

# Blue-green stormwater management in NSW: Examination of challenges and pathways forward



White Paper Version 1, 2022

A *franc.sydney* Action Coalition  
Initiative funded by Stormwater NSW



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### Thankyous.

We would like to thank the *franc* Partners for their support and belief in the *franc* concept. We would also like to thank the myriad of practitioners, researchers and advocates who attended the *franc.sydney 2022* Conference and associated workshops that enabled us to collect and collate the data that is presented herein. Special thanks go to the panellists of the *franc.sydney 2022* conference *What will it take to make urban stormwater truly Blue/Green* plenary session: Prof. Martina Doblin (facilitator); Dr Briitta Denise Hardesty, Dr William Glamore, Keysha Milenkovic, and Tony Weber.

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We'd also like to thank Chris Grey of GEMS Environmental for your advice and support in organising the first Action Coalition workshop.

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# Acknowledgement of Country

*Stormwater NSW recognises and acknowledges the unique relationship, stewardship of, and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia practising the oldest living culture on earth. We pay our respects to their cultures, Country and Elders past and present.*

## Partners

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## Disclaimer

This paper is the first of a series of publications<sup>1</sup> that captures the collective perspectives of those involved in, or affected by current urban stormwater management in NSW. It is not an end in-and-of itself, but rather a mechanism for advancing the discourse to inform actions towards improving stormwater management.

As such, this paper is up for debate and discussion. Accordingly, we encourage anyone reading this paper to provide constructive feedback via [admin@stormwaternsw.asn.au](mailto:admin@stormwaternsw.asn.au) and, if you can, attend and/or contribute to future *franc* conferences. We are particularly interested in hearing from you if you think we've missed an important issue, or if you can demonstrate that any of the issues described herein are not accurate. By contributing in this way, you add to the quality and coverage of the content and, therefore, help us all to progress better stormwater management practice in the interests of the state of NSW.

### Purpose of this Paper

The purpose of this paper is to support the *franc* initiative by providing a written record of the collective perspectives of 'the *franc* community', where the *franc* community refers to individuals and entities that are involved in urban stormwater management, or have a stake in how urban stormwater management is undertaken in NSW. While this necessarily includes stormwater engineers and planners within the public and private sectors, it also includes people such as practitioners and researchers across a much wider spectrum. This includes developers, urban planners, ecologists, waterway managers, sustainable development and environmental managers, researchers, and, importantly, advocates and practitioners concerned about community health and wellbeing.

To support the *franc* initiative, this paper has the following objectives:

- Inform the collective effort to improve urban stormwater management within the broader contexts of urban liveability, waterway protection, and climate change adaptation.
- Provide pathways to resilient, sustainable and nature-friendly urban stormwater management in NSW, whilst making optimal use of the existing pit-and-pipe systems.
- Tie together past *franc* conferences and other events with future conferences and events, enriching each new event and the outcomes of the *franc* initiative.
- Develop and evolve a 'collective memory' to draw out and resolve intractable and underlying issues, and to provide a mechanism for reporting back to the *franc* community, government, and the public.
- Provide a basis for formulating strategies and actions.
- The University of NSW
- Provide a unified and authoritative basis for advocacy work towards improving urban stormwater management in NSW.

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<sup>1</sup> Annual iterations will aim to be published within three months of each *franc* conference.



## What is franc?

For centuries, the basic principles underpinning urban stormwater management have changed little, focusing exclusively on the rapid removal of stormwater from developments via pits, pipes and channels in order to protect infrastructure, assets and public safety from flooding. In the past, this conventional approach has been sufficient to meet regulations. However, these approaches were not without negative impacts which have been magnified by rapid and accelerated urban expansion, including the degradation of waterways around the country. Whilst such approaches were heralded as positive progress in the 1980's we now recognise they have also led to the 'greyness' of urban developments, removing natural aesthetics. This removal of greenscapes has also exacerbated the effects of climate change. Climate change brings with it more intense storms, more frequent urban flooding, increased erosion in our waterways, and intensification of urban heat. Each increasing the challenges inherent in stormwater management.

Despite advances in technologies and practices designed to address the above, adoption in NSW has been slow, and there are concerns that this situation will not be rectified due to the complex social and economic challenges and barriers confronting this positive change. Accordingly, at its core, *franc* is about meeting these complex social and economic challenges to redress this slow down, and to seek improved stormwater management in a fair and equitable manner to the benefit of NSW and its community for generations to come.

Pragmatically, the franc initiative seeks to tap into the collective knowledge and perspectives of a wide range of disciplines and stakeholders that, in a myriad of ways, have a stake in or are affected by, urban stormwater management. It is about building a community of individuals and entities who are

passionate about changing the way we manage stormwater in the interests of our community and our waterways, and how better management approaches can help us adapt to climate change. It seeks a future focused, resilient, adaptive and connected future. In short, it is about being *franc*.

### How franc (and this paper) Came to Be

In 2019, the Stormwater NSW Committee recognised that despite advances in technologies and practices, NSW was not adopting new approaches to urban stormwater management at a pace sufficient to address the social, environmental and economic consequences of rapid urban expansion and the compounding effects of climate change. The Committee also recognised that this issue could not be addressed solely by the stormwater industry alone, but instead needed to be understood and addressed within the broader context of urban development, waterway protection and human health.

