PARRAMATTA RIVER WATERWAY GOVERNANCE REVIEW 2017

Report prepared for the Parramatta River Catchment Group

28 JULY 2017

AUTHORS: DR PETER DAVIES, DR JAMES HAZLETON, LINDA BARACH, CYRIELLE JOEI

This Report has been prepared for the Parramatta River Catchment Group (PRCG). It responds to the Request for Fee Proposal Parramatta River Waterway Governance prepared by the PRCG (dated 16 October 2016) and has been conducted in accordance with the scope of works as provided (dated 2 November 2016) and in response to ongoing discussions with the submission prepared by the PRCG Group Coordinator. The Report has been prepared as an internal document for the PRCG to inform its strategic direction and specifically the development of the Parramatta River Masterplan.

The Report has been prepared in good faith based on the completed reports, other information provided by the PRCG and its members and as revealed as part of the consultative processes used in the study design.

This Report is a point in time review and the recommendations are current as at the date of this Report. The authors acknowledge that the PRCG has a number of ongoing studies, reports and projects that confirm or complement many of the recommendations of this Report. The recommendations made in this Report have been communicated and discussed throughout the engagement, and have already led to a number of actions by the PRCG. The Report sets out the authors' recommendations and also acknowledges the ongoing activities of the PRCG and its member organisations which will contribute to good governance.

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EXECUTIVE SUMMARY

The mission of the Parramatta River Catchment Group (PRCG) is to make the Parramatta River swimmable by 2025. The PRCG partners and the community have defined six elements to make the river not only swimmable, but a world class and living river: clean, clear water; quality facilities; ease of access; an engaged community; business opportunities; and healthy ecosystems.

To achieve this mission there is a need to understand and align the responsibilities and priorities of the many state agencies and 11 local councils in the Parramatta River catchment. The PRCG commissioned Macquarie University to conduct a review of the existing governance structures across the Parramatta River catchment (this Report). This governance review examines the role of key state agencies and local government with respect to their responsibility, regulatory, legislative, planning and operational roles to make the river swimmable again. The review focuses on three key areas: how the waterways are managed across the catchment; the relationship between the swimmable goal and ecological health; and how swim sites may be activated.

The review was conducted in three stages. Stage 1 comprised a desktop study of state agency and local government legislative and operating requirements. Stage 2 comprised a series of individual and group interviews with key persons in state agencies that were identified as having responsibility for and/or key involvement in governance functions related to waterway management, ecosystem health or environmental and human health monitoring. Stage 3 used the findings from stage 2 as a basis to identify gaps and key focus areas for a future governance system and processes to inform the direction of the future Parramatta River Masterplan. This Governance report should, therefore, be read as a point in time review for the PRCG, with recommendations providing direction for the development of the first Management Plan. The key actions will of course evolve as the Group and its members continue to change and refine their commitment and capacity to the mission.

This Parramatta River Waterway Governance Review Report (the Report) is structured around the key issues identified by the PRCG as key to making the river swimmable again:

- **Waterway management** (eg. pollution control, water sensitive urban design, development controls, stormwater asset management)
- **Ecological health** (eg wetlands, riparian vegetation, biodiversity, weed management, endangered species)
- **Management of swimming sites** (eg safety, maintenance, facilities, monitoring).

It provides a detailed analysis of the current state of governance and management of these areas. The Report also considers the role of strategic land use planning, important given the current focus of the NSW Government, specifically preparation of District Plans by the Greater Sydney Commission and their future impact on the Metropolitan Plan for Sydney (*A Plan for Growing Sydney*), as well as local plans directing land use by councils. The governance issues are collated across these issues according to common functional aspects and detailed in the 'Summary of Governance Issues' section, which draws on the desktop document review and the interviews/ workshops conducted with key stakeholders.

This Report is one of a suite of research projects identified by the PRCG Strategic Plan 2016–2018 as key inputs to developing the Parramatta River Masterplan, which will be "the blue print for how the river will be made

swimmable again by 2025".[1] The brief specifically requested that the review "draw upon the outputs and recommendations arising from the other Masterplan research projects: Swim Site Activation; Ecological Health; Water Quality Monitoring and Modelling; and Community Research."

Best practice governance is essentially about establishing a framework of responsibilities to achieve an outcome, then monitoring and reporting against this framework. Effective governance requires role clarity and the authority and resources required for implementation. To implement swimmability governance arrangements, NSW Government commitment will be required to harness the interest and resources of state agencies and local government towards funding of measures to reduce diffuse source water pollution and support water sensitive urban design (WSUD) initiatives. Agencies will be reluctant to actively take on responsibilities beyond their legislative remit unless the NSW Government indicates its explicit support for the swimmability 2025 mission.

The main element of the Masterplan yet to be agreed is how the 'swimmability' objective will be operationalised. Work on the Swim Site Activation project has established that the objective will include one or more swim activation options (ranging from natural river swimming, treated river swimming to off-river swimming) as well as other elements sought by the PRCG including having an engaged community, healthy ecosystems, quality facilities, ease of access to and along the river and creating business opportunities. The particular swim activation mix selected will have a pivotal impact on formulating appropriate governance arrangements.

For **natural river swimming**, the key questions are: is the water clean enough to meet the standards required by NSW Health; will the water be clean enough in the future; and is the water considered clean enough by the community? This option requires high-level support from the NSW Government and local government to ensure adequate management of the catchment now and into the future. In turn, this will require significant coordination and support (ie. resources and strategic buy-in) from key agencies, local government and the community. Precedents for this option exist, such as Chiswick Baths, which are monitored under the NSW Beachwatch program and maintained by the local council.

For **treated river swimming** the key issues are: agreeing standards for treated water at swim sites and 'splash' contact recreation; and the costs and responsibility for this treatment. Treated river water swimming can be different to a traditional swimming pool in that the water treatment may be designed to meets standards most, but not all, of the time. Adopting this as an outcome carries additional risk and operational responsibilities. This option may be particularly relevant for the upper river sites where water quality modelling suggests river water is suitable for swimming most of the time and would be increased with significant catchment interventions coupled with additional site-based river water treatment. Splash or secondary contact recreation (which has a lower water quality standard than primary contact) may be an alternative at some sites where water quality, physical infrastructure or site conditions may not be suitable for swimming. At these sites treatment of adjacent stormwater discharge points may be required to reduce the impact of locally based stormwater water pollution sources. For either option, the type and level of treatment required may vary considerably. It is important to note that a lower level of treatment may increase the level of public health risk. This will then require a higher level of coordination and support from key agencies, local government and the community to ensure runoff across the catchment and corresponding river water quality meets or approaches national guidelines for sites where swimming or secondary contact recreation is allowed.

[1] News Release: 19 May 2016 Federal Government funding needed to make the Parramatta River swimmable for all Western Sydney residents: http://www.ourlivingriver.com.au/media/1145/media-release-fed-govt-funding-needed-to-make-river-swimmable.pdf

For **off-river swimming** or other **land based recreation** the key issue is: which land-based swim sites would have the best access, least (catchment) cost and integrate with regional open space and recreation planning. Off-river swimming may provide recreational opportunities similar to Drummoyne Swimming Centre or South Bank, Brisbane and would rely on conventional swimming pool water treatment and maintenance. The actions to achieve this option could include engaging with recreation demand studies and broader strategic planning for green spaces and liveability, and aligning with planning for Greater Parramatta and Olympic Park river city vision. The governance issues for this option would be similar to those currently faced by planning agencies and public land managers associated with parkland and public pools.

In order to gain community and political support for the mission, it is important that the PRCG and the future owners and managers of potential swim activation sites decide what form of swim activation they envisage in which locations. The PRCG and its members may choose to activate a number of the swim options along the Parramatta River. The community benefit of more swim and recreation options is significant and would generate greater connection and engagement with the Parramatta River. However, this would require engaging with more local councils and may require a greater degree of state agency involvement in the overall project. Under a multi-site implementation strategy there will be a need for site specific or sub-catchment governance arrangements. This will involve the key land and water management agencies and a high degree of coordination and funding commitment to ensure the sites' suitability now and into the future.

Recommendations

It is neither appropriate nor practical to recommend a final governance model. Governance arrangements will change over time as swim activation projects are agreed and implemented, as agencies undertake associated works or the priorities of the PRCG members change. This Report therefore makes general governance recommendations that will provide a robust foundation for the development of the Masterplan by encouraging greater collaboration and moving towards a more sustainable operating and funding model. Collaboration and funding are the most important governance aspects and will provide a strong foundation for any catchment based program. The advocacy actions identified in the PRCG Strategic Plan 2016-18 (actions 3.1 – 3.4) are also particularly relevant to address the governance issues identified in this report.

It is hoped the recommendations below will serve as a solid scaffold upon which to build more specific governance structures once the details of the Masterplan have been agreed.

Recommendation 1: Agree specific 2025 swimmability targets as a matter of priority

As outlined above, a decision on the site activation options needs to be made as soon as possible to enable development of the Masterplan. A refined governance model can then be developed to support delivery of the Masterplan. This will be informed by the current water quality modelling and swim site activation studies. The final targets must have consensus across the PRCG in order to support a coordinated planning, delivery and management outcome.

Recommendation 2: Identify a lead agency for swimmability governance

Fundamentally, this Report shows that the current governance of water, waterways, catchment areas and land adjacent to waterways is complex, confusing and inconsistent. No single agency is responsible for water governance, and the role of the many agencies involved is often unclear. This finding is not surprising and reflects the fact that Sydney catchment management has historically lacked a central coordinating body with sufficient powers, funding and whole of government support. Nevertheless, the ability to meet 2025

swimmability targets will be materially enhanced by improving the clarity of swimmability governance via establishing a lead agency responsible for delivery of a swimmable Parramatta River. Lead candidates include Sydney Water Corporation, the Greater Sydney Commission and the Office of Environment and Heritage.

Recommendation 3: Link swimmability to liveability and embed 2025 swimmability targets within the Greater Sydney Commission's strategic planning and the Metropolitan Water Plan with a view to positioning the project as a state priority

Although the Parramatta River swimmability mission is not articulated in the Premier's or State Priorities,[2] the NSW Environment Protection Authority (EPA), Sydney Water Corporation and the Greater Sydney Commission have explicitly identified support for this initiative in their strategic planning documents.

By establishing the Greater Sydney Commission (GSC), the NSW Government has clearly signalled its intention to achieve greater coordination between the multiple agencies responsible for planning and environmental management. The GSC "is leading metropolitan planning to make Greater Sydney more productive, sustainable and liveable."[3] The GSC is championing the 'three cities' strategy, which positions Parramatta as "the Central City, with the Greater Parramatta area at a critical moment in history – the stars are aligning with total investment from the public and private sectors of over $10 billion over the next five years."[4] Given this level of investment and the importance of Parramatta and the Parramatta River, the objectives of the PRCG to make Parramatta River swimmable is complementary to the broader metropolitan and district planning outcomes and is assisting delivering the Green and Blue Grids across Sydney. There is clearly significant potential to further engage with the GSC to align with its strategy and planning. By making this link between the Green and Blue Grids and Parramatta River swimmability more explicit, there is an opportunity to frame the swimmability project as one of strategic importance to Sydney and NSW and therefore become a priority for state government agencies.

The recently released Metropolitan Water Plan (MWP) 2017 similarly presents an opportunity to work collaboratively with key water management agencies on liveability initiatives. Aligning the Parramatta River swimmability vision with the work to be undertaken under the auspices of the MWP would be a worthwhile investment of resources. This could be achieved by the MWP identifying the swim in Parramatta River mission as one of its WaterSmart projects, while at the same time serving as a model to support greater coordination between and within state agencies and local government.

More broadly, 'swimmabilty' might be framed as contributing to 'liveability', which may have broader appeal and is a term used extensively by agencies such as Sydney Water Corporation and the GSC. Defining liveability within the operational 'mandate' of government has been the subject of review by the Independent Pricing and Regulatory Tribunal (IPART) as part of the pricing determination for Sydney Water Corporation (discussed in detail later in this report). While IPART was not prepared to support Sydney Water Corporation funding liveability projects in the current price path, IPART has recognised that liveability is an important concept that could be funded, contingent on having whole of government commitment, community support and preferably be linked to specific projects. There is an opportunity therefore to capitalise on the potential to incorporate

[2] The previous NSW State Plan 2021 was replaced in 2015 by 12 Premier's Priorities and 18 State Priorities. One of the priorities is relevant to the Parramatta River mission: Premier's Priority 10 – Keeping our Environment Clean: Reduce the volume of litter by 40 per cent by 2020.

[3] https://www.greater.sydney/what-we-do

liveability as a core funding area for Sydney Water Corporation, local government and other agencies when they propose budgets and project proposals to IPART and NSW Treasury.

The community attitude survey conducted for the PRCG suggests strong support for the swim vision as does general environmental management and protection within local government community strategic plans. Willingness to pay surveys will provide additional detail for future funding proposals by state or local government. It is up to state and local government to ensure that funding for projects is directly linked to community aspirations and expectations.

Recommendation 4: Develop, implement and monitor water sensitive urban design policies and controls across the catchment

Water Sensitive Urban Design (WSUD) has been identified by the PRCG as priority issue. The policy settings for WSUD, including consistency by planning agencies across the catchment and funding (both capital and maintenance) of structures remain ongoing concerns particularly for local government. Planning and environmental agencies, notably local government, must establish, enforce and monitor the outcomes of policies and standards that link to the swim in Parramatta River mission. Our review indicates the potential for much greater co-ordination, monitoring and regulation of WSUD policies at a catchment level

The construction and maintenance of WSUD structures requires additional investment. Many WSUD structures were installed with the assistance of NSW Government grants. Funding for their ongoing maintenance and eventual replacement as these assets age is constrained. This reflects on the need for WSUD to have greater priority in budget allocations at a capital and maintenance level beyond funding from existing special rate variations (environmental levies) and stormwater management service charges that are in place across many local councils in the catchment.

Recommendation 5: Implement a risk-based approach to swimmability governance, including an ongoing process to identify, assess, manage and monitor ongoing and project-based risks

A risk-based approach to governance was supported by a number of agencies including the Office of Environment and Heritage (OEH), which nominated itself as a possible provider of this service, and NSW Health. Interviewees suggested a number of steps to implement this approach including: describe the threats; identify the sources of pollution (modelling and where possible monitoring); ascertain behavioural actions by residents, industry and government; identify the critical catchments (risk and need); prioritise (for example by cost benefit analysis) and focus on specific risks for the selected swim sites and their preferred option; undertake actions; and develop relevant monitoring and evaluation frameworks to determine program and project success. We endorse this approach and note that risk-based frameworks have become increasingly important governance tools in both the government and commercial sectors and have recently been adopted by the Parramatta River Catchment Group. It is worth noting that a number of PRCG agencies operate under a risk-based framework. For example, a best practice, risk-based environmental management approach is demonstrated by Sydney Water's ISO14001 certified Environmental Management System and is used to manage the Lake Parramatta swim site by Parramatta City Council. A risk-based approach also underlies the adaptive management approach used by many environmental agencies such as OEH.[5] In recommending a risk-

[5] http://www.environment.nsw.gov.au/research/adaptive-management.htm

based approach, however, we emphasise that this process goes beyond specific risk identification and mitigation. The widely adopted COSO Enterprise Risk Management framework (discussed in the body of this Report) also includes such elements as leadership and culture as integral to the achievement of organisational objectives. We therefore suggest that the risk management framework untimely put in place explicitly considers not only the risks posed by particular swim sites but also the wider governance elements necessary to enable the 2025 vision. We recommend a regular self-assessment of the operation of the risk management framework as well as continual monitoring of the risks themselves. Such self-assessments are typically performed at an organisational level, but might relatively easily be adapted to enable an insightful analysis for the organisational stakeholders of the Master Plan.

Recommendation 6: Establish an ongoing swimmability monitoring program, with reference to Harbourwatch, the Masterplan project and the pressure-state-response approach

In relation to monitoring more generally, our review has indicated that while there is ongoing reporting of water-related metrics within the Sydney basin, there is insufficient publically accessible and routine monitoring that can directly inform the Masterplan and recommendation of swim activation sites. While noting water quality monitoring data has been used to develop swimmability models (based on enterococci levels) and that the PRCG has recommended a future water quality monitoring program, interviewees suggested that data is currently inconsistently captured, reported and analysed.

The Beach/Harbourwatch program has widespread public and awareness support and would provide a good foundation for building confidence in the water quality in Parramatta River. It should form part of a monitoring program that: quantifies pressures within the catchment; describes the state of the catchment and waterway health; and reports on how effective actions or responses have been in addressing important water quality and environmental concerns. There should be online reporting of the data and how it relates to activities within the catchment, and the data should also documented in state of environment reports, and annual/ term of council reports.

Recommendation 7: Reconceptualise the role and structure of the PRCG, once swimmability targets have been agreed and a lead agency identified, and update memorandum of understanding accordingly

Part of the project brief for this Report was to consider the ongoing role of the PRCG. A precise specification is premature, particularly given the need for resolution of the issues addressed in Recommendations 1 and 2 (agreeing swimmability targets and identifying lead agency). However it is clear that there are a number of possible roles for the PRCG going forward. Key areas already mentioned above are advocacy and funding; WSUD policy co-ordination; risk management implementation; and monitoring. From a governance perspective, we also emphasise the critical role of fostering the 'informal' network as well as more formal governance accountabilities. Creating opportunities for networking and interaction outside formal channels – eg. inter-agency workshops, discussion forums and events – is also a crucial part of effective coordination and knowledge exchange. As part of our review we note that the current role of the PRCG has moved beyond that reflected in the PRCG Memorandum of Understanding, and recommend that this MoU be updated as the next phase of the PRCG role is determined.

Summary of governance recommendations

PROJECT BRIEF AND CONTEXT

This Report analyses current governance structures across the Parramatta River catchment contributing to the vision of making Parramatta River swimmable by 2025. The project was commissioned by the Parramatta River Catchment Group (PRCG) whose aim is to work with its partners to improve the health of the Parramatta River and the catchment. It does this through collaboration with its partner councils, state agencies and utilities in order to inform and direct policy and practice (***Figure 1)***. The need for an overarching governance arrangement for the PRCG is paramount to enable the combined efforts and activities of its partner organisations to achieve its agreed vision.

This governance review examines the role of key state agencies and local government with respect to their responsibility, regulatory, legislative, planning and operational roles to make the river swimmable again. The review focuses on three areas: how the waterways are managed across the catchment; the relationship between the swimmable goal and ecological health; and how swim sites may be activated and managed. A key focus of this governance review is to assess the individual and collective institutional responsibilities and capacities of state and local government to achieve a swimmable river. This includes an analysis of current governance structures and, through a gap analysis, recommendations for revised processes and structures.

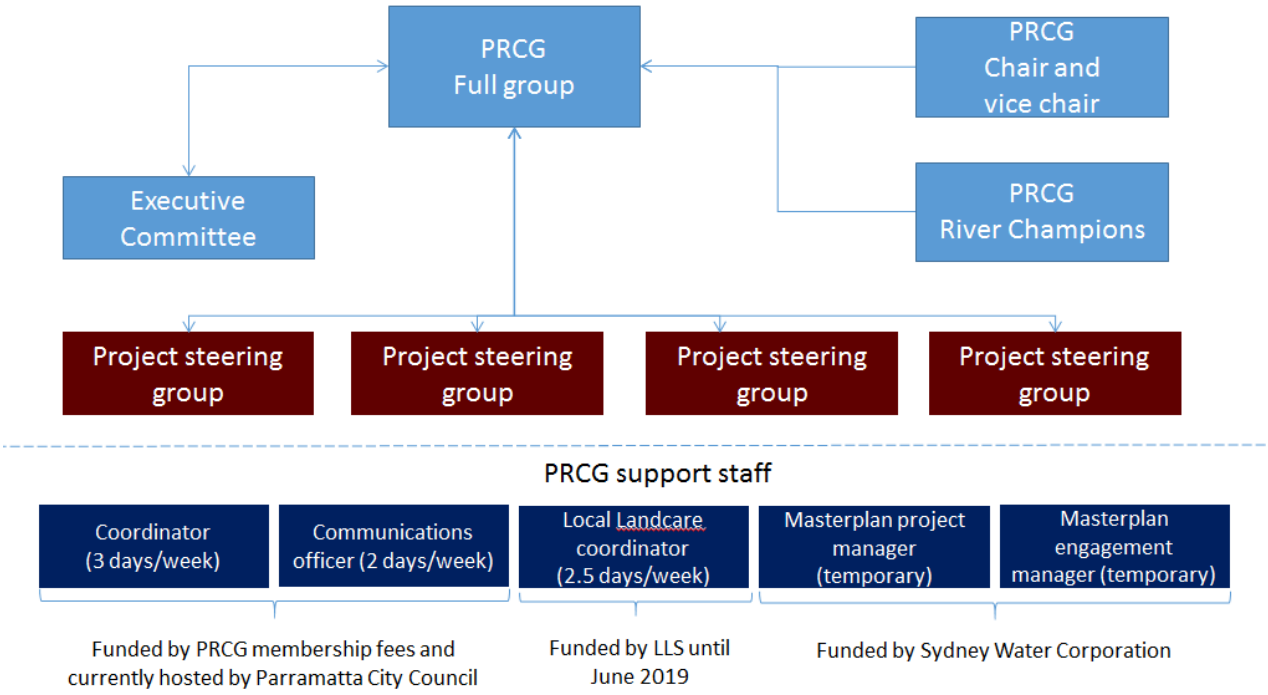


Figure 1. Structure of the Parramatta River Catchment Group

Parramatta River 'swimmability' vision

The Parramatta River is a major tributary to Sydney Harbour, one of Australia's most significant waterways. The catchment covers an area of 266 km^2 and includes land managed by 11 councils, Sydney Olympic Park Authority, Parramatta Park Trust and Sydney Water. The river contains freshwater upstream of the Charles St Weir in the Parramatta CBD, and below this it is an estuarine system. Over 750,000 people live in the catchment and this area will be subject to significant urban renewal as described in the West Central District Plan and at key urban activation sites as identified by the NSW Department of Planning and Environment and the Greater Sydney Commission (GSC). The vision to make Parramatta River swimmable aligns with the three

pillars driving urban renewal and strategic planning by the GSC: a productive city, a liveable city and a sustainable city.

