The Committee for Sydney

SYDNEY'S WATER FUTURE

PLANNING FOR AN *UN*RAINY DAY

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EXECUTIVE SUMMARY: SYDNEY'S WATER FUTURE

INTRODUCTION

Water, and water policy, has slipped from our civic discourse in recent years as memories of the millennial drought fade, and as our reservoirs have spilled over in the wake of years of above average rainfall. In seeking a new civic dialogue, the Committee is motivated by three key concerns: –

- Our current abundance of water is leading to a complacency among our civic leaders and our fellow citizens.
- We need to break the pattern of the previous two centuries of crisis management and start thinking now about what we are going to do when the inevitable happens and we experience a protracted period of water scarcity.
- We need to take a wider view of water in the city: to see and value water in all its manifestations and to understand the role water can play in greening and cooling our city, in place making and in supporting our environment and health.

The civic dialogue we are suggesting ultimately calls for leadership and action. Years of complacency (and often underfunding) during good times have usually been followed by rushed and expensive decisions, almost all involving major engineering solutions which have not always been good for wallets or the environment. There is a need for long term planning and a bi-partisan commitment to developing, and then implementing, sound water policy.

SYDNEY'S WATER FUTURE – REPORT STRUCTURE AND KEY MESSAGES

1. A City Haunted by Water

Will our existing water and sewage systems cope with a Sydney now at 5 million but on its way to 8 million at mid-century? And how will we manage both a denser Sydney and one which is also shifting inexorably Westward away from the cooling of the coast? Also, what do we mean by water infrastructure? In this report, we stress that it is not just the pipes, dams and treatment plants, and argue that we must also look at the water in the urban landscape; in our streams and rivers, our parks and gardens and in the very way we build our city.

2. Of Droughts and Flooding Rains

This chapter looks at the history of water policy in Sydney going right back to early colonial settlement. It examines and interrogates our history of crisis management, as each drought or flood prompted heroic engineering solutions. Sydney's historical water policies may have contributed to more environmental degradation than was necessary and this report questions, in particular, whether dumping 80% of Sydney's waste in the ocean is the most environmentally sustainable outcome feasible.

3. Watering Sydney: From Crisis To Resilience

This chapter warns against the danger of complacency. Although our dams are nearly full and a desalination plant is available, Sydney is not "drought proofed". We are never far from the next water crisis. We need to start thinking and planning now about the future of water in the urban landscape. We need to identify the best policy options – with water recycling a focus – and whether we have we the right regulatory or competitive environment. The time to ask these questions is now, while we have time for a considered debate.

4. & 5. Changing the Cityscape, not the Waterscape & Watering The Green Grid

The report stresses the importance of water sensitive urban design and the critical role that water plays in supporting green space and the liveability of our urban fabric. It considers the potential for rehabilitating our overland drainage systems by turning them into living streams, delivering better connected, quality open space for our communities.

6. Density Done Well: Enter the Planners

This chapter argues that delivering water infrastructure to infill development is substantially cheaper than delivering it to greenfield housing. A sprawling city is far more expensive to service. It argues that increasing our urban density (and doing it well), is one of the easiest and best means to protect both our waterscape, and our wallets.

ALIGNMENT BETWEEN THE COMMITTEE'S PAPER AND THE INFRASTRUCTURE AUSTRALIA REPORT

As *Sydney's Water Future* was going to print, Infrastructure Australia (IA) published its report on *Reforming Urban Water*. We note also that the Productivity Commission's final report on *National Water Reform* is due shortly. This is thus good timing for the broader conversation the Committee is calling for.

IA's commentary on the higher water infrastructure costs associated with greenfield development versus infill development particularly strengthens the Committee's view that continued urban sprawl is neither economically nor environmentally sustainable. There is agreement between IA and the Committee that 'density done well' should be the preferred urban form for managing Sydney's growth, not least because it enables public services such as mass transit and water to be provided most cost-effectively.

IA is very supportive of the need to better integrate city-planning with water planning and notes, importantly, that *"the growing proportion of multi-unit dwellings in many cities brings efficiencies for water supply, sewerage and other services"*. In line with this paper, IA also notes that *"the benefits of increased densification could be substantial with Sydney Water estimating that the cost of servicing greenfield lots is on average five to six times higher than for infill properties"*. We agree.

IA's commentary on the potential for smart technologies to assist with better demand management is also consistent with the Committee's *#WeTheCity* series, which has consistently promoted the benefits of smart technology as a means of improving consumer services and urban outcomes – and delivering better value for money. Smart technologies will also help, crucially, with introducing new demand management approaches.

ALIGNMENT ON EMPHASISNG WATER'S ROLE IN GREAT PLACE-MAKING

The Committee's emphasis on water's role in place making and good centre design is also stressed by IA, which notes that *"access to shared green spaces, including parks, sporting fields and environmental reserves, have become more important in our cities"*. These spaces are not only important for the enjoyment of urban communities, but also for improving the sustainability of these denser environments. Natural spaces in cities can help to improve air quality, reduce artificial heating (otherwise known as the 'heat island effect'), support local biodiversity and provide a natural means of water stream filtration. The Committee believes this is a critical issue for the sustainable future of Western Sydney and its capacity to absorb the development and growth now being planned for it. We also strongly agree about the importance of, and potential for, integrating natural elements within urban design to reduce flooding risks, restrict chemical runoff, filter pollutants from waterways and improve liveability in urban developments

EXECUTIVE SUMMARY CONCLUSION

The Committee welcomes the IA report's push to begin a national discussion about water reform, particularly with regards to some of the more contentious issues, including the potable re-use of water. In alignment with this report, IA notes that *"the best time to plan for Australia's water sector is when most dams are relatively full, not empty"*. We agree. To ensure *Sydney's Water Future*, we do indeed need to plan for an unrainy day.

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Cover images credit: Sydney Water

A CITY HAUNTED BY WATER

When we think of a city, we usually think about its physical structure; its built form, its architecture and streets. We think of its bustling economy, the exchange of goods and services. We think of people, scurrying like ants through a complex web of streets and paths. We think of rolling suburbia, house after house stretching from its centre. Cities are complex. An interweave of human activities, and powerful economic, social and physical forces. Yet we rarely think about the one element that has done more than anything else to shape our cities: water.