Based on this recognition, Stormwater NSW took its first tentative steps towards seeking out 'natural allies' that would help broaden the stormwater conversation. Finding its first ally in UNSW's WaterGUM team, two workshops (collectively titled "[The State of WSUD in NSW](#)") took place in July 2020 that sought to understand current challenges and impediments to the implementation of Water Sensitive Urban Design (WSUD) in NSW, with respect to four themes - policy, funding, capacity building and collaboration. These workshops were attended by over 150 people from the government, commercial and research sectors. The findings from this engagement process were collated and summarised into the green paper "[The State of WSUD in NSW](#)"<sup>2</sup>.

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<sup>2</sup> Thomas *et al.* 2021. The State of WSUD in NSW (Green Paper). Stormwater NSW & UNSW WaterGum, Sydney.



During the same year, Stormwater NSW consulted with GEMS Event Management about how to re-imagine the annual Stormwater NSW conference to include a wider audience to broaden the conversation concerning stormwater management. This consultation culminated in the *franc* concept, and the first *franc.sydney* conference held in May 2022. The intent of the *franc* concept and conference was to frame urban stormwater management in the broader context of waterway and marine protection, blue-green infrastructure, human health and climate change adaptation. In this spirit, Stormwater NSW invited new partners (in addition to UNSW), including several catchment groups, the CSIRO and the Sydney Institute of Marine Science (SIMS), and featured the plenary panel session “What Will it Take to Make Urban Stormwater Truly Blue Green”.

This plenary panel session included representatives from the research, local government and consultancy sectors, and was based on advancing the conversation captured by *The State of WSUD in NSW* green paper. The panel session included formal presentations, a discussion between panellists, followed by questions from conference delegates. In addition to the four themes collated in the green paper, this panel session proposed two other important themes - Planning & management deficiencies and Leadership. Key outcomes are presented in the following sections of this paper.

This paper establishes what will be an annual publication, representing an ongoing discourse about progressing sustainable stormwater management approaches in NSW. Annual publications will be released within three months of future *franc.sydney* conferences. The core purpose of each edition of this white paper will be to record the current state of stormwater management, assess the progress of stormwater management since the previous edition, identify key issues and to set out actions to take the next step forward. The collection of papers will also build up a record of the journey of stormwater management over time.

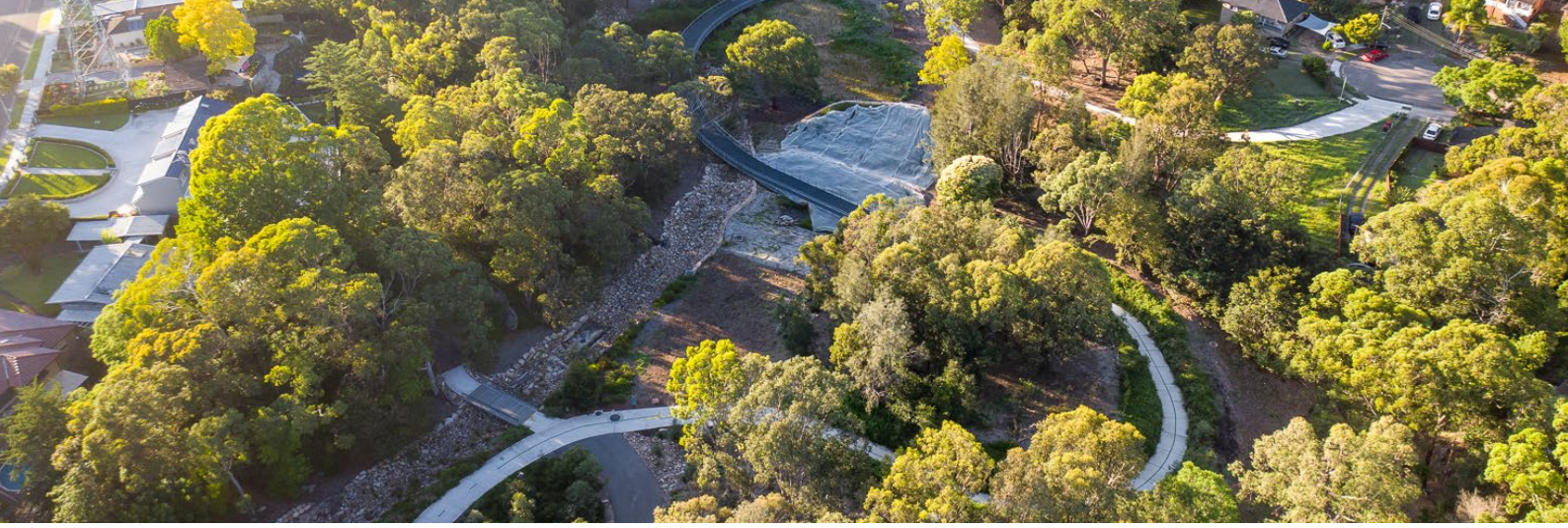
## Authority of this Work

Utilising inductive research methods that borrow from Grounded Theory<sup>3</sup>, this paper contains the distilled perspectives of practitioners, researchers, and advocates that have expertise in, or concerns about, how we manage urban stormwater within the broader context of human urban development, urban waterway protection, and climate change. Consequently, these perspectives represent the collective technical authority of private, public and research sector practitioners, as well as the perspectives of the broader NSW community. As such, this paper represents the most comprehensive and accurate representation of the current status of urban stormwater management in NSW, and what is needed to begin to meet the challenges ahead.

