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Water-sensitive urban design

Water-sensitive urban design is the integration of urban planning and development with the management, protection and conservation of the water cycle as a whole. The key principles of water-sensitive urban design, as stated in the *Urban Stormwater – Best Practice Environmental Management Guidelines*, are:

Protect natural systems – protect and enhance natural water systems within urban developments

Integrate stormwater treatment into the landscape – use stormwater in the landscape by incorporating multiple use corridors that maximise the visual and recreational amenity of developments

Protect water quality – improve the quality of water draining from urban developments into the receiving environment

Reduce run-off and peak flows – reduce peak flows from urban development by local detention measures and minimise impervious areas

Add value while minimising development costs – minimise the drainage infrastructure cost of the development.

Melbourne Water has implemented new drainage standards to reduce the impacts of stormwater run-off on receiving environments in line with the *Urban Stormwater Guidelines*, to minimise the impact of urban development and stormwater run-off on our rivers, creeks and bays.



Planning and feasibility

Water-sensitive urban design concepts and technologies, if planned and implemented correctly, offer an opportunity for not only elements of the water cycle complementing the development, but the development to complement the water cycle.

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To achieve the best possible results of implementation, the pre-planning phase must:

- identify the land use capabilities and existing conditions or constraints of the site
- consider the intended design and function of the proposed development
- identify the likely impacts of the development on the existing environment
- match these factors with the most appropriate water-sensitive urban design technologies designed to achieve a sustainable balance between development and environment.

Water-sensitive urban design techniques

A range of applications are available for the integration of water-sensitive urban design concepts and technologies into urban developments. Types of techniques include (but are not limited to):

- grassed or vegetated swales – primary treatment and conveyance function; can provide secondary treatment benefits
- filtration trenches – primary treatment and conveyance and detention options; can provide secondary treatment benefits
- bio-retention systems – secondary treatment, conveyance, detention and retention functions (through infiltration); can provide tertiary treatment benefits
- wetlands – tertiary treatment system, storage, detention, possible reuse options
- rainwater tanks – using stormwater as a resource – detention, retention, a substitute for drinking water in garden irrigation, car washing, toilet flushing, etc
- greywater reuse – collect from households, primary treatment on site, reuse for external irrigation or internal toilet flushing options
- rain gardens, rooftop greening, urban forests – provide natural vegetated features of aesthetic value and provide treatment function by filtering stormwater
- any combination of these and other techniques for the best possible outcome.

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Lynbrook Estate – a demonstration

Lynbrook Estate is an 800-lot residential development approximately 35km south-east of Melbourne. It is the first residential development in Melbourne of this scale to integrate water-sensitive urban design principles and features for stormwater management.



The Lynbrook Estate project is the result of collaboration between Melbourne Water (drainage authority), the Urban and Regional Land Corporation (developer) and their consultant team of KLM Development Consultants and Murphy Design Group Landscape Architects, together with the Cooperative Research Centre for Catchment Hydrology (performance monitoring) and the City of Casey (local council).

Features of the estate include the capture of roof and road run-off into vegetated buffer strips above gravel-filled conveyance trenches (ie grassed swales) at the local streetscape level. The local street swales connect to the central boulevard of the estate, where a landscaped median strip has been modified to provide further treatment and conveyance of stormwater. This component is called a bio-retention system and is incorporated into a standard road width of 16 metres with a one-way crossfall – no kerbs, gutters or side entry pits.

Tertiary treatment is provided by constructed wetlands downstream of the bio-retention system, which provides the final treatment of stormwater before being discharged into the ornamental lake and then the local waterway. Treated stormwater is harvested from the lake via a gravity-fed exfiltration trench to irrigate the 7.5 hectare Town Park and remnant River Red Gums.

The water-sensitive urban design features minimise the impact of the new development on the environment, significantly reducing pollutant loads of suspended solids, nitrogen, phosphorus and heavy metals from entering local rivers and creeks and Port Phillip Bay. The combined stormwater treatment system at Lynbrook has reduced pollutant loads in estate run-off by 80% for total phosphorus, 60% for total nitrogen and 90% for total suspended solids. These results exceed the target reductions as specified in the *Urban Stormwater Guidelines* of 45% total nitrogen, 45% total phosphorus and 80% for total suspended solids.

In 2000, the innovative design of the Lynbrook Estate was awarded the prestigious President's Award for Excellence by the Urban Development Institute of Australia.

Melbourne Water is owned by the Victorian Government. We manage Melbourne's water supply catchments, remove and treat most of Melbourne's sewage, and manage rivers and creeks and major drainage systems throughout the Port Phillip and Westernport catchment.

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