Water runs through everything we do. It keeps us, and everything around us, alive. It keeps our buildings cool, our environment green and it transports our most deadly and odious waste away from doing us harm. You'd think we'd be thinking about water all the time, but we don't. Most of the time we take water for granted. It turns up when we need a drink or a wash and then disappears down a drain, out of sight and mind. Only when something goes wrong does water, and water policy enter our thinking, and then it's usually in some dramatic crisis. When water washes our house away, when scarcity turns our urban landscape brown and our gardens wilt. When our showers are rationed, and our car must remain unwashed. We never, ever, think about sewerage unless, through some infrastructure failure, we see (or smell) it. Water is either an A or Z topic – in crisis it is front of mind and discussed at every gathering or barbeque and it is all over the media. When the eventual floods come, and the storages fill, it reverts to normality as a Z topic. The Committee believes we should think about water a lot more than we currently are. That water, and our waterscape, is so crucial to our city's future that we should pay it more attention. Especially now, when we are not in crisis.

Sydney is currently in a period of water wealth. Our dams are near capacity, and our desalination plant (one of the largest in the southern hemisphere) will be ready should this change. So, it's not surprising Sydneysiders seem unconcerned about water right now. But the Committee believes now is exactly the time we should be rethinking our approach to water. How we manage it and how we plan our city around it. Because living in a period of 'water wealth' is not the usual state of affairs for Sydney.

We are currently in a period of water glut only because of the herculean efforts of previous generations. Our forebears, who built and financed the dams which store our water wealth and the sewerage systems which protect us from the miasma of diseases which once contaminated urban life. When Sydney Water was founded 127 years ago, one in four Sydney children died of cholera or typhoid, mostly because of poor sanitation. We owe a lot to these forebears. But we also owe a lot to the next generation who almost certainly will not live in a Sydney as water rich as ours is today. There is a water crisis coming.

Our city is growing rapidly. Our population will grow to more than 8 million people in just a few decades' time. Our current water systems won't be able to cope with the demand of this many mouths, let alone will our environment cope with so much sewage. Drought, a regular visitor to our city, will come again. This looming crisis is likely to be exacerbated in unpredictable ways by the vagaries of climate change.

Furthermore, more of us will also be living further west, away from the moderating effects of the coast. More of us will be living in the Hawkesbury/Nepean catchment, a water system that is already struggling with pollution and nutrient run-off from human settlement.

But the crisis in water is not just about what we'll drink or how we'll manage sewerage or storm water flooding. We need to take a wider view of water and its place in the cityscape because there is also a creeping crisis in our urban environment and this is affecting all of us. Our city is suffering from a growing heat island effect as urbanisation and its inherent roofing and paving, engulfs the Sydney basin. This extra heat is not only uncomfortable, in many cases it's lethal. Furthermore, our attempts to control and regulate water has seen our natural rivulets and streams being covered over and historic water courses diverted. Our native habitats, all of which rely on access to surface water, are being endangered. We know there is a crisis coming, can we talk about it?

The Committee has produced this paper to prompt a discussion about the future of water. To challenge our city, all of us, to think about water in its various manifestations and uses and ask if our current polices, and approaches are the right ones. To ask what, if anything, we should be doing now, while we're not in a crisis, in order to reduce the burden on future Sydneysiders. But before we can look at some of these issues in detail, it's worth looking at the history of water in Sydney. The way water has challenged us in the past.

OF DROUGHTS AND FLOODING RAINS

A CITY SHAPED BY WATER

Sydney is where it is today because of a small, but remarkable, little stream known unimaginably as the Tank Stream[1]. This stream, fed by a spring at what is now Hyde Park, provided the early settlers with a surprisingly consistent supply of water. Even during the devastating drought of 1788–89, this stream kept Governor Phillip and his motley crew from dying of thirst. So fecund was this seemingly endless supply of water, (it still flows today) the colony of hundreds, and then thousands were well watered for decades.

What finally undid the Tank Stream wasn't a lack of water, but pollution. As the colony grew up around its banks the lack of proper planning or pollution controls meant the stream became fetid and eventually undrinkable. The babbling brook that supplied the colony for its first few decades became a sewer, and Sydney entered its first water driven crisis.

The water policy solution that the colony settled on would set the pattern for resolving every subsequent water crisis Sydney faced for the next two and a half centuries. And, it was very simple; we would use our engineering prowess to bring water from afar. In 1825, John Busby, an engineer, came up with a suggestion to drill a 3.6 km bore to link the Lachlan Swamps (now Centennial Park) to Hyde Park to provide the city with fresh water. This engineering feat provided Sydney's colony with a fresh supply of drinkable water for another generation. In 1858 Busby's bore was extended to the Botany swamps and remained the principle source of water until 1896. Engineering would be set as our principal policy framework. The Tank Stream, now undrinkable, became the colony's official sewer; a means to transport our effluent out into the harbour.

But the water crises kept coming. With each generation the city outgrew or contaminated each successive new source of water. In the drought of 1861 the eastern suburbs wetlands ran dry and the colonial government established a royal commission into Sydney's water crisis. Sydney's growth was putting too much pressure on our valuable water reservoirs, but worse, the lack of adequate sanitation and sewerage was leading to an unacceptable disease burden. The result of the Royal Commission was the establishment of the Board of Water Supply and Sewerage in 1888 (a precursor to today's Sydney Water), to plan and implement a metropolitan wide water plan. This was essentially an engineering body and their principal policy response to each subsequent water crisis was an engineering solution. Wave after wave of heroic engineering and construction programs ensued. In the late 1800s a new dam was built on the Upper Nepean and a reservoir built at Prospect. From 1907-1941 we saw the Cataract, Avon, Cordeaux,

1 The Tank Stream was named because Governor Phillip ordered 'tanks' to be carved into the stream floor so that even in dry times, water could be sourced.