## Findings of this paper

In NSW, policies, legal instruments, and their implementation, rarely facilitates management of urban stormwater addressing the entire catchment. The policy and legal frame exists to make this possible but there is not yet a collective groundswell of community pushing in this direction. Nor does the policy and legal framework effectively address broader issues like stormwater management within the broader context of urban planning, human health and waterway protection. This is despite the scientific evidence that managing urban stormwater holistically - in terms of both the urban water cycle and the socio-environmental factors - will reap significant benefits. For example strategy and policy documents from NSW Health identify that green and blue spaces in the urban environment are essential to human health, as do those of the Government Architect and NSW Planning. However, competing objectives like the provision of affordable housing draw resources away from the implementation of blue green infrastructure.

<sup>3</sup> Glaser, B.G. and A. Strauss (2006). *The Discover of Grounded Theory: Strategies for Qualitative Research*. London, Transaction Publishers.



Unlike other jurisdictions, NSW's implementation of policy into regional and local planning instruments exhibit variable approaches and levels of commitment; and strikingly, legal instruments do not all align with the science underpinning catchment management. This shortcoming is also evident in the disjointed ways various stakeholders work on this issue, across the public, private and research sectors. As a consequence, the integration of concepts such as Water Sensitive Urban Design (WSUD), Integrated Water Management (IWM) and blue-green infrastructure into urban planning are fragmented and poorly managed. Despite the advancement of scientific insight and implementable solutions, improvements have been slow and sporadic<sup>4</sup> since the CRC for Water Sensitive Cities published their findings in 2015<sup>5</sup>. Although grappling with a financial inability to maintain existing stormwater infrastructure, and being constrained by the lack of explicit direction from the state, many councils are working towards refining Local Environment Plans (LEPs) and Development Control Plans (DCPs), a process that can take the better part of a decade. The slow progress increases the risk that NSW and its community will be adversely affected by worsening floods, water security issues, and the social and economic costs of poor urban development that will likely carry through into the next century.

Further chapters closely explain a range of issues and potential ways forward, highlighted by the *franc* community.

## Central Themes and Issues

### Policy Issues

**No over-arching state-wide commitment to sustainable integrated urban water management:** NSW currently has no single state-wide legal instrument or policy commitment that specifically focuses on directing and guiding the transition to more sustainable stormwater management practices that account for improved liveability within the context of climate change, extreme weather events and sustainable development.

This is reflected in the widely varying commitments to WSUD or similar stormwater management philosophies (e.g., Blacktown City Council Development Control Plans are far more advanced in this space than almost any other in the state). Where legal powers do exist (e.g. s.20 POEO Act - pollution of waters) there is either an unwillingness to utilise the powers or inconsistent application of the available powers. The lack of commitment is also reflected in current NSW legislative instruments. For example, while there is legislation for coastal zones and marine parks, there is no legislation for urban catchments despite coastal zones and marine parks being directly affected by urban catchments.

**Fragmented policy:** Stormwater management and urban waterway protection related policy is distributed across numerous state and local government related planning and regulative instruments. While this complexity is, in part, due to the many disciplines and areas of planning that stormwater management incorporates, the absence of overarching direction exacerbates the problem. At state and local levels, this creates confusion, increases the risk of errors of omission in application and leads to inefficiencies for planning authorities and developers alike due to the highly variable requirements between and even within local government areas.

<sup>4</sup> Kuller, M., et al. (2021). "Are we planning blue-green infrastructure opportunistically or strategically? Insights from Sydney, Australia." Blue-Green Systems.

<sup>5</sup> Choi, L, McIlrath, B., and Williams, D. (2015). Policy Framework for WSUD in Five Australian Cities. Clayton, Victoria. CRC for Water Sensitive Cities.





**Weak policy and impotent regulatory instruments:** While policy documents such as the Greater Sydney Regional Plan and Greater Sydney Water Strategy express strong aspirational intent to incorporate WSUD into urban planning, neither they nor the legislative instruments underpinning them introduce an obligation to do so. Use of language such as “must consider” and “may make a planning instrument” allow planning authorities and developers to avoid much of the aspirational content which is fundamental to achieving other important public and environmental health outcomes<sup>6</sup>. It is important to acknowledge that inclusion in these policy documents is a pivotal step towards tighter regulatory controls.

**Lack of incentives:** Incentive programs have and are being used in Australia to encourage sustainable practices (e.g., Blue Carbon Method<sup>7</sup>). Such methods have proved effective where market systems have proven inadequate. However, current NSW government policy includes little to no incentives to encourage the incorporation of WSUD and blue-green infrastructure elements into existing or new development. Further, in some cases, the state government discourages the incorporation of such elements. Examples include unrealistic expectations on the capacity of developers to incorporate a range of community infrastructure (not just blue-green elements) that exceed their financial capacity to do so, and the failure to develop equitable Land Valuation Contribution Models to prevent winners’ scenarios between developers (i.e., situations where one developer’s infrastructure delivery burden is much higher than another’s).

**Policy opportunities:** Opportunities exist in the consolidation and strengthening of existing policies and legislation that articulate NSW’s intentions, objectives, and institutional arrangements to meet the challenges of population growth, increased urbanisation, and climate change.

