resources.

**South East Queensland Regional Plan 2005–2026**
- Desired Regional Outcome 11 Water management
  - Principle 11.5 Environmental values and water quality
  - Policies 11.5.1, 11.5.3, 11.5.4.
- Desired Regional Outcome 2 Natural environment
  - Principle 2.5 Waterways and wetlands
  - Policy 2.5.1.

**South East Queensland Regional Coastal Management Plan 2006 (and the State Coastal Management Plan)**
- Policies 2.4.1, 2.4.4.

**Environment Protection Policy (Water) 1997**
- Schedule 1—Environmental values and water quality objectives
- Queensland Water Quality Guidelines 2006

**Related policies/programs**
- South East Queensland Healthy Waterways Strategy 2007–2012

2.4 Environmental values and water quality objectives

Applying WSUD principles to development by using best management practices is a practical way of significantly contributing to protecting and securing environmental values and water quality objectives for South East Queensland’s waterways and Moreton Bay. Local government plans, which manage diffuse urban sources of pollution (e.g. stormwater), are relevant to achieving these objectives.
Adopting the design objectives is also an appropriate way of considering environmental values, water quality objectives, and the relevant policies of the SEQ Regional Plan and the *South East Queensland Regional Coastal Management Plan* when assessing individual development applications.

If future monitoring indicates that these measures are not securing or maintaining scheduled environmental values, then further measures may be required. This approach is consistent with adaptive management best practice.

Considering environmental values and water quality objectives in larger-scale strategic land use or catchment planning would involve applying the design objectives to areas of urban development, and also assessing the combined effects of all catchment activities and land uses on receiving waters.

### 3 Design objectives for urban stormwater management

#### 3.1 Scope of the design objectives

The design objectives address three components of urban stormwater that affect water quality and waterway health:

- frequency of urban stormwater flows
- magnitude and duration of urban stormwater flows
- loads of sediment, nutrients and litter in urban stormwater.

These design objectives do not address all aspects of waterway health (e.g. environmentally relevant activities) or every phase of development (e.g. the construction phase). Rather, the aim is for them to work in concert with existing and emerging national, state and local government requirements and recommendations addressing a range of water management issues (e.g. protection and management of riparian corridors, reuse of grey water, conservation of potable water, flooding, and control of sediment and erosion).

#### 3.2 Origin of the design objectives

The design objectives are derived from a significant body of work the South East Queensland Healthy Waterways Partnership completed while preparing the WSUD Action Plan.

They are based on extensive research and analysis of urban developments and the prevailing climatic conditions in South East Queensland, and were developed in consultation with various stakeholders and a panel of nationally recognised technical experts. They have been tested to ensure that they effectively meet environmental outcomes, and are practical for applying to typical developments in the region. They are considered current best practice and some local governments in the region have already adopted design objectives similar to those endorsed in this guideline.

The technical report, *Water sensitive urban design—Developing design objectives for water sensitive urban development in South East Queensland* describes the method used to develop the objectives.

---

11 Future monitoring of EVs may require a review of the design objectives. Climate change and other economic, social and technological changes may also require a reassessment of best practices in the future.

12 Prepared by the Moreton Bay Waterways and Catchments Partnership (now the SEQ Healthy Waterways Partnership) and Ecological Engineering Pty Ltd. Available from the SEQ Healthy Waterways Partnership website -see Section 4 of this guideline.
3.3 The design objectives and when they should be applied

The design objectives for managing urban stormwater are intended to:

- Manage the frequency of flows: to protect in-stream ecosystems from the effects of more frequent runoff by capturing the initial runoff from impervious areas. In developed catchments, this will ensure that the frequency of hydraulic disturbance will remain similar to what it was before development.
- Stabilise waterways: to prevent exacerbated in-stream erosion downstream of urban areas by controlling the magnitude and duration of sediment-transporting flows.
- Manage stormwater quality: to protect receiving water by reducing the percentage of sediment, phosphorus, nitrogen and litter in stormwater runoff generated by urban development, compared with that in untreated runoff.13

The primary intention is for all South East Queensland local authorities to use the design objectives as a consistent standard for all new assessable urban development.

They apply to:

- a previously developed site (redevelopment)
- an undeveloped site in a developed area (infill development); or
- an undeveloped site in an undeveloped area (greenfield development).

For very low density development, the adoption of alternative ‘deemed to comply’ solutions will be accepted as achieving compliance with the design objectives. A suite of generic ‘deemed to comply’ solutions will be delivered as an action of the SEQ Healthy Waterways Strategy.

The design objectives can also be used to design stormwater management infrastructure in existing urban areas (commonly referred to as ‘retrofitting’), though full compliance may not be feasible in some circumstances, since retrofitting is often constrained by space limitations, resource constraints and existing infrastructure.