Nepean and Woronora Rivers dammed. Yet these massive projects didn't prevent the rolling water crisis affecting our city. The catastrophic drought of 1934-42 nearly crippled the city, which was also being wracked by the Great Depression. Water levels fell to their lowest level ever, just 12%. Sydney embarked on its biggest engineering feat yet, the Warragamba Dam, flooding the river valleys of the Blue Mountains. Sydney's water catchment now extended beyond the Southern Highlands and to headwaters close to Canberra. Even with this enormous reservoir (2,000,000 million litres or 5 Sydney Harbours) Sydney would continue to lurch from crisis to crisis. In 1977, the Shoalhaven Dam was completed. Then, following the millennial drought, one of the largest desalination plants in the southern hemisphere was commissioned. And, then it rained.

GIRT BY SEA

If there has been a rolling crisis in water supply, there has also been a series of crises with water pollution. Starting with the Tank Stream, Sydney and Sydneysiders have progressively polluted our urban waterways. In quick succession, the polluting of the Tank Stream was followed by Shea's Creek (Alexandria Canal) and the Cooks River, still the two most polluted waterways in Australia. One by one, every major waterway, including our beautiful harbour, became a dumping ground for effluent and other pollution for decades. As each waterway became so polluted as to damage our health or affect our amenity, we came up with ever greater engineering feats to move the pollution further away from us. Sewers which flowed into the Harbour and Botany Bay, were piped to the coast to be dumped off our beaches. In the 1980s and 90s, when repeated fecal blooms closed Sydney's beaches, deep water outfalls were built pumping Sydney's effluent out of sight. Today 80% of Sydney's waste water is dumped, after minimal treatment, into the ocean. We'd dump 100% if some of us didn't live so far inland. It's questionable whether dumping only minimally treated sewage in the ocean is really the hallmark of a sustainable Sydney. We are lucky to be girt by sea, but perhaps the sea is not lucky to be next to us.

WATERING SYDNEY: FROM CRISIS TO RESILIENCE

Image courtesy of Sydney Water.

Sydney has also suffered from a third water related crisis. Our urban development has fundamentally altered the natural hydrology of our landscape. We've paved or roofed over a huge portion of the land. Rainwater, unable to sink into the ground, now flows faster and in often unpredictable ways. Stormwater systems today are mostly buried or, if seen, are open canals following the flow lines of once natural stream and creek systems. These concrete channels are a glaring reminder of how we transformed and reinvented our urban landscape unsympathetically to natural processes and amenity. We have built over waterways and in the path of floods, ignoring the safety of both life and property.

The natural creeks, which pre-existed the engineered channels, once provided a source of local water and a means to attenuate storm flows and protect local waterways. Today's channels serve only to protect local property from minor flooding. The rate at which water is channeled and transported during a storm creates challenges for local ecosystems, which have become exposed to pollutants and scouring water flows, stripping soils and other materials from catchments. Moreover, the stormwater channels in the older parts of Sydney do not have the capacity to carry the more intense rainfall events, with flooding of roadways, houses and commercial centres becoming common events. Such intense rainfall events are expected to become more frequent with climate change.

The history of water in Sydney has been one of irreversibly changing or damaging water resources, by polluting them or terraforming them. We've hijacked water from neighbouring regions, some hundreds of kilometres away, into Sydney's 'ownership'. We've crisscrossed our landscape with extensive subterranean sewerage networks and, along with water supplies, introduced a complex interconnected web of nearly 50,000 km of pipes and pump networks, which has defied the boundaries of natural water catchments.

Our relationship with water has been shaped by crisis after crisis, each of which has prompted a large and expensive engineering solution. The Committee thinks we should do better than just crisis management for something so important as water. Great cities don't happen by chance. They happen when we plan. When we put in place policies

that anticipate the potential crises which may befall us. They happen when we are agile, able to adapt to change. When we use our precious resources efficiently. This paper wants to prompt the sort of deep thinking that Sydney will need if we are to be agile, adaptive and efficient. To prompt a more nuanced and considered policy approach to living in a watered city.

With our dams near full and our desalination plant in reserve, it's easy to think that the days of crisis and water insecurity are behind us. But we are wrong to think that we've drought proofed the city. Sadly, nothing is further from the truth.

Sydney is growing, and growing fast. In the next few decades we will nearly double our population. A city of over 8 million people cannot be watered by the existing dams and desalination plant. At least not during an extended drought. Moreover, our sewage treatment systems will be overwhelmed by so many people. Our current pattern of urban growth will continue to overwhelm both landscape and waterscape. As we continue to sprawl further out, as we drop more streams into culverts, and pave grassland and forest, we are dangerously changing our waterscape. Toss into the mix the vagaries of climate change and we have a very uncertain water future. So, what needs to be done?

CHANGING MINDS AND ALTERNATE PERSPECTIVES

The first thing that needs to change is our minds. How we think about water, in all its form and function, affects how we treat it. Much of our problem is that we don't think about water much at all. We might love our harbour and beaches, but beyond that we seem to have a complete disregard to the value of water. This needs to change. We need to recognise that we live not just in a beautiful landscape, but a waterscape. Two and half centuries of urbanisation in Sydney has resulted in a significant degree of community estrangement from our local environments (including its natural waterways and landscape). We take for granted our access to safe water and sanitation. Each household has high quality water to every tap, and a sewerage system that protects public health, our beaches and rivers and all at a very low cost. It's only when the security of water supply is at risk, or visible pollution threatens our health or lifestyle that we become conscious of how essential it is.

Furthermore, we rely on two professional groups to do most of our thinking about water: our public health experts and the hydrologists and engineers of our utilities. These two groups bring the particular policy frameworks of their professions to the issue. That water must be pure to be safe, and contaminated water removed as quickly as possible from people and places. Or, water can be directed and managed, we can pipe it and pump it anywhere and everywhere. Both mindframes lend themselves to engineering solutions. More and bigger dams, wider flood channels, sewage pumped further out to sea. The Committee is not opposed to engineers, nor do we think that public health shouldn't be at the forefront of our thinking. But we do think that there are other ways of thinking about water. We need more eyes on the problem and we need to apply different disciplines and policy frames if we are going to get truly innovative thinking. More importantly, the engineers and health workers who are members of the Committee agree.