This could be achieved via a review of current policies and institutional arrangements, as has happened recently in Victoria<sup>8</sup>. Furthermore, speeding up the adoption process of the best management practices through adaptive policy management presents a valuable opportunity for NSW. Examples of such practice are already present in Victoria, where established assessment tools are used to quantify the change in capacity and identify individual needs for councils in their journey towards sustainable urban water management. This helps to guide policy through the transition processes, building better, more sustainable cities.

## Funding Priorities

**No funding programs dedicated to transitioning urban water management practices:** Unlike other jurisdictions (e.g., Victoria), NSW has no funding programs that specifically aim to improve urban water management practices, whether they be capacity building, research and development, or planning. There are indirect options, such as the Coastal Management Program funding, for urban catchments that directly affect the health of coastal estuaries. This highlights the lack of connectivity between policy, funding and outcomes as poor inland management will still ultimately have consequences for downstream waterway health. While dedicated programs have existed in the past<sup>9</sup>, these have been ad-hoc and short-lived with no linkage to a long-term commitment towards transitioning to more sustainable practices.

<sup>6</sup> This is evident in high variability in requirements across local government areas, and recent developments in Western Sydney that bear little resemblance to the aspirational intent of the Greater Sydney Regional Plan (e.g., Ludhiana Glade, Schofields).

<sup>7</sup> Clean Energy Regulator. (2022). 2022 Blue Carbon Method under the Emissions Reduction Fund. Australian Government: <http://www.cleanenergyregulator.gov.au/About/Pages/News%20and%20updates/NewsItem.aspx?ListId=19b4e-fbb-6f5d-4637-94c4-121c1f96f6cfe&ItemId=1043#:~:text=A%20blue%20carbon%20project%20achieves,earns%20Australian%20carbon%20credit%20units>.

<sup>8</sup> Melbourne Urban Stormwater Institutional Arrangements Review (MUSIA). <https://www.water.vic.gov.au/liveable/stormwater-review>

<sup>9</sup> E.g.: Stormwater Management Plans, Section 12 directive, Protection of the Environment Administrative Act 1991



**Inadequate funding mechanism for the ongoing operation and management of WSUD infrastructure:** NSW does not have a properly costed state-wide mechanism for collecting revenue to manage urban stormwater, whether it be for conventional or WSUD type systems. This acts as a deterrent to local councils' adopting sustainable systems and impedes the proper operation of existing infrastructure. While NSW has a Stormwater Service Charge<sup>10</sup> that local councils may adopt, this charge has never been subject to appropriate financial assessment and is well below rates applied in other states and those able to be applied by Sydney Water to its systems. Further, as each year passes, this charge reduces in value in real terms as it has not been pegged to CPI or any other mechanism since its introduction in 2006. Councils can forgo the charge and opt to seek a rate increase to manage stormwater, however this is not often sought as few councils have dedicated stormwater management teams. Because stormwater infrastructure is largely underground, issues are not in the public view. Unsurprisingly, funding more often goes to issues like potholes in roads where they are both visible and affecting road users daily. Consequently, most stormwater infrastructure in NSW suffers from insufficient maintenance, particularly where WSUD type systems are concerned.

**Wide scope of, and transparency issues with, the application of the Stormwater Management Service Charge<sup>10</sup>:** The sheer variety of stormwater management activities that can be funded by the Stormwater Management Service Charge grossly outweighs the amount of money the charge can raise. The charge is not exclusively concerned with progressing sustainable stormwater management as it also needs to fund the operation and maintenance of existing, often conventional, systems, with more limited public and environmental benefit. Even if it was exclusively focused on progressing sustainable management, it would still fall woefully short. Not all councils that have implemented this non-compulsory service charge are using it to fund the adoption and operation of WSUD type systems, as they don't have sufficient funds to adequately manage the 'pit and pipe' network they already have responsibility for.

Further, due to a lack of regulatory oversight, it is unclear if all revenue collected via the Stormwater Management Service Charge is being spent in accordance with the Stormwater Management Service Charge Guidelines.

**WSUD funding is short-term and opportunistic, lacking any long-term strategic planning to optimize benefits:** This issue appears to have two causes. The first is that, unlike Victoria,<sup>11</sup> NSW has no whole of state long-term funding mechanism for driving sustainable stormwater management practices or protecting its urban waterways. Consequently, accessing funds to this end is ad-hoc, being spread across multiple grant programs, and lacking any cohesive state-wide, or even catchment wide, objective. This often results in programs and infrastructure that are likewise poorly conceived or quickly fall by the wayside when funding dries up. The second is a function of the inherent limitations of funding within most local councils. The implementation of WSUD is usually attached to other major council works, such as road and curb improvements, park management, or brown/green-field developments<sup>12</sup>. Consequently, WSUD is often incorporated as an afterthought (if at all) rather than strategically at the catchment scale. Compounding this is NSW local councils' boundaries rarely aligning with natural water catchments, with multiple councils often occurring within a single watershed, or part thereof. As a result, catchment scale planning is extremely rare in NSW, increasing the risk of wasteful, poorly targeted funding.

<sup>10</sup> This is evident in high variability in requirements across local government areas, and recent developments in Western Sydney that bear little resemblance to the aspirational intent of the Greater Sydney Regional Plan (e.g., Ladhiana Glade, Schofields).