The mission of the Parramatta River Catchment Group to make the river swimmable by 2025 forms one part of the larger strategic direction for the Group. Its vision is that Sydney deserves a world class river and the purpose of the group is to make Parramatta River a living river.

What is a 'swimmable' river?

A 'swimmable' river means more than just swimming. The Parramatta River Catchment Group partners and the community have defined six elements that make the river swimmable and in turn a world class and living river. These elements are illustrated in ***Figure 2***. From a governance perspective, the breadth of these elements and aspirations provide both opportunities and challenges. Underpinning each element is a network of agencies with differing responsibilities and drivers, as well as many diverse stakeholders. Achieving these outcomes will require strong leadership from the NSW Government and focused coordination between these agencies. It will also require significant engagement and commitment between levels of government, industry and the community. For the purpose of swimming in Parramatta River, the swim site activation report provides direction for primary and secondary contact recreation in or adjacent to the river that also complements the six elements in ***Figure 2***.

Figure 2. Elements of a swimmable river as identified by the Parramatta River Catchment Group

Parramatta River Masterplan

The analysis and recommendations in this Report have been informed by the research reports and technical studies that form Stage 1 of development of the Parramatta River Masterplan. This Report is designed to provide direction and recommendations to inform the Parramatta River Masterplan and how it can be best implemented (***Figure 3***). In understanding the formation of the Masterplan, it is also important to consider that this is an iterative process that will require ongoing review. This will include outcomes of future technical studies and governance reviews as indicated by the dotted lines in ***Figure 3***.

There is a need for a consistent and agreed monitoring, evaluation and reporting framework. This should be designed to directly link to environmental and social considerations (which have emerged from the technical studies) as well as overarching regulatory reporting requirements of the respective government agencies and councils. The governance framework is also critical to manage current and future institutional, reputational, environmental and social risks and will set a foundation for an adaptive management process to enable the Parramatta River Catchment Group achieve its swimmability mission as a coordinated partnership.

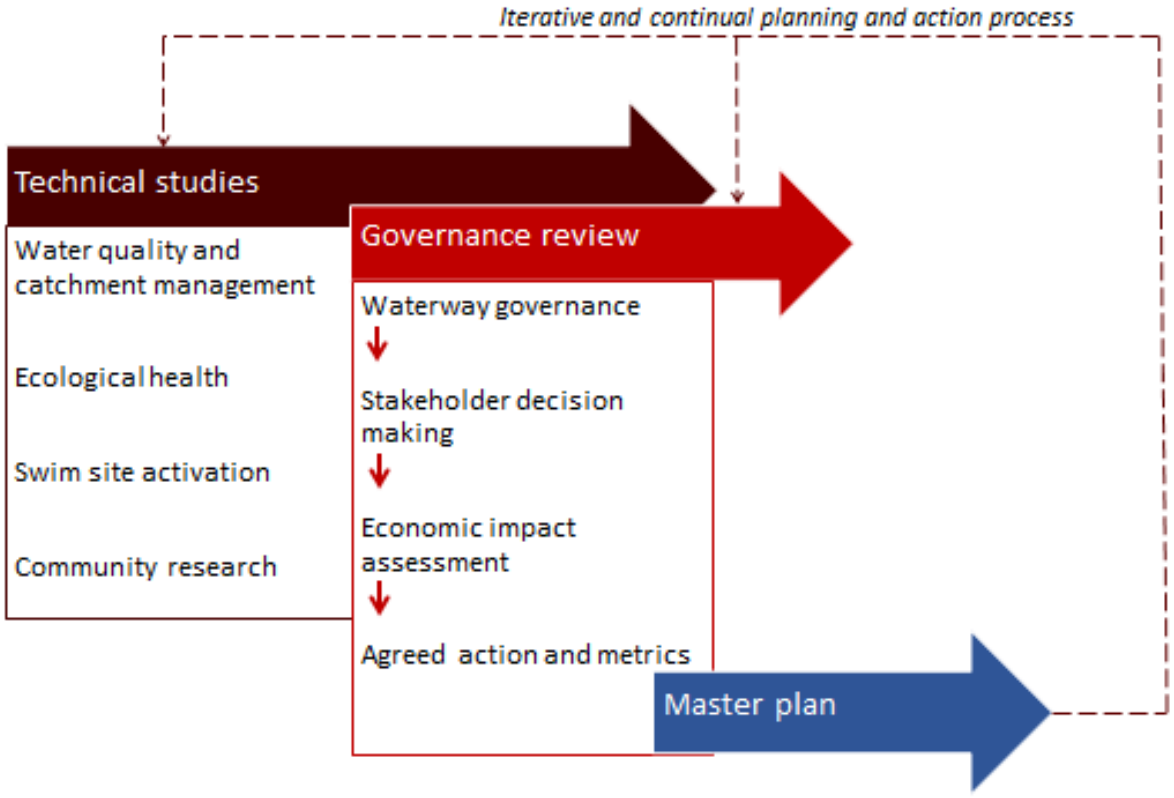


Figure 3. Master Plan development process

The Parramatta River Masterplan will map the necessary steps and milestones required to make Parramatta River swimmable again by 2025.

To have effect, the Masterplan must build on the collective capacity and coordination of all PRCG members (financial and associate members), including the five elected community members (***Table 1***). The Masterplan must also reflect the key areas of responsibility of the Parramatta River Catchment Group including:

- Planning and research – driving catchment wide planning and research to make the river swimmable again
- Coordination – coordinating collaboration across organisations to deliver positive outcomes for the river in a more efficient way
- Advocacy – working with partners to spread advocacy and work together to achieve its goals
- Communication and engagement – continuing to build support from the community and stakeholders to connect them to the river and build the capacity needed to make it swimmable again
- Monitoring and reporting – working to establish a coordinated monitoring program for swimming in the river and how data will be made accessible and to whom.

Table 1. Membership of the PRCG as at April 2017

Financial Members	Associate Members	Community Representatives
NSW Department of Planning and Environment NSW Environment Protection Authority Sydney Water Corporation Hunters Hill Council Inner West Council City of Ryde City of Canada Bay Burwood Council Strathfield Council City of Parramatta Cumberland Council The Hills Shire Blacktown City Council City of Canterbury-Bankstown	Parramatta Park Trust/ Western Sydney Parklands Sydney Olympic Park Authority Office of Environment and Heritage NSW Department of Primary Industries Roads and Maritime Services	Ryde Hunters Hill Flora and Fauna Society Impeesa Bushcare (Parramatta) Association of the Greening of Bidjigal Reserve Trust Blacktown and District Environment Group Inc.

PROJECT APPROACH AND METHODS

A staged approach was taken for this project as illustrated in ***Figure 4*** below.

Stage 1 the ***desk top study*** undertook a review of state agency and local government legislative and operating requirements. This study was not designed as a comprehensive, detailed legal review, but rather with a clear focus on capturing the drivers and constraints in agencies' operating environment that impact on their ability to drive and contribute to 'swimmability' outcomes. Within this stage a review of the results (to date) of technical studies overseen by the Parramatta River Catchment Group was undertaken. This incorporated a review of the technical documents (refer to tables in 'Review of Governance Mechanisms' section).

Stage 2 ***mapping and validation*** involved a series of individual and group interviews with key persons in state agencies identified as having responsibility for and/or key involvement in governance functions related to waterway management, ecosystem health or environmental and human health monitoring. A workshop with local government officials was also held for those with responsibility for strategic planning, sustainability and operational tasks. A workshop approach was taken rather than interviews to reflect and capture the diversity of functions undertaken by councils and the number of councils in the Parramatta River catchment. The qualitative research aspect of the project was reviewed by and approved by the Macquarie University Human Ethics Committee. The purpose of the interviews and workshops was to interrogate, expand on and confirm the findings from the desk top studies in stage 1. The interviews and workshop were designed to identify key areas of exploration, institutional barriers, organisational culture, opportunities and institutional reporting timetabling which could impact on implementation and delivery post-development of the Masterplan. Participants were selected in consultation with the Parramatta River Catchment Group Coordinator, the Waterway Governance Technical Group and the Masterplan Reference Group. Interview and workshop questions are provided in ***Appendix A***. At the end of stage 2 a ***map of the current governance arrangements and key processes*** was developed.

Stage 3 used the findings from stage 2 as a basis to identify gaps and key focus areas for a future governance system and processes to inform the direction of the Masterplan. The method was based on a sequential design as reflected by the stages. It also incorporated ongoing review and validation of findings and insights as the project progressed (indicated by the arrows in ***Figure 4***). This was achieved primarily through the interview processes and feedback from presentations to the various committees of the Parramatta River Catchment Group. Regular reporting to and discussion with PRCG Project Coordinator played an important role in focusing and refining the project towards practical recommendations.

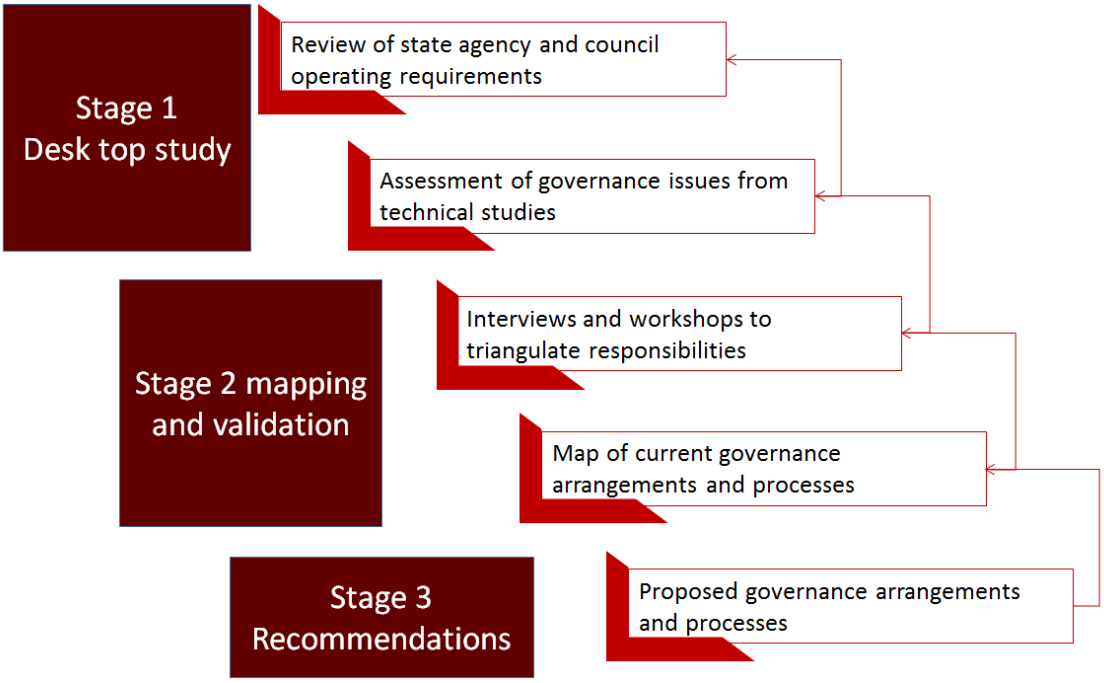


Figure 4. Method of governance discovery and review

GOVERNANCE – AN OVERVIEW

Theoretical framework

This section sets out the theoretical framework of governance that informs this Report. Fundamentally, governance is about establishing a framework of responsibilities to achieve an outcome, then monitoring and reporting against this framework. While precisely specifying 'governance' can be challenging, one important characteristic is that governance is not based on 'politics', but rather on "managerial or technocratic competence or, conversely, on cooperative, consensual decision making".[6]

At its simplest, governance might be conceived as the 'what', the 'who' and the 'how':

- What is it being governed – what are the critical objectives and sub-objectives?
- Who is governing – who are the governing bodies that are accountable for the attainment of objectives and sub-objectives?
- How is governance taking place – what are the governance mechanisms utilised by governing bodies to attain the desired outcomes?

In the public sector, interest in governance has expanded in line with the range and complexity of expected public sector outcomes:

> [D]elivering quality services with fewer resources to diverse populations of users, partnering effectively with the private and non-profit sectors, responding flexibly and rapidly to shifts in demands and needs, assuring citizens' safety and security, stimulating widespread and equitable economic growth and opportunity, and coping proactively with transnational threats.[7]

Traditionally governance was conceived as a 'top down' process whereby accountabilities were established at senior levels and cascaded downwards through a process of delegated responsibilities together with accompanying operational controls. Information on the achievement of objectives then flowed upwards, such that senior attention could be quickly directed at those pockets where the desired outcomes were not being achieved. Though relatively simple, such a framework was still dependent on adequate resourcing, particularly around information processes.

While this model of top-down governance can be effective in a well-defined and orderly environment, it is less useful in ambiguous and dynamic settings. In the public sector, power is now dispersed across a range of actors and at a range of levels. Such operational changes also undermine the utility of 'top down' governance:

> The power of central government to develop and implement policies in a top-down manner has decreased, leading to increasingly diffuse policymaking structures and processes stratified across subnational, national, and supranational levels of government.[8]

Therefore while accountabilities and delegated responsibilities remain important, modern governance requires a broader range of 'adaptive' mechanisms to be considered. Close attention needs to be paid to

[6] Rose-Ackerman, S. (2017), "What Does "Governance" Mean?", *Governance*, Vol. 30 No. 1, pp. 23-27

[7] Brinkerhoff, D. W. and Brinkerhoff, J. M. (2015) "Public Sector Management Reform in Developing Countries: Perspectives Beyond NPM Orthodoxy", *Public Administration and Development*, Vol. 35 No. 4, pp. 222-237

[8] Loorbach, D. (2010) "Governance framework Transition Management for Sustainable Development", *Governance: An International Journal of Policy, Administration, and Institutions*, Vol. 23 No. 1, pp. 161-183.

mechanisms to foster learning, interaction, integration and experimentation.[9] From a practical point of view, this 'adaptive' approach to governance entails such characteristics as:

- *Flexibility of objectives* – as system complexity increases, the difficulty of specifying objectives is correspondingly greater. In addition, given systems are dynamic, a lack of flexibility of objectives means that actors cannot easily adapt as a result of new learnings.

- *Explicit ongoing opportunities for 'social learning'* – actors within a modern governance framework are typically highly interdependent, which requires far more opportunities for both formal and informal interactions between them. This 'social learning' comprises learning not only about 'technical' content regarding organisational objectives and capabilities but also organisational culture. Actively fostering robust networks within a governance structure is critical for effective and timely response to inevitable changes in plans.

- *Rapid and iterative development* – in fields such as software engineering 'agile development' has become the mantra, whereby priority is placed on creating crude prototypes to obtain user input as quickly as possible and iteratively adding features to these prototypes. These sentiments resonate with adaptive ecological management and the 'Plan, Do, Check, Act' cycle required by an ISO 140001 certified Environmental Management System. Good governance frameworks should therefore encourage collaborative experimentation, and even more importantly emphasise the open sharing of the results of the experiment to maximise the collective learnings.

Further, the evolution of 'good governance' in the corporate setting emphasises the crucial role of a risk-based approach. For example, the Australian Stock Exchange (ASX) prescribes eight principles for corporate governance:[10]

- Principle 1: Lay solid foundations for management and oversight
- Principle 2: Structure the board to add value
- Principle 3: Act ethically and responsibly
- Principle 4: Safeguard integrity in corporate reporting
- Principle 5: Make timely and balanced disclosure
- Principle 6: Respect the rights of security holders
- Principle 7: Recognise and manage risk
- Principle 8: Remunerate fairly and responsibly.

These ASX principles reflect a general trend in the corporate world to take a more proactive and risk-aware approach to governance. In particular, Principle 7 now requires companies to report their assessment and response not only to material financial risks, but also on material environmental and social sustainability risks (Recommendation 7.4). Internationally, disclosure of corporate risk management practices has been mandated under the US Sarbanes-Oxley Act, implemented following the collapse of Enron.

[9] Loorbach, D. (2010) "Governance framework Transition Management for Sustainable Development", *Governance: An International Journal of Policy, Administration, and Institutions*, Vol. 23 No. 1, p 165

[10] Australian Stock Exchange (2013) Corporate Governance Principles and Recommendations (3rd Edition), accessed 8 April 2017, available at: http://www.asx.com.au/documents/asx-compliance/cgc-principles-and-recommendations-3rd-edn.pdf

Governance and risk management

As noted above, there is increasing recognition of the intertwined nature of governance and risk management. On the one hand, risk management is a key part of effective governance. On the other, effective risk management is only possible within a well-governed environment. This apparent paradox arises because of the different levels at which risk management occurs: for example risk management at a detailed level might involve establishing specific controls (such as requiring authorisations) and establishing such procedures is clearly part of effective governance. Yet senior management can always override controls, and the culture that management establishes has a highly material influence on the extent to which procedures are followed and hence controls are effective. From this perspective, effective governance is therefore the foundation for effective risk management.

Whilst there are a number of risk management frameworks available, a framework that depicts the relationship between governance and risk management (and which is also one of the most frequently cited) is the Committee of Sponsoring Organisations (COSO) framework, shown in Figure 5. This model makes clear that effective risk management is only possible when multiple elements work together. Culture and leadership (the internal environment), establishing clear goals (objective setting) and effective formal and informal knowledge sharing (information and communication) are just as important to managing risk as the more traditional elements of risk assessment and control activities. The COSO model also makes clear that this approach can be applied to multiple categories of objectives (strategic, operational, reporting and compliance) and can be applied at multiple organisational levels (entity-wide, divisional or single business unit or subsidiary).

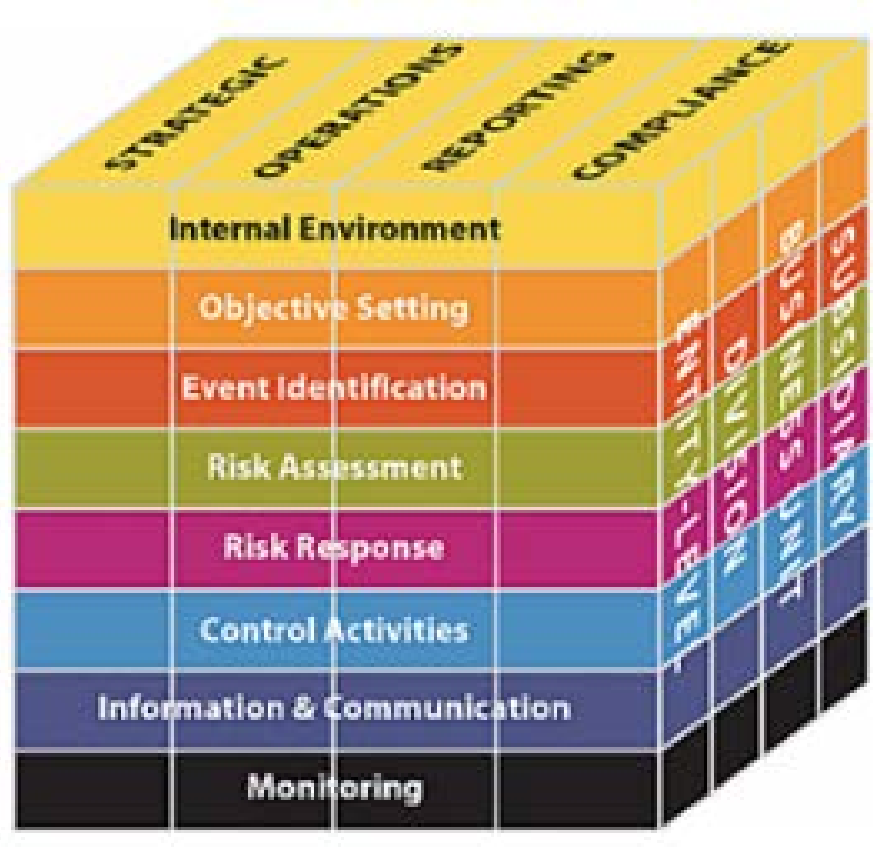


Figure 5. The COSO Enterprise Risk Management Model

A final crucial intersection between governance and risk management is that of adaptation. An enterprise risk management model must be able to quickly respond to new risks that threaten the achievement of organisational objectives. Consequently the tangible outputs of the risk management system (risk registers, control policies and so on) must be continually updated. This philosophy is similar to the 'rapid and iterative development' approach to governance, which also recognises that governance arrangements may become ineffective or even counterproductive as circumstances change.

Performance indicators

Performance indicators are a further key component of governance. Key questions include whether indicators should be aggregated or separate, what indicator framework to adopt and whether indicators should be developed using a top-down or bottom-up approach.

Aggregate indicators are appealing because they provide a simple view of the phenomenon in question against a given benchmark. For example, the ecological footprint aggregates different types of consumption and compares the amount of biologically productive land required to support this consumption with what is actually available in order to determine whether this consumption is 'sustainable'. The disadvantage of this approach is that the weighting and completeness of the underlying components might be criticised; in relation to the ecological footprint it has been pointed out that there are many important dimensions of sustainability that are ignored (such as mercury pollution) and the relative weights of components such as carbon emission have also been criticised.[11] While proponents of the current foot printing model have responded to these criticisms,[12] the point remains that any aggregation process will be contentious.

