

A DECENTRALISED WATER MASTER PLAN FOR THE CITY OF SYDNEY: – DEVELOPING THE BASELINE

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INTRODUCTION

The City of Sydney is working to realise its vision to be a GREEN, GLOBAL and CONNECTED city, a vision articulated in their strategy Sustainable Sydney 2030. This vision, in part, rests on changes to the way in which both potable and non-potable water is sourced, managed and used throughout the local government area. The aim is to achieve an integrated, resilient and sustainable water cycle by addressing all of its elements: improving efficiency, stormwater infrastructure issues and stormwater quality and laying the framework for a resource-effective decentralised non-potable network.

METHODOLOGY/ PROCESS

The first step in the master-planning process was to develop the baseline by effectively using spatial analysis and modelling techniques to identify and scale non-potable demand opportunities, stormwater quality and quantity issues and potential supply options. This spatial planning approach will be discussed in more detail, including the following steps:

- Define and map the baseline for current water demand within the City of Sydney
- Link City of Sydney's floor space data with water consumption to map water use intensities
- Identify the opportunities for efficiency by discrete water use sectors and end uses through benchmarking of sectors
- Identify and map water quality pollution and flooding hotspots and strategies for reduction.
- Forecast and map the potential demand for non-potable water supplies to 2030 and estimate the impact of climate change on 2030 demands
- Identify water supply opportunities at the lot, precinct and regional scales considering the potential for rainwater, wastewater, stormwater, groundwater and seawater
- Identify potential linkages between supply opportunities where networks might be formed
- Assess the potential for synergies between the Trigeneration and Solid waste systems currently being planned for City of Sydney
- Match supply with demand, assess the scale of the opportunities and define infrastructure options.

RESULTS/ OUTCOMES

The spatial planning approach enabled us to map metred water demand with floor space data and the future growth capacity study to provide clear indications of:

- Existing potable water demand on a building and floor level thereby identifying key water users in individual sectors such as multi-residential, single residential, food and beverage, office, hotels, parks and reserves. These were then assessed against industry benchmarks to identify opportunities for efficiency programs.
- Future (2030) water demand forecasts.
- End uses suitable for recycled water at a building and floor level for the future (2030) scenario taking into account existing and growth opportunities.
- Potential volumes and locations of alternative source waters for recycled water.
- Synergies with other water systems (potable water, wastewater, stormwater and groundwater) and the other City of Sydney Green Infrastructure Strategies.
- Issues and opportunities presented in the face of climate change such as flooding, groundwater concerns, additional sewage overflows, and potential additional local water supply.
- The impact of demand density on storage requirements and volumetric reliability of roof water harvesting options and other local water sources.
- The temporal and spatial dynamic nature of supply and demand and how a different analysis of scale influence the overall outcome.
- A sub-catchment, catchment and city wide water balance for future decision making.
- The importance of considering other synergies beyond the supply/demand factors.

The baselining process is a major step in the development of a suite of plans that constitute the Decentralised Water Master Plan, including: a Water Efficiency Plan, a Stormwater Infrastructure Improvement Plan, a Water Sensitive Urban Design Plan and a Decentralised Non-Potable Water Network Plan. Following the baselining phase, further analysis will be undertaken of the costs, wider benefits, risks and potential institutional and financing arrangements for non-potable supply options. This may include the identification of enabling actions for policy, regulation and legislation.

CONCLUSION

The Decentralised Water Master plan will not be fixed, but dynamic and changing, which means that the spatial mapping of the baseline and associated modelling provides a solid foundation for ongoing decision making. Each locality has its own unique challenge, constraints and opportunities which will also change between now and 2030. To put this within a single decision making framework is complex and is significantly assisted by the spatial and temporal mapping. This mapping allows a filter and focus for local and strategic considerations now and into the future.