<sup>11</sup> Melbourne Water. (2022). Liveable Communities, Liveable Waterways Program. Melbourne. Accessed 19 November 2022: <https://www.melbournewater.com.au/water-data-and-education/get-involved/apply-funding/LCLW-program>

<sup>12</sup> Kuller, M., Reid, D.J., Prodanovic, V. (2021) Are we planning blue-green infrastructure opportunistically or strategically? Insights from Sydney, Australia. *Blue-Green Systems*, 3 (1), pp. 267-280



**Funding opportunities:** Opportunities to structure and increase funding in sustainable water management practices in NSW are located in several aspects. Developing effective asset management plans of current blue-green stormwater assets would be able to provide justification (business case) for increase in asset maintenance funding and allocation of resources for further implementation. This would also tackle the current lack of control of privately installed devices and regulate them. Publicly driven funding through promotion of co-benefits of blue-green stormwater infrastructure and restructuring current stormwater fees and levies have a potential to provide new avenues for supporting sustainable infrastructure and investment in local expertise and sustainable economy. Furthermore, through promotion of industry, government and local community education in blue-green infrastructure and WSUD stormwater management, a deeper understanding and urgency to solve the environmental issues would be promoted, incentivising decision-makers to create further funding opportunities for sustainable actions in NSW (create political drive).

## Capacity building

**Lack of skilled resources:** Organisations, whether they be councils, state entities or private landowners, face considerable challenges finding personnel who have the necessary skills to appropriately plan, design, construction, and manage stormwater infrastructure. This is not only the case for WSUD type systems, but conventional also. For example, the severe financial strain facing most local councils is well documented due to issues such as infrastructure backlog, over servicing, and, more recently, COVID related impacts (e.g. rate collections and low unemployment). Compounding these issues is tertiary education which, to date, continues to produce civil engineers that are not taught sustainable urban stormwater management as part of the core curriculum. Further, for similar reasons as well as an absence of market incentivization programs, appropriately skilled consultants and contractors are also in short supply.

**No formal capacity building mechanism:** Unlike other jurisdictions,<sup>13</sup> NSW has no formal capacity building program for progressing sustainable stormwater management. While organisations like Stormwater NSW are trying to fill this gap, lack of funding and materials to develop formal programs severely limits their capacity to do so.

**Knowledge Gaps:** Much research and development (R&D) still needs to be done to maximise the benefits and reduce any downsides associated with sustainable stormwater management. While this includes further R&D into WSUD system development, it also includes important areas that have received far less attention, such as technologies and systems for increasing operational efficiencies and optimizing performance. And perhaps most importantly, understanding and incorporating existing and future research concerning the economic and social benefits of WSUD, blue-green infrastructure and healthy urban waterways into cost / benefit analyses. This should not only aim to understand the costs and benefits of implementing such systems and assets, but also the cost of not doing so, projected over the long-term (fifty plus years). Otherwise, we risk creating developments that are unfit for human habitation as the effects of increasing urban density and climate change take effect.

**Lack of state-sanctioned guidelines and standards for regional climates:** No NSW state government authority appears to currently endorse, recommend, or otherwise give mention to guidelines and standards associated with WSUD / sustainable urban water management. While attention is given to the management of water supply catchments, particularly in agricultural settings, very little is given to urban water catchments.

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<sup>13</sup> E.g.: Melbourne Water's Clearwater capacity building program; Water Sensitive SA; many others across the globe.



This is despite the well-known detrimental impacts of urban developments on our urban waterways<sup>14</sup> and marine environments<sup>15</sup>, mostly associated with urban stormwater runoff. This continues to be the case despite calls for this to be corrected, including the Federal Productivity Commission's March 2020 paper on Integrated Urban Water Management<sup>16</sup>. Further, what guidelines do exist are often ill-suited to most regions in Australia, being based on data and modelling from locations of different climates, many of which are in the northern hemisphere. Consequently, they risk producing WSUD type systems that are not appropriately sized or otherwise designed, resulting in sub-optimal performance, excessive construction costs and / or operational costs.

**No formal state-based technical support to local government:** Constitutionally, state governments have primary responsibility for the management of natural resources and ecological sustainable development within their state boundaries. As discussed previously, NSW State Government has devolved much of this responsibility onto NSW local government. However it has, to date, provided very limited ongoing technical support towards sustainable urban catchment management, whether that be directly through state government programs or indirectly through funding programs to industry bodies or innovation centres.

**Capacity building opportunities:** The opportunities are presented in forming Action and Working groups for ensuring appropriate state-wide guidance and sets of rules for uniform capacity building across different sectors (industry, government, community, research). Showcasing positive WSUD cases, and learning from them can be the simplest way (and the most cost-effective) to promote good practices in sustainable stormwater design. Through intersectoral collaboration a set of guidelines (or guiding principles) for appropriate WSUD asset design and management could be developed for the entire NSW (similar guidelines are developed for other water technologies) to provide support for the current best management practices in the field.

## Collaborations

**Legal and market barriers:** In the absence of formal government programs, NSW currently relies on not-for-profit (e.g. Stormwater NSW, Cooks River Alliance) to provide support in sustainable urban stormwater management practices. Due to limited funding and commercial necessities, these entities must ensure their services remain financially viable and that competition and consumer law is not broken. Consequently, issues concerning competition legislation, intellectual property, and copyright act to stymie effective collaboration.