In terms of the identification of indicators, two important dimensions are content and process. In terms of content, one of the most widely used frameworks is the 'Pressure – State – Response' (PSR) model and its variants. This model extends early work on indicators, which focused almost exclusively on measuring 'states' (eg. levels of pollution) to incorporate 'pressures' (eg. numbers of factories) and 'responses' (eg. pollution licensing). The PSR model has itself been extended; for example the European Environment Agency[13] (1999) added dimensions of 'driving force' and 'impact' to arrive at a 'DPSIR' (Driving-force, Pressure, Status, Impact, and Risk) model, although there is ongoing debate as to the utility of such additions. The PSR approach has been widely adopted in relation to sustainability reporting, and in particularly has informed much State of the Environment reporting both in Australia and overseas. The model has been used both quantitatively (ie. presenting specific measures for each of the PSR dimensions) and qualitatively (ie. using the framework to organise a narrative exploration of a particular sustainability issue).

In addition to indicator content, there have been ongoing discussions regarding the appropriate process. The central debate is between top-down, expert-driven versus bottom-up, community-driven approaches. Both have advantages and disadvantages: expert-driven indictors are likely to have much better scientific grounding and hence a more accurate measurement of what is most important from an ecological perspective (eg. microbe concentration in soil samples). On the other hand, communities are more likely to identify indicators that are most relevant to community concerns (eg. litter). Given that community engagement is crucial to

[11] Fiala, N. (2008) "Measuring sustainability: Why the ecological footprint is bad economics and bad environmental science", *Ecological Economics*, Vol. 67 No. 4, pp. 519-525.
[12] Kitzes, J., Moran, D., Galli, A., Wada, Y. and Wackernagel, M. (2009) "Interpretation and application of the Ecological Footprint: A reply to Fiala (2008)", *Ecological Economics*, Vol. 68 No. 4, pp. 929-930.
[13] European Environment Agency (1999) Environmental indicators: Typology and overview - Technical report No 25/1999, accessed 8 April 2017, available at: http://www.eea.europa.eu/publications/TEC25

most sustainability projects a combination of including community-sourced indicators as well as educating the community as to the relevance of expert-sourced indicators is recommended as the optimum approach.

This section has provided a brief overview of how governance might be conceptualised. In summary, we identify 'governance' as comprising the following elements:

- Clarity of objectives (the 'what')
- Clarity of accountabilities (the 'who')
- Quality of governance mechanisms (the 'how'), including:
    - Legislative authority and formal policies;
    - Risk-based assessment;
    - Resourcing; and
    - Information and monitoring.

The following sections of this report consider these governance elements in relation to the development of the Parramatta River Masterplan.

CLEAR OBJECTIVES

What is the goal?

Understanding what is meant by a swimmable river was a point of discussion in most interviews. To swim in Parramatta River was described as a "fabulous aspiration" by one interviewee and a goal that could enable a range of complementary recreation activities in, on and adjacent to the river as well as improving the water quality and environmental amenity.

The type of swim activation has significant bearing on governance arrangements for the PRCG and the related state and local government agencies. The Parramatta River Swim Activation Framework divides the swimming in Parramatta River proposition into three categories:

1. Natural river swimming – this would be similar to the Chiswick Baths and other Sydney Harbour swim sites
2. Partially treated water river swimming. This could be similar to the Spree Canal in Berlin[14] that relies on ecological treatment to remove some pollutants. This approach carries some health risks and requires ongoing management procedures to protect users (eg. advisory health warnings after heavy rain, such as the Beachwatch/ Harbourwatch system currently applying to ocean and harbour beach sites)
3. Land based swim sites overlooking the river such as Drummoyne Swimming Centre or South Bank, Brisbane that are adjacent to and landscaped within the river precinct and rely on fully treated water filtration systems.

Each of these options has its varying complexities which have been considered in the Swim Activation Report[15] (McGregor Coxall, 2016) from a feasibility, vulnerability and desirability perspective (***Figure 6***). From an

[14] http://www.konbini.com/us/lifestyle/berlin-are-turning-river-spree-into-the-worlds-biggest-swimming-pool/

[15] McGregor Coxall (2016) *Parramatta Swim Activation Framework*. Report prepared for the Parramatta River Catchment Group, November.

operational and management perspective, natural river and treated river water swimming in particular have a greater number of contributing variables that relate to how the catchment is managed now and into the future when compared with traditional land-based swimming pools. Natural river swimming and partially treated river water swimming options require a greater number of agencies to commit and coordinate their activities and programs to address water quality risks from a catchment to site perspective.

In contrast, a land-based swim site would rely on a single, engineered, water treatment system, as used in conventional pools, typically drawing on potable water (but not necessarily) to address health risks and meet NSW Health guidelines for Public Swimming Pools.[16] The governance issues around this option would be similar to the management of the public pools that have been the domain of local government for many years.

Various examples of recreational swimming in and adjacent to rivers were provided by participants, most notably the Street Beach and Boat Pool as part of the South Bank precinct in Brisbane.[17] A number of participants suggested the South Bank, Brisbane, example as a lower risk proposition for the PRCG that would be particularly relevant for the upper reaches of the river including Parramatta CBD and Parramatta Park. This option could rely on an engineering water filtration plant drawing from either the river or potable supply and be designed and operated to enhance community access to and connection to the river as part of a broader strategy to increase the desirability of swimming in Parramatta River.

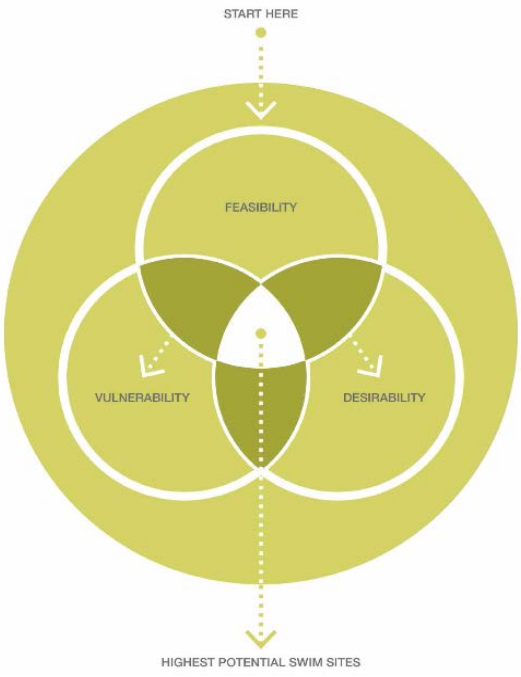


Figure 6. Conceptual decision making framework for Parramatta Swim Activation[18]

Issues of feasibility and vulnerability within the conceptual decision making framework for Parramatta River Swim Site Activation were seen by participants as particularly relevant from a governance perspective. The

[16] Health Protection NSW (2013) Public swimming pool and spa pool advisory document, Sydney, April. Available at: http://www.health.nsw.gov.au/environment/Publications/swimming-pool-and-spa-advisory-doc.pdf (accessed 27 July 2017)
[17] http://www.visitbrisbane.com.au/south-bank/things-to-do/swimming-at-south-bank?sc_lang=en-au
[18] McGregor Coxall (2016) Parramatta Swim Activation Framework. Report prepared for the Parramatta River Catchment Group, November

major governance issues associated with the criteria related to feasibility and vulnerability are summarised in ***Table 2*** below.

From the analysis of the feasibility and vulnerability issues, water quality emerged as having the most significant governance issues with respect to the governance themes of control and complexity. For this reason, it is suggested that a centralised water authority might provide the best opportunity for the coordination of catchment and in-river activities with respect to water management.

There are many options to support greater integration and coordination between organisations, ranging from the government assigning responsibility to an existing agency or state government department (see Recommendation 2) through to the creation of a State-led advisory committee and enabling legislation as proposed for the Yarra River.[19] From a governance perspective, the critical success factors for a central agency is that it is has the necessary support, powers and funding to enact change. These elements do not necessarily have to be legislated; what is critical is that all stakeholders must support this reform agenda and commit to working cooperatively and collectively (Recommendation 7).

During discussions on the swim options, the most commonly raised governance theme was the need for a water and catchment monitoring program and protocols for the dissemination of information. These two elements were considered to be key to an effective risk management strategy (also discussed in the "Monitoring" section).

For in-river swimming, interviewees referenced the need for water to meet the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*[20] (ANZECC Guidelines) and NSW Water Quality Objectives[21] and follow the steps as outlined in the NSW Steps for Decision Making (***Figure 7***). The PRCG already has these guidelines clearly in focus and has already completed a number of the Steps as part of the technical studies: the environmental value and human use has been articulated for Parramatta River (step 1); the mission of the PRCG has set in-train the water quality objectives (step 2); project levels are currently being defined as part of the swim activation process (step 3); waterway issues and risks are currently being considered as part of the development of the Masterplan (step 4); physical and community indicators have been identified through the water quality monitoring studies and ecological health studies (step 5); and trigger values will need to be established following commitment to the site activation plans, and will be informed by water quality modelling and monitoring (step 6).

[19] State of Victoria Department of Environment, Land, Water and Planning (2017) Yarra River Action Plan. Refer to: https://www.planning.vic.gov.au/policy-and-strategy/waterways-planning/yarra-river-protection
[20] http://www.environment.gov.au/about-us/publications/archive#water
[21] http://www.environment.nsw.gov.au/water/usinganzeccandwqos.htm; http://www.environment.nsw.gov.au/resources/water/anzeccandwqos06290.pdf

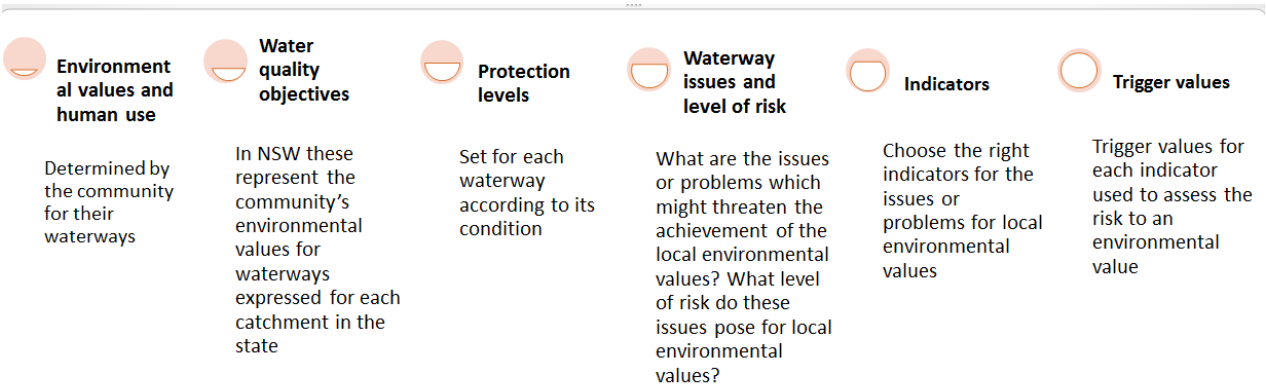


Figure 7. Steps in decision making for a healthy waterway – using the ANZECC Guidelines and Water Quality Objectives in NSW[22]

Table 2. Assessment of governance issues impacting on site feasibility and vulnerability for in river or partially treated river water

Site activation	Elements	Key governance issues	Control	Complexity
Feasibility	Boat traffic	Greater control for public boat traffic (Roads & Maritime Services) Low control for private boat traffic	○	●
	Water quality	Low control over diffuse water pollution (major risk) from multiple sources High control over point source pollution sources	○	●
	Bathymetry	Impacted by geomorphic and anthropocentric processes	○	●
	Publically accessible land	Typically one agency (local government or Crown) but approval to operate may require multiple parties	○	●
Vulnerability	Water quality	Low control over diffuse water pollution (major risk) from multiple sources High control over point source pollution sources	○	●
	Water clarity	Highly impacted by rain affecting primarily diffuse water pollution (sediment runoff) but also wet weather sewer overflows	○	●
	River dynamics	Impacted by geomorphic and additional flow generated by stormwater system during heavy rain	○	●
	River bed physical hazards	Impacted by geomorphic processes and debris deposited during and after major rain events	○	●
	River sediment type and quality	Legacy sediment quality presents long term issues for removal. Avoid contaminated sites	○	●

[22] http://www.environment.nsw.gov.au/water/usinganzeccandwqos.htm

	River bank and river edge characteristics	Impacted by geomorphic processes, vegetation and user impacts		
	Heritage	Management by local government and state agencies with opportunities to enhance heritage attributes		

Evaluation Key

Control		Complexity	
High – one agency		**High** - multiple factors contributing to risk or hazard with minority being able to be regulated	
Medium – 2 -3 agencies		**Medium** – many factors impacting on risk or hazard with majority being able to be effectively regulated	
Low - > 3 agencies		**Low** – binary (1) factor impacting on risk or hazard	

Conceptual designs for 3 options

Concept designs are an effective means to engage stakeholders as to what is feasible, how various options can address general and specific site vulnerabilities and how they may meet community and other stakeholder expectations or desires. Concept designs can also provide a mechanism through which options can be further explored from a risk basis and provide indicative capital and maintenance costs that will be of direct relevance to the land management agencies, in this case three local councils, as part of future capital works and budget planning.

Figure 8 illustrates three different options for the activation of swim sites along the Parramatta River developed by McGregor Coxall. These have been informed by the Swim Activation report (McGregor Coxall, 2016). Specific water quality treatments vary between the three sites from no treatment (for the natural swimming proposal for Silverwater Park) to a wetland based treatment system for Kissing Point Park. The need for treatment has been informed by the recently completed Water Quality Monitoring study that has revealed many parts of the Parramatta River are already meeting swimming water quality standards (or are expected to) most of the time.

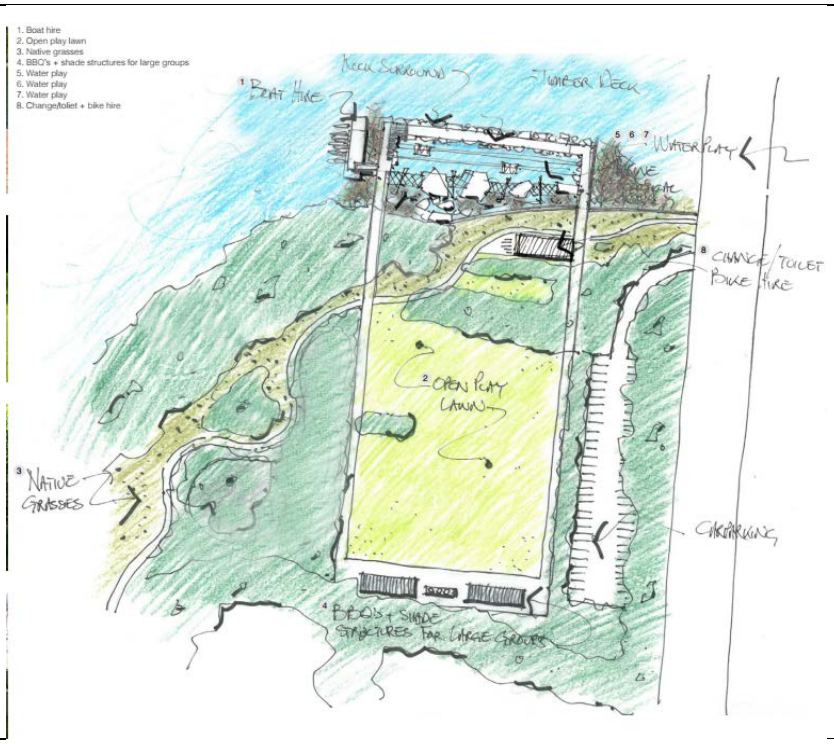
Silverwater Park

Natural river pool swim site

No water quality treatment

Strong emphasis on splash based contact with River outside pool area

Activation includes supporting amenities



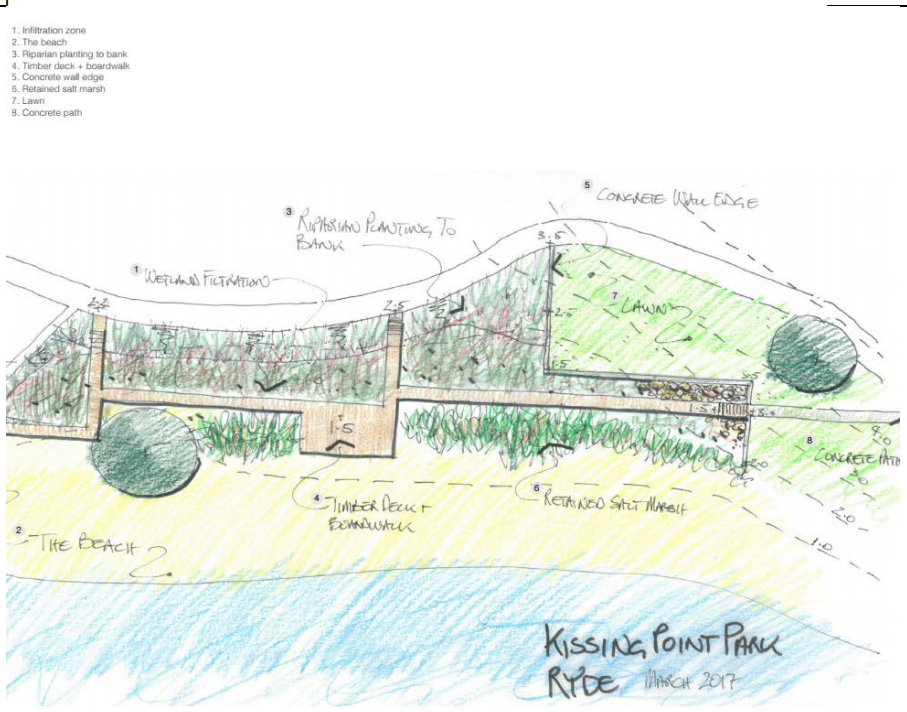
Kissing Point Park

Natural river beach swim site

Park area and beach separated by concrete wall

Wetland installed to treat stormwater drainage discharging

Retention and creation of riparian vegetation (salt marsh) vegetation community



Brays Bay

Enclosed river pool
River water treated through series of natural vegetation structures
Integrated land based amenities within park
On-river recreation supported through boat access

Figure 8. Concepts for three swim activation sites[23]

[23] McGregor Coxall (2016) *Parramatta Swim Activation Framework*. Report prepared for the Parramatta River Catchment Group, November.

1. Silverwater Park

This site relies on water quality of the Parramatta River meeting current primary contact standards. This option may operate as an overwater adventure play area with minimal water contact, or as a more traditional beach or swimming pool. In the short to long term it will rely on catchment based policy and actions to maintain (at least) or improve urban runoff given that increased development within the catchment is likely to result in greater runoff and potentially more pollutants. Site governance responsibility would rest with City of Parramatta Council with opportunities to work directly with the Greater Sydney Commission to integrate design features and planning controls in the immediate catchment area as part of the Greater Parramatta and Olympic Park Precinct.

2. Kissing Point Park

This site is affected by a stormwater drainage outlet within the site that plays a critical role addressing a local flooding issue. As noted in the PRCG Water Quality technical report, international studies have demonstrated that relatively small drains can lead to localised high levels of faecal indicator bacteria at enclosed beaches.[24] From a governance perspective, ensuring that stormwater quality treatment devices are installed within and at the end of the catchment, as part of a treatment train, should be a priority for City of Ryde Council if this site is to proceed. Catchment based policy solutions should also be tailored by the council to link site discharge water quality to the swimmability goal and standards.[25]

3. Brays Bay

This site within the City of Canada Bay is a site that can be integrated with current strategic land use planning being undertaken by the Department of Planning and Environment and the council. The concept design for this site will rely on treatment of water through a wetland or similar biofiltration system integrated within the design. This option still requires the water quality of the Parramatta River to be of a sufficiently high standard to enable the biofiltration system to do the necessary cleaning or polishing of water for the swim site. As a natural treatment system this brings with it additional governance and risk issues related to public expectations and performance of the system to meet the necessary goals. As a system designed around vegetation to perform a filtering function it is also likely to attract water birds which, ironically, have been identified by the PRCG water quality modelling study to be significant contributors to faecal coliform and other bacterial concerns. This represents a design and maintenance dilemma for natural filtration systems that perform both a health (water quality) and ecological (habitat) function.

[24] Rippy M A, Stein R, Sanders B F, Davis K, McLaughlin K, Skinner J F, Kappeler J, Grant S B.(2014) Small drains, big problems: the impact of dry weather runoff on shoreline water quality at enclosed beaches. *Environmental Science and Technology*. 48(24):14168-77.

[25] Askarizabeh, A et al (2017) From Rain tanks to catchments: Use of low-impact development to address hydrologic symptoms of the urban stream syndrome. *Environmental Science and Technology*. 49(19), 11,264–11,280.

CLEAR ACCOUNTABILITIES

The current governance of water, waterways, catchment areas and land adjacent to waterways is complex, confusing and inconsistent. The answer to the question 'who is responsible?' for achieving a swimmable river is either: no one agency, or many agencies, to some extent. Governance is about establishing responsibilities and frameworks to achieve an outcome – in this case, swimming in the Parramatta River by 2025. It is important to recognise that the governance structure developed to underpin delivery of the PRCG Masterplan depends on the specific 2025 'swimmability' target and how this is to be measured, reported and who is assigned responsibility. From the interviews conducted there are a number of issues that remain unclear.

Who is responsible for water quality?

While this is clearly a vexed issue, from the interviews it seems that Sydney Water is generally regarded as the 'guardian of the waterways', despite the corporation not having legislative authority over waterways (excepting its trunk drainage assets). Sydney Water undertakes significant works associated with its wastewater overflow abatement program to reduce discharges into waterways in line with the requirements of the Environment Protection Authority (EPA) licensing arrangements for waterway health.[26] Its corporate strategy identifies improvement in waterway health as a key element of its business strategy. It is an active member of the PRCG and publishes public information/ education material on waterway management.[27]

The majority of water pollution within the Parramatta River is currently due to diffuse urban runoff sources (metals runoff, bacterial /pathogen load runoff). Sewer overflows also contribute, but are less significant. In this respect local government, as managers of the catchment and diffuse source pollutant loads, are responsible for water quality, as is the NSW Office of Environment and Heritage, which has carriage of the NSW diffuse water pollution strategy.