This guideline does not provide detailed technical information on how to achieve the design objectives on a particular site or how to address a particular type of development—this information can be accessed from other sources, especially the Water Sensitive Urban Design Technical Design Guidelines for South East Queensland prepared by the South East Queensland Healthy Waterways Partnership.

Ongoing uptake and use of software to model stormwater management, (e.g. MUSIC14), will provide the necessary information on the sizing, position and design of the devices needed to achieve the objectives.

Table 2 summarises the design objectives and their application.

Tables 3, 4 and 5 provide further explanation, including the preferred methods for demonstrating compliance.

---

13 See the design objectives technical report for further details regarding loads versus concentrations.
3.4 Use in local government planning frameworks

It is recommended that local governments:

- directly adopt the design objectives in structure plans so they take effect before a full amendment to their IPA Planning Scheme if this has a conflicting code or policy, or where there are no provisions addressing either the intent or content of the design objectives of this guideline
- at the first opportunity, incorporate the design objectives in planning scheme amendments designed to implement approved structure plans, the SEQ Regional Plan, the State Coastal Management Plan, the EPP (Water) and other relevant state planning policies
- use the design objectives in priority infrastructure planning for new development areas
- where applicable, incorporate the design objectives at the first opportunity into the planning and implementation of local authority and state government urban stormwater management infrastructure (e.g. total water cycle or integrated urban water management plans).

3.5 Use in state and regional planning frameworks

It is recommended that state and regional authorities use the design objectives for:

- water quality planning and policy
- infrastructure planning and delivery, where relevant
- assessment of water management policies and proposals from local governments and industry.

---

15 A report on preferred methods to incorporate the design objectives in planning schemes is available from the Healthy Waterways website.
<table>
<thead>
<tr>
<th>Criterion</th>
<th>Intent</th>
<th>Design objective</th>
<th>Recommended application</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Frequent flow management</strong></td>
<td>To minimise the frequency of disturbance to aquatic ecosystems by managing the volume and frequency of surface runoff during small rainfall events</td>
<td>From the proposed development, capture and manage:</td>
<td>Applicable where runoff from or within the site passes through or drains to an unlined channel, or non-tidal waterway or wetland.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the first 10 mm of runoff from surfaces that are 0% to 40% impervious</td>
<td>Where a receiving waterway is degraded(^{16}), the local or regional authority may choose not to require compliance with this objective, on the basis that it has identified the receiving waterway and its associated catchment/s as having limited potential for future rehabilitation and/or WSUD retrofitting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the first 15 mm of runoff from surfaces that are &gt;40% impervious</td>
<td>Management of captured stormwater should include one or more of the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: The capacity to capture runoff must be restored within 24 hours of the runoff event.</td>
<td>• evaporation of stormwater</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• reuse of stormwater (including collection and use of roof water)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• infiltration to native soils or filtration through an appropriately designed soil and plant stormwater treatment system (e.g. bioretention).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Waterway stability management</strong></td>
<td>To control the impacts of urban development on channel-bed and bank erosion by limiting changes in flow rate and flow duration within the receiving waterway</td>
<td>Limit the post-development peak one-year average recurrence interval (ARI) event discharge to the receiving waterway to the pre-development peak.</td>
<td>Applicable where runoff from or within the site passes through or drains to an unlined channel, or non-tidal waterway or wetland.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Where a receiving waterway is degraded(^{17}), the local or regional authority may choose not to require compliance with this objective, on the basis that it has identified the receiving waterway and its associated catchment/s as having limited potential for future rehabilitation and/or WSUD retrofitting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The local authority may substitute an alternative criterion where catchment-scale studies have been undertaken to develop a catchment-specific approach to managing instream erosion impacts.</td>
</tr>
<tr>
<td><strong>3. Stormwater quality management</strong></td>
<td>To control the impacts of urban development on pollutant loads discharged to receiving waters in the post-construction period.</td>
<td>Achieve the following minimum reductions in total pollutant load, compared with that in untreated stormwater runoff from the developed part of the site:</td>
<td>Applicable to all development, excluding development that:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 80% reduction in total suspended solids</td>
<td>• comprises six or less dwellings with no internal road; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 60% reduction in total phosphorus</td>
<td>• is less than 25% impervious, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 45% reduction in total nitrogen</td>
<td>• captures and manages the first 10 mm of runoff per day from all impervious areas.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 90% reduction in gross pollutants</td>
<td>Management of captured stormwater should include one or more of the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• evaporation of stormwater</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• reuse of stormwater (including collection and use of roof water)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• infiltration to native soils or filtration through an appropriately designed soil and plant stormwater treatment system (e.g. bioretention).</td>
</tr>
</tbody>
</table>