**Disparity of understanding and acceptance of WSUD across and within different stakeholder groups:** This disparity manifests in terms of knowledge and commitment to WSUD, making collaborations at scale potentially difficult. As such, this issue demonstrates that progressing sustainable stormwater management and the implementation of blue-green infrastructure is not merely an engineering problem, but also one that requires shifting entrenched attitudes and practices that no longer adequately serve the common good. In other situations, however, it is the costs that are the barrier, rather than willingness, as seen in the Aerotropolis where the cost of land was a significant barrier.

<sup>14</sup> NSW Department of Planning, Industry and Environment. (2019). Waterway health. Protecting and Managing Water Quality. NSW government. Accessed 30 January 2022. <https://www.environment.nsw.gov.au/topics/water/water-quality/protecting-and-managing-water-quality/waterway-health>

<sup>15</sup> NSW Department of Primary Industries. (2021). Draft NSW Mainland Marine Park Network Management Plan 2021-2031. Marine Estate Management Authority NSW, Sydney

<sup>16</sup> Productivity Commission. March 2020. Integrated Urban Water Management – Why a good idea seems hard to implement, Australian Government, Canberra



**Active resistance:** Several participants in the 2020 workshops reported covert and occasionally overt pushback against councils that attempted to implement WSUD, citing unwilling developers and, in some instances, state government departments.

**Parochialism:** The sustainable stormwater management and blue-green infrastructure 'industries' have been, and remain, niche groups. Efforts towards sustainable development remain highly fragmented and disjointed and, as a consequence, most efforts towards changing current paradigms and practices have seen little effect. We tend to not venture beyond our niche groups and make assumptions about other stakeholders that may not necessarily be accurate. We also tend towards telling rather than listening, talking at other stakeholders rather than understanding their issues and finding common ground. This creates two problems: (1) our understanding of the problem and its solutions are limited and (2) we lack support of other stakeholders to meet current challenges and advocate for change. Accordingly, if we are to solve current challenges and increase our chances of being heard, then we need to put aside our preconceptions and reach out to a much broader range of stakeholders.

**Collaboration opportunities:** The opportunities for the enhanced collaboration on the topic of sustainable water management in NSW are in forming a variety of interest groups (catchment, industry, community, etc.) driven by the same (or similar) founding principles deeply based on the need to drive positive change in their sector. Creation of these collaboration channels would then promote greater push for WSUD technology implementation, drive new avenues of funding, and most importantly drive knowledge dissemination and best practice application.

## Planning and Management Deficiencies

**Highly variable practices between councils:** Linked to current NSW policy issues that do not require councils to implement sustainable stormwater measures, this issue refers to the highly varied approaches councils take to managing stormwater within their local government areas. Consequently, because urban councils often occur within the same catchment, efforts to improve waterway health by one council is often confounded by other councils taking a more conventional approach to stormwater management.

**Unrealistic public infrastructure delivery expectations:** When planning authorities undertake precinct planning and rezoning, there is a tendency to set unrealistic expectations on what developers can deliver. WSUD type elements and the provision of blue-green infrastructure are but one of a long list of services that planning authorities put onto developers, without due consideration of the financial risk that developers take on and their ability to deliver. As a consequence, while most developers want to deliver developments that leave a positive legacy, they often struggle to meet all the demands and expectations placed on them. So, while developers support the concepts and intent of planning instruments like the Design and Place State Environmental Planning Policy, they feel that more effort needs to go into pragmatic decisions concerning on-ground delivery. This includes consideration of incentives, trade-offs, and more equitable cost sharing schemes for larger green field developments (refer to earlier commentary on Land Value Contribution Models).



**Changing expectations:** As the effects of urban expansion and climate change take hold and become more prominent in the media, the general community is becoming more aware of the issues that sustainable stormwater management and blue-green infrastructure address. COVID has also contributed to this as residents of urban areas 'rediscovered' their local waterways and parklands (blue-green infrastructure). As such, we can expect community expectations concerning urban areas and the condition and utility of their urban waterways to also change. So, while they may not be overtly aware of the importance of stormwater management, they are certainly more aware of the consequences. Accordingly, conventional practices are unlikely to deliver on these changing expectations.

**Absence of life cycle planning and management:** Referring to the relatively common tendency to focus only on the design and construction of WSUD type systems and quick fixes for urban waterway problems, this issue tends to manifest in two ways. The first is the failure to properly account for the creation of new stormwater management assets in operational plans and budgets (in some cases, asset management teams within councils are not even made aware of new assets). As a consequence, WSUD type systems are not always constructed with operation and maintenance in mind and teams within councils responsible for their operation and maintenance often lack the resources to look after them effectively. The second is failure to monitor the impacts of urban development and stormwater on our urban waterways, leading to the slow degradation of these waterways and the steady reduction in riparian vegetation and green space along their banks.

**Slow to embrace digital technology and the 'internet of things' (IoT):** with the rise of the internet and the digital revolution, significant steps forward have been made in tracking and monitoring a multitude of things, including urban stormwater and waterway health. Digital technology and the IoT provide great opportunities to improve how we manage urban stormwater and our urban rivers, with great potential for improved outcomes and cost-efficiencies. Yet, with a few notable exceptions (e.g., Wollongong City Council), few organisations have embraced this opportunity. Moreover, well-designed information management systems that are integrated with GIS can go a long way to solving the age-old problem of relying on the knowledge of individuals who take their knowledge with them when they leave. By embracing the opportunities afforded by advances in digital technology and IoT, we stand to significantly improve operations and whole of catchment management whilst creating datasets that can further our understanding of urban stormwater management.