Previous catchment activities, specifically unregulated or poorly regulated industry, has left a legacy of contaminated sediments in certain parts of the river. These "legacy" pollutants (with those companies responsible long departed), the responsibility for clean-up would fall to the NSW EPA. Current technology to remediate in-river sediments is expensive and is also likely to cause additional pollution as a result of the mobilisation of contamination.

From a catchment management perspective and as highlighted in the 2017 Metropolitan Water Plan,[28] coordination between (and within) government agencies and between state and local government is a particular challenge. The challenges of coordination, clarity of a target and defining responsibilities and accountabilities were central themes within interviews with state agency staff and the workshop with local government representatives. The governance task for the PRCG, therefore, should not be underestimated nor seen as a 'new' undertaking. There exist deep structural and institutional challenges to reforming organisational practices requiring more than the good will of individual staff, such as those represented on the PRCG committees.

In the interviews conducted as part of this Governance Review, there was overwhelming support from state and local government respondents for the vision of a swimmable Parramatta River. However, this support was

[26] Port C, Garofalow F, Cassidy M, Abulafia N, Chen T & Cantrell C, A Risk-based approach for management and regulation of wet-weather overflows. *Current: The Australian Water Association Magazine* August 2016 p78.

[27] https://www.sydneywater.com.au/web/groups/publicwebcontent/documents/document/zgrf/mdgz/~edisp/dd_083395.pdf (accessed 27 July 2017)

[28] https://www.metrowater.nsw.gov.au/2017-metropolitan-water-plan (accessed 27 July 2017)

moderated by phrases such as "aspiration goal" and "it may be possible …". On the question of responsibility, one interviewee expressed it this way: "everyone and nobody has responsibility for water quality". Another described the governance of water and catchment management as a "tragedy of the commons" and when asked who has overall responsibility, the response was often "I don't know". Herein lies the major governance issue.

State agency staff and local government practitioners were generally able to identify who is directly responsible for certain parts of the urban water system. For example, Sydney Water has responsibility for water and wastewater services. The Environment Protection Authority (EPA) is responsible (under the *Pollution of the Environment Operations Act 1997*) for the regulation of water pollution from scheduled premises, although regulation for minor water pollution offences (Tier 3 fines or penalty notices) can be issued by councils. From a regulatory perspective, some interviewees asked why the local government sector had not undertaken a strong and consistent coordination role in the regulation of water quality. The answer to this suggestion offered by some respondents was that there were too many councils with different priorities and standards. This then suggests the potential for a greater role for the EPA, although it too has resourcing and thus priority constraints. Previously the NSW EPA led the Stormwater Trust that invested considerable time and resources into addressing diffuse source water pollution involving the preparation of stormwater management plans, funding priority issues and capacity building. The long-term effectiveness of this investment has been questioned by some and underscores the dilemma faced in coordination effective and sustained action on stormwater reforms. Notably, however, the EPA signed a Statement of Joint Intent with the PRCG in February 2016 to pursue and develop a number of areas of cooperation for the benefit of both parties.[29] An example of this collaboration is the *Get the Site Right* campaign targeting construction sites around the Parramatta River for sediment and erosion control compliance.[30]

The certainty of responsibility becomes less clear with respect to stormwater. This is shared between Sydney Water (largely but not exclusively the trunk drainage) and local government (mostly the distributed system), although other agencies such as Roads and Maritime Services (RMS) have ownership as a consequence of historical happenstance. The Office of Environment and Heritage (OEH) was mentioned as the agency having the strategic role in directing actions to reduce diffuse source water pollution (*NSW Diffuse Source Water Pollution Strategy*[31]). However, as noted by many participants, the strategy has lapsed as a strategic priority or, as described by one interviewee, it is a policy that "has slipped through the cracks". For a summary of agencies and others with the capacity to 'control' diffuse source pollution see ***Figure 9*** below.

Strategic land use planning and development approvals were seen primarily as the responsibility of local government although it was noted that this is becoming increasingly blurred with respect to recent changes to the *Environmental Planning and Assessment Act 1979* (EP&A Act). Specifically the NSW Government has used urban activation precincts or priority growth areas to support a specific and greater density of development outcomes for certain locations, such as Wentworth Point within the Sydney Olympic Park precinct. Under

[29] Areas of cooperation include: provision of technical advice and interpretation of monitoring data; Contribution of technical expertise in relation to monitoring, development of baseline data and reporting requirements; Development of measurable baseline and reporting characteristics to provide a high level of confidence that the ultimate goal of "swimmability" for the Parramatta River has been achieved; Work collaboratively on reducing the litter load on the Parramatta River using joint regulatory and education campaigns and disseminating information about the progress and achievements of the Our Living River campaign to the community; Work collaboratively on reducing pollutant loads from licensed and unlicensed facilities on the Parramatta River, including from sewage overflows, using joint regulatory and education campaigns; Provision of technical and historic advice on contaminated sites issues along the Parramatta River foreshore to inform the appropriate selection of healthy swimming sites and access points.

[30] http://www.ourlivingriver.com.au/regulation (accessed 27 July 2017)

[31] http://www.environment.nsw.gov.au/water/dswp.htm (accessed 27 July 2017)

these planning arrangements, the Department of Planning and Environment is the designated planning authority (not local government).

Figure 9. 'Controls' over diffuse source pollution

The formation of the Greater Sydney Commission in 2015 has also reinvigorated a focus on strategic planning by the NSW Government. The draft district plans will directly inform the shape of local land use planning instruments (local environment plans, LEPs). Enforcement of local land use policies and conditions of consent for specific activities were seen by interviewees as a function traditionally and firmly sitting with local government, however this grip is loosening. This is due to a combination of three factors: the increasing role of private certifiers rather than council as the principal certifying authority to ensure conditions of consent have been met prior to issuing of an occupation certificate; a shift to more exempt and complying development activities with a subsequent rise in codifying development standards; and fewer resources prioritised by councils to be directed to the regulation of laws and local policies.

The roles and responsibilities of the Roads and Maritime Service (RMS) were rarely mentioned as during the interviews conducted for this governance review. When the RMS was raised, comments were mostly directed to its role in relation to the management of stormwater runoff from major roads (eg. via the construction and maintenance of pollution control devices). In relation to waterway responsibilities, interview participants did not raise the RMS or acknowledge its role. The role of the RMS is a question that requires attention by the PRCG, including how it can use its technical group and other committees to identify and resolve any issues that may arise as part of future structures or activities that may affect the Parramatta River and estuary.

Sewer or stormwater?

Water quality and swimmability were seen as conflated issues by participants and also contestable as to who has responsibility, including proportional responsibility. The activity of assigning responsibility and in turn accountability for particular actions to address causes is a major failing of past and current catchment plans.[32]

Two notable issues arose from the interviews and the local government workshop that underscore the need to resolve the coordination dilemma as to who is responsible (to fund and deliver programs) and accountable (when things go wrong). First was a higher level binary question of which is the major contributor to water quality problems – stormwater or sewage. Second was the question of attributing responsibility to those contributing to water quality issues. Other questions included who owns or manages the land or asset, who has assumed responsibility (often by default), what is the role of government (by this was meant, which part of government?) or how to address impacts arising from activity on private land.

The question of accountability and responsibility was particularly evident around questions related to water quality. This became an abridged focus on the relative contribution of stormwater or sewage to the water quality of the Parramatta River. Responses to this issue were clearly divided. Sydney Water, being responsible for the wastewater system, pointed to local government and urban runoff as the major contributor and the barrier to achieving a swimmable Parramatta River by 2025. This view was also shared by most state agency government staff who were interviewed. Reasons for this included a lack of adequate development controls related to the management of runoff from private land and a traditional or 'institutional lock' on stormwater management that remains focused on flood protection rather than contemporary integrated water management principles. Local government, the primary agency responsible for stormwater, pointed to wet and dry weather sewer overflows as the contributor to the health related pollution (bacteria) load.

The evidence identifies "stormwater pollution [as] the major threat to the ecological integrity of Sydney Harbour [which] threatens the multiple social, environmental and economic benefits that this iconic waterway provides".[33] This is supported by the current water quality modelling research project undertaken by the PRCG, which has also found much of the dry weather bacterial load is attributable to domestic animals and water birds (not dry weather leaks from the sewerage system).

That the evidence finds stormwater is (now) the major threat to the quality of the Parramatta River reflects both the success and shortcomings of past programs, policies and funding initiatives. To date the most successful water quality and catchment policies and programs have focused on targeted sites and or specific point source pollutants (see summary of controls over point source sewage pollution in ***Figure 10*** below). Since the 1970s and the introduction of the *Clean Waters Act* gains were primarily made through the regulation of water pollution (environment pollution licensing) by the State Pollution Control Commission (now the EPA). This largely stopped the ongoing and cumulative input of pollutants from industry that had previously disposed of solid and liquid wastes directly to the Parramatta River and its tributaries (note, however, that legacy contamination within sediments remains an issue).

More recently, significant investment by the NSW Government and Sydney Water has been directed to reducing wet and dry weather sewer overflows to the Parramatta River, Sydney Harbour and tributaries. This investment has led to improvements in water quality and reductions in pollution loads. What is less certain is whether these initiatives have had an impact on the water quality within the upper reaches of the Parramatta

[32] Davies, P and Wright, I. (2014) "A review of policy, legal, land use and social change in the management of urban water resources in Sydney, Australia: a brief reflection of challenges and lessons from the last 200 years" *Land Use Policy* 36, 450-460.
[33] Local Land Service (2015) Sydney Harbour Water Quality Improvement Plan. Published June 2015 p ii.

River estuary, as there is little spatial and temporal water quality monitoring. This was a key finding of the review by Khan and Byrnes[34] and points to a clear opportunity for the PRCG with respect to its future governance models.

Controls over sewer ('wastewater') overflows

Sydney Water: owns and operates Sydney's sewerage infrastructure. Maintenance and operating standards can reduce the number and impact of overflows. The system is very complex and highly regulated. Overflows of sewage into the environment are licensed and regulated by the NSW Environment Protection Authority under the *Pollution of the Environment Operations Act 1997* (POEO Act). Sydney Water continuously monitors its system and regularly publishes water quality reports on its website.

Environment Protection Authority: regulates Sydney Water under the POEO Act. Sydney Water's sewage treatment plants and systems are licensed and heavily regulated to protect the environment. Pollution incidents must be reported to the EPA and the EPA can issue clean-up notices and issue fines for water pollution. The EPA can impose Pollution Reduction Programs on licensees, including Sydney Water.

Figure 10. 'Controls' over point source sewage pollution

From a catchment perspective, programs directed at improving the quality of stormwater runoff have been less successful. In part this is due to the diffuse nature of stormwater pollution, requiring many treatment systems across the catchment. It is also due to the 'value' of treating stormwater not being universally accepted. As one interviewee stated, "there needs to be a change in the perception of a river and riparian corridor as a [social and environmental] asset." Many respondents identified a lack of monitoring, particularly by local government, to assess the effectiveness of various WSUD strategies. This has meant there is no feedback loop to evaluate and thus improve the performance of stormwater pollution infrastructure, for example, including how this is maintained. Presently councils and others rely on stormwater quality improvement models to predict a reduction in pollutants related to certain WSUD treatments. In practice, far less is known as to their actual efficacy.

[34] Byrnes, K. and Khan, S. (2016) *Strategic analysis of water quality in the Parramatta River: Technical Analysis Report*. Prepared for the Parramatta River Catchment Group. Final Report 5 December 2016

The diffuse nature of pollutants related to stormwater has strong parallels with respect to the widely distributed ownership and management of the various stormwater assets. This is largely a consequence of history with Sydney Water (generally) responsible for trunk drainage and local government for the distributed network. There are however other agencies with varying responsibilities. This is illustrated by the ownership of parts of Hawthorne Canal (***Figure 11***), noting that beyond the canal private land ownership further complicates any apportionment of responsibility and accountability. The Hawthorne Canal example serves to emphasise that seeking to attribute responsibility tied to proportional land ownership or contribution of pollution will only perpetuate disagreement and tension . Rather, this example should be used as evidence for a new governance framework that can resolve the coordination and responsibility impasse.

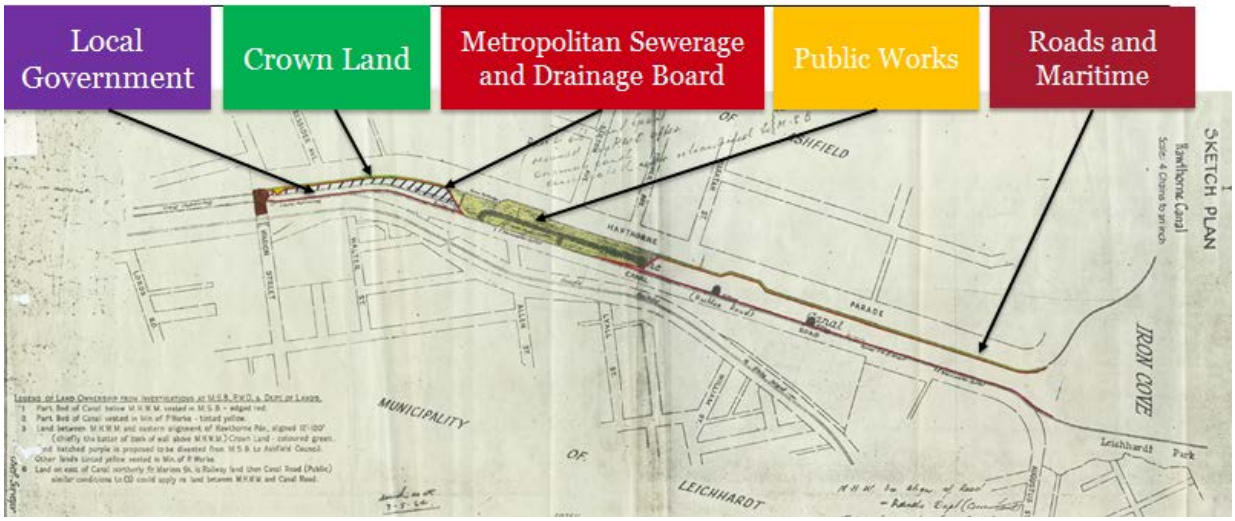


Figure 11. Land and stormwater assets ownership along parts of Hawthorne Canal
(base image provided by PRCG)

Who should take the lead?

Regarding who could or should take an overarching coordination role for urban water management, there was a diversity of opinions (***Figure 12***). Some interviewees suggested the Greater Sydney Local Land Service (LLS) should assume the coordinating role as this was the responsibility of its predecessor, the Sydney Metropolitan Catchment Management Authority (CMA). It was noted however that the Greater Sydney LLS does not have the same legislative direction as the former CMA, has limited funding and seems increasingly focused on primary production and environmental issues at the urban/peri-urban interface rather than catchment issues related to urban areas. From the PRCG's perspective, the LLS withdrew as a financial member in 2016. This perhaps reinforces its shift away from integrated catchment management as a priority, and likely its resourcing capacity to be a catchment 'leader'.

Interviewees also suggested the Greater Sydney Commission as a potential coordinator, adding to its many other responsibilities for land use planning. This is not part of its legislative mandate, although the GSC recognises it can provide an "adjunct role" to "reconnect people to the river" through its plans and design outcomes. As noted by one interviewee, the GSC could build on, or at least provide the planning vision, for the community's "imagination and aspiration" for a swimmable river even if this vision was described as a "nostalgic" objective. If the GSC were to undertake a larger and coordinating role as a catchment agency, it would have to do so within its three pillars (ensuring Sydney is productive, liveable and sustainable), which may not always prioritise, or be perceived as prioritising, catchment outcomes.

Sydney Water Corporation (SWC) was another likely contender to assume responsibility for overarching coordination. As noted by SWC staff in the interview, IPART in its 2016 pricing determination made it explicitly clear that it cannot fund liveability initiatives as this is outside its core regulatory responsibilities (refer to section 'Sydney Water's Liveability initiatives' below).

While not mentioned by interviewees, the Metropolitan Water Directorate could be a fourth agency, adding to its existing responsibility for the coordination of the Metropolitan Water Plan. The Metropolitan Water Directorate is not a member of the PRCG. As one interviewee commented, the future of this directorate may be limited as it has recently delivered the next 10 year water plan for Sydney.

The Office of Environment and Heritage (OEH) has responsibility for diffuse source water pollution and has in the past worked collaboratively with the EPA to regulate (through pollution reduction programs and related orders) activities to address catchment issues. The EPA is working collaboratively with the PRCG and local councils to monitor and enforce environmental compliance on building sites along the Parramatta River (the *Get the Site Right* taskforce[35]).

The Department of Premier and Cabinet may be another option through which to drive the objectives of the PRCG. This would require the swimmability goal to become a "Premier's priority" and thus action would be delivered through the Premier's Implementation Unit within the Department of Premier and Cabinet. As noted in the interviews and discussion with the PRCG group members, the swim in Parramatta River goal is neither listed as state priority nor has been explicitly championed by the Minister for Western Sydney.

Notwithstanding the views as to who should or could adopt a coordinating governance role, the challenge must recognise that the current framework, as described by one interviewee, is "a mess."

[35] https://www.medianet.com.au/releases/119147/ (accessed 27 July 2017)

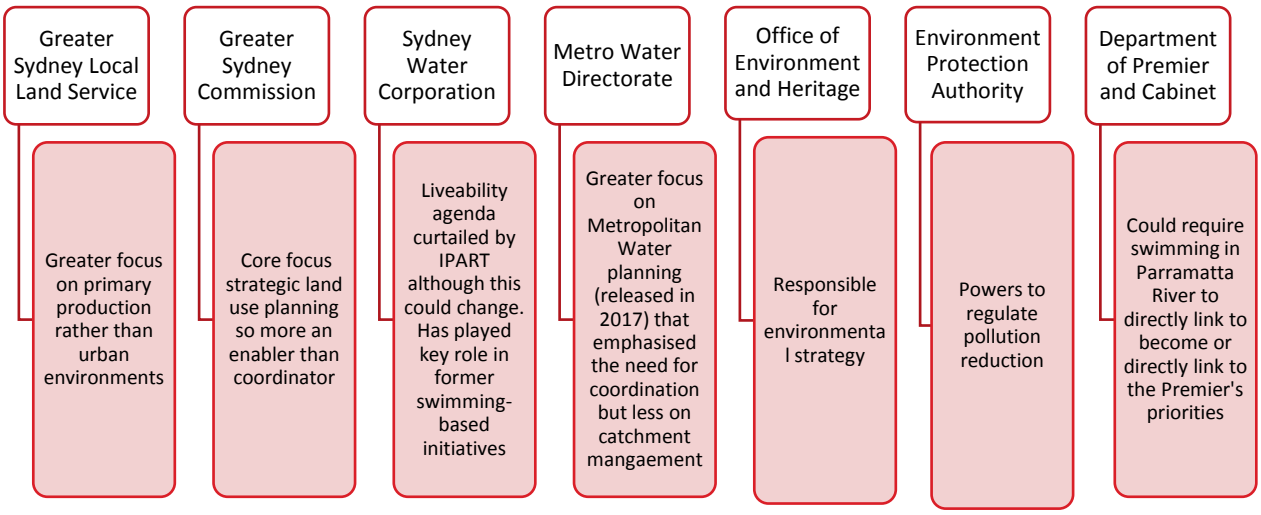


Figure 12. Summary of government departments or agencies suggested by interviewees as having a possible formal, lead coordinating role

Role of the PRCG

Part of our project brief was to consider the ongoing role of the PRCG. In this Report, a precise specification is premature, particularly given the need for further clarity in relation to the operationalisation of the 'swimmability' objective and the identification of a formal lead agency. Nevertheless, interviewees indicated that the PRCG has played a vital role in advancing the swimmability agenda and that there are a number of possible roles for the PRCG going forward.

Key areas for the PRCG include aspects already within its explicit remit, such as advocacy and funding. Other potential roles that could build on other aspects of this report include WSUD policy co-ordination; risk management implementation; and monitoring. From a governance perspective, we also emphasise the critical role of fostering the 'informal' network as well as more formal governance accountabilities. Creating opportunities for networking and interaction outside formal channels – eg. inter-agency workshops, discussion forums and events – is also a crucial part of effective coordination and knowledge exchange. As part of our review we note that the current role of the PRCG has moved beyond that reflected in the PRCG Memorandum of Understanding, and recommend that this MoU be updated as the next phase of the PRCG role is determined.

Sydney Water's 'liveability' initiatives

Sydney Water Corporation is regulated by the Independent Pricing and Regulatory Tribunal (IPART) by two instruments: the Sydney Water Corporation Operating Licence; and the Pricing Determination. IPART is a significant stakeholder due to its decision making role in the prices Sydney Water Corporation is able to charge its customers. IPART makes its Pricing Determination every four years based on its assessment of Sydney Water Corporation's capital and operating costs.

If the PRCG is looking to Sydney Water Corporation to step in to support and fund initiatives around the swimmability mission, this would require an investment beyond the budget that Sydney Water Corporation is authorised to spend. For example, reducing wet weather overflows from the sewerage system, beyond programs required by the EPA, or constructing stormwater improvement projects outside of declared catchments, would require additional capital, maintenance or program funding, or a combination of these.

