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Urban waterways, water sensitive urban design, and the law: A help or a hindrance? A focus on urban stormwater

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ABSTRACT

Traditional urban stormwater management systems have paid little attention to environmental needs. Water sensitive urban design is a low impact development approach to planning and engineering that provides significantly better environmental outcomes, but its uptake has been slow in New Zealand. In 2020, the New Zealand Government released a new National Policy Statement on Freshwater Management. This placed Te Mana o Te Wai - the good health of waterways - at the heart of freshwater planning. This article describes the pre-2020 urban stormwater planning and management approach and critically discusses the new approach, concluding that significant opportunities to improve urban stormwater management have been missed. The argument is supported by a detailed consideration of urban stormwater plans in Auckland and Christchurch.

Keywords: water planning, urban design, green infrastructure

1. INTRODUCTION

Almost all of New Zealand's population growth is and will continue to be in urban areas. Traditional urban and industrial development alters landscapes from permeable vegetated surfaces to a series of impervious surfaces directly connected to surface water. This results in frequent pulses, increased flood peaks and poor-quality stormwater runoff, requiring management. Historically New Zealand, like other industrialised countries, treated stormwater as a liability and nuisance endangering human health and property – this was particularly so in Auckland where sewers and stormwater ran together in combined pipes (and still does in some areas). This resulted in a focus on the design of stormwater management systems to rapidly convey stormwater runoff directly to waterways with no focus on ecosystem health. In such systems, even 2 mm of rainfall generates runoff carrying contaminants (including sediment, heavy metals, oils/greases, faecal material and litter) washed off from impervious surfaces such as roads, footpaths and roofs. These harm fish and aquatic life, which are generally much more sensitive to these contaminants than people or plants. The increased frequency of flows and higher peak flows also alter stream channel morphology and stability, as eroding banks further degrade biodiversity values. In summer, removal of riparian shade combined with stormwater from hot impervious surfaces exacerbates impacts on aquatic life by increasing stress and toxicity of some contaminants (notably ammonium).

In recent decades there has been increasing recognition that urban waterways can be valued ecosystems providing habitat for a range of important fauna and for plant species. Instead of piping or turning our back

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on streams, wetlands and lakes, we've focused new development around them (e.g., Avon River redevelopment, Pegasus town). This movement towards celebrating water and 'holistic stormwater management' has begun shifting the perception of stormwater runoff from a liability and nuisance to that of having value as a water resource, with resulting changes to stormwater management practices. Further impetus to the change of perception has been provided by recent droughts, cost of providing large centralised potable water (a substantial proportion of which of which is used for toilet flushing and summer irrigation), and the increasing appreciation of rain tanks to provide resilience in natural disasters.

The National Policy Statement for Freshwater Management 2020 (NPSFM) came into force on 3 September 2020 and has reinforced the concept of Te Mana o te Wai - a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and well-being of the wider environment. It protects the mauri of the wai. Te Mana o te Wai is about restoring and preserving the balance between the water, the wider environment, and the community.

Water-sensitive urban design (WSUD or WSD) is a land planning and engineering design approach. It integrates the urban water cycle, including stormwater, groundwater and wastewater management and water supply, into urban design to mimic the natural hydrological cycle. This minimises adverse environmental effects and can improve aesthetic, biodiversity and recreational values. WSUD is similar to low-impact development (LID), a term used in the United States; and Sustainable Drainage System (SuDS), a term used in the United Kingdom.[2]

This paper considers the policy and regulatory context for the protection and enhancement of urban waterways and the adoption of WSUD principles and approaches. It focuses on stormwater as one of the 'Three Waters'. However, it does not comment on the regulation of drinking water or wastewater, and acknowledges these are both important elements of water law which relate to urban areas.

To date, while the regulatory context has allowed the adoption of WSUD principles and approaches, their implementation appears to rely on informed and committed individual developers, planners, council staff and decisionmakers. WSUD has, in many cases, been treated as a 'luxury', side-lined by concerns about the cost of maintenance and that property owners will not do that maintenance. Exemplary, integrated WSUD projects have been constructed throughout NZ over the last 10 to 15 years but it is still 'fringe', although mandated in some large infrastructure projects (e.g., NZ Transport Authority projects). In some cases, WSUD has been applied to enable development in highly environmentally sensitive areas such as wetlands (Takanini, Auckland) and upstream of sensitive marine environments (Long Bay, Auckland).

A range of new regulatory and policy initiatives in relation to stormwater are being implemented or proposed. But will they result in the desired improvements?

