Senate Inquiry: Stormwater Resources in Australia.

Submission by eWater, Canberra

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Summary

Efficient management of stormwater is essential in order to prevent adverse impacts on the environment. The efficient management strategies involve managing stormwater runoff quality using Water Sensitive Urban Design (WSUD) principles, while at the same time assuring reliable alternative water resources to minimise potable water demands through the concept of Integrated Water Cycle Management (IWCM). WSUD/IWCM have proven to be effective for the more common and frequent rainfall runoff patterns in Australia. However, a broader national recognition and acceptance of WSUD/IWCM practices across all stormwater management authorities are still missing. Followings are our key recommendations to ensure the efficient stormwater management practices in Australia.

1. **Nationally consistent WSUD/IWCM guidelines** need to be developed. The guidelines should aim to provide a nationally consistent approach for managing stormwater in an integrated way. **All government authorities should recognise the value of WSUD/IWCM principles and adopt those principles in their land and infrastructure development codes.**

2. **An easy-to-use planning tool needs to be developed to support efficient and effective implementation of these new guidelines. This software-based tool would provide the ability to easily simulate all three urban water cycle service networks** (water supply, stormwater, wastewater), ranging in scale from a single allotment up to subdivisions. This tool must model both water quantity and water quality, with options for economically and technically efficient system optimisation. Ideally, this new tool would build on benchmark models such as MUSIC and Urban Developer, developed by the government and industry partners of the eWater Cooperative Research Centre and its predecessors. MUSIC is applied widely across Australia as a stormwater quality design tool by developers, consultants and local governments.

3. **Ensuring appropriate funding is made available to support the development of (1) nationally consistent guidelines, and (2) an integrated planning tool** to assess the scenarios and output metrics that associate with the concept of WSUD/IWCM. In addition, all stormwater management authorities, largely local governments, should have operational plans and funding to support the ongoing maintenance of stormwater infrastructures, not just to fund their capital costs.

Introduction

Traditionally, the prime objective of urban stormwater management had been flood mitigation and the aim had always been to transport the stormwater as rapidly as possible from our urban areas to the nearest waterways. As such majority of the stormwater is transported through so called engineered hard drainage system (e.g. pits and pipe systems) to receiving waterways without any treatment. In a typical urbanised area up to ninety percent of the rainfall may flow into the hard stormwater system, and produce extremely poor quality runoff to receiving water body. To protect our environment and country's unique ecosystems, we need an approach that recognises the environmental impacts of urbanisations, the linkages between land and water management and the importance of community values and involvement. Stormwater management practices should integrate water into the landscape to enhance visual, social, cultural and ecological values. Australian cities are facing a range of critical pressures related to urban expansion and water shortages along with the degradation of urban streams and waterways. **Managing Australia's limited water resources requires an integrated and complete water cycle approach (including both quantity and quality) considering 'cities as water supply catchments'.**

Issues and Challenges in Stormwater Management

The natural movement of water has changed dramatically with progressive changes in the Australian landscape from forest or other indigenous vegetation to urban environmental conditions. The urban development has substituted vegetated ground with land covered by large impervious surfaces such as roofing and paving. A catchment consists of a variety of vegetative covers and natural soils in an undeveloped environment. During an event of rainfall in this type of environment, the majority of the rainfall absorption is through the processes of infiltration through the soils into the groundwater and transpiration via vegetation and evaporation into the atmosphere. As a catchment is developed, the natural vegetation and pervious areas are replaced by surfaces which do not allow water to be absorbed such as roads, concrete and buildings. Stormwater runoff from an impervious environment has the potential to cause a wide range of impacts on downstream waterways. It increases the likelihood of regional flooding if managed improperly and also has the potential to transport high pollutant loads directly to rivers, streams and wetlands. This may have a variety of effects on public health and safety, local and regional infrastructure and the ecological health and recreational amenity of waterways. Economic and social benefits to the local fishing, aquaculture, agriculture, grazing, commercial and tourism industries can be achieved by having healthy waterways. The preservation of waterways used as drinking water supplies provides obvious commercial and public benefits by reducing the requirement for drinking water treatment and reducing public health risk. About thirty percent of the high quality drinking water produced by centralised supply systems is used for non-drinking uses such as irrigation and toilet flushing which is an inefficient way of managing a scarce resource. **We should conserve high quality drinking water for drinking, cooking and washing purposes by a smarter approach to water distribution and usage. Domestic water supplies should be augmented with alternative sources such as rainwater, stormwater and recycled wastewater for all other applications.**

WSUD's National Recognition

The necessity to deal with both the quantity and quality of runoff has been recognised in recent years. The hard engineering strategy for the management of stormwater is being modified by the application of Water Sensitive Urban Design (WSUD). This strategy focuses on decentralised stormwater management system where the runoff and pollutants are managed locally within urban housing, commercial and industrial areas. WSUD involves the utilisation of natural processes and storage and reuse principles to reduce local and regional flooding and improves the quality of stormwater discharging from the site. However, still the full and consistent implementation of WSUD practices are limited to only a handful of large and/or innovative local government authorities. The problem seems to be that most councils don't have the human or financial resources to implement WSUD principles even if they want to**. A broader recognition and funding of WSUD practices across all stormwater management authorities is essential**.

