Introduction

This Practice Note has been prepared by Water Resources to assist Development Assessment staff and applicants understand the desired assessment processes. Additionally, it offers a resource for developers and professional consultants to better apply Water Sensitive Urban Design principles in their future work.

This Introductory Practice Note contains important information in relation to WSUD on a broader scale, while the *WSUD Engineering Guidelines: Stormwater* detail the technical design requirements of individual devices.

Following this Introductory Practice Note, a series of Practice Notes will follow, including:

- Application of WSUD at Subdivision Scale (Practice Note 1b)
- Application of WSUD at Lot Scale (Practice Note 1c)
- Application of WSUD at Street Scale (Practice Note 1d)
- Application of WSUD at Commercial or Industrial Scale (Practice Note 1e)
- Swales (incorporating Buffer Strips) (Practice Note 2)
- Bioretention Swales (Practice Note 3)
- Sedimentation Basins (Practice Note 4)
- Bioretention Basins (Practice Note 5)
- Constructed Wetlands (Practice Note 6)
- Infiltration Measures (Practice Note 7)
- Sand Filters (Practice Note 8)
- Other Measures (Practice Note 9)
- Aquifer Storage and Recovery (Practice Note 10)
- Ponds/ Lakes (Practice Note 11)
- Plant Selection for WSUD Systems (Practice Note 12).

It is important to highlight that Brisbane City Council encourages innovative developments that maximise all of the outcomes outlined in the section below. However, the key focus of this Practice Note and the *WSUD Engineering Guidelines* is stormwater management.

**What is Water Sensitive Urban Design?**

The guiding principles of Brisbane’s Water Management Strategy are centred on achieving smart and responsible water cycle solutions.

WSUD represents a set of *design elements* and *on-ground solutions* that aim to minimise impacts on the water cycle from our built environment, and enhance our City’s livability. It consists of a number of different approaches that can be used to achieve the following long term outcomes:

- protect waterway health (by improving stormwater quality and reducing runoff)
- minimise effluent discharge
- maximise recycling opportunities
- reduce water demand and supplement with alternative sources.
WSUD offers a simplified and integrated approach to land and water planning by dealing with the urban water cycle in a decentralised manner consistent with natural hydrological and ecological processes. It also benefits the City of Brisbane by reducing infrastructure both in capital and maintenance expenditures.

WSUD relates to all stages of a development including planning (e.g. site analysis and protection of existing natural features), site management during construction (e.g. erosion and sediment control) and development outcomes. Figure 1 illustrates the relationship between WSUD, elements of the water cycle, and their contribution to smart and responsible water cycle solutions in our built environment.

**Figure 1: WSUD and the Water Cycle**

- **A Clean and Green Brisbane**
- **Sustainable Development**
- **Water Strategy for Brisbane**
- **WSUD**

**Promotes designs that:**
- Minimise Effluent Discharge
- Protects Waterway Health by Improving Stormwater Quality and Reducing Runoff
- Reduce Water Demand
- Maximise Recycling Opportunities
Key Steps for Integrating WSUD into Development

1. Determine and comply with WSUD objectives and performance standards (City Plan, BCC’s Water Quality Objectives, potable water demand reduction):
   - water quality objectives and load reduction
   - reduction in potable water demand/ use
   - flood management and risk
   - water balance
   - public health standards
   - long term maintenance requirements.

2. Undertake Site Planning and Analysis to identify ecological and landscape opportunities and constraints. The Site Analysis needs to demonstrate that the following are fully considered and explicitly acted upon:
   - existing landform and topography
   - natural waterways, waterway features and receiving waters
   - flow regime
   - soil types and erosion hazard
   - existing vegetation and habitat
   - adjacent land use
   - existing services and infrastructure
   - any existing planning controls (e.g. wetlands/ waterway corridors, Vegetation Protection Orders etc.)
   - presence and quality of groundwater exchanges.

3. Select appropriate Best Management Practice (BMP) measures to manage all aspects of the water cycle, including, but not limited to:
   - retain natural drainage lines and appropriate waterway corridors
   - base street layout around natural topography (minimise need for bulk earthworks)
   - retain natural features (i.e. waterways, wetlands, vegetation etc.)
   - minimise impervious areas/ encourage infiltration
   - maintain natural water balance and minimise changes to natural flow regime
   - utilise opportunities to reduce burden on existing infrastructure (e.g. potable water use)
   - utilise opportunities for water reuse (e.g. stormwater and recycled water)
   - maximise use of stormwater treatment at the source.