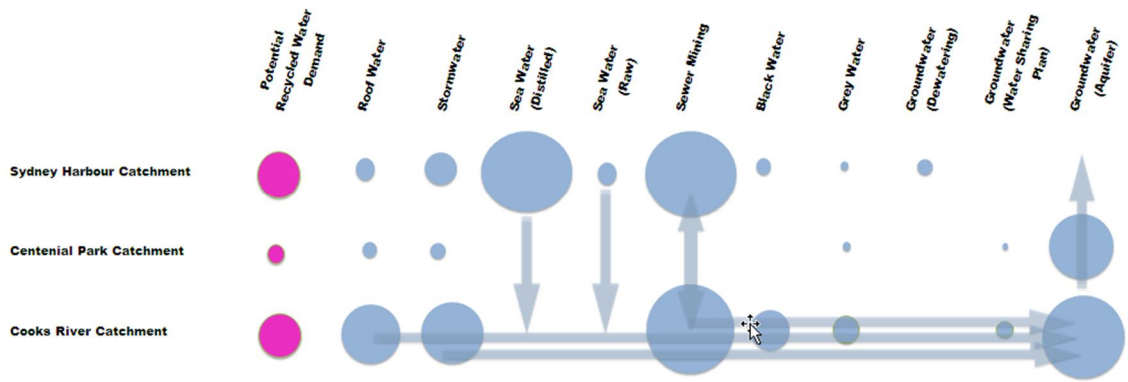


Figure 7: High level look at Supply and Demand

Table 1: Impact of 2030 climate change projections on catchment runoff from the City of Sydney LGA

Climate data	Ave Annual Runoff (ML/y)	Variation from Historic	
		(ML/y)	%
Historic	19,483	-	-
Future 2030 - 5%ile	20,921	1437	7%
Future 2030 - Average	22,793	3309	15%
Future 2030 - 95%ile	24,420	4937	20%

Notes:

1. Historic climate represents observed Sydney climate data from 20 years from 1991 – 2010
2. Future 2030 data represents 20 years of simulated climate data under the A2 global carbon emissions scenario sourced from the University of NSW (UNSW 2009)
3. Results for 2030 represent three simulated climate data sets that produce the 5 percentile, average and 95 percentile runoff selected from 100 simulated climate data replicates

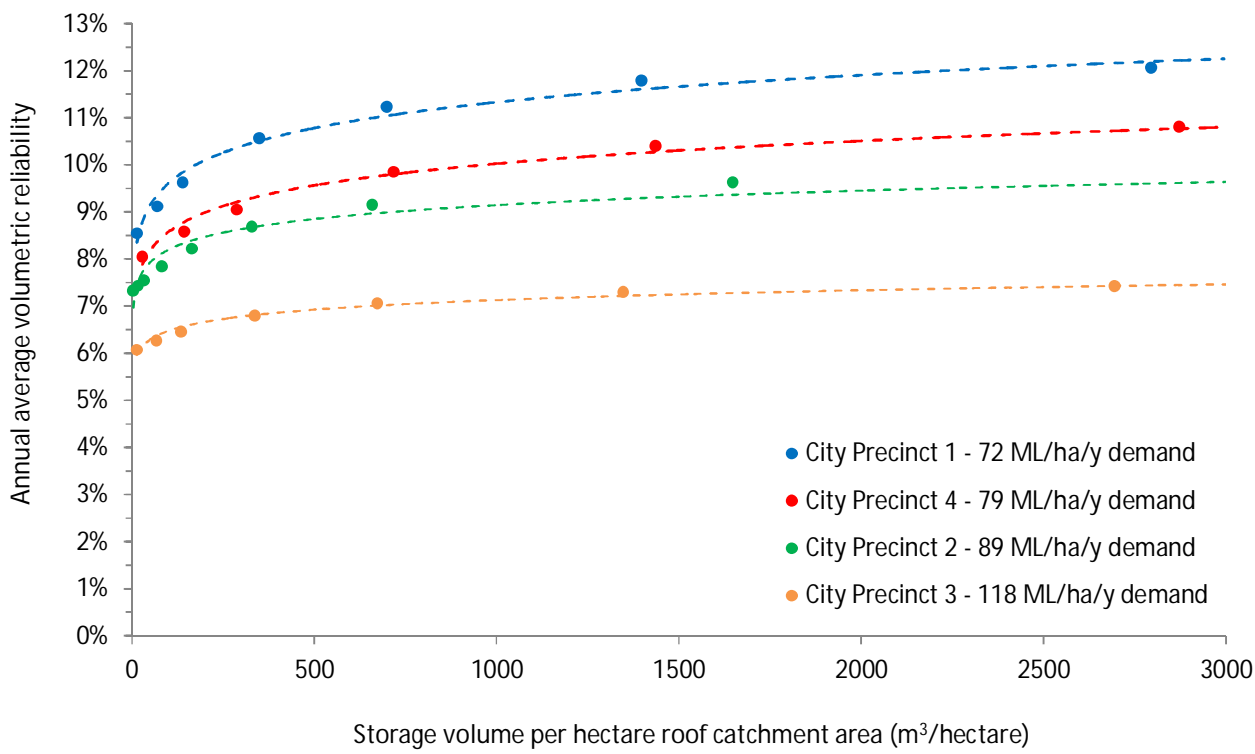


Figure 8 Analysis of the relationship between storage size and volumetric reliability of precinct scale roof water harvesting in the Sydney City Area for four alternative roof catchment precincts. Analysis was carried out using GHD's IWM Toolkit