Sydney is growing both in size and complexity. There will never be a single silver bullet solution enabling us to address every issue and which provides for a more productive, sustainable and liveable city. But we do know that the answers are not found in simply extending the existing piping system or sourcing water from further afield. Frankly we're running out of neighbouring catchments to rob. They may play a role but so will other things like water recycling, a more competitive environment, and more involvement of the private sector. Addressing the challenges of growth, climate, environment, health and affordability will require these and much more. It's clear that we can't afford to keep doing things the way we have in the past, with us reaching a crisis, ahead of heroic measures to bring it back under control. As our city grows, there's a need to reconnect water management with 'place' much as Indigenous Australians have traditionally done, and to understand and optimise the connection of natural elements to ensure water sustainability and our own wellbeing. We require a shift in mindset, a broader conceptualisation of water to see the opportunities in the challenges presented as we build and redevelop our cities.

Just as building Warragamba led previous generations to become water wasters, believing we have boundless water supply might undo this generation too. We have not drought proofed Sydney.

WATER, WATER, EVERYWHERE... AND SYDNEY'S DESALINATION PLANT

Surprisingly, for a city beset by frequent and recurring water crisis, Sydney didn't have a comprehensive and integrated water strategy until 2004. This Metropolitan Water Plan was the first attempt to quantify the water problems before us and identify policy options to overcome them.

The Metropolitan Water Plan raised the option of both water recycling and desalination plants, but these were quickly dismissed by our politicians and the media. The community, they reasoned, simply wouldn't stomach drinking recycled sewerage and 'desal' was just expensive 'bottled electricity'. But it noted that should things get desperate, these options might need to be reconsidered.

As the millennium drought closed in on the city, they were dusted off. A second Metropolitan Water Plan was adopted in 2006 which suggested recycling should be considered but only in certain circumstances, and not for drinking. And, should water levels drop below 30%, a desalination plant should be built.

In 2007, the Government was re-elected promising to build the plant if water levels reached this critical mark. Plans were put in place and draft contracts signed as the drought deepened and water levels continued to fall from 40% to 35%. As the drought dragged on Sydneysiders' patience began to fray. At such times, there is often a bias for action. To do something, anything, to fix the problem as the consequences of running out are unthinkable. Assuming it was only a matter of time before we hit the critical mark, the government gave the green light to build a desalination plant at Kurnell. The following week the drought broke. By the time the desalination plant was completed, Sydney's water supply was back at safe levels, and the plant was mothballed. Beyond testing that the plant worked, Sydney is yet to use it. Our water levels never dropped below 30%.

One day we might need to use the desal plant. Drought will certainly come again, and water levels may fall. For many it is comforting to know that we have it in reserve. But it didn't come without a cost. Whether we use it or not, we are all still paying for it through a levy on every house and business. This is a drag on our urban productivity and means we are paying for a service we don't need, at least not yet.

The Committee is also worried that having the desal plant in reserve may lead to complacency within governments and our communities. Just as building Warragamba led previous generations to become water wasters, believing we have boundless water supply might undo this generation too. We have not drought proofed Sydney.

CHANGING THE CITYSCAPE, NOT THE WATERSCAPE: URBAN POLICY AND WATER

You'd think that with all the effort we put into planning our metropolis that we'd know how to build a water wise city. Sadly, too often our planners and developers take only a utilitarian approach to managing water. Water is seen as an issue to be managed by a utility, who, for a fee, will eventually connect a new neighbourhood to water and sewerage. If the area can't be serviced it is held back until the utility is ready or the developer or government stumps up for the infrastructure. We view water in much the same way we view footpaths or roads; enabling infrastructure, but nothing more. Fortunately, we are seeing promising signs of change.

Water sensitive urban design is a planning approach which seeks to integrate the water cycle with the built environment (see Figure 1). Done well, it recognises the opportunities and constraints that the urban water cycle presents for the way that the city is planned. It considers the movement of water to define the urban layout and form, land use zoning, and urban design.

Many water sensitive urban design approaches involve natural systems (plants, soil, water bodies) and passive operation (using gravity, infiltration, plant uptake of nutrients etc.). Water provides points of focus and beauty in urban landscapes. Urban design can create natural water bodies as central to the design and layout of urban spaces. In Sydney, we've seen examples of this around Sydney Harbour, for thirty years we've carefully pushed development back from the water's edge opening the foreshore for all to enjoy.

In Parramatta and Liverpool, we see the CBD deliberately reorienting itself to face and embrace the river. We also use man made water features – fountains, water play areas, and ponds – as a point of focus and congregation in urban spaces. Water is also necessary to support green space and should be incorporated into the urban fabric. Water, and greening supported by water, provides amenity, cooling and a sense of calm and wellbeing for urban populations in an increasingly dense city. Water can make us happier, healthier and more productive. We should value it more than we do.

Stormwater running off from our urban areas is contaminated with a range of pollutants, from hydrocarbons and heavy metals, to litter, nutrients, and microorganisms. Water sensitive design seeks to prevent these pollutants degrading our rivers and harbour and mitigate the quantity and strength of flow causing erosion and degradation of river health. It does this by retaining and cleansing urban stormwater through permeable surfaces, rain gardens, stormwater detention tanks, and wetlands. Many of these interventions also provide attractive green features along roads and footpaths, in parks and other open spaces, adding to local amenity and cooling. Dams, water catchments and reservoir sites have historically been places for communities to congregate and picnic. A resurgence in such uses is likely, and desirable to provide our growing population access to recreational and open space.

Figure 1: Example of Water Sensitive Urban Design

WATERING THE GREEN GRID

Our city is crisscrossed with open drainage canals and swales. Once babbling brooks and streams are now stagnant and weed infested. Concrete scars on the urban landscape (see Figure 2). But it need not be like this. We can restore these waterways and turn them from fenced-off eyesores into linear urban parks. We can activate them providing a sequence of accessible paths for pedestrians and cyclists. We can build on the efforts of the Government to create a 'blue-green grid', a network of parks and green space across Sydney and create a network of waterways and streams. Such a program would be expensive, but it would also pay a big dividend for the city, its citizens and our environment. Here's how.