It is instructive to consider how IPART decides what it will allow Sydney Water Corporation to include in the prices it charges customers. If the NSW Government regulates a certain standard of environmental performance (for example, if the EPA requires Sydney Water Corporation to upgrade its network to reduce wet weather sewerage system overflows) , IPART will consider this an operating or capital cost Sydney Water Corporation must incur to meet its regulatory obligations. If there is a strategy or aspiration to aim for higher standards (for example, water quality standards to improve liveability or sustainability), then IPART may take this into account in determining Sydney Water Corporation's pricing. However, IPART would require clear evidence that it would be "prudent and efficient" for customers to pay for this:

> [T]o the extent that the objectives of liveability are reflected in the broader social and environmental regulatory framework created by Parliament, the government, and its expert environmental and social regulators (eg, EPA, Department of Planning and Environment, DPI Water), on behalf of the community. IPART would consider, and could allow, expenditure proposals to achieve standards higher than those mandated by Parliament and/or government. In such a case, IPART would require clear evidence that it would be prudent and efficient for customers to pay to exceed the mandated standards. For instance, IPART would consider:
>
> 1. Whether the proposal would fit best with Sydney Water's responsibilities or whether it would fit best with another party or parties' responsibilities such as another arm of government or local government.
> 2. Whether the issue has been considered by government and/or Parliament when setting the existing standard or regulatory requirements and whether the facts around the issue have changed since that time.
> 3. Whether Sydney Water's customers have both the capacity and willingness to pay more to realise the higher standard.
>
> Proponents would need to provide evidence for IPART to consider in forming a judgement on whether Sydney Water's customers have the capacity and willingness to pay the higher prices required to meet the higher standard. … Stakeholders will continue to have opportunities to express their views and provide supporting evidence on liveability issues with the relevant agencies and for Parliament and/or government to consider whether the relevant regulatory standards need to be adjusted. If the relevant standards are adjusted, we would then reflect the prudent and efficient expenditure of meeting the new standard in setting maximum prices at the next price review.[36]

[36] IPART *Review of Prices for Sydney Water Corporation*, June 2016, pp 36-37.

It is recommended that the PRCG engage with Sydney Water Corporation to ascertain how the PRCG and other agencies might be able to assist Sydney Water Corporation in making the case to IPART to consider additional funding (in the next pricing determination). In the PRCG Strategic Plan 2016-18 there is an action towards developing the Parramatta River Masterplan to "undertake specific community research on preferences and willingness to pay for potential options that could be canvassed within the Master Plan and connect these to possible funding mechanisms". It would be worth considering if the PRCG and Sydney Water might work collaboratively on this community research with a view to demonstrating customer "willingness to pay" as an input to IPART's next pricing determination.

REVIEW OF GOVERNANCE MECHANISMS

Planning frameworks

The legal and policy framework for planning in NSW is working towards vertical policy alignment (***Figure 13***). This involves cascading from objectives articulated in the State Plan[37] and the Premier's Priorities[38] through to the operations of NSW Government departments, agencies and local government. Various laws, regulations, plans and policies affect decisions about land and water resources. This section provides a brief overview of the vertical framework of land-use planning, from the State Plan to the primary piece of land use planning and development control legislation, the *Environmental Planning and Assessment Act 1979* (EP&A Act). It then broadens horizontally, identifying and explaining the other issues affecting the governance of land and water management affecting the Parramatta River catchment.

State Plan

As stated, the NSW State Government is working towards a vertically integrated legal and policy framework cascading from the State Plan, which sets the priorities for all government operations including local government. The current State Plan includes 12 'Premier's priorities' of which the most relevant is keeping our environment clean via a target to reduce the volume of litter by 40% by 2020. From a swim site activation perspective, litter is an aesthetic pollutant that can detract from the desirability of a site. Outside this priority, there is little in the way of direct priorities through the apex plan of the state to support a liveable river.

Figure 13. Vertical integration of State planning to local government controls

[37] NSW Government, (2016) NSW 2021 A plan to make NSW Number one. Available at: http://www.ipc.nsw.gov.au/sites/default/files/file_manager/NSW2021_WEBVERSION.pdf (accessed 27 July 2017)

[38] NSW Government (2016) Premier's priorities in action. Available at https://www.nsw.gov.au/premiers-priorities.

Land use planning

From a land use and catchment management perspective, the *Environmental Planning and Assessment Act 1979* (EP&A Act) is the primary law that can influence both strategic and day to day actions that directly and indirectly impact on the health of the Parramatta River. The EP&A Act supports multiple land-use decision-making processes in two main categories: strategic planning at various spatial scales; and controls over development, most commonly as individual projects.

The EP&A Act enables decision-making at the state, regional and local levels. The EP&A Act does not operate in isolation and links with many other statutes, plans and policies. The EP&A Act is administered by the Department of Planning and Environment, including the making of land-use plans. Changes to land use and environmental planning, policy and jurisdictions have been constant for many years and this continues, as evidenced by the ongoing review of the Act.[39]

In 2015 the Greater Sydney Commission was created under the Greater Sydney Commission (GSC) Act 2015. This has placed a much greater emphasis on strategic land use planning for Sydney that has direct links to metropolitan and local planning through the EP&A Act (as discussed below).

The Department of Planning and Environment is also in the process of reviewing all State Environmental Planning Policies (SEPPs). The draft Vegetation SEPP will replace SEPP 19 Bushland in Urban Areas and will have a direct impact on land management, biodiversity and vegetation clearing.[40] Similarly, coastal management reforms are under review and the proposed Coastal Management SEPP is foreshadowed to guide development close to the Parramatta River estuary, especially around areas of high environmental sensitivity.[41]

OBJECTS OF THE GREATER SYDNEY COMMISSION

(a) to lead metropolitan planning for the Greater Sydney Region,

(b) to promote orderly development in the Greater Sydney Region, integrating social, economic and environmental considerations with regard to the principles of ecologically sustainable development contained in section 6 (2) of the Protection of the Environment Administration Act 1991,

(c) to promote the alignment of Government infrastructure decision-making with land use planning,

(d) to promote the supply of housing, including affordable housing,

(e) to encourage development that is resilient and takes into account natural hazards,

(f) to support ongoing improvement in productivity, liveability and environmental quality,

(g) to provide increased opportunity for public involvement and participation in environmental planning and assessment in the

[39] Ruming and Davies 2015; also refer to http://www.planning.nsw.gov.au/Policy-and-Legislation/Under-review-and-new-Policy-and-Legislation/Legislative-Updates-to-the-Environmental-Planning-and-Assessment-Act

[40] Refer to Department of Planning and Environment web site: http://www.planning.nsw.gov.au/Policy-and-Legislation/State-Environmental-Planning-Policies-Review/Draft-Vegetation-SEPP

[41] Refer to the Department of Planning and Environment Coastal Reforms Planning portal. http://www.planning.nsw.gov.au/Policy-and-Legislation/Coastal-Reforms

District and local planning

The Greater Sydney Commission (GSC) has prepared six draft District Plans. Three of the six plans are relevant to the Parramatta River catchment including the West Central Plan[42], Central[43] and North.[44] All draft plans are underpinned by the aim of creating Sydney as a productive, liveable and sustainable city and are due for finalisation in 2017. *A* schema for the implementation of draft District Plans is summarised in ***Figure 14***.

The governance systems created under the GSC Act 2015 are based on a sustainability framework, with three commissioners assigned responsibility for environment, economic and social functions, respectively.

The membership of the GSC's Infrastructure Delivery Committee includes five state government agencies (Planning and Environment; Transport; Treasury; Health; and Education). The Infrastructure Delivery Committee has the potential to lead to a transformative change in the way in which strategic planning, construction and the operation of public infrastructure and private development is undertaken. The GSC operates within the planning hierarchy (as per ***Figure 13***, above) that links the strategic direction of the metropolitan strategy through to how development assessment is undertaken.

Highlighting the cross-jurisdictional and planning boundaries, the three swim site activation sites currently under investigation by the PRCG fall within three draft district plans and a specific plan for the Greater Parramatta and the Olympic Peninsula (GPOP).

Figure 14. Implementation of District Plans[45]

[42] GSC 2016 Draft West Central District Plan. Available at: https://gsc-public-1.s3.amazonaws.com/s3fs-public/dp_west_central_access_amends_2016_12_21.pdf?mfBNIh_hFdDan.pTC8xLBzYuhM6CQ9Qy (accessed 27 July 2017)
[43] GSC 2016 Draft Central District Plan. Available at: https://gsc-public-1.s3.amazonaws.com/s3fs-public/dp_central_amends_access_2016_12_21.pdf?5VvZDeT2.olRReQgb.G27CCuIs_br_Rz (accessed 17 June 2017)
[44] GSC 2016 Draft North District Plan. Available at: https://gsc-public-1.s3.amazonaws.com/s3fs-public/dp_north_amends_access_2016_12_21.pdf?LWLWQs2kS75D5tAyUKEDvybGwq59UVbX (accessed 17 June 2017)
[45] GSC (2016) Draft District Information Note 5 Priorities and Actions. Available at: https://gsc-public-1.s3.amazonaws.com/s3fs-public/2016_11_20_infonote_5_final.pdf?hco_i61d4ArxC6YEIHmdATIrA8k_QWiu (accessed 27 July 2017)

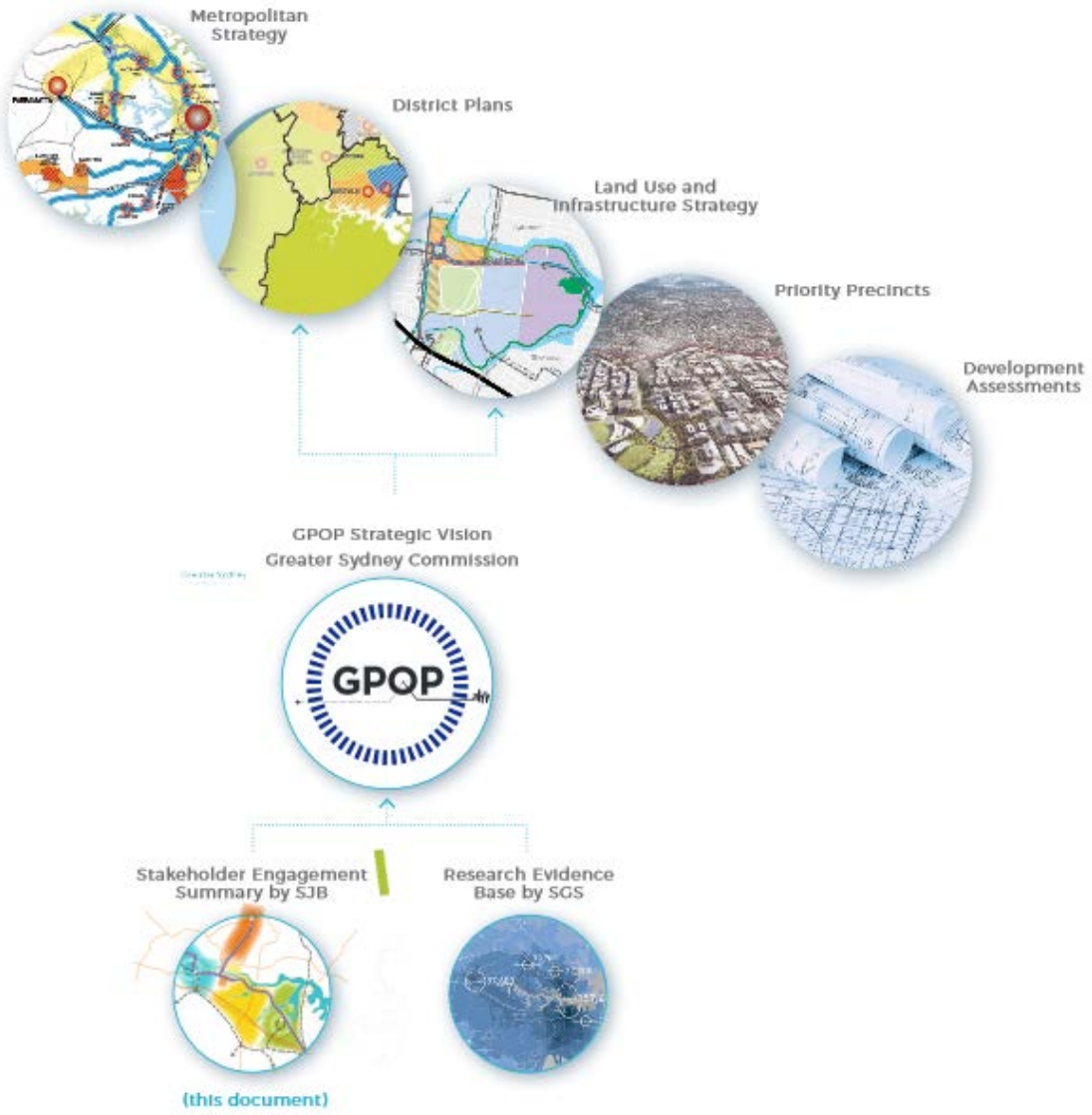


Figure 15. Greater Parramatta and Olympic Park planning document hierarchy

The draft District Plan for West Central contains specific priority outcomes aligned with the overarching agenda of creating a sustainable and liveable city that is consistent with the aim to make Parramatta River a liveable river. Priorities in the draft plan relate to the protection and management of remnant vegetation, bushland, green and open spaces and waterways and specify the lead and partner agencies responsible for the priority or action. Within the area of this draft plan is the GPOP, a 4,000 hectare site including the development of Camellia and Westmead Precinct (***Figure 15 and 16***). Both the GPOP and the Draft West Central plan are of direct relevance to the Silverwater Park swim activation and more broadly development of swim and recreation opportunities on the southern banks of the Parramatta River.

The Brays Bay swim activation site lies at the western boundary of the GSC draft Central District Plan within the Port Jackson Basin.

The Kissing Point Park site is located on the northern shores of the Parramatta River and falls under the GSC draft North District Plan.

Across all three draft district plans and the GPOP there are both general and site specific opportunities to integrate a range of recreational opportunities, including swimming in the river, as part of the district and subsequent local design and function. The opportunity for the PRCG is to ensure that the site feasibility and activation studies are influential and effective in gaining the strategic and institutional support.

There is a consistent approach across the draft district plans to enhance landscapes. This includes: the protection and management of waterways, including both natural and man-made systems, areas of native vegetation and valuable biodiversity and ecological communities; and through the implementation of Sydney's Green Grid (as below). By way of example specific reference is given to key actions within the Draft West Central district plan for waterway, biodiversity, green grid and climate adaptation.

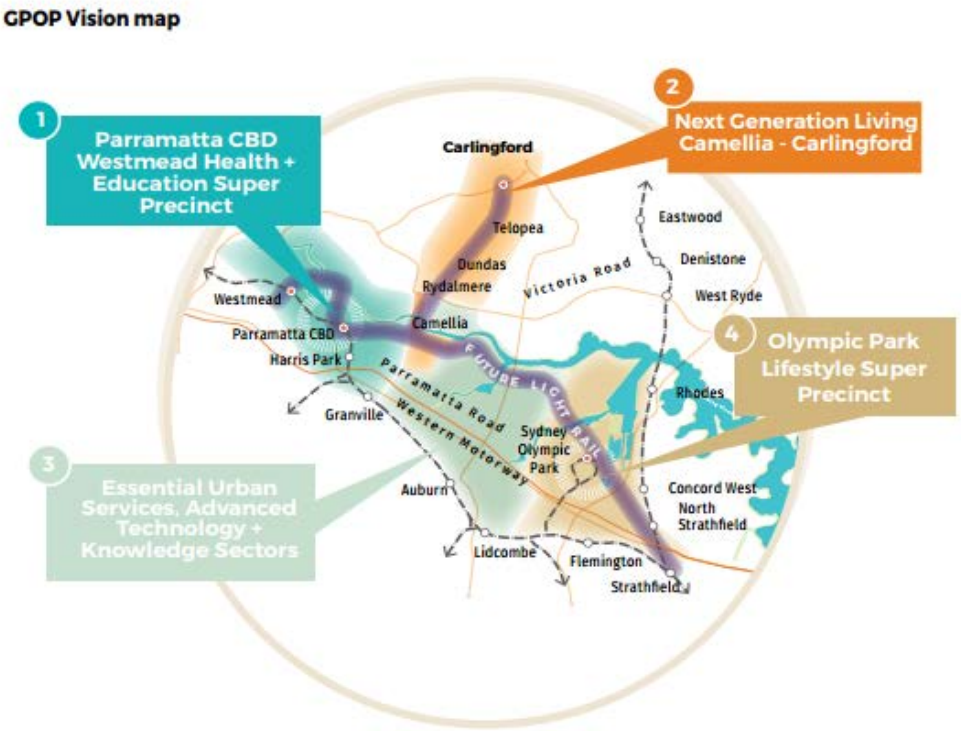


Figure 16. Greater Parramatta and the Olympic Peninsula (GPOP) Vision Map[46]

1. Protecting district waterways

Protecting waterways is an important priority for districts, particularly to maintain and improve waterway health and water quality. The West Central District Plan emphasises the conservation and protection of the Parramatta River, and the North and Central district plans emphasise the preservation of Sydney Harbour's foreshores and waterways.

The GSC identified the review of criteria for monitoring water quality and waterway health as a crucial action for all districts. Specific goals are set for the South Creek area and to achieve excellent environmental performance in the South West, West Central and West districts (which are also priority development areas).

[46] Refer to GPOP Map available at: https://www.greater.sydney/digital-district-plan/580 (accessed 28 July 2017)

South Creek was mentioned a number of times in the governance interviews as a region of strategic importance for Sydney and consequently a focus for many state agencies. While this focus will raise the importance of how to manage the riparian area, hydrology, recreation opportunities for this part of the city, it may also serve to take attention and possible resources away from the Parramatta River and in turn impact on the goals of the PRCG.

2. Protecting and enhancing biodiversity

Protecting and enhancing biodiversity is a priority and one that has to balance both biodiversity outcomes and development. The focus of conservation planning is on opportunities to protect and enhance valuable native vegetation near national parks. While not explicit, this will rely on current government policy such as using biobanking to secure certain urban bushland sites at the expense of others. At the district and strategic level, there is an objective is to obtain better biodiversity conservation outcomes than might be achieved through a site-by-site or project-by-project approach. While not clearly articulated in the plan or in the governance interviews, the outcomes are likely to be linked to mechanisms within the Draft Vegetation SEPP 9State Environmental Planning Policy) and related policy to support strategic planning at the landscape level in order to 'consider opportunities to connect areas of biodiversity, the relationship between different areas and threats to natural features' as well as 'the effects of conservation efforts across the landscape'.[47]

Another objective is to improve or maintain the conservation status of threatened species and communities. An objective of strategic conservation planning is to facilitate urban growth and development, reduce costs and expedite the approval process for development and infrastructure. Although plans aim to provide an 'equitable model' for identifying and recovering costs to biodiversity caused by urban growth and development, there is no specific mention of reviewing the biodiversity offset scheme.

For the PRCG there is no explicit provision for incorporating the protection of community supported fauna mascots where these are not listed or otherwise protected by state or federal laws.

3. Delivering Sydney's Green Grid

Sydney's Green Grid is a city-wide grid of green and open spaces "to promote a healthier urban environment, improve community access to recreation and exercise, encourage social interaction, support active transport connections to centres and public transport, and improve the city's environmental resilience."[48] In delivering Sydney's Green Grid, the draft district plans indicate that priority areas (that is, those areas forming part of or contributing to the Green Grid) can make use of funding programs (eg. the NSW Metropolitan Green Space program and NSW Environmental Trust grants). The GSC has identified the development of support tools and methodologies as an action for improving local open-space planning in the districts. The Central District Plan makes special mention of maximising public benefits from the innovative use of golf courses, including an action to 'identify opportunities for shared golf courses and open space'.[49] This may provide opportunities for advancing urban ecological outcomes.

Details of the Green Grid and how it may support the PRCG are evolving rapidly as the GSC works with the NSW Government Architect and local government to map the grid at various scales across Sydney. An example

[47] GSC (Greater Sydney Commission) (2016a) Draft West Central District Plan. Available at: https://www.greater.sydney/digital-district-plan/974 Accessed 21 April 2017

[48] NSW Department of Planning and Environment (2014) A plan for Growing Sydney. P 85 Available at: https://www.rdasydney.org.au/A-Plan-For-Growing-Sydney-WEB.pdf (accessed 27 July 2017)

[49] GSC (Greater Sydney Commission) (2016b) Draft Central District Plan.

at the local government level is the Parramatta Ways[50] initiative that provides more granular detail on how green and blue grids can in integrated with project objectives broadly consistent with the PRCG.

4. Creating efficient districts

District plans include an action to embed the NSW Climate Change Policy Framework[51] in the planning process in conjunction with support for low-carbon initiatives as a way of increasing the resource-use efficiency of districts and minimising waste. The development of environmental performance targets and benchmarks is outlined as an action across all districts. Water management is highlighted as an issue to be supported at the district level through the identification of land for future waste recycling and reuse.

The urban heat island (UHI) effect and air and noise pollution were identified as key issues to increase resilience. A suggested action is the review of guidelines on air-quality and noise measures, especially for developments near transport infrastructure. For the UHI effect, the GSC proposes integrating UHI mitigation into the planning of urban-renewal projects and priority growth areas across the districts.

Water Sensitive Urban Design (WSUD) and integrated urban water management

Many of the interviewees identified that water sensitive urban design (WSUD) land use controls should play a greater role in managing diffuse source pollution. However, the type of controls and how they should be applied was a point of contention. For the purpose of this review WSUD is defined, and was understood by most interviewees, as the integration of water cycle management into planning, design and construction with a greater emphasis on the management of runoff (as opposed to managing potable and wastewater) and its impact on downstream waterways.[52]

Local government practitioners identified a number of key barriers to the application of WSUD land use policies. These ranged from structural issues related to a lack of a (current) state-wide policy (noting the NSW Diffuse Source Water Pollution Strategy[53] has targets to 2015 only) and regulation (such as a Sydney-wide WSUD State Environmental Planning Policy (SEPP)) to institutional issues relating to the lack of consistent application of local Development Control Policy (DCP) controls within their own council and by state agencies undertaking works in their Local Government Area.

State agency staff expressed various opinions with respect to the role of land use planning regulation. Some expressed a “need for more” while others suggested that WSUD controls implemented through council DCPs were at the “appropriate policy hierarchy” and were working effectively. This diversity of opinion highlights the contested and arguably inconsistent understanding and application of WSUD policy across the catchment.