\(^{16}\) For the purposes of this guideline, a waterway is defined as degraded where:

- the proportion of impervious area within the catchment, prior to the proposed development, is greater than 30%; or
- it is designated as ‘highly disturbed’ under Schedule 1 of the Environment Protection Policy (Water).
**Table 3: Frequent flow management**

| Objective: | From all impervious surfaces on the proposed development, to capture:  
| | • the first 10 mm of runoff from surfaces that are 0% to 40% impervious  
| | • the first 15 mm of runoff from surfaces that are >40% impervious  
| | Capacity to capture must be restored within 24 hours of the runoff event. |
| Background: | Under pre-development conditions, soils and vegetation in the catchment absorb small rainfall events, which do not, therefore, produce surface runoff in small urban creeks. In an urban catchment, impervious surfaces generate runoff during these small storms, which, if directly connected to a formal stormwater drainage system, is transported directly to receiving waterways. This increased number of surface runoff events means that urban pollutants are frequently delivered to streams, and in-stream ecosystems are regularly disturbed. Studies within Australia and overseas have shown a strong correlation between the impervious area directly connected to streams and the degradation of aquatic ecosystems.  
| | Using local hydrologic data from South East Queensland, it has been shown that capturing up to 15 mm of runoff from impervious areas within a development will ensure a similar frequency of flow in the receiving urban streams to that pre-development. |
| Recommended application | Since this objective aims to protect in-stream ecology in ephemeral waterways, it should be applied only where runoff from or within the site passes through an unlined channel, creek or non-tidal river that is not a degraded waterway.  
| | Where a receiving waterway is degraded, the local or regional authority may choose not to require compliance with this objective, on the basis that it has identified the receiving waterway and its associated catchment/s as having limited potential for future rehabilitation and/or WSUD retrofitting.  
| | Management of captured stormwater should include one or more of the following:  
| | • evaporation of stormwater  
| | • reuse of stormwater (including collection and use of roof water)  
| | • infiltration to native soils or filtration through an appropriately designed soil and plant stormwater treatment system (e.g. bioretention). |
| Demonstrating compliance | Compliance with this objective can easily be demonstrated by providing a total stormwater capture volume in cubic metres (m$^3$), calculated as follows:  
| | **Capture volume (m$^3$) = Impervious area (m$^2$) x target design runoff capture depth (m/day).**  
| | The spatial distribution of the required capture volume may be adapted to suit individual site conditions, provided that the required volume from all impervious areas is captured before leaving the site.  
| | Capturing the required volume of runoff will reduce pollutant load and simultaneously improve water quality. Therefore, it may eliminate the need for separate additional storage to meet the objective for managing frequent flow if measures taken to manage the quality of stormwater incorporate capturing this volume.  
| | Since the objective requires that the capacity to capture this volume of runoff be available each day, the management system (whether infiltration, evaporation, reuse or bioretention) must be capable of draining the captured stormwater within 24 hours. |
### Table 4: Waterway stability management

<table>
<thead>
<tr>
<th><strong>Objective:</strong></th>
<th>To limit the post-development peak one-year average recurrence interval event discharge to the receiving waterway to the pre-development peak.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Background:</strong></td>
<td>Urbanisation typically increases the duration of sediment-transporting flow in urban streams, leading to increased rates of bed and bank erosion. The purpose of this design objective is to limit changes in potential to transport sediment downstream by events of intermediate magnitude, which are responsible for a large proportion of total sediment movement in streams.</td>
</tr>
<tr>
<td><strong>Recommended application</strong></td>
<td>Since this objective aims to protect in-stream ecology in ephemeral waterways, it should be applied only where runoff from or within the site passes through an unlined channel, creek or non-tidal river that is not a degraded waterway. Where a receiving waterway is degraded, the local or regional authority may choose not to require compliance with this objective, on the basis that it has identified the receiving waterway and its associated catchment/s as having limited potential for future rehabilitation and/or WSUD retrofitting. The local authority may also substitute an alternative criterion where catchment-scale studies have been undertaken to develop a catchment-specific approach to managing the effects of in-stream erosion.</td>
</tr>
<tr>
<td><strong>Demonstrating compliance</strong></td>
<td>Compliance with this design objective can be demonstrated using a runoff routing model. For small developments, the local authority may use simplified methods to demonstrate compliance.</td>
</tr>
</tbody>
</table>
**Table 5: Stormwater quality management**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Compared with that of untreated stormwater runoff from the developed part of the site to achieve at least:</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>80% reduction in total suspended solids</td>
</tr>
<tr>
<td>•</td>
<td>60% reduction in total phosphorus</td>
</tr>
<tr>
<td>•</td>
<td>45% reduction in total nitrogen</td>
</tr>
<tr>
<td>•</td>
<td>90% reduction in gross pollutants</td>
</tr>
</tbody>
</table>