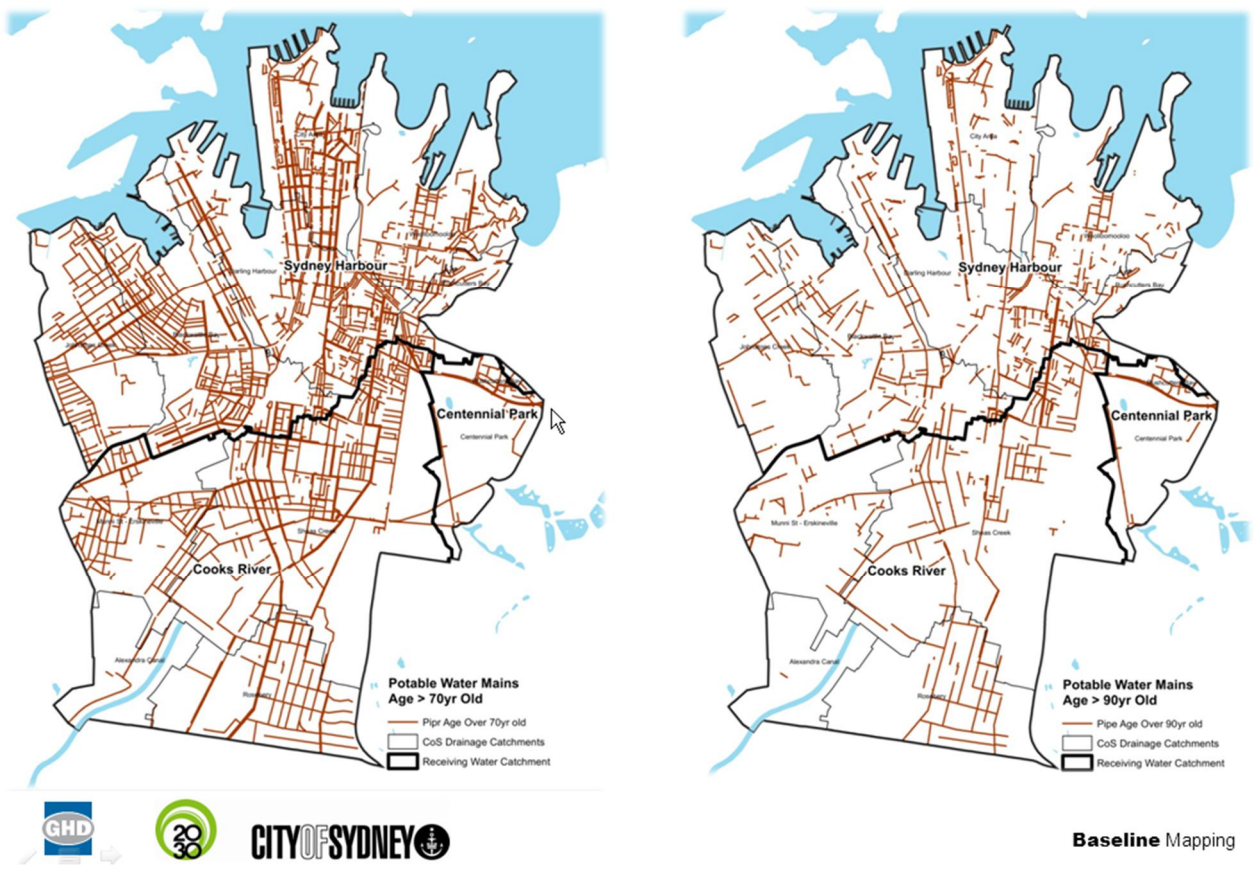


Figure 9: Investigation into other opportunities when looking at aging infrastructure