[50] Parramatta Council (2017) Parramatta Ways – Implementing Sydney’s Green Grid. Available at: https://www.cityofparramatta.nsw.gov.au/sites/council/files/inline-files/Parramatta%20Ways%20Report_0.pdf (accessed 27 July 2017)

[51] NSW Government and Office of Environment and Heritage (2016) NSW Climate Change Policy Framework. Available at: http://climatechange.environment.nsw.gov.au/About-climate-change-in-NSW/NSW-Government-action-on-climate-change (accessed 27 July 2017)

[52] Definitions of WSUD will vary and for local government planning predominantly relates to the retention, detention and treatment of stormwater runoff. Most councils have WSUD guidelines and controls that are primarily focused on stormwater. Integrated urban water runoff takes a more holistic perspective and for urban areas will consider all water streams including stormwater, potable water and wastewater.

[53] NSW Department of Environment and Climate Change (2009) Diffuse Source Water Pollution Strategy. Available at: http://www.environment.nsw.gov.au/resources/water/09085dswp.pdf (accessed 27 July 2017)

In essence, the contention regarding WSUD from a development control perspective turns on whether a mandatory approach through an environmental planning instrument, such as a Local Environmental Plan or SEPP, should be used or whether local controls that are discretionary, such as a DCP, are appropriate. A notable comment from the local government sector was that regulation, compliance and management of approved WSUD controls is poor and often absent underscoring the need to ensure policy is supported by a robust and consistent regulation.

A WSUD Policy Review undertaken by Cardno Lawson Treloar in 2009 for the former Parramatta City Council[54] concluded that WSUD, as one part of an integrated water cycle management approach, did not form a uniform and core aspect of council's planning and stormwater management frameworks. Where it was applied this ranged from a quantitative target-driven approach to a more flexible solution-driven approach. The review concluded that "it is vital that objectives relating to WSUD principles are incorporated into each [of the PRCG councils'] LEP."[55]

A later review by Aleidzans[56] found that all 13 councils in the Parramatta River catchment had some degree of WSUD principles, controls and definitions in their local land use controls. The major impediment to specific and stronger WSUD controls achieved through the LEP related to the constraints of the Standard Instrument LEP, which is the template prepared by the Department of Planning on which the new format of local plans must be based.[57] In this respect, WSUD was largely executed via local policy and there existed "a huge variation in the scope and detail across the catchment."[58]

At a national level, WSUD is a well-established concept in all jurisdictions with the exception in NSW where it is a codified requirement only within lands identified by the Sydney Region Growth Centre SEPP.[59] From a water governance perspective, this highlights a legal and policy gap in NSW when compared with other jurisdictions. For councils and other planning authorities within the PRCG, the opportunity therefore is to develop a more consistent local policy approach that is also performance based and flexible. Such an approach would complement the process of securing water quality outcomes within planning agreements that offer opportunities to maximise development yields and environmental outcomes across public and private land. A standard approach would also accommodate the direction of current planning reforms that is moving towards a more flexible and performance based approach to development assessment and concurrently seeking to encourage more 'code complying' development that does not rely on a merit based assessment process.

It is worth noting that Sydney Water Corporation has led the development of the Parramatta River Waterway Improvement Plan, a collaboration between local councils and community groups and NSW Government agencies to implement on-ground WSUD stormwater projects to improve the health of the Parramatta River.[60] This "plan" consists of a series of interventions restricted to Sydney Water's declared stormwater catchment areas. Whilst an important progression of asset management from simple maintenance of hydraulic function and some gross pollutant capture, it should be considered as contributing to, rather than re-envisioning, the

[54] Cardno Lawson Treloar (2009) *Working together for sustain the Parramatta River Project - Water Sensitive Urban Design Policy Review*. Report prepared for Parramatta Council, 27 February 2009.
[55] As above at p 25.
[56] Aleidzans, V (2016) Water Sensitive Urban Design – A policy synthesis of the 13 councils within the Parramatta River Catchment. Report prepared for the Parramatta River Catchment Group
[57] A copy of the standard Instrument – Principle LEP can be accessed at: https://www.legislation.nsw.gov.au/#/view/EPI/2006/155a
[58] Aleidzans, V (2016) *Water Sensitive Urban Design – A policy synthesis of the 13 councils within the Parramatta River Catchment*. Report prepared for the Parramatta River Catchment Group at p16
[59] Choi, L. and McIlrath, B. (2015) Policy framework for WSUD in five Australian Cities. Project B5.1 under the CRC for Water Sensitive Cities.
[60] http://www.awa.asn.au/documents/Nadesan_River_Health_22.pdf

total waterway outcomes that the PRCG's masterplan is undertaking. Given the importance of WSUD and the high degree of variation within the scope and detail of implementation across the catchment, this is an element that should be included in the catchment monitoring and reporting program, discussed further below in this Report.

Water quality standards

Many agency and utility staff supported the use of the national water quality guidelines (ANZECC Guidelines) as the basis for setting the health and ecological standards. Some respondents had a greater understanding of the guidelines and the opportunity they afford (and encourage) to set waterway specific targets. The value of this approach is to ensure that the benchmark set for the PRCG is catchment-specific and reflective of the existing urban impacts. Without applying waterway specific targets, default water quality values are used that do not reflect the condition of urban waterways and thus considered highly degraded.[61]

Discussion on what are the most important parameters varied across the respondents. Bacterial levels as measured by the Beachwatch and Harbourwatch program (Enterococci) was the parameter most frequently recommended for monitoring. In 2016, the PRCG commissioned a Strategic Analysis of Water Quality in the Parramatta River catchment, which included a literature review[62] and technical analysis of water quality monitoring data to date[63] to inform a business case for a future Riverwatch Monitoring Program. Enterococci was identified as one of many analytes. Importantly, there is limited historical monitoring data for enterococci levels (with only 5 sites having sufficient monitoring of enterococci levels to scientifically analyse, including the 4 sites already open for swimming) and no monitoring data for the other analytes recommended (namely bacteriophages, bacteroides and sediment contaminants). This was seen as a significant barrier by many agency representatives, particularly from NSW Health.

Sampling of sediments for the purpose of supporting recreational swimming within the Parramatta River and estuaries was a more divided issue among respondents. There was an understanding that contaminated sediments occur within the river, particularly at specific locations adjoining former industrial areas such as Homebush Bay. Based on the 'known' or reasonably predicted contamination sites, all respondents identified this as a potential barrier for swim site activation and suggested the PRCG should specifically avoid the known and potentially contaminated locations. In terms of investing in a detailed sediment sampling program to manage the risks associated with sediments, there was greater support to apply a risk-based approach to monitoring rather than allocating significant resources for a comprehensive spatial and temporal monitoring program.

Since the commissioning of this Report, the PRCG's has commenced a Riverwatch Monitoring Program and is sampling sediment at 7 proposed swimming sites.

[61] For a discussion on the implications of generic and site specific guidelines refer to: Tippler C, Wright I A and Davies P J (2013) "Ecosystem Guidelines for the Conservation of Aquatic Ecosystems of the Georges River Catchment: A Method Applicable to the Sydney Basin". *Proceedings of the State of Australian Cities Conference*, Sydney, 26-29 November 2013.

[62] Khan, S and Byrnes, K. (2016) *Strategic Analysis of water quality in the Parramatta River. How should recreational water quality in the Parramatta River be assessed? A Review of Current Literature*. Jacobs Australia, Prepared for the Parramatta River Catchment Group. Final report 10 May 2016.

[63] Byrnes, K. and Khan, S. (2016) Strategic analysis of water quality in the Parramatta River: Technical Analysis Report. Prepared for the Parramatta River Catchment Group. Final Report 5 December 2016.

Catchment management policies

Coordination between and within agencies and local government is a major challenge facing catchment-based and strategic water management programs. These challenges are particularly relevant to the task of the PRCG. This is evidenced by the succession of catchment committees, boards, and authorities and now the Local Land Services (LLS). These have generally shifted from smaller catchment scales (committees and boards) to the whole of the metropolitan area (authority and now LLS). The current Greater Sydney Local Strategic Plan 2016-2021[64] includes a specific strategic objective concerned with creating healthy harbours, rivers and waterways. Under this strategy are numerous key actions that, overall, complement and mirror the efforts and direction of the PRCG. Since the drafting of this strategic plan it would appear that the priorities of the LLS have shifted from the urban to the peri-urban areas of Sydney with a greater focus on the Hawkesbury-Nepean catchment. Note also that the LLS are no longer financial members of the PRCG (refer to Table 1).

Metropolitan water planning and its associated governance arrangements have a long history of operating as a centralised water authority, dating from the 1880s as the Board of Water Supply to the current Sydney Water Corporation (which released the landmark *Water Plan 21* in 1997).

The *Sydney Water Catchment Management Act 1998* marked the beginning of a decentralised approach to metropolitan water planning and service delivery. Initially this involved shifting bulk water supply responsibilities to the newly established Sydney Catchment Authority (now Water NSW), which effectively took catchment management away from Sydney Water (albeit with a focus outside metropolitan Sydney).

The 2004 Metropolitan Water Plan marked the beginning of a multi-agency approach to metropolitan water planning. This was led by the Department of Infrastructure Planning and Natural Resources in 2004 with subsequent iterations in 2006 (coordinated by the NSW Cabinet Office), 2010 (coordinated by NSW Office of Water) and 2017 (coordinated by the Metropolitan Water Directorate). Since 2004 all plans have benefited from oversight by an independent review panel.

ESTABLISHING PARTNERSHIPS AND COLLABORATIVE ARRANGEMENTS

Opportunities for improved social, environmental and economic outcomes from water, wastewater and stormwater investment can be realised with state agencies, local government and industry working together. We will address current coordination gaps across government and between state and local government – which has been identified as a key barrier to a more efficient and integrated approach to water servicing in our region. To improve coordination, the plan allows for a working group to be formed. This group will comprise representatives of relevant agencies from state government, local government, industry and non-government organisations to properly integrate programs and avoid duplication of effort.

SOURCE:
2017 METROPOLITAN WATER PLAN NSW GOVERNMENT PAGE 48

[64] Greater Sydney Local Land Services (2016) Local Strategic Plan 2016-2021, June 2016.

The recently released 2017 Metropolitan Water Plan[65] reinforces a decentralised and cooperative based water governance framework. Unlike previous metropolitan water plans, it explicitly states that coordination of water planning and delivery between agencies and levels of government is a barrier (see side text box p 49 above). This is evidenced by a specific action to develop collaborative arrangements between state agencies, local government and industry between 2017 and 2020.

The 2017 Metropolitan Water Plan identifies a number of challenges, including the impact of increasing urbanisation on liveability, in particular waterway health. According to the plan, cost-effective and sustainable water infrastructure is hampered by 'split responsibilities between state and local government for water, wastewater and stormwater servicing in Greater Sydney, and the misalignment of land use and water planning' [which] hinder[s] an integrated and whole-of-government approach to water infrastructure servicing decisions.' (NSW Government 2017, p 21).

Coordination of water services and catchment management is not a new issue for Sydney.[66] Historically the periods of more certain water planning and delivery have occurred during periods of stable governance frameworks where dedicated funding has enabled specific (most often engineering-based) projects focused on water, stormwater and wastewater delivery. This has included the construction of a separated stormwater and sewer wastewater system (late 1800s), the major water supply dams (late 1800s–1960) and the delivery of environmental programs linked to beach swimming and river health (under the Clean Water Program of 1989-1994). Support for environmental, and specifically catchment management, programs has waxed and waned. High points are the introduction of pollution laws in the 1970s, a focus on river health through bodies such as the Healthy Rivers Commission (1995-2004) and a focus on urban runoff through the NSW Urban Stormwater Trust in 1997.

From a coordination perspective, the genesis of the NSW Government Stormwater Trust arose from a Stormwater Forum held in 1993 attended by federal, state and local government, business, industry, academics and the NGO sector. The Forum concluded that substantial benefits would accrue from having a single (centralised) body to coordinate the management of stormwater and deliver integrated water cycle management outcomes. This was eventually taken up by the NSW Environment Protection Authority (EPA) as part of its broader remit enabled by the *Protection of the Environment Operations Act 1997*.

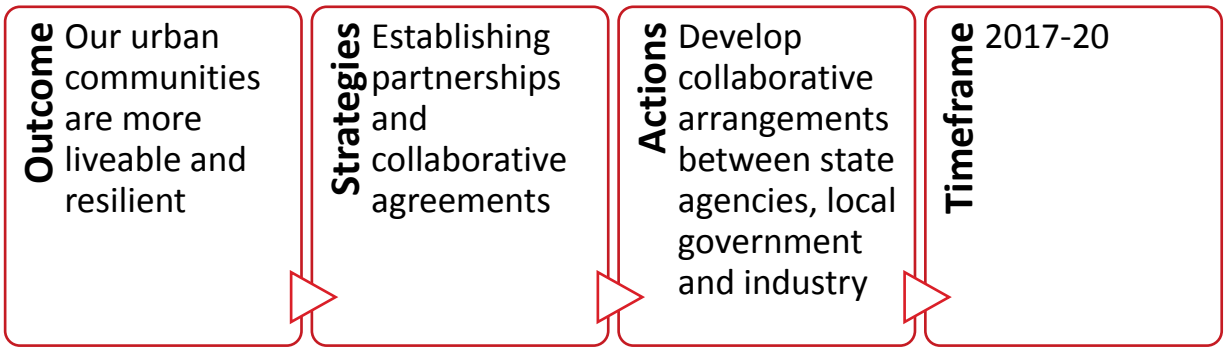


Figure 17. Priority actions to address metropolitan water coordination issues[67]

[65] Metropolitan Water Directorate (2017) Metropolitan Water Plan NSW Government. Available at: https://www.metrowater.nsw.gov.au/2017-metropolitan-water-plan (accessed 27 June 2017)

[66] Davies, P. and Wright, I. (2014) "A review of policy, legal, land use and social change in the management of urban water resources in Sydney, Australia: a brief reflection of challenges and lessons from the last 200 years" *Land Use Policy* 36, 450-460

[67] 2017 Metropolitan Water Plan 2017 p 66.

Since the late 1990s, two waterway governance themes have emerged that have had an impact on the efficacy of catchment and water planning in Sydney. These are detailed below.

1. A reliance on a commitment by government agencies and local government to various programs and policies without an accompanying financial obligation or support

For the most part catchment and water planning in Sydney has relied on one or a number of models that incorporate voluntary participation (as in the PRCG), peer-supported participation (Metropolitan Water Chief Executive Officers (CEOs) committee) or quasi-regulatory commitment (via a government order to participate, as used by the EPA to require the preparation of stormwater management plans). Financial resources, incentives or opportunities to raise revenue have generally been limited and forced the participating agency or council to prioritise funding within already committed budgets. Where government grants or support for the introduction of specific levies have been made available these have tended not to be sufficient to deliver the projects necessary to realise the vision of the plans.

Local government practitioners were particularly critical of competitive grant programs, with the NSW Environmental Trust being specifically mentioned. This may reflect the reduced number of existing grant programs compared to what was previously available, and the fact these are not only highly contested (limiting their chance of success – thus reducing certainty) but often require significant and unforeseen obligations with respect to project administration and delivery over and above what was anticipated in the initial application.

The stormwater management service charge that councils can choose to introduce ($25 flat fee) was identified as a positive, albeit modest, funding initiative by the NSW Government. However, many council officers identified that the use of funding generated by this charge is increasingly being shifted to more traditional stormwater (pits and pipes) programs rather than stormwater quality or catchment works and, as it is not indexed to inflation, its 'real' value post its introduction in 2005 has substantially reduced. For example the actual income received under the stormwater management service charge for the Parramatta City Council is increasingly lower than the amount that would be collected if indexed to inflation and is not reflective of the additional residential growth, particularly medium and high rise development (***Figure 18***).

While the allocation to the management of current assets is permissible under the funding arrangements, some council practitioners suggested that this may not necessarily reflect the genesis of the funding as an outcome of the NSW Stormwater Trust.

2. Institutional inertia to change by State government agencies and local government

To a large extent this has been driven by competing internal priorities bound by fixed budgets, so this is very much linked to the first issue. A common theme voiced by participants in the workshop with local government practitioners and interviews with state agency staff was that stormwater management had its "golden years" as described by one local government participant, led primarily by the NSW Stormwater Trust in 1997 and subsequent programs and policies. State and local government participants perceive that, since then, there has been limited institutional change with respect to how urban runoff is managed. One state government participant reflected that the absence of any substantial and sustained and positive impact from this program has contributed to many state agencies reluctant to step in and take a lead. The key message from the local government sector, in particular, is that there is insufficient funding and internal prioritisation of what funding is available to support new and maintain existing initiatives and structures. This limits the long term and cumulative waterway health benefits (***Table 3 – Barriers and Opportunities***).

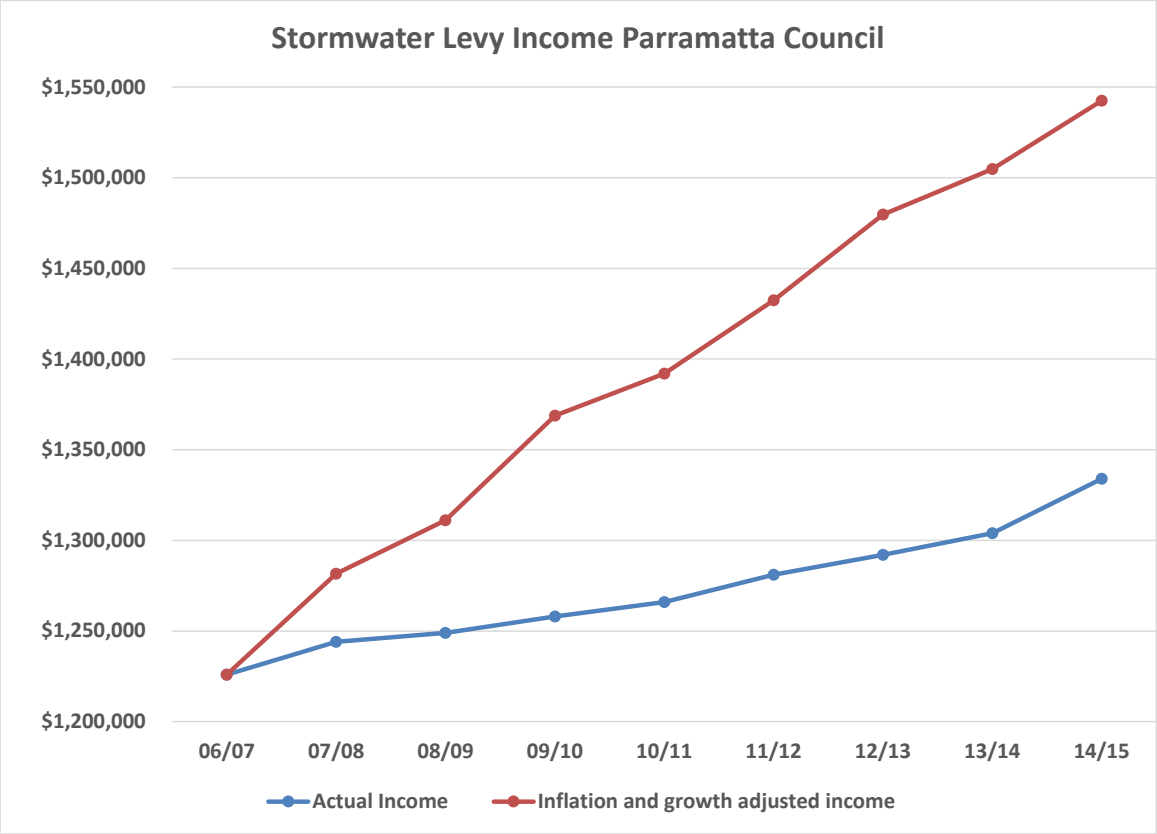


Figure 18. Income received by Parramatta Council from its Stormwater Management Service Charge compared to an inflation indexed charge for the period 2006/07-2014/15[68]

Within the local government sector there is a concern that stormwater funding, management and policy remains deeply rooted in flood control (hydraulic conveyance) rather than having a broader integrated catchment management focus. This perception may be fuelled by an ongoing fiscally constrained environment, which this level of government is subject to as a consequence of decreasing budgets under rate capping restrictions and cost shifting of services.[69]

To a large extent the answers sought by the PRCG as part of this governance review can be seen as a test case; an opportunity to explore a number alternative water governance models and to resolve longstanding coordination issues and the institutional inertia within and between levels of government. However, such reform must recognise the two issues above that apply equally to the PRCG and its membership. First, while there is overwhelming commitment and support for the Swim in Parramatta River goal, this is not matched by funding. Second, how can the PRCG members overcome the institutional inertia to fund projects outside 'business as usual'?

The 2017 Metropolitan Water Plan offers two opportunities the PRCG may be able to capitalise on:

[68] Source: P Hackney per Parramatta City Council.

[69] NSW Independent Local Government Review Panel (2013) Revitalising local government, October. Available at: http://www.localgovernmentreview.nsw.gov.au/documents/LGR/Revitalising%20Local%20Government%20-%20ILGRP%20Final%20Report%20-%20October%202013.pdf (accessed 20 April 2017).

1. Advocate for a seat at the table of the forum tasked to explore and overcome the coordination issues surrounding barriers to integrated water management in Sydney.

2. Take advantage of the community consultation undertaken as part of the 2017 Metropolitan Water Plan which has revealed 'clean and safe water for drinking and swimming' as the highest community value (NSW Government 2017 p 62), reflecting the aspirations of the PRCG for Parramatta River. In essence, the community want water that is safe and contributes to their quality of life.