**Fragmented and ambiguous responsibilities:** NSW has no singular body or entities wholly responsible for the management of urban catchments. Prior to 2013, Catchment Management Authorities were able to provide guidance such as management plans, act as liaison between different levels of government and provide appropriate oversight for grant schemes etc. However, without a minimum standard determined by NSW state government, water protection measures across the state, as managed by local government<sup>17</sup> have resulted in highly fragmented and inconsistent implementation of WSUD. This is further complicated by fragmented ownership along waterways, in particular sections that are in private ownership, preventing continuity of responsibility and subsequent management.

<sup>17</sup> DEC NSW. (2006). Local planning for healthy waterways – using NSW Water Quality Objectives. Department of Environment and Conservation. New South Wales Government, Sydney, page 2



At a macro level, this issue is closely linked to the policy issues described earlier. The dissolution of the Catchment Management Authorities in 2013 left no clear entity responsible for our urban rivers. These responsibilities are now spread across multiple entities including local government, Department of Planning and Environment, Sydney Water, the EPA, National Parks, the Marine Estate Management Authority, etc. Consequently, it is no longer possible to clearly identify who has ultimate responsibility for our urban waterways. This issue also occurs at a micro (sub-organisational) level, particularly in local government, where responsibilities are spread across multiple departments (e.g. asset management, parks and recreation, and environmental). Overall, this situation has created significant governance inefficiencies by introducing unnecessary complexity into urban water management. The end result is delayed projects, wasted resources and the discouragement of wholistic catchment management.

**Deficient economic and cost benefit analyses:** While economic and cost benefit analysis are often presented as objective analyses based on quantitative data, such analyses are inevitably grounded in subjectivity (opinion). Concerning urban development in NSW, this subjectivity appears to manifest on both sides of the ledger. On one side, there appears to be insufficient accounting for the benefits of sustainable stormwater management and the incorporation of blue-green elements into urban development. On the other side is the failure to properly account for the long-term costs of a conventional 'business-as-usual' approach to development given the realities of climate change and urban expansion. Sustainable stormwater management and the incorporation of blue-green infrastructure into new and existing developments do provide viable means of increasing climate change resilience, protecting public and private assets from flood, extreme heat and storms.

Contemporary science also clearly demonstrates that the effective incorporation of blue-green infrastructure reduces the burden on our mental and physical health systems, whilst reducing social issues such as crime and improving environmental outcomes.<sup>18</sup> Despite the cost of conventional approaches to development and the benefits of sustainable development, NSW planning laws and economic analyses seem to favour developments that appear at odds with science and good planning practice. Accordingly, there appears to be an urgent need to institutionalise accounting for these factors in our planning authorities and financial institutions if we are to avoid the cost of low-resilience conventional development.

**Inadequate baseline targets:** Baseline targets are a critical component of effective planning and management. They provide a yard stick that guides decision making, whether it be planning a new development or measuring the effectiveness of urban stormwater management and waterway protection. However, recent default targets have relied too heavily on managing concentration of key pollutants, without controlling hydrology and flow regime, which is a primary factor in degrading waterways. Such generic targets fail to adequately protect streams or account for local conditions or community expectations.

This is one area that has seen recent regulatory progress in Development Control Plans for new precincts of Mamre Road and Aerotropolis in Western Sydney, and councils such as Northern Beaches progressing towards implementing the Risk-Based Framework which highlights the significance of flow regime on waterway health. While these are location specific, they represent a transition towards integrated water management and protection of waterways from stormwater.

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<sup>18</sup> PowerLab. (2008 – 2022). Publications. Research, Australia: <https://www.powerlab.site/research/publications>



## Leadership

**Accepted norms need to change:** Perhaps the biggest challenge is the need to embed the changes that are occurring to previously accepted wisdom underpinning why and how we manage urban stormwater, how we view urban waterways, and what we consider acceptable concerning urban planning and development (e.g. what we really mean by “affordable housing”). Pits and pipes are still prevalent alongside more holistic WSUD elements, despite the more limited services they provide. Urban waterways, often seen in the past as little more than drains (and, in some cases, literally converted into them), are now starting to be ‘daylighted’ again, where there is space to do so. Sydney Water have done significant work in this space, and Canterbury-Bankstown Council have committed to 700m per year. While waterways are no longer converted to drains, the cost of rectification and rehabilitation is significant and this legacy remains a threat to our marine environments and fishing industry, whilst disfiguring the visual and olfactory characteristics of our urban environments.

There also needs to be scrutiny around the concept of how affordable “affordable” housing actually is. Such housing tends to be tightly packed, often on floodplains, with little to no greenspace, and no consideration for the thermal consequences of climate change.<sup>19</sup> When considered across medium to long-term time scales, it becomes increasingly clear that current norms may not be best placed to deliver optimal outcomes. But changing norms takes strong leadership.

### **Lack of cohesive practitioner advocacy and action:**

A key issue that arose from the franc Sydney 2022 Conference panel session was the need for urban stormwater management, urban planning and development, and waterway practitioners<sup>20</sup> to “step-up” and lead from the front. It was felt that we have been too reliant on others (particularly governments) to do this, and that we have thus far failed to come together and actively promote sustainable practices.

We have also tended to be parochial, sticking to our niche groups, and failing to engage effectively with other stakeholders to understand their challenges and establish common ground.