We know that having access to quality open space, places with trees and open, flowing water, can reduce stress and mental illnesses. Moreover, these linear, water parks could also double as pedestrian and cycle paths. Kids could walk along the streams to school, or adults could take a shortcut to catch the bus to work.

Recreating natural habitats would also increase biodiversity, as well as a cooler micro-climate. That would make it an even more attractive place to be in hot months. Encouraging a more natural flow of water through the streams would also reduce nuisance mosquitoes, which thrive in stagnant water.

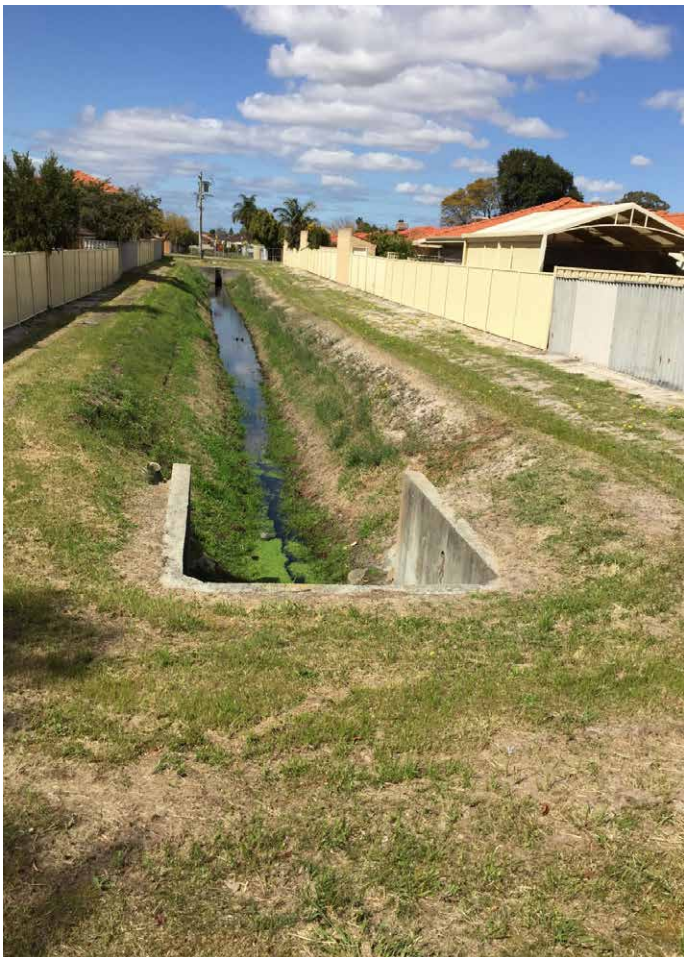
Potentially the most convincing reason for local governments and water utilities to rehabilitate drains is that living streams significantly increase neighbouring property values. Following the restoration of a wetland in the Perth suburb of Lynwood, median home values within 200 metres increased by $17,000 to $26,000 above the trend increase for the area[2]. In Sydney, restoring the natural banks of Cooks River raised nearby property values by between 4% and 9% above trend[3].

As Sydney gets denser, better connected, quality open space becomes more and more important. It might be expensive, but if it makes us healthier, happier and wealthier then it's a worthwhile investment.

Water and vegetation in urban environments creates cooling through shading, evaporation, and evapotranspiration from plants. This is important with climate change heating our planet. We need to counteract urban heat emanating from buildings and roads, especially as the urban sprawl moves more of us into hotter areas, distant from coastal cooling.

In short, we need to think about water differently. Our current practice of fragmenting water planning into the silos of water, sewerage, stormwater and recycled water needs to change. We need to think beyond these practices and build a new paradigm – a new integrated planning and water perspective.

Figure 2: A Suburban Drain



2 CRC for Water Sensitive Cities. 2015. The Value of Restoring Urban Drains to Living Streams.
3 Unpublished data supplied to the Committee for Sydney by Sydney Water.

Image courtesy of Zoe Meyers, Australian Urban Design Research Centre.

From hot-house to green-house: Change is coming

Our climate is changing and we are causing it. Our leading scientists are certain that our actions are changing the weather. What they can't be certain about is how this change will affect us and our waterscape, but they've had a good guess, and the news is not good.

They tell us that Sydney will be much hotter and drier than today, or anything we've experienced in the past. This will lead to increased evaporation, heat waves, extreme winds and fire risk.[4] They tell us that we will have less rainfall, but when it does rain it will be heavier and more extreme.

That we will have less water in our streams and catchments areas, but more frequent and larger floods.

We shouldn't let our current situation of water wealth lead us to complacency. The experts are telling us we are in for a rough time, and that our waterscape is in for an even tougher time. Now is the time to act.

4 CSIRO. 2007. Climate Change in the Sydney Metropolitan Catchments. Page 5.

DENSITY DONE WELL: ENTER THE PLANNERS

Perhaps the most important role planning can play is in ensuring we have more and better designed, higher density neighbourhoods. The Committee has been a champion for increasing our urban density in a smarter, more considered way than currently occurs. There are many reasons why increasing our urban density is good for us, but first among them is water. For most of the past century, Sydney has adopted urban sprawl as its principle settlement pattern. We've planned a seemingly endless series of suburbs with densities at less than 14 homes per hectare. This land hungry policy is also water hungry. As we've sprawled, we've paved over rivulets and streams, cleared paddock and forest alike. We've paved, curbed and gutted our neighbourhoods, turned creeks into swales and canals, drained wetlands. We've laid thousands of kilometres of pipes and sewers. This has not only had a dramatic impact on our water resources, it's also expensive. In most cases it's far cheaper and easier to provide water and sewerage to infill development than it is to greenfield developments on the urban fringe. For Sydney Water, the cost of providing water and sewerage in infill development ranges from $4,000 to $20,000 per household. For greenfield development, the cost is more than double, ranging from $30,000 to $40,000 per household.

Increasing our urban density (and doing it well), is one of the easiest and best ways we can protect our waterscape and our wallets. Removing the relentless pressure of urban expansion across the landscape and waterscape will continue to be a top priority for the Committee. We hope it will be a top priority for everyone in Sydney.

