

From Sustainable Urban Water To Restorative Developments: Applying a Holistic Framework for Water Management when renewing our Cities

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Internationally, increased pressures on urban areas due to population growth, climate change and resource constraints are driving the need to plan and design more innovative and sustainable water management within our cities. This paper focuses on the implications of these new drivers in the planning and design of three large scale urban renewal developments in Sydney, Australia. It also considers how these new approaches can be rolled-out and become models for sustainable water management in highly urbanised areas around the world.

In Sydney, long term water shortages have resulted in increased public and institutional support for initiatives in sustainable water management, including household rainwater tanks and greywater reuse systems. To date however, regulations and costs to developers have meant that larger scale recycling schemes have been limited to greenfield housing developments where the government-owner utility has provided the infrastructure.

The recent introduction of the Water Industry Competition Act has changed the regulatory landscape in the Greater Sydney region, promising developers significant access to water and wastewater infrastructure. Private companies will now be able to own and operate sewer or stormwater mining infrastructure and sell the recycled water they produce. The opportunities provided by this legislation combined with an awareness of the business case for sustainability are driving a number of landmark urban renewal developments across Sydney to consider innovative servicing options for both water and sanitation.

The case studies addressed in the paper are three iconic precinct scale developments that include residential, commercial and retail sectors, located within 3km of the city centre. In each case, the developer has investigated what it would take to move beyond best-practice and create restorative developments that have net positive impacts for the environment and society. There has also been a significant focus on adopting a holistic and integrated approach that considers water consumption, waste, stormwater quantity and quality and downstream impacts within the same analytical framework. Linkages to the assessment of energy systems alternatives have also been made, particularly in relation to cooling loads and potential co-generation on the sites.

Across the three case studies, the new framework has been applied in order to set clear and site-specific water and sanitation management targets for the developments. This has occurred at three tiers, firstly with a 'Base Case', that meets with already strict government regulations, then a 'Sustainable' case that

seeks to have no net impact on the environment and finally a 'Restorative' case that aims to have a net positive impact on the environment. The site specific targets and actions have been defined in terms of catchment (stormwater) management, water use efficiency, potable water substitution and resource recovery.

Each site has a range of opportunities and constraints based upon existing infrastructure and placement within a catchment / urban environment. The first site is located directly on Sydney Harbour and due to its waterfront location, stormwater runoff from this site must be of a very high quality. The second development located near to Sydney's Central Station sits at the bottom of a catchment, with several large stormwater and sewer mains passing beneath the site; this makes stormwater or sewer mining easily accessible. The last example is an old railyard which sits in a low lying, flat area and is constrained by existing drainage capacity and local flooding. At this site, the reuse of rainwater and stormwater provides the added benefit of flood attenuation.

Together, these case studies demonstrate how emerging drivers for sustainability and a changing regulatory landscape have impacted upon the planning and design of water and sanitation infrastructure (at the precinct scale) in Sydney city. The three developments are at the forefront of an emerging trend in Sydney where innovative combinations of decentralised water and sanitation management options are now being seriously explored by developers.

The results from modelling the impacts of water efficiency, the use of alternative supply sources and stormwater pollution reduction will be shown in this paper. These case studies demonstrate how the new framework of target setting and costing for these developments can be applied to assess the potential of these innovations. In light of increasing demands on cities worldwide, these approaches have significant potential to be applied in a range of urban environments.