Barriers	Opportunities
Financial	**Financial**
Limited budget and resources	Funding from development sector
Levy funding not consistent or focused	Greater use of special levies
Capacity and capability	**Capacity and capability**
Lack of appropriate expertise	Council mergers
Inter-council, internal	**Institutional**
Institutional	Build on political buy-in generated by PRCG
Disagreements across departments about priorities	Direction for councils to be set (reprioritised) by government orders or regulation
Lack of political will	**External**
Equity across councils	Alignment with other levels of government
External	Leverage outcomes via District Plans (GSC)
Lack of support by state agencies	Increased priority at State Government level
	Work jointly with Sydney Water Coroporation (addressing problems based on risk)

Table 3. Barriers and Opportunities to realising the Swim in Parramatta River goal as identified by local government practitioners

Resourcing

From a funding and coordination perspective there are numerous directions that can be taken. ***Figure 19*** provides a simplified two-dimensional model of funding directions that may be relevant to the PRCG. This model draws on past and current environmental and waterway initiatives. The model illustrates on the x-axis where the initiative is site specific or broad in its application and the y-axis if the management is centralised or devolved.

Presently the PRCG and its activities seek to promote a collaborative or devolved approach. This is evidenced through many of the community-led programs, social surveys and institutionally via the MoU that ties the membership base of the PRCG. The direction of the Management Plan and future agreement between partners (Recommendation 7) will shape whether this is the preferred model or a more centralised model led

by a key agency (Recommendation 2) will be more successful. Our report recommends a more centralised approach based on recent approaches. Specifically in NSW and Sydney, collaborative catchment management approaches have had limited success compared with more centralised initiatives delivered through direct funding from the State (eg. through a Premier's Priorities program or the Clean Waterways program delivered by the Water Board/Sydney Water two decades ago). In part this is a consequence of having to align, voluntarily, multiple partners, their strategies, budgets and other resources. The current limitation of the centralised options is that:

1. Swimming in Parramatta River is not a Premier's Priority;
2. IPART have curtailed Sydney Water Corporation's funding of liveability initiatives (as discussed in detail above); and
3. From the governance interviews it was identified that the limited success of the Stormwater Trust (1990s-2000) may have lessened the state government's appetite to re-enter the catchment management and diffuse pollution space.

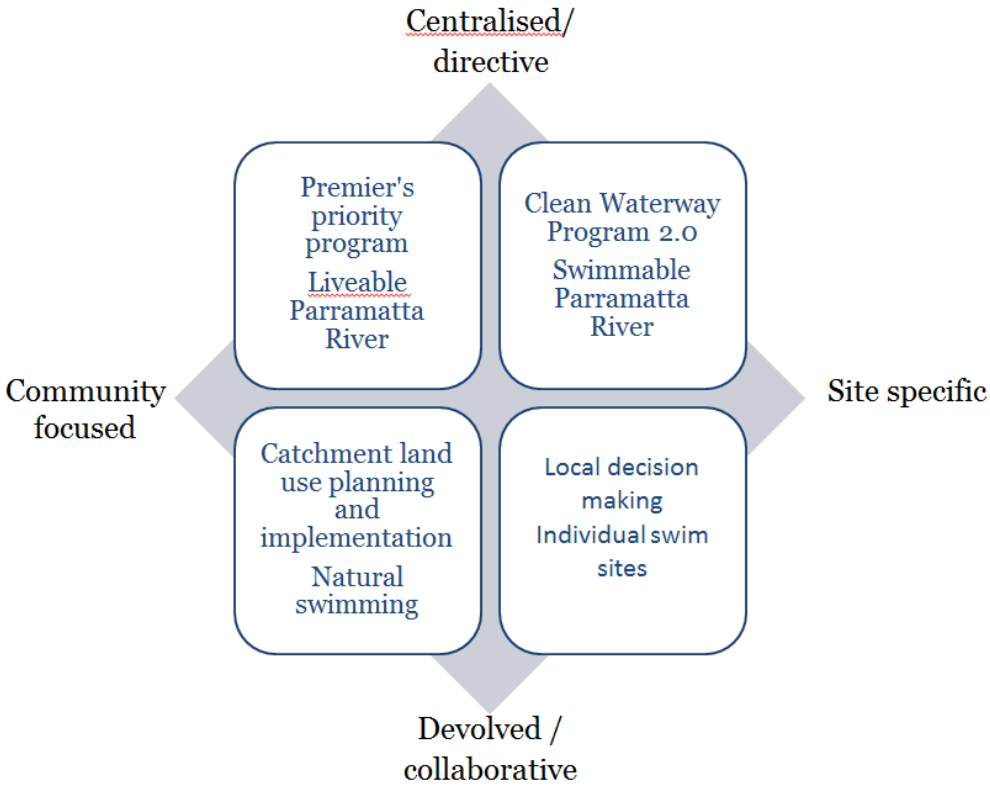


Figure 19. Catchment based funding models relevant to the PRCG

Risk-based governance approach

A number of interviewees called for a risk-based approach to manage water pollution. Such an approach can overcome normative (subjective and value-based) perceptions of risk, contribution and impact of pollution and apply a more objective and fact-based position. This approach has been used by the Office of Environment and Heritage OEH (***Figure 20***) to plan for the protection of sensitive estuaries and coastal lakes as part of the Illawarra/Shoalhaven Regional Plan (REF action 5.4.2, 5.4.3)[70] and Hawkesbury Shelf Marine Bioregion.[71]

From a governance perspective, a risk-based approach was supported by a number of agencies including OEH (which nominated itself as a possible provider of this service) and NSW Health (as used for many of their community and environmental health programs). It is understood that the PRCG coordinator has met with OEH staff, and confirmed that the Masterplan approach that is being used is consistent with the OEH framework[72] and aligned with the framework supported by in the GSC draft district plans.[73]

Interviewees suggested a number of steps to this approach that included: describe the threats; identify the sources of pollution (modelling and, where possible, monitoring); ascertain behavioural actions by residents, industry and government; identify the critical catchments (risk and need); prioritise (for example by cost benefit analysis) and direct to specific risks for the selected swim sites and their preferred option; undertake actions; and develop relevant monitoring and evaluation frameworks to determine program and project success (refer to section 'Monitoring' below).

As part of the risk assessment process the PRCG is currently finalising or has completed water quality monitoring and modelling and ecological studies and is considering the outcomes of these studies in the selection of potential sites for activation (the subject the site activation study and further detailed studies as discussed earlier in this report). These technical studies have been informed by the earlier work contained in the Sydney Harbour Water Quality Improvement Plan.[74]

The more detailed water quality modelling has focused on 17 possible swim sites to gauge the level of water quality risks and inform the prioritisation of future swim sites as well as appropriate and cost-effective interventions. The development scenarios and land use controls within the Masterplan design and broader planning instruments are recommended to integrate with future land use controls (refer to discussion on WSUD and Recommendation 4).

Many interviewees also saw an opportunity for a risk-based decision framework to consider both the swim goal (focusing on water quality related to catchment actions) as well as the ecological goal to protect iconic

[70] NSW Government (2015) Illawarra Shoalhaven Regional Plan. Prepared by the Department of Planning. Available at http://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/~/media/3316E0D25C04474AB7E4D3D6648C6B97.ashx. (accessed 20 April 2017)

[71] BMT WBM (2015) *Hawkesbury Shelf Marine Bioregion Threat and Risk Assessment Report*, October. Available at: http://www.marine.nsw.gov.au/__data/assets/pdf_file/0011/594218/Hawkesbury-Shelf-Marine-Bioregion-Threat-and-Risk-Assessment-TARA-Report.pdf accessed 21 April 2017; and NSW Marine Estate Management Authority (2016) Hawkesbury Shelf Marine bioregion assessment – Hawkesbury Environmental background report. Available at: http://www.marine.nsw.gov.au/__data/assets/pdf_file/0007/594871/hawkesbury-environmental-background-report.pdf. (accessed 20 April 2017)

[72] Dela-Cruz J, Pik A & Wearne P (2017), *Risk-based framework for considering waterway health outcomes in strategic land-use planning decisions*, Office of Environment and Heritage and Environment Protection Authority, Sydney.

[73] For example refer to West Central draft District Plan p 143. Available at: https://gsc-public-1.s3.amazonaws.com/s3fs-public/dp_west_central_access_amends_2016_12_21.pdf?mfBNIh_hFdDan.pTC8xLBzYuhM6CQ9Qy (accessed 27 July 2017)

[74] Local Land Service (2015) Sydney Harbour Water Quality Improvement Plan. Published June 2015

species (such as protecting and enhancing remnant vegetation and riparian areas in the catchment). These 'dual' goals reinforce the underlying principles of total catchment management and the need to ensure users' expectations are measured and evaluated from a swim or other recreation perspective as well as their connection to nature via the iconic species.

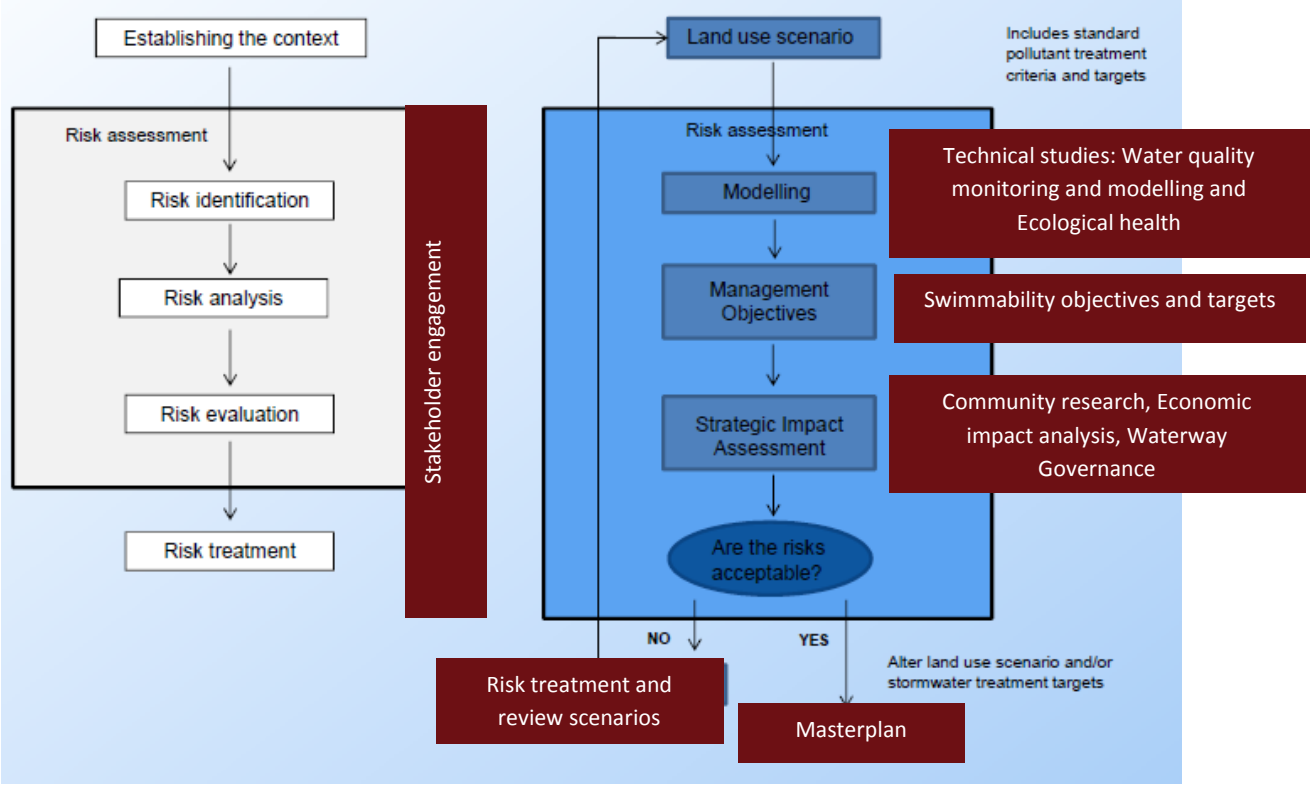


Figure 20. Modified OEH / EPA Risk-based decision framework and how it integrates with the PRCG process [75]

As noted in Recommendation 5 we strongly endorse a risk-based approach to swimmability governance. We therefore endorse the call by interviewees for drawing on principles of risk management in order to deliver swimmability outcomes and the work already done by NSW OEH and EPA to develop an appropriate framework. In developing the ongoing approach to risk management in the context of the Masterplan, it is also appropriate to be mindful of the symbiotic relationship between governance and risk management. As discussed in the governance theory section of this report the organisational context (or 'control environment in the COSO standard) has a significant role in determining the other elements of the risk management framework such as risk assessment and treatment. In recommending a risk-based approach, therefore, we emphasise that this process goes beyond specific risk identification and mitigation to include such elements as leadership and culture as integral to the achievement of organisational objectives. We therefore suggest that the risk management framework ultimately put in place explicitly considers not only the risks posed by particular swim sites but also the wider governance elements necessary to enable the 2025 vision.

[75] Adapted from NSW Government (2015) Illawarra Shoalhaven Regional Plan. Prepared by the Department of Planning. Available at http://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/~/media/3316E0D25C04474AB7E4D3D6648C6B97.ashx. (accessed 20 April 2017)

Such is the importance of this approach that we would recommend a regular self-assessment of the operation of the risk management framework as well as continual monitoring of the risks themselves. Such self-assessments are typically performed at an organisational level, but might be relatively easily adapted to enable an insightful analysis for the organisational stakeholders of the Masterplan. The data from the self-assessments can be a valuable input into determining the need for adjustments to the various elements of governance discussed in this report.

Monitoring

The Beachwatch/Harbourwatch program, coordinated by OEH, was frequently cited by interviewees as a model to use as part of a water quality monitoring framework and public awareness program to inform the community if swimming is suitable and safe. Currently there are three sites in Parramatta River that are monitored under the Beachwatch partnership program with local government: Dawn Fraser Pool, Chiswick Baths and Cabarita Beach. As noted by one interviewee, the health criteria warnings developed for ocean and harbour sites may not necessarily apply to upper estuarine locations or freshwater locations that do not benefit from tidal flushing. Such locations may require more frequent monitoring to ascertain if the current health advice for the upper reaches is to avoid swimming in estuarine areas for up to three days.[76]

The Strategic Analysis of Water Quality Monitoring in the Parramatta River catchment reports commissioned by the PRCG[77] also recognise the lack of data may limit public approval and community acceptance of swimming at some of the upper Parramatta River sites. Their report outlined a broader range of analytes that should be included in a Riverwatch Monitoring program tailored to the Parramatta River and its tributaries. These include site-based screening for contaminated sediments, and investigative monitoring for bacteroides and bacteriophages to understand viruses and pollution sources.

It was suggested by both interviewees and the above-mentioned monitoring reports that a longer term monitoring program be commenced as soon as practicable to develop a predictive model to offer guidance as to when and where it may be safe to swim, particularly after (heavy) rain. The Masterplan Water Quality Modelling project, which is a key input into the Masterplan, provides a predictive model of the current trajectory of water pollutants (as measured by enterococci) in terms of water quality and the effectiveness of different intervention scenarios at proposed swimming sites. Site-based water quality monitoring is needed to support this modelling.

Our desktop review also indicated that while there is ongoing water quality monitoring (as is being used to inform the water quality modelling project) very little is publically accessible and is often aggregated within annual reports. Many interviewees supported water quality monitoring data being publicly available and accessible. They opined that water quality data (either their own agency or others) is currently inconsistently captured, reported and analysed. This has implications as to how some of this data may inform and validate future water quality modelling studies.

The conclusions from our review strongly support these recommendations:

[76] Refer to Beachwatch web site: http://www.environment.nsw.gov.au/topics/water/beaches/is-it-safe-to-swim (accessed 27 July 2017)

[77] Byrnes, K. and Khan, S. (2016) *Strategic analysis of water quality in the Parramatta River: Technical Analysis Report*. Prepared for the Parramatta River Catchment Group. Final Report 5 December 2016; and Khan, S and Byrnes, K. (2016) *Strategic Analysis of water quality in the Parramatta River. How should recreational water quality in the Parramatta River be assessed? A Review of Current Literature*. Jacobs Australia, Prepared for the Parramatta River Catchment Group. Final report 10 May 2016.

1. Water quality monitoring be conducted prior to and used to inform (or not) swimming or other water based contact recreation
2. All water quality and modelling data be publically accessible, presented in a form the public can understand;
3. Data is available on a site by site basis, in a consistent form and not aggregated across sections of the river; and
4. Data be used to continually develop and test predictive modelling to minimise risks.

We also note that the GSC has implemented a 'dashboard' of indicators designed to capture how Greater Sydney and the six districts (central, north, south, south west, west and west central) are performing against strategic priorities. The dashboard is organised under three headings: productivity, liveability and sustainability. Presently, there are no water indicators within the dashboard, but consideration of these has commenced. Sustainability indicators comprise greenhouse gas emissions, waste, open space and air quality. Liveability indicators comprise population age, child care, obesity, aged care, housing completions and mortgage and rental stress.

In order to open new sites for swimming along the Parramatta River, site-based monitoring will need to be conducted. These would need to follow the National Health and Medical Research Council guidelines for primary water contact, which are already used by the Beachwatch / Harbourwatch program (for Cabarita beach, Chiswick Baths and Dawn Fraser Pool) and City of Parramatta (Lake Parramatta). It is important to note that these guidelines are currently under review and that, in other countries, other water quality criteria such as bacteroides and bacteriophages have been considered important in monitoring for acute risks to human health. In addition to water quality parameters, other dimensions around site management, waterway management and ecological health should be incorporated into a future monitoring program. Such a holistic and consistent catchment-wide monitoring program has never been conducted within this catchment.

Best practice would be to adopt a Pressure-State-Response (PSR) approach to mapping each of the core dimensions of water quality, ecological health and swimmability. As it is a useful tool to describe cause-effect relationships the PSR framework is widely utilised both in Australia and by overseas by agencies such as the Organisation for Economic Co-operation and Development (OECD), United Nations Environment Program (UNEP) and the US Environmental Protection Agency. In this context, "pressure" refers to activities that have an impact on a given state. "State" refers to the health of a given system such as an ecosystem. "Response" is the action undertaken by governments or other actors to improve a given state.

An indicative approach (***Table 4*** below) is provided for consideration.

Table 4. Indicative Pressure-State-Response approach to mapping water quality, ecological health and swimmability

	Pressure	**State**	**Response**
Water quality	• Stormwater • Sewer overflows • Lack of diffuse water pollution source control • Licensed pollutant discharges • Fauna pollution (e.. exotic or invading species)	• Water pollution • Water clarity • Water smell	• WSUD regulation • Stricter pollutant licensing

Ecological health	• Stormwater flows • Sewer overflows • Lack of diffuse water pollution source control • Habitat loss due to development	• Number of endangered ecological communities • Number of threatened flora and fauna species • Prevalence of iconic species/ mascots	• WSUD regulation targeted at wetlands • Stricter pollutant licensing Development restrictions
Swimmability	• Limited swim site accessibility • Peak swim demand • Other water users (eg. boats, sports)	• Swim area • Swim rate • Swim injury rate • Swim site traffic congestion	• Signage and notifications • Site safety inspections • Site parking restrictions

Ultimately, headline indicators may form part of a more detailed element of the GSC dashboard. PSR indicators may also be aggregated into indices in order to assist with policy decisions. While aggregation of indicators can be contentious, indices can enable decision-makers to obtain information quickly about relative priorities within a given system and across systems. This relationship between data and policy-orientated information is shown in ***Figure 21***.

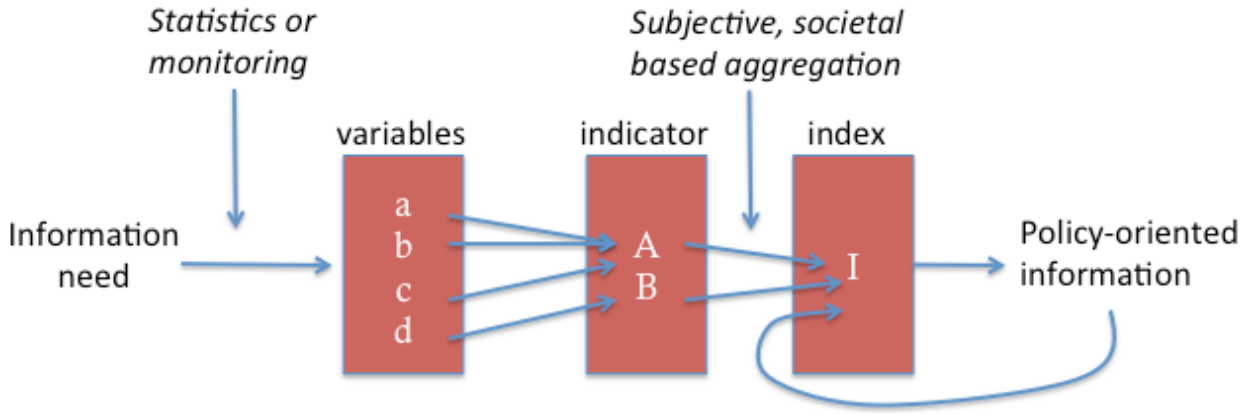


Figure 21. Translation of an information need into policy-orientated information via variables, indicators, and indices [78]

[78] Adapted from Lorenz, C. M., Cofino, W. P. and Gilbert, A. J. (2001), "Indicators for Transboundary River Management", *Environmental Management*, Vol. 28 No. 1, pp. 115-129.

SUMMARY OF GOVERNANCE ISSUES

This section provides a summary of the governance issues arising from the studies commissioned by the PRCG for the development of the Parramatta River Masterplan and related documents. It is divided into four sections. The first three relate to the core areas of focus of this review: water quality and catchment management; ecological health; and swim site activation. The governance issues are collated across these sections according to common functional aspects.