CLOSING THE LOOP: REUSE, RECYCLE, CONSERVE

If we change the way we think about water, if we value it for all the things it can do for us, then maybe we'll stop wasting it. Even during our most desperate droughts, we've allowed billions of litres to wash out to sea. Our dam levels have come close to rock bottom, but we've still let rainwater wash off our roof or our sewer systems to discharge into the ocean. Cities around the world are reassessing their wastewater and stormwater and looking at ways it can be recycled or reused to water gardens and parks. Many are moving from a lineal system where water is harvested, treated, consumed and then flushed, to a more closed system, where water is reused, to flush toilets, water gardens, and clean streets. Many of them are now drinking treated waste water. Perhaps we should too.

So good you could bottle it

The biggest barrier to recycling more of our wastewater comes not from cost, or because it's particularly hard, but from the 'yuk' factor. People just don't like the thought of drinking something that's been drunk before. While understandable, this attitude is wrong. Properly treated waste water is as pure as desalinated water. Indeed, many parts of Australia already rely on recycled water for their everyday livelihood. In the Goulburn Valley, wastewater is recycled and returned to the Goulburn River where it is eventually drunk by cities and towns downstream. In Perth, waste water is cleaned and then used to recharge the city's aquafers and then drunk. The Perth community accepted this after a prolonged period of discussion, and after a sensible debate from political leaders.

We should discuss recycling more water in Sydney. One day the rest of the world might call us to account for the minimally treated wastewater we are dumping in the Pacific Ocean. Few cities in the world still do this. Moreover, the water crisis is coming. We will probably need to change our minds, and sooner than most of us think. Let's talk about it.

Again, there are some signs that our attitudes are changing. While 80% of Sydney's waste water is pushed out to sea, 20% of it must be treated on shore because it is too far, and too expensive, to pump to the deep-water outfalls. This water is cleaned, and valuable nutrients are extracted and used as fertilizer. This, now clean water, is being used to restore environmental flows in streams and rivers in Western Sydney. It's being used to flush toilets and water gardens and parks. While the principal driver of this change was the insurmountable cost of pumping the sewage so far east (and the unacceptable dumping of raw sewage in the Hawkesbury and Nepean Rivers), the outcome is a greener, cooler and more sustainable Western Sydney. Recycling and recovery of water should become the default system for all new developments. The old thinking that we can take water from distant catchments, foul it, and then dump it at sea must end. We can close the loop and we should.

From water-hungry brewery to an urban oasis: Sydney's Central Park

When Fosters announced it was ending nearly two centuries of brewing in central Sydney, one of the reasons it cited was the lack of affordable water for its operations. Brewing is a water intensive industry, with water used in almost every step of its production, and only a small portion of it ending up being drunk. As Sydney Water slowly moved to more realistic water charging, Fosters decided to leave town. They left behind six hectares of prime Sydney real estate, right on the edge of the CBD.

The developer, keen to innovate, and supported by a local council committed to sustainable development, tried something new. Together they set out to develop a high density neighbourhood, with homes and businesses that could generate, as far as possible, their own power and recycle and reuse their own water. The vision was to create a lush and green environment in which thousands could work, rest and play. The result was Central Park.

The final stages of the site are still being finalised but the early numbers tell a compelling story. At full capacity, Central Park saves one million litres of drinking water a day. That's about 150 Olympic swimming pools every year or one Olympic pool every few days. By using recycled water, Central Park residents save 120 litres of water a day.

By covering the buildings with a green and growing garden they are helping support a native ecosystem, in the heart of our bustling city. But most importantly, by using recycled water the developer has improved the resilience of the community against a changing climate, especially the heat island effect. This is because local recycled water enables cheap greening and water features. When compared to an un-vegetated public domain, a well-managed, lush tree canopy can reduce land surface temperature by up to 15 degrees on a 35-degree day.

The Committee sees Central Park as a model that other, high density precincts should follow.

Image courtesy of Flow Systems.

Image courtesy of Sydney Water.

GOVERNANCE AND THE WATERSCAPE

How we manage water in Sydney and who's responsible for water policy is complex and spread across several agencies and different tiers of Government. The number of agencies who have a role in water management and policy is long and includes;

- Sydney Water;
- NSW Department of Environment and Planning;
- Office of Environment and Heritage;
- NSW Environment Protection Authority (EPA);
- Greater Sydney Commission;
- WaterNSW;
- Local Councils;
- Independent Pricing and Regulatory Tribunal (IPART); and,
- Numerous commonwealth agencies.

This list is by no means exhaustive. Toss in a growing number of private sector water providers and infrastructure companies, and it is no wonder there is a blurring of who is responsible for what.

It's also not surprising that water policy, and water services, are increasingly contested areas. We have large utilities running huge pieces of infrastructure, like Sydney Water, and smaller utilities seeking to challenge their market dominance. Both private and public organisations often function as monopolies so IPART are watching and regulating. Government too seems to be tripping over itself with water management and land-use management more often in conflict than harmony. We still have people being moved into floodplains, proposals to raise the heights of dams and flood world heritage areas, and sewage treatment plants proliferating across the landscape.

The Committee does not take a view on a preferred governance structure for managing Sydney's waterscape. But we do ask whether the structures we have are going to serve our city and citizens in the water crisis to come. Can we talk about it?