This paper addresses:

- A brief description of the water quality challenges of urban growth and development practices
- The policy and regulatory environment prior to 2020
- The regulatory and policy changes introduced in 2020

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[2] *For a recent seminar and series of papers on WSUD in the New Zealand context see* *https://www.tauranga.govt.nz/council/water-services/water-sensitive-design.*

For a detailed discussion of the issue, see V. Southworth, Increasing the uptake of building-scale water sensitive urban design stormwater management options in Christchurch, New Zealand, Master of Water Resource Management Thesis, University of Canterbury 2019 - *https://ir.canterbury.ac.nz/handle/10092/17052*

It concludes that the recent regulatory changes are helpful, even if strictly unnecessary. However, these regulatory changes are not sufficient in themselves. Alongside these regulatory changes, the recommendations of both the 'Activating Water Sensitive Urban Design for Healthy Resilient Communities' work of the Building Better Homes, Towns and Cities National Science Challenge and the policy and practice recommendations of the Urban Water Working Group need to be implemented. That includes prohibiting 'business as usual' where these have known adverse effects – such as stream piping, copper and zinc roofing and guttering materials, and direct piping of stormwater to streams. It also means ensuring minimum standards and 'bottom lines' adequately protect receiving environments, providing mechanisms which incentivise all stakeholders to achieve improved outcomes, and having funding mechanisms available to ensure that such outcomes are financially achievable.

2. CHALLENGES OF URBAN GROWTH AND DEVELOPMENT PRACTICES[3]

During urban development pervious surfaces (grasslands, forests, wetlands) are usually replaced with impervious surfaces (roads, buildings, paved areas). This disrupts the natural water balance by reducing infiltration of rainwater into soil and groundwater, thus increasing the volume of water that runs off into streams and reducing baseflow which supports stream flows during dry periods. Urbanised catchments are characterised by flashy flows (impervious surfaces such as roofs and pavement create extreme high flows during rain events, with periods of very low flows in-between).

Impervious surfaces provide a hard surface on which contaminants accumulate (e.g., copper in vehicle brake dust accumulating on roads). A wide range of contaminants are produced in urban areas due to the variety of activities such as transport, industry (e.g., outdoor use and/or storage of chemicals and materials), and residential chemical use (pesticides, cleaning agents, painting). During storm events, water running over these impervious surfaces collects and transports the contaminants into drains and streams resulting in higher contaminant concentrations in urban streams compared to streams in non-urban areas. In addition, some impervious surfaces themselves generate contaminants. For example, zinc is released from zinc-based roofing materials and copper is released from copper architectural material.

Other issues include removal / piping of headwater and ephemeral streams areas and removal of wetlands and seepages which filter and detail water, and support summer stream flow.; modified or channelised stream beds; chemical and physical barriers to fish passage; and low native biodiversity with dominance of tolerant weed or pest species. Furthermore, water in urban streams often has faecal contamination, which combined with sediment (which allows bacteria to survive longer), means urban waterbodies are unsuitable for recreation after rainfall or food gathering at any time.

These pressures, commonly referred to as symptoms of 'urban stream syndrome', need to be addressed to provide for ecosystem health and other community values. Altered stream channels and piping can in some cases have counter-productive effects on urban resilience when piped networks and flow channels reach design capacity and overflow. This can cause damage to property, and in some extreme cases, pose a threat to human life. These issues decrease the social and cultural well-being of urban communities. The loss of urban waterbodies to piping/drainage can also reduce the sense of place that people have with an area.

[3] For a general description of water quality issues associated with urban areas, see eg Gadd, J and Milne, J. 2019. Monitoring water quality in urban streams and stormwater: Guidance for New Zealand practitioners. NIWA Client Report 2019168AK prepared for Envirolink. MBIE Contract No. Co1X170; Urban Water Principles: Recommendation of the Urban Water Working Group.2018. Wellington: Ministry for the Environment; Implementing Ngā Wai Manga – the Urban Water Principles through policy and practices – the Urban Water Working Group's recommendations to central government and the urban water sector. 2020. Wellington: Ministry for the Environment.

Impacts on urban waterbodies often go hand in hand with reducing or degrading areas people use (e.g., for recreation, mahinga kai).

In combination, these multiple pressures result in degradation of biological communities and reduced ecological functioning in urban streams. This condition is characterised by fewer sensitive invertebrates and fish species. In New Zealand, urban streams are dominated by pollution-tolerant taxa as demonstrated by lower macroinvertebrate community index (MCI) and Ephemeroptera-Plecoptera-Trichoptera (EPT) scores.