| Background | Though targets for the quality of receiving water are typically specified as desired concentrations of pollutants, experience in Australia and overseas has identified problems with using this criterion for discharged urban stormwater. Difficulties include the possibility that though the median (or some other percentile) concentrations of pollutants may be low, they may be very high during infrequent storm events. The increase in runoff volume that typically accompanies urban development can also significantly damage urban streams by increasing disturbance and erosion, even if the concentration of pollutants is low. The proposed design objectives for managing the quality of stormwater therefore adopt a load-based approach. The numerical values of the load-based targets are based on the load reductions that can be achieved using the best practice stormwater management infrastructure currently operating in South East Queensland’s climatic and pollutant export conditions, and operating near the limit of its economic performance. This means that though it may be possible to further reduce loads, this would involve a substantial extra cost to obtain a very small additional water quality benefit. Since the load-based reductions are relative to the average pollutant loads in untreated runoff, a higher standard is effectively imposed on low-pollutant-generating development, by requiring pollutants to be removed to unachievable levels. Accordingly, development resulting in no more than six dwellings or 25% imperviousness or less can be addressed through simpler ‘deemed to comply’ solutions (see below). |

<table>
<thead>
<tr>
<th>Recommended application</th>
<th>It is recommended that this design objective be applied to all development, except very low density development that:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• comprises six or less dwellings with no internal road; or</td>
</tr>
<tr>
<td></td>
<td>• is less than 25% total imperviousness, and captures and manages the first 10 mm of runoff per day from all impervious areas.</td>
</tr>
<tr>
<td>Management of captured stormwater should include one or more of the following:</td>
<td>• evaporation of stormwater</td>
</tr>
<tr>
<td></td>
<td>• reuse of stormwater reuse (including collection and use of roof water)</td>
</tr>
<tr>
<td></td>
<td>• infiltration to native soils or filtration through an appropriately designed soil and plant stormwater treatment system, (e.g. bioretention).</td>
</tr>
</tbody>
</table>

| Demonstrating compliance | For very low density development with less than 25% total imperviousness, some local governments may provide pre-determined infrastructure solutions that are ‘deemed to comply’ with the stormwater quality management design objective. This eliminates the need for detailed modelling. For developments with higher levels of imperviousness, numerical modelling of pollutant export and stormwater treatment performance will be required to demonstrate compliance. The ‘MUSIC’ model is widely adopted for this purpose. Modelling should be based on a continuous simulation of catchment hydrology using models, parameters and methodologies in accordance with local government requirements. |

Implementation Guideline No: 7 – Water sensitive urban design
4 WSUD references and resources

4.1 Download this guideline
This guideline and accompanying consultation reports can be downloaded from both the Department of Infrastructure and Planning and South East Queensland Healthy Waterways Partnership websites:
- www.dip.qld.gov.au
- www.healthywaterways.org

4.2 Technical documents
The Water by Design section of the Healthy Waterways Partnership website (www.healthywaterways.org/water_by_design) contains other WSUD information relevant to South East Queensland.

You can view and/or download a range of technical and supporting documents and other information, including:
- Technical design objectives report—Water sensitive urban design—Developing design objectives for water sensitive urban development in South East Queensland (MBWCP and Ecological Engineering: 2006)
- WSUD Action Plan
- WSUD Technical Design Guidelines.

4.3 Planning documents
SEQ Regional Plan checklists, implementation guidelines and advisory papers are available from www.dip.qld.gov.au.

EPA guidelines and resources are available from www.epa.qld.gov.au.

5 Addendum December 2008

5.1 Emerging policy frameworks

Draft SEQ Regional Plan 2009-2031
The revised draft SEQ Regional Plan 2009-2031 was released on 7 December 2008. After a period of public consultation, the draft SEQ Regional Plan will be finalised in June 2009.

Until the draft SEQ Regional Plan 2009-2031 is finalised, the policies of the SEQ Regional Plan 2005-2026 will apply. However, the Regulatory Provisions of the draft SEQ Regional Plan 2009-2031 now supersede the previous Regulatory Provisions.

This Guideline will therefore be updated and finalised as part of the finalisation of the SEQ Regional Plan 2009-2031 in June 2009.

State Planning Policy Healthy Waters

A new State Planning Policy Healthy Waters is currently being prepared and will be considered by Cabinet for release for public consultation in early 2009. The SPP includes urban stormwater management design objectives for each region of the State, modelled on the design objectives of this guideline.