## Actions

### **First Tentative Steps Already Taken.**

Changing accepted norms and practices in well-established practices is always challenging, as it goes beyond the mere technical, requiring individuals, professions and organisations to challenge established ‘truths’ and practices that are often intergenerational. Stormwater management and how urban development is delivered are no exceptions, being stepped in practices dating back centuries. Hence, it will take time and a concerted inter-sector effort and commitment from a range of stakeholders working together towards solutions that are effective and equitable. Given the complexity of the issues described above, it may take several years to see the first signs of change, and longer to see more sustainable approaches to become normalised.

<sup>19</sup> For example, Ladhiana Glade, Schofields, NSW

<sup>20</sup> Where “practitioners” refers to anyone involved in these areas, whether they be consultants, contractors, technocrats or researchers





Working in our favour, however, is that much of the technical development has progressed significantly over the past few decades and, as a consequence, the tool kit for on-ground solutions is well established. Further, there are jurisdictions in Australia and abroad that offer working examples of how things can be improved. While only in its first year, the *franc* initiative has already made some significant first steps in building a platform for positive change, including:

- The establishment of the *franc* concept and inaugural *franc.sydney* conference, bringing together stakeholders beyond the stormwater industry to meet challenges ahead.
- Formation of and the first **Action Coalition** workshop, held in July 2022, where individuals from the private, public, and research sectors began to think about how the **Action Coalition** should work, and what its purpose should be.
- The provision of this first white paper that:
  - captures the outcomes and ideas from the 2022 inaugural *franc.sydney* conference and preceding engagement seminars
  - provides a comprehensive outline of the issues and challenges concerning transitioning to sustainable stormwater management practices
  - Identifies initial actions for the Action Coalition to undertake grow the *franc* concept and formalise itself to this end, and
  - Provides a solid foundation upon which to develop the next *franc.sydney* conference and associated events and workshops in 2023.

## What is the Action Coalition?

The Action Coalition is where ideas from the *franc* initiative are translated, as the name suggests, into actions. While the precise structure and function of this coalition are still to be defined, its intent is to provide a formal collaboration mechanism that interested parties can become part of to undertake actions and activities derived from *franc* conferences and related events.

The Action Coalition is intended to be a dynamic and open collaborative mechanism that is able to expand, contract and divide into sub-groups depending on the need.

The first formal Action Coalition activity took place in July this year (2022), involving representatives from the public, private and research sectors. At the conclusion of the workshop, it was generally agreed that the purpose of the Action Coalition should be as follows:

*'to utilise collated knowledge and expertise to inform, improve, and advocate for stormwater runoff management in NSW that better serves the health and wellbeing of the community'*<sup>21, 22</sup>.

It was also determined that the structure and operations of the Action Coalition be formalized into terms of reference that facilitated a structured operational environment with sufficient flexibility to allow it to form and reform according to need. It also determined that funding opportunities should be investigated to provide administrative and digital (e.g. website, social media) support to the Coalition, as well as support for the drafting, editing and production of documentation and other outputs.

The work still needed to be done is to define the terms of reference for the Coalition to give it a formal structure, but to maintain sufficient flexibility and not to restrict the Coalition's dynamism. To this end, the Coalition needs to establish a framework that facilitates its purpose yet still allows for an open forum that enables constant evolution and where a wide range of individuals and entities can participate.

<sup>21</sup> In the spirit of *franc* and its continuous improvement philosophy, this purpose is still open to refinement.

<sup>22</sup> Credit to Aaron Wright, NSW Department of Planning and Environment, and Stephanie Kermode, Jacobs.



## Next Steps

Based on the 2022 inaugural *franc.sydney* conference and subsequent July workshop, the following foundational actions have been identified.

- Expand / diversify the professions and industries participating as speakers and panel session participants at *franc.sydney* to include First Nations, developers, urban planners and urban ecologists.
- As per above, seek out additional 'natural allies' to become *franc* Partner Organisations and / or Action Coalition members.
- Formalise the Action Coalition and identify a funding source to resource data collection, document production, digital resources and administrative work.
- Begin to shift the conversation from barriers and challenges to actions for improving how we manage stormwater in the interests of the NSW community.

## Concluding Remarks

2022 saw the launch of the *franc* concept, its associated conference and this paper, the first in a series of papers that will explore the question "how do we make stormwater truly blue-green" and what can be done. In less than 12 months, we have already made significant progress, having captured a comprehensive record of the contemporary challenges and barriers facing NSW to protect its waterways and manage urban stormwater in the face of worsening climate change impacts.

Yet despite this rapid progress, we can still expect to see significant growth in content and sophistication of future white papers, *franc* conferences and events given the spirit, intent and mechanisms adopted by the *franc* initiative. Abstract submissions and guest speaker lists for *franc.sydney* 2023 already attest to this, with an expansion in topics and presenters, representing an even wider range of perspectives than that offered during *franc.sydney* 2022.

Further, while this paper lists a multitude of inter-twined barriers and challenges, NSW has the expertise and resources to solve them. By taking the first tentative steps defined herein, we can make a difference, transforming our cities as we transform our practices and perspectives in a way that will have positive economic, social and environmental outcomes for generations to come. So, on behalf of Stormwater NSW and our current Partners, we sincerely hope those reading this paper will join us in this effort by submitting constructive feedback on this paper, coming to the annual *franc* conferences, and joining the Action Coalition.



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