3. THE POLICY AND REGULATORY ENVIRONMENT PRIOR TO 2020

In 2020, several policy and legislative changes were introduced. This section of the paper considers the regulatory and policy context before these changes were introduced to understand the significance of these recent changes. Prior to 2020, the regulatory and policy context for stormwater management comprised the Resource Management Act 1991 (RMA), the National Policy Statement for Freshwater Management 2014 (as amended in 2017), the New Zealand Coastal Policy Statement 2010 (NZCPS), and various Council planning instruments promulgated under the RMA.[4]

3.1 Resource Management Act

To achieve its sustainable management purpose, the RMA sets out the duties and functions of regional and territorial authorities and the hierarchy of planning documents. In regard to the effects of using or contaminating water resources, the responsibility largely lies with regional councils while the control of the effects of land-use activities lies largely with district or city councils. The RMA provides for the preparation of national policy statements, national environmental standards, regional policy statements, regional plans and district plans. The relevant documents, through their objectives, policies and rules, set the resource management context for water, water services and associated infrastructure management. All activities associated with the establishment and operation of water services and infrastructure must be assessed against these plans, which will influence what and where infrastructure can be developed, how it is managed, its development cost and the timing of development.

3.2 National Policy Statement for Freshwater Management 2014 (as amended in 2017)[5]

Regional and district councils had to give effect to this and decisions on resource consents had to have regard to it. The Freshwater NPS required regional councils to recognise the national significance of freshwater for all New Zealanders through including provisions within their regional plans. These set freshwater objectives and environmental standards for all of the freshwater use, discharges into water and integrated management of the effect of land use and development on fresh water.

Policy C2 of the 2014 NPS required all regional councils to make or change regional policy statements to the extent needed to provide for the integrated management of the effects of the use and development of:

- land on fresh water, including encouraging the co-ordination and sequencing of regional and/or urban growth, land use and development and the provision of infrastructure; and
- land and fresh water on coastal water.

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[4] *A detailed stocktake of provisions (objectives, policies, rules and methods) relevant to stormwater in a selection of Resource Management Act planning documents can be found in 'Stormwater Policy and Plan Provisions. Stocktake and Assessment' 3-c2055.00 Rev 1. WSP, Christchurch. 16 March 2020.*

[5] *https://environment.govt.nz/publications/national-policy-statement-for-freshwater-management-2014-amended-2017/*

3.3 New Zealand Coastal Policy Statement 2010

Policies 22 (Sedimentation) and 23 (Discharge of Contaminants) require consideration of the impact of land use on coastal water and consideration of the integrated management of catchments and stormwater networks.

To demonstrate what was able to be achieved in the pre-2020 context, I set out some comments on the regulatory context of New Zealand's two largest urban areas, Auckland and Christchurch.

3.4 Auckland Unitary Plan

The Auckland Unitary Plan was made operative in part at various dates from 2016. The Auckland Council had initially sought specific references to WSUD in the Plan's provisions. However, the Independent Hearing Panel Water did not accept that and instead imposed a comprehensive set of policies relating to 'Water Quality and Integrated Management'.[6]

The Stream Ecological Valuation (SEV) methodology was originally designed to determine the value of Auckland urban streams, but is now being applied by many other regional councils to evaluate effects management proposals associated with impacts of modifying streams. For the most part, the SEV methodology is a robust and effective tool to support decisions on suitable offset packages for the modification or loss of freshwater stream habitats. The SEV methodology has produced successful outcomes and given certainty to regulators and applicants alike.[7] However, in Auckland, the large-scale removal of streams now means there are not enough stream lengths remaining on which to apply mitigation, so mitigation/offsetting often involves expensive stream daylighting projects.

In October 2019, the Environment Court approved a single, regionwide Auckland stormwater network discharge consent (NDC).[8] The single stormwater network discharge consent (NDC) replaces 116 different consents and multiple authorisations with a single consent containing a comprehensive set of requirements for use across Auckland.