4. Prepare a site layout plan and design, clearly demonstrating how the above process was followed.
Figure 2 identifies the process that developers must follow and documentation to be consulted in order to incorporate appropriate WSUD into a development.

No single treatment measure can adequately remove all types of stormwater pollutants (e.g. coarse to fine sediments, nutrients and dissolved contaminants). To achieve Water Quality Objectives, more than one treatment measure is needed and the treatment measures need to be implemented in a series, i.e. a ‘Treatment Train’.

The order of the treatment elements is important. Coarser sediments need to be removed first (e.g. with a sediment basin), and fine particulates and nutrients last (e.g. with a wetland). Treatment elements, such as wetlands and bioretention systems, will become clogged and hence under-perform if adequate pretreatment (i.e. removal of gross pollutants and coarse sediments) is not undertaken.
For further information specific Practice Notes at a number of various scales have been produced and should be referred to. These include:

- Application of WSUD at Subdivision Scale (Practice Note 1b)
- Application of WSUD at Lot Scale (Practice Note 1c)
- Application of WSUD at Street Scale (Practice Note 1d)
- Application of WSUD at Commercial or Industrial Scale (Practice Note 1e).

Figure 3 depicts several on-ground solutions for incorporation into Urban Development at various scales.

*Figure 3: Incorporation of WSUD into Urban Development*
Pre-Lodgement Advice

Prior to planning urban development in Brisbane, it is important that the proponent demonstrates that they have undertaken the following steps to ensure the listed outcomes are met.

- WSUD must be included in all new developments. The proponent must demonstrate that the development meets the following outcomes of WSUD:
  - protect waterway health by improving stormwater quality and reducing runoff
  - minimise effluent discharge
  - maximise recycling opportunities
  - reduce water demand and supplement with alternative sources.

- Developments must demonstrate compliance with the WSUD provisions of the following Codes and Planning Scheme Policy:
  - Stormwater Code
  - Subdivision and Development Guidelines.

- The following information/reports must be provided to support compliance with the provision of these Codes:
  - how the proposal meets the relevant Performance Criteria and Objectives of the Strategic Plan, Codes and Subdivision and Development Guidelines
  - a site-based Integrated Water Management Plan that illustrates how the WSUD components have been integrated into the development
  - modelling data used in the Water Management Plan.

- To aid the selection of suitable BMPs, the following list has been compiled. Applicants are referred to the Subdivision and Development Guidelines for detail:
  - Site Planning:
    - retain natural drainage lines and appropriate waterway corridors
    - based on street layout around natural topography (minimise need for bulk earthworks)
    - retain natural features (i.e. waterways, wetlands, vegetation etc.)
    - minimise impervious areas/encourage infiltration
    - maintain natural water balance and minimise changes to natural flow regime.
  - Reduce water demand and supplement with alternative sources:
    - water efficient fixtures and fittings
    - rainwater tanks
    - water reuse systems
    - aquifer storage and recovery systems
    - other.
Pre-Lodgement Advice (continued)

- Factors to aid the selection of suitable BMPs (continued)
  - Protection of waterway health through reducing runoff:
    - bioretention swales
    - bioretention basins
    - on-site infiltration
    - rainwater tanks
    - porous paving
    - other.
  - Protection of waterway health by controlling stormwater pollution:
    - swales and buffer strips
    - bioretention swales
    - bioretention basins
    - constructed wetlands
    - sediment basins
    - sand filters
    - aquifer storage and recovery
    - ponds/ lakes
    - rain gardens
    - porous paving
    - erosion and sediment control plan.
  - Minimise effluent discharge:
    - demand management
    - greywater reuse
    - reclaimed water reuse
    - other.
  - Maximise recycling opportunities:
    - water reuse systems.
Useful Documents/ Websites

Brisbane City Council WSUD Engineering Guidelines: Stormwater

Australian Water Association
http://www.awa.asn.au/

Cooperative Research Centre for Catchment Hydrology

National Water Quality Management Strategy

Melbourne Water

Stormwater Industry Association
http://www.stormwater.asn.au

Water Sensitive Planning Guide for the Sydney Region
http://www.wsud.org/

Australian Runoff Quality

NSW Stormwater Trust

Lower Hunter & Central Coast Regional Environmental Management Strategy

Auckland Regional Council
http://www.arc.govt.nz/arc/environment/water/stormwater-tp10.cfm