THE RISE OF A WATER WISE SYDNEYSIDER

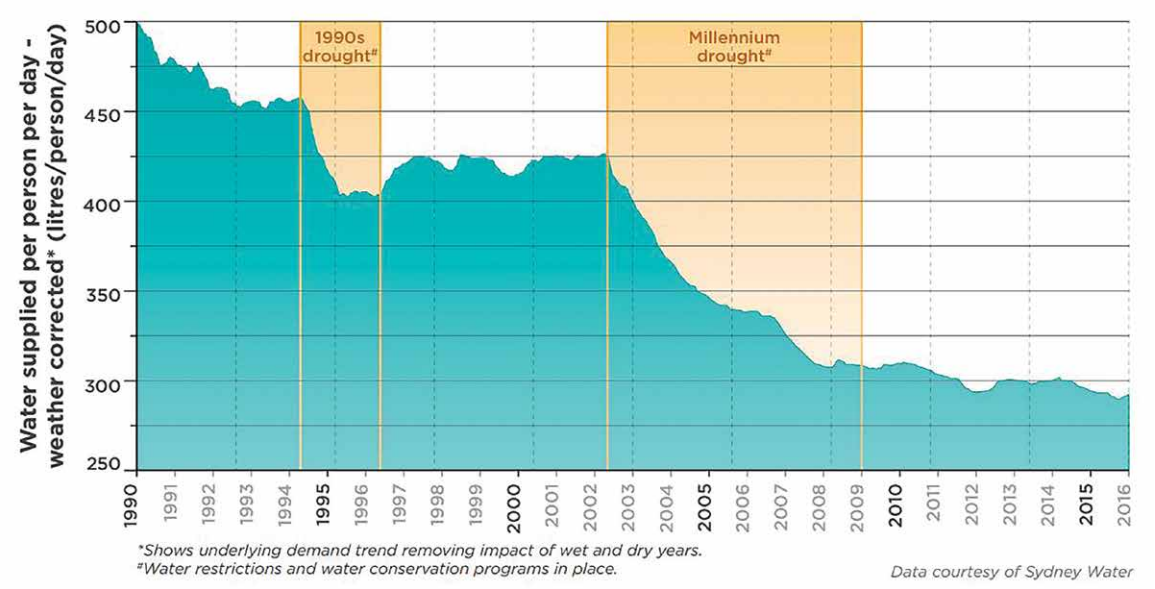
Perhaps the biggest change we can affect is to foster a water conscious culture. One that values and conserves water. One that sees through the built environment and urban landscape and sees and appreciates our city's waterscape. It is in this area that the Committee is most optimistic because this is just what we are starting to achieve.

After the Second World War, Sydneysiders seem to have succumbed to a form of collective amnesia. Keen to forget the horrors of conflict and the lost decade of the Great Depression, we also forgot the great 1930s drought. We forgot the water restrictions, the shuttered tanneries, the starving livestock. The post war generations were lucky that the dams built by previous generations filled with flooding rains. Furthermore, the building of the mighty Warragamba Dam in 1960 gave them a seemingly endless supply of water – water they set about wasting. By 1970, Sydneysiders were profligate water wasters.

Image courtesy of Sydney Water.

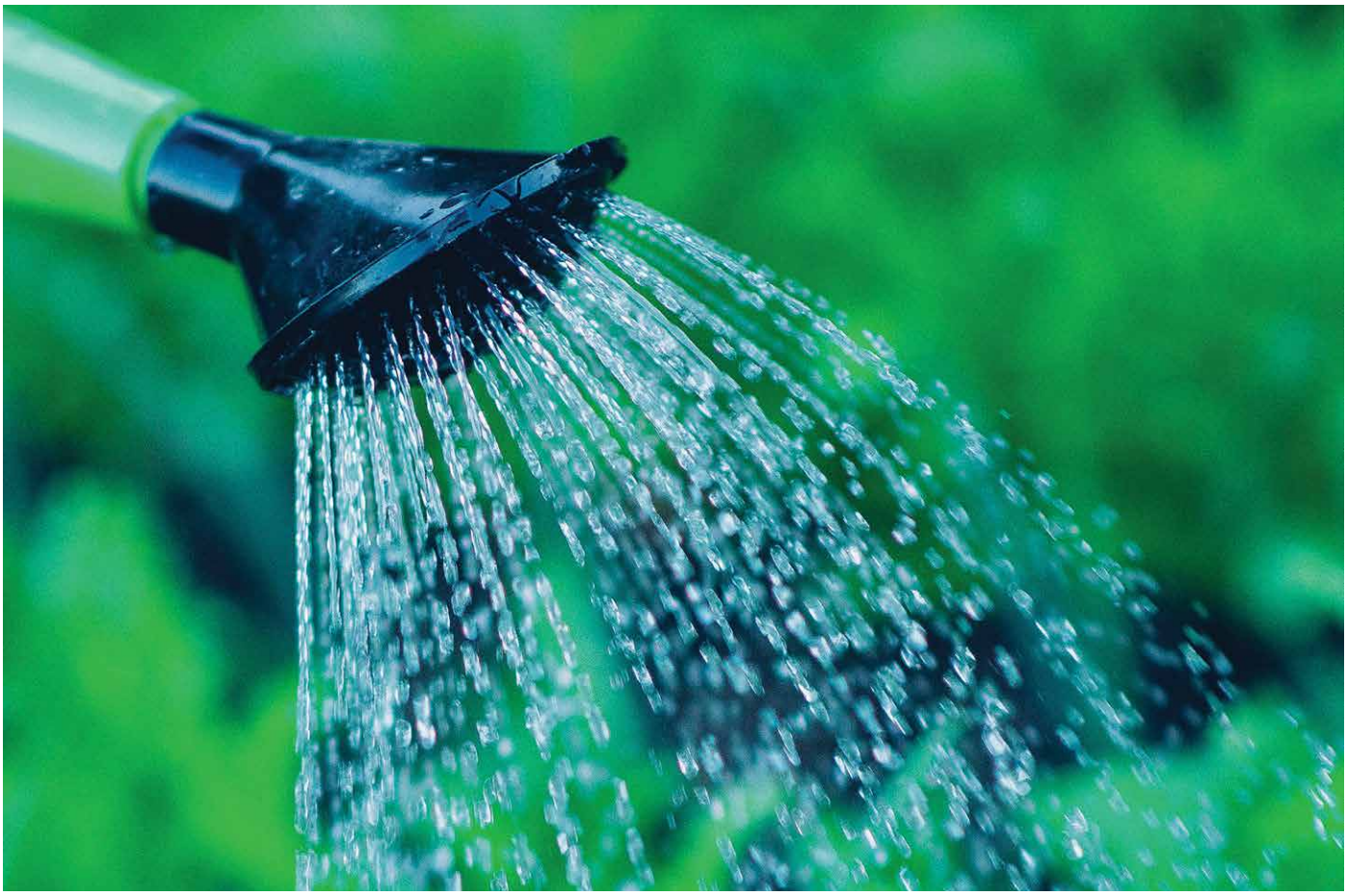
The millennial drought changed this. Shocked at the browning of our landscape, being told how long to shower and being fined for washing a car, Sydneysiders began to change their water wasting ways. Across the city, businesses and households began to look at the ways they could conserve our scarce water resources. Dripping taps were repaired, rain water tanks installed, dual-flush and waterless toilets became de jour. In the space of a few short years, millions of people made millions of tiny interventions in their lives to save water. Governments responded too. Councils found new, more sustainable ways to water parklands and golf courses, harvesting waste water and drilling new bores. We started washing our streets with recycled water. Sydney Water embarked on a system wide effort to repair leaking water pipes. IPART put a more meaningful price on water to encourage more efficient use. When the drought ended in 2009, Sydneysiders were now using less water than they had in 1970, despite almost doubling in population. In just a few short years we went from water wastrels to water wise. The good news is that this effort hasn't abated, at least not yet. Since the drought, we've continued to reduce the amount of water we each use, each and every year. Our dams are full now, not just because we've had some rain. Our dams are full because we've curbed our water wasting ways.