Tables 5, 6 and 7 provide a summary of governance issues affecting water quality and catchment management, ecological health and swim site activation accordingly. The focus of the identification of governance issues is centred on the swimmability goal and how it may affect the future management plan for the river. As well as interviews, this analysis was based on the following technical documents prepared for the PRCG:

Water Quality Monitoring: Jacobs and UNSW[79]
WSUD: Choi and McIlrath[80], Alidzans[81] , Cardno Lawson Treloar[82]
Ecological Health: CT Environmental[83]
Swim activation: McGregor Coxall[84]
Water quality modelling (outputs presented at the PRCG full group meeting 1 June 2017)

Water quality and catchment management

Table 5. Water quality and catchment management review

Functional aspects	**Governance issues**
Strategic land use planning	• Role of Greater Sydney Commission emerging, relatively new body • Water Sensitive Urban Design (WSUD) supports catchment improvements. Controls are in place by most councils but there is inconsistent policy and application • Opportunity to strengthen WSUD and broader integrated water cycle management policy frameworks • WSUD stormwater controls near and adjacent to swim sites should be prioritised at catchment level and as part of stormwater drainage design • Wet and dry weather sewer overflows require ongoing attention • Catchment impervious area is likely to increase with new development, requiring compliance, regulation and catchment to lot specific design considerations
Statutory land use planning	• Management of contaminated sites will remain a legacy issue. Limitations of current technologies to address contamination will impact on swim site and other recreation opportunities

[79] Khan, S and Byrnes, K. (2016*) Strategic Analysis of water quality in the Parramatta River. How should recreational water quality in the Parramatta River be assessed? A Review of Current Literature*. Jacobs Australia, Prepared for the Parramatta River Catchment Group. Final report 10 May 2016. and Byrnes, K. and Khan, S. (2016) *Strategic analysis of water quality in the Parramatta River: Technical Analysis Report*. Prepared for the Parramatta River Catchment Group. Final Report 5 December 2016

[80] Choi, L. and McIlrath, B. (2016) *NSW Planning Framework for Water Sensitive Urban Design*

[81] Aleidzans, V (2016) *Water Sensitive Urban Design – A policy synthesis of the 13 councils within the Parramatta River Catchment*. Report prepared for the Parramatta River Catchment Group; Aleidzans, V (2016b) Council Needs Analysis: report and results. Report prepared for the Parramatta River Catchment Group.

[82] Cardno Lawson Treloar (2009) *Working together for sustain the Parramatta River Project - Water Sensitive Urban Design Policy Review*. Report prepared for Parramatta Council, 27 February 2009.

[82] McGregor Coxall (2016) *Parramatta Swim Activation Framework*. Report prepared for the Parramatta River Catchment Group, November.

	• Within the catchment there will be a greater proportion of residential land use replacing industrial and commercial activities. This should lessen stormwater pollutant loads • Southern side of catchment is generally more contaminated and may require additional land use controls to reduce on-going pollutant loads
Environmental regulation	• Diffuse source pollution (metals runoff, bacterial /pathogen load runoff) and sewer overflows remain the primary sources of contamination • The EPA has used regulation (pollution reduction programs under the *Pollution of the Environment Operations Act 1997*) to improve environmental performance of Sydney Water Corporation. • There is no significant priority by state or local government nor centralised regulatory system for managing diffuse source pollution
Site regulation	• Compliance and regulation of Water Sensitive Urban Design controls is limited, thus their effectiveness at the lot to catchment level can only be modelled rather than measured
Land ownership	• Design and controls for major redevelopment sites is likely to fall to State Government, offering opportunities to have greater control over outcomes (although this also carries a risk if integrated water management is not included in the planning, design, construction and maintenance) • Ownership of waterfront land either Council or Crown or private • Regulating the management of contamination from legacy pollutants is the responsibility of the Environment Protection Authority (EPA)
Operational procedures	• Management of licensed (point source) discharge (also through pollution reduction programs) is regulated by the EPA and affects major industry (including Sydney Water) • Management of diffuse pollution rests with local government, supported by State strategy (requires updating by OEH, as the most recent policy guiding this expired in 2015)
Economic viability	• Limited funding for WSUD, both capital and maintenance (both a concern for public and private land managers) • Environmental monitoring and capital works not prioritised or targeted towards swim activation
Funding	• Funding for water quality monitoring not consistent across member councils • Priority to undertake strategic / risk planning is subject to project bid / competitive process, serving as a barrier
Recreation	• Water pollution • Water clarity (visibility) • In-stream marine life • Smell • Natural barriers to accessibility (mangroves) • Boats • Presence of lifeguards may be needed at some sites • Underwater hazards • Currents • Width of river
Statutory responsibility	• Lines of responsibility are not clear • Coordination remains a barrier
Other strategies	• Office of Environment and Heritage (OEH) Diffuse Source Water Pollution strategy requires updating

Ecological health

Table 6. Ecological health governance review

Functional aspects	Governance issues
Strategic land use planning	• Housing and employment targets dominate over habitat conservation, protection and creation • 3370ha of natural vegetation across catchment with only 505ha as undisturbed or low disturbance condition (OEH study 2013) • Promotion, implementation and maintenance of Green Grid at a strategic level
Statutory land use planning	• 11 endangered ecological communities • 148 threatened flora and fauna species • Development approval processes less effective for the protection and maintenance of new habitats • Creation of new habits limited by space and development opportunities • Opportunities to explore planning agreements on larger sites and sites adjacent to public land to maximise ecological outcomes • WSUD controls could be strengthened and better targeted to key catchments of known pollution or proximate to current and future swim activation sites
Environmental regulation	• Management of biobanking sites and other lands in trust or reserve to ensure ecological outcomes are maximised (although this must also consider impact on patch size and fragmentation of habitats)
Site regulation	• Compliance of landscape and WSUD controls limited (an issues for planning and development control authorities and private certifiers) • Some species eg. aquatic birds, while favoured for their ecological outcomes can contribute to poor water quality • Creation of oyster reefs in river will need support and possible approval by Roads and Maritime Services
Land ownership[i]	• Multiple land ownership across catchment with variability in management procedures • Public land (including Crown and that owned or managed by a statutory body) provides opportunity to protect and consolidate ecological outcomes. • Public land usually governed by Plan of Management that should be revised to reflect direct and indirect benefits and impacts associated with the swim vision • Green and Blue grid should be preferentially prioritised on public land (greater control) using private land to supplement and connect corridors
Operational procedures	• Operating priorities and procedures vary according to land manager • Stormwater infrastructure needs to be managed for both hydraulic efficiency (flood control) and ecological outcomes (so that instream habitats are either protected or created off line) • Management of WSUD features, particularly wetlands as recommended for habitat, require specific maintenance controls and incur higher costs than traditional stormwater infrastructure • Examine opportunities for greening the catchment through open space and related strategies
Economic viability	• Opportunity to explore benefit of green infrastructure and ecosystem services and the benefits that are accrued Including to private property
Funding	• Funding for maintenance should be accounted for in planning agreements and other development costs
Recreation	• Balancing ecological and recreation uses may present issues such as location of swim sites and broader water-based recreation on river that may disturb key fauna • Regulation of fishing and other uses in and on river
Statutory responsibility	• Highly fragmented with respect to terrestrial and aquatic habitat protection and management • Greater priority to threatened species or endangered ecological community (EEC) rather than the majority of natural area that provide ecosystem and catchment services
Corporate strategy	• Multiple councils with variety of priorities in their 10 year Community Strategic Plans • Environmental outcomes need stronger link to land use planning strategies (metropolitan, district and local)

Swim site activation

Table 7. Swim site activation governance review

Functional aspects	**Governance issues**
Strategic land use planning	• Spatial differences for site activation based on feasibility, vulnerability and desirability • Linear connections to and along river critical as part of river / foreshore activation
Statutory land use planning	• Plans of Management may require modification as part of site management and activation
Environmental regulation	• Pollution and water quality related issues key determinant of site and swimmability option (both a regulation and compliance issue) • Management of natural areas in the catchment in-stream need strong protection
Site regulation	• Safety for users key concern • In-stream hazards changeable • Water quality spatially and temporally variable • Hours of operation: need to consider site and safety risks • Supervision at site (life guards) may be required for more 'formal' sites
Land ownership	• Ambiguity for river and LGA boundary noting Roads and Maritime Services (RMS) has responsibility for moorings, jetties harbours, sea bed. • Greater engagement with RMS is required as a key stakeholder
Operational procedures	Need to be developed and link to: • Risk assessment processes and procedures • Signage • Notifications • Site safety and risk inspections
Economic viability	• Need to explore cost/benefit and return on investment if an 'entry fee' or other charges are introduced to the site • Councils (and other land managers) to explore funding models and approaches for infrastructure and maintenance
Funding	Opportunities for funding via: • Development contributions • Private sector involvement (eg. waterway parks) • Special rates or levies
Recreation	• Issues regarding the regulation of public and private boat traffic (noting that this may increase if waterway becomes more highly valued and in better condition) • Need to consider ecological values including in-stream habitats and riparian areas • Options analysis for potential locations based on spectrum from: - River swimmable - Treated river water - Splash contact - Land-based swimming - Land-based recreation
Statutory responsibility	Regulation: • Boat traffic routes (swimming and ecological purposes) • Maritime restricted zones • Boat infrastructure (jetties, pontoons, other moorings) • Organised sporting/ recreation activities
Other strategies	• Link to Australian Water Safety Strategy 2016-2020 ("reduce drowning by 50% by 2020") supported by 11 goals

RECOMMENDATIONS

1. Agree specific 2025 swimmability targets as a matter of priority

It is recommended that the Swim Site Activation report and concept designs for the preferred sites be finalised including detailed costing reflecting the recommended swim options based on water quality monitoring and modelling data. Information from this process must then be incorporated into future capital works programs of the relevant council or other land managers.

A specific project incorporated within a capital works budget will have a greater chance of securing the necessary funding (including from external grants, developer contributions or special rate variations) and in turn act as a catalyst for other complementary initiatives such as changes to land use policy, a greater focus on compliance and regulation and the management of point source and diffuse pollution sources proximate to and impacting on the proposed swim site. The timing of local government elections in 2017 and subsequent revision of council Community Strategic Plans provides an ideal opportunity to identify specific projects that align with community expectations and can be linked to a 10-year capital works or delivery program and shorter term operational plan.

Defining and costing specific projects can also integrate with and be incorporated into precinct and district planning, under the auspices of the Greater Sydney Commission and the Department of Planning and Environment and broader integrated water management planning and initiatives linked to the delivery of the Metropolitan Water Plan for Sydney.

2. Identify a lead agency for swimmability governance

As discussed at length in this Report, our findings are that the current governance of water, waterways, catchment areas and land adjacent to waterways is complex, confusing and inconsistent. No single agency is responsible for water governance, and the role of the many agencies involved is often unclear. This finding is not surprising and reflects the fact that Sydney catchment management has historically lacked a central coordinating body with sufficient powers, funding and whole of government support. Nevertheless, the ability to meet 2025 swimmability targets will be materially enhanced by improving the clarity of swimmability governance via establishing a lead agency responsible for delivery of a swimmable Parramatta River. Lead candidates include entities such as the Sydney Water Corporation, the Greater Sydney Commission and the Office of Environment and Heritage. The lead agency must have the authority, influence and preferably a dedicated funding mechanism to empower and where necessary direct change to meet the outcomes of the PRCG.

Aligned with the identification of a lead agency, there is also value in seeking greater support for the objectives of the PRCG by a NSW Government Minister. This would have the benefit of gaining a ‘ministerial champion’ at the upper levels of government and hence expedite decision making favourable to implementation of the Master Plan.

3. Link swimmability to liveability and embed 2025 swimmability targets within the Greater Sydney Commission’s strategic planning and the Metropolitan Water Plan with a view to positioning the project as a state priority

It is recommended that the Masterplan aligns with the key strategies and focus areas of the Greater Sydney Commission: productivity, liveability and ***sustainability.*** The most critical element of this recommendation is to continue to engage with the Greater Sydney Commission (GSC) as a key stakeholder and identify tangible strategies, plans and projects that can be incorporated within metropolitan, district and local plans that support the vision of the PRCG to make Parramatta River swimmable by 2025.

The Masterplan must align with key strategies and focus areas of the Greater Sydney Commission under their three pillars: productivity, liveability and sustainability. To this end, monitoring and evaluation frameworks linked to project outcomes established under the Masterplan should integrate with the Greater Sydney Sustainability Profile, compiled to support the District Plans as well as assist discussion and ongoing collaboration on sustainability issues and opportunities for planning.

There are significant opportunities to collaborate with Sydney Water Corporation on its 'liveability' agenda and work to demonstrate the community's 'willingness to pay' for liveability projects such as the swim in Parramatta initiative. In the PRCG Strategic Plan 2016-18 there is an action towards developing the Parramatta River Masterplan to "undertake specific community research on preferences and willingness to pay for potential options that could be canvassed within the Masterplan and connect these to possible funding mechanisms". It would be worth considering if the PRCG and Sydney Water Corporation might work collaboratively on this community research with a view to demonstrating customer 'willingness to pay' as an input to IPART's next pricing determination for Sydney Water. Such a study could also be positioned to inform local government special rate variation applications as may arise.

There is also an opportunity to take advantage of the community consultation undertaken as part of the Metropolitan Water Plan, which has revealed 'clean and safe water for drinking and swimming' as the highest community value (NSW Government 2017 p 62), reflecting the aspirations of the PRCG for Parramatta River. In essence the community want water that is safe and contributes to their quality of life. The 2017 Metropolitan Water Plan identifies that it will deliver a number of WaterSmart cities projects to facilitate a more integrated approach to providing water, wastewater and stormwater services to make communities more liveable and resilient. The PRCG, through its members, could seek to have a WaterSmart cities project linked directly to the swim in Parramatta River vision as part of one many urban renewal sites identified within the catchment and adjacent to the Parramatta River.

Recommendation 4: Develop, implement and monitor water sensitive urban design policies and controls across the catchment

Water sensitive urban design (WSUD) land use policies are inconsistent across the catchment and do not fulfil their potential to improve catchment, ecological and water quality outcomes that can contribute to the swim in Parramatta River by 2025 mission. The recent 2016 Council amalgamation process in which various Parramatta River catchment councils were merged or created has added extra complexity with several WSUD policies operational within a single council area. This remains a challenge and one that should be addressed by the councils as a priority.

WSUD policy frameworks must be performance-based and sufficiently flexible to maximise a 'guaranteed' return on investment beyond design based modelling. A WSUD policy must consider both capital and maintenance costs and obligations and offer flexibility to ensure outcomes are maximised at either the lot or sub-catchment basis.

Critically resources for regulation and maintenance of WSUD structures must be increased and standards applied consistently across the catchment to ensure policy compliance. Many WSUD structures were installed with the assistance of State Government grants and the funding for their replacement as these assets age and, critically, their ongoing maintenance is constrained. At the local government level, the application of funding for compliance of structures on public and private land and maintenance of publically owned structures is highly variable and generally underfunded. Funding for WSUD comes from ordinary rate income, existing special rate variations (environmental levies) and stormwater management service charges, which haven't kept pace with inflation and population increases.

When the PRCG Strategic Plan 2016-18 was being developed in 2014, Water Sensitive Urban Design (WSUD) was identified as a priority issue. The community attitude survey conducted for the PRCG suggests strong support for the swim vision yet needs to explore willingness to pay in more detail as this is critical to future funding proposals by state or local government. Exploration of willingness to pay has been planned as part of the economic analysis component in Stage 2 of the Masterplan development. Our review indicates the potential for much greater co-ordination and monitoring of WSUD policies at a catchment level.

Recommendation 5: Implement a risk-based approach to swimmability governance, including an ongoing process to identify, assess, manage and monitor ongoing and project-based risks

From a governance perspective, a risk-based approach was supported by a number of agencies as a mechanism to prioritise actions within a future Masterplan. This should draw on the current State Government model to provide a level of risk modelling consistency and integrated with district planning being undertaken by the Greater Sydney Commission. Various interviewees including OEH and NSW Health strongly recommended this approach. A risk-based approach would involve a number of steps as below:

- Describe the threats
- Identify sources of pollution (modelling and where possible monitoring)
- Ascertain behavioural actions by residents, industry and government
- Identify the critical catchments (risk and need)
- Prioritise (for example by cost benefit analysis) and direct to specific risks for the selected swim sites and their preferred option
- Undertake actions, and
- Develop relevant monitoring and evaluation frameworks to support program and project success.

In recommending a risk-based approach, however, we emphasise that this process goes beyond specific risk identification and mitigation. The widely adopted COSO framework (discussed in the body of our report) also includes such elements as leadership and culture as integral to the achievement of organisational objectives. We therefore suggest that the risk management framework untimely put in place explicitly considers not only the risks posed by particular swim sites but also the wider governance elements necessary to enable the 2025 vision. We recommend a regular self-assessment of the operation of the risk management framework as well as continual monitoring of the risks themselves. Such self-assessments are typically performed at an organisational level, but might relatively easily be adapted to enable an insightful analysis for the organisational stakeholders of the Masterplan.

(We note that the PRCG has commenced, since the start of this governance review, a risk based approach consistent with the recommendation above. We recommend that this be continued and refined)

Recommendation 6: Establish an ongoing swimmability monitoring program, with reference to Harbourwatch, the Masterplan project and the pressure-state-response approach

It is strongly recommended action is taken to develop and commence a longer term monitoring program as soon as practicable to develop a predictive model that can offer guidance as to when and where it may be safe to swim, particularly after (heavy) rain. We note that the PRCG has recently commenced a monitoring program following the recommendations of the Water Quality Monitoring reports.

In relation to water quality monitoring program we also recommend that: all water quality and modelling data be publically accessible, presented in a form the public can understand; data is available on a site by site basis, in a consistent form and not aggregated across sections of the river; and data be used to continually develop and test predictive modelling to minimise risks. These recommendations follow the comments by interviewees who suggested that data is currently inconsistently captured, reported and analysed.

As a model for part of the public portal of water quality monitoring data, it is recommended that the PRCG use or integrate their data within the Harbourwatch monitoring web site and associated protocols. This would build on the current swim sites along the Parramatta River including Dawn Fraser Pool, Chiswick Baths and Cabarita Beach. The Harbourwatch/Beachwatch data set and web portal has strong community trust, acceptance and awareness.

It is also recommended that the PRCG engage with the Greater Sydney Commission to discuss how a water quality monitoring and reporting program developed for the Masterplan might be enabled as a data feed into the Greater Sydney Commission Sustainability Dashboard.[85]

Recommendation 7: Reconceptualise the role and structure of the PRCG in light of determination of swimmability definition and lead agency identification and update memorandum of understanding accordingly

Part of the project brief for this Report was to consider the ongoing role of the PRCG. A precise specification is premature, particularly given the need for resolution of the issues addressed in Recommendations 1 and 2 (swimmability definition and lead agency identification). However, it is clear that there are a number of possible roles for the PRCG going forward and that these will shape the direction and extent of actions in the Masterplan. Key areas already mentioned above are advocacy and funding; WSUD policy co-ordination; risk management implementation; and water quality monitoring.

From a governance perspective, we also emphasise the critical role the PRCG can play in terms of fostering the 'informal' network of stakeholders as well as more formal governance accountabilities. Creating opportunities for networking and interaction outside formal channels – eg. inter-agency workshops, discussion forums and events – is also a crucial part of effective coordination and knowledge exchange. These are particularly relevant to continue to engage and connect the 'active' partners (financial and non-financial members) but also to encourage the less engaged agencies, such as Roads and Maritime Services and Greater Sydney Local Land Service, whose support, including via approvals and funding, may be required.

As part of our review we note that the current role of the PRCG has moved beyond that reflected in the PRCG Memorandum of Understanding, and recommend that this MoU be updated as the next phase of the PRCG role is determined. It is recommended that the updated MoU contain specific actions, expectations and

[85] https://www.greater.sydney/dashboard#sustainability

resource commitments from the members that align with the Masterplan. The recent amalgamations impacting local government and the restructuring of State Government agencies are also drivers to review the MoU. It is good practice for a MoU to have formal revision dates. These can serve as an opportunity for the PRCG to reflect on its priorities and expectations of its members and as a prompt for members as to their commitment to the mission to making the Parramatta River swimmable by 2025.

Appendix A. Interview and workshop questions

1. What are the most important factors impacting on swimming water quality goal?

(to generate a list)

2. Assign a % contribution of the factors you have listed that impact on the swimming goal -

that will involve initially a rank then %

(to enable a semi-quantitative analysis that we can then assess with our review of completed expert reports)

3. What can or should be done (generally) to address the most important factors

(possibly top 3)

4. Who is responsible?

Asking them to assign responsibility (this most likely will involve multiple agencies or parts therein)

4A: How are the factors that impact on the swimming water quality goal measured and by whom?

B. If they aren't measured, how could they be and by whom?

(This may well come up in your question re technical reports etc. but I think it might be good to have an explicit question).

5. What your/their organisation/section is doing to realise the swim vision?

Generate a list of actions currently being undertaken (may also want to comment on the effectiveness of these.

6. What your/their organisation/section could do to realise the swim vision?

(and perhaps the % contribution that this may make based on their raking from questions 1 and 2)

7. What governance structures exist in your organisation that may support realisation of the swim vision? What structures may impede the realisation of this vision?

For this question it might also be helpful to give a sense as to what you mean by 'governance structures' in this context. eg. do you mean prioritisation in council plans; ambiguity in legislation; level of resourcing etc.

8. How could they be used to realise the swim vision?

In terms of the complexity of the various issues we could also get the participants to undertake a certainty analysis. In essence after task 2 (and would be happy to have discussion on where else this may best fit) to rank in 2 dimensions the top (say 5 issues) against:

what degree of confidence they have that this is the most important issue (y axis) (almost certain, likely, 50/50, unlikely, almost impossible)

what is the state of the evidence (technical reports/ data/etc...) that would support their confidence: (almost certain, likely, 50/50, unlikely, almost impossible)