WSUD/IWCM Planning & Modelling

Conventionally, stormwater, water supply and sewage have been managed separately. There are however opportunities available to integrate all these aspects of the water cycle in a way that improves environmental and community outcomes at reduced cost. From a stormwater perspective, the most common approach is stormwater reuse, generally for non-potable purposes. This reduces the demand on the potable water supply and reduces runoff volumes and flow rates. Diversification of water sources is a key characteristic of Integrated Water Cycle Management (IWCM). It offers

multiple benefits such as an increased security for water supply, improvements to water quality in waterways and urban amenity. The extent and the pattern of the diversification depend on such factors as climate, topography, housing density, community preferences and affordability. These factors generally vary across a city. Hence there are many different ways to achieve diversification (i.e. many different configurations or portfolios) and they offer varying levels of benefits and costs. Therefore, identifying trade-offs associated with different portfolios of water sources is essential to identify the best portfolio of water sources for a city. The portfolio approach has the advantage of considering interactions among the options compared to considering individual sourcing options. Lack of understanding of hydrological processes, water quality, ecological implications, economic costs and social acceptability of different portfolios of water sourcing options will lead to identification of less efficient IWCM solutions, which would eventually result in low acceptability to source diversification.

Managing and assuring reliable alternative water resources is one of the key challenges in Integrated Water Cycle Management (IWCM). Most of the water resource management tools available today have been developed for larger (regional) scale applications with limited applicability to small (allotment) scales. To achieve comprehensive IWCM goals, modelling capability is necessary at smaller scales, particularly given the rapidly developing landscape across Australia. In addition, most previously developed tools do not employ functions to measure ecological impacts. These cannot be ignored when achieving IWCM. **Hence, an easy-to-use software-based tool needs to be developed that would provide the ability to simulate all three urban water cycle service networks (water supply, stormwater, wastewater), ranging in scale from a single allotment up to large clusters or subdivisions.** This tool must model both water quantity and water quality, with options for economically and technically efficient system optimisation**.**

Nationally Consistent WSUD/IWCM Policies and Guidelines

Most major Australian cities promote the adoption of WSUD/IWCM principles to urban water management. Unfortunately at present there is no nationally acceptable framework in Australia to evaluate IWCM options, in order to help identify multiple trade-offs associated with different portfolios of water sources. Different jurisdictions have different legislative and resource management requirements relating to stormwater management. Several state, local, and regional governments have developed technical guidelines on specific stormwater management techniques and practices. However, there are no nationally consistent guidelines for ecologically sustainable management of stormwater quantity and quality. **Consistent approaches to planning across local governments is important. The guidelines should aim to provide a nationally consistent approach for managing stormwater in an integrated way.** They will help to identify objectives for stormwater management and to integrate management activities at the catchment, waterway and local development level. The guidelines should outline why we need to manage our stormwater in ecologically sustainable and integrated ways.

In order to facilitate the integrated planning process, authorities need to ensure that relevant codes, policies and guidelines relating to stormwater management are developed in the process of reviewing the planning scheme. These codes (including household and commercial plumbing codes) and policies should reflect environmental values and water quality objectives for local waterways, so that water quality as an issue is properly addressed when land use is proposed to be changed. Authorities also need to produce catchment based stormwater management plans which identify specific future stormwater management requirements for the waterways.

Funding Constraints

Government funding for water management in general has often focused on regional water security and flooding issues. The limited amount of funding that is available for stormwater management is spent mainly for the installation of stormwater infrastructure. Often it is found that councils or other responsible authorities have no operational plans or funding to support the ongoing maintenance of stormwater infrastructure. Funding to broaden the current approach to stormwater management and adopt a more environmentally sensitive and ecologically sustainable design based approach may not be readily available from existing revenue sources. Additional government funding allocation (or perhaps an additional water and drainage rates levy) is necessary to support the development of nationally consistence guideline, and a modelling tool to assess the scenarios and output metrics that associate with the concept of IWCM and its various surrogate measures in order to achieve efficient solutions. It is also important to allocate sufficient funding to support the ongoing maintenance of stormwater infrastructures, not just to fund their capital costs.

About eWater

eWater's not-for-profit mission is to support ecologically sustainable water management in Australia and around the globe. Commonwealth and State Governments have been long term partners of eWater, both as in its period as a cooperative research centre and now as an independent, not for profit public company. eWater is the developer and supplier of Australia's leading stormwater management modelling software MUSIC (Model for Urban Stormwater Improvement Conceptualisation). This tool is designed to help urban stormwater professionals visualise possible strategies to tackle urban stormwater hydrology and pollution impacts. eWater has the capacity and expertise to continue to assist the Government with a wide range of water management challenges including:-

- Integrated whole of systems water systems modelling;
- System optimisation and trade-off studies;
- Product customisation for National/State specific needs;
- Case specific studies, including environmental benefits;
- Technical review; and
- Capacity building.

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