Figure 3: Historical water use in Sydney



Source: Metropolitan Water, 2017 Metropolitan Water Plan, page 17.

This water valuing culture is also making us richer. By saving water and using it more responsibly, we've been able to defer some of the big and expensive capital works programmes like raising the height of Warragamba Dam. Our desalination plant has been mothballed for several years now, reducing pressure on our stretched electricity grid. We've not needed to pump water from the Shoalhaven. We should remind both government and Sydneysiders alike that the cheapest dam is the one we never have to build.



CONCLUSION

LET'S HAVE A CIVIC DEBATE – AND PREPARE FOR AN 'UN-RAINY DAY'

Sydney, through the Greater Sydney Commission's emerging Metro Plan, is currently debating its future. It is working through the complex issues of a growing city. How will it house its people, keep them employed, and connect them, both to each other and to the world? In thinking about the city's future, the Committee, as ever, is also keen to learn from Sydney's past. The existential water crisis which threatened the early colony, which exacerbated the Great Depression, and which drove consecutive generations of Sydneysiders to the herculean construction of dams and desalination plants, all have lessons for us today. In debating the future of our metropolis, we should remember the key element that makes our city both beautiful and liveable: water.

This paper is an attempt to prompt a debate, and then, hopefully some action. We are seeking a debate because there is always a danger of complacency about water – a danger that Sydneysiders will forget previous experience and the lesson that we need to plan properly for what might be called an 'un-rainy day'. While our dams are near full this attitude is understandable, but it is also fraught with risk. All the experts, from climate scientists, public health professionals, environmentalists to demographers, are telling us that while the demand for water will certainly grow as the city grows, the supply is less certain. Though we seem to be in a period of plenty, we can move quickly into a dry season and towards another water crisis. It's just a matter of time. So we should talk about it, plan for it, and take action now, before it's too late. Crisis management is no way to run a city. Not a smart one anyway.

INTEGRATE WATER PLANNING IN CITY PLANNING, BUILDING ON THE WORK OF SYDNEY WATER AND THE GREATER SYDNEY COMMISSION

The emerging Greater Sydney Commission metropolitan strategy, *A Metropolis of Three Cities*, is thus timely and important. This is a detailed, metropolitan wide, plan for managing growth in Sydney. Most importantly, it is a plan that has been made with water, and all its attributes and values in mind, both at a spatial level within Sydney and at a more strategic level in terms of the urban form of Sydney.

Nowhere is this better demonstrated than in the GSC plan for the Western Parkland City. This new city, west of the M7, will soon be home to over one and a half million people, the vast majority of whom will live in the catchment of a relatively unknown waterway called South Creek. South Creek flows through the flattest, hottest and driest part of Sydney. In planning for this new city, the Commission is seeking to make South Creek the centerpiece of a new urban environment. It plans to promote better density along it, and its tributaries and banks. To line it with trees and parklands, and link it with bicycle paths and bridges so all can access the water. They see South Creek as the basis for making the Western Parkland City cool, green and attractive. How? By retaining more water in the landscape and integrating waterways into the urban design of new neighbourhoods. The plan sees water as not an obstacle to be overcome, to be dammed or channeled, but an asset to be treated respectfully. The plan is to treat South Creek better than we treated the Tank Stream. It's not going to become a sewer. The plan also is about enabling higher density development and thus an urban form which is far more efficient from a water servicing and management point of view than a low density suburban form, or sprawl.

AVOIDING PARTISANSHIP – AND ENGAGING THE COMMUNITY IN A SHARED FUTURE

In debating the future of water, we should also be mindful to avoid the partisanship and politicking which has unnecessarily complicated and clouded the issues in the past. Drinking recycled water may or may not be in Sydney's future, but we should discuss it nonetheless. Calmly and politely. If we are going to plan properly, every option should be on the table. We also should avoid the temptation to seek short-term political mileage through scaremongering. Again, our history can teach us some lessons here.

Historically, the first two metropolitan water strategies for Sydney both canvassed water recycling as a future possibility, only to have politicians, from both sides, immediately shout down debate, falling over themselves to rule out the possibility. Compare that to the way Perth discussed the issue. Over a decade of careful and reasoned debate, combined with a bi-partisan approach from their politicians, the Perth citizenry slowly came to accept that drinking recycled water was both safe and reliable. The community came to a consensus that then allowed the politicians to act.

The Committee is not calling for Sydney to start drinking recycled sewage; on this we don't have a view. What we are calling for is a better civic dialogue. That dialogue must be non-partisan, bringing together all parties across public, private and not for profit sectors – as there are innovators in this space in all of these – and more deeply than ever before, with the communities of Sydney, to discuss all these issues maturely, on evidence, so we can then start to plan comprehensively. We need to take steps to ensure our future is not one of crisis, but one of resilience. The Committee has produced this paper to prompt this vital discussion, so Sydney can ensure that with water provision and planning that as with other key elements of a successful city for all, as we grow bigger, we get better still.

The Committee for Sydney

"I commend the Committee on the role they are playing in intellectual thought leadership for Sydney."

THE HON. GLADYS BEREJIKLIAN MP
PREMIER OF NSW

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