The NDC is described as, "a key tool in managing and integrating land uses, stormwater discharges and the region's natural water assets to reduce impacts from climate change and flooding and allow multiple community and environmental outcomes to be realised".[9]

This consent is intended to:

- provide certainty and a regionally consistent set of performance requirements
- provide a framework to support urban growth and development for future urban areas while enabling stormwater management plans to be tailored to specific sites and scenarios

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[6] *See sections 1.2.1 and 3 of the decision of the Auckland Unitary Plan Independent Hearings Panel Hearing topics 46, 47, 48 and 49 dated July 2016 - https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/unitary-plan/history-unitary-plan/ihp-designations-reports-recommendations/Documents/ihp046to049waterqualitystormwater.pdf*

[7] *For a description of SEV and the concept of biodiversity offsetting generally see Biodiversity Offsetting under the Resource Management Act: A guidance document September 2018 available at https://www.lgnz.co.nz/assets/Uploads/7215efb76d/Biodiversity-offsetting-under-the-resource-management-act-full-document-....pdf*

[8] *Kainga Ora and others v Auckland Council. 30 October 2019.*

[9] *Auckland Council Design Manual: Regionwide Stormwater Network Discharge Consent (NDC) available at http://www.aucklanddesignmanual.co.nz/regulations/technical-guidance/ndc*

- improve water quality through robust performance requirements for the public network
- reduce complexity and promote compliance requirements
- deliver accountability, transparency and best practice through regular reporting and reviews.

The NDC applies to:

- existing diversions and discharges of stormwater from the public network, including areas with combined sewers that overflow into watercourses
- new or modified diversions and discharges that result from the upgrading of the stormwater network
- future diversions and discharges that result from the extension of the public network to service intensification and greenfield growth.

The NDC expires in 2052. It has 42 conditions and seven Schedules. Condition 41 enables a review of conditions under s128 of the RMA "to address any unanticipated adverse effects that arise from the exercise of the consent or to adopt any new requirement of a National Policy Statement, National Environmental Standard." However, this is likely to be triggered, given the frequency and volume of sewage overflows in the Eastern Isthmus which are permitted as the "Best Practicable Option', and not addressed by the Central Interceptor (which targets Western Isthmus sewage overflows).[10]

The Auckland Unitary Plan also provides for Stormwater Management Areas in the Auckland section.[11] These apply in areas in Auckland that have higher quality streams. These provisions have been influential in increasing WSUD by providing that all sites within the SMAs must:

(a) provide retention (volume reduction) of at least 5mm runoff depth for the impervious area for which hydrology mitigation is required; and

(b) provide detention (temporary storage) and a drain down period of 24 hours for the difference between the pre-development and post-development runoff volumes from the 95th percentile, 24-hour rainfall event minus the 5 mm retention volume or any greater retention volume that is achieved, over the impervious area for which hydrology mitigation is required.

3.5 Canterbury Land and Water Plan (CLWP)

The CLWP became operative in March 2017. It has several policies relating to stormwater in urban areas. They are not as comprehensive as the Auckland Unitary Plan:

4.15 In urban areas, the adverse effects on water quality, aquatic ecosystems, existing uses and values of water and public health from the cumulative effects of sewage, wastewater, industrial or trade waste or stormwater discharges are avoided by:

a. all sewage, industrial or trade waste being discharged into a reticulated system, where available;

ab. all stormwater being discharged to land or into reticulated system, where a reticulated system is available;

[10] *See https://www.stuff.co.nz/environment/300001629/remuera-residents-gagging-at-eel-and-sewage-miasma*

[11] *https://unitaryplan.aucklandcouncil.govt.nz/Images/Auckland%20Unitary%20Plan%20Operative/Chapter%20E%20Auckland-wide/1.%20Natural%20Resources/E10%20Stormwater%20management%20area%20-%20Flow%201%20and%20Flow%202.pdf*

b. all stormwater being discharged in accordance with a stormwater management plan, where one has been consented;

c. the implementation of contingency measures to minimise the risk of a discharge from a wastewater reticulation system to surface water in the event of a system failure or overloading of the system beyond its design capacity; and

d. any reticulated stormwater or wastewater system installed after 11 August 2012 is designed and managed to avoid sewage discharge into surface water.

4.16 Any reticulated stormwater system for any urban area is managed in accordance with a stormwater management plan that addresses the following matters:

a. the management of all discharges of stormwater into the stormwater system; and

b. for any reticulated stormwater system established after 11 August 2012, including any extension to any existing reticulated stormwater system, the discharge of stormwater being subject to a land-based or designed treatment system, or wetland treatment prior to any discharge to a lake or river; and

c. how any discharge of stormwater, treated or untreated, into water or onto land where it may enter water meets or will meet, the water quality outcomes and standards and limits for that waterbody set out in Table 1, Schedules 5 and 8 and Sections 6 to 15,(whichever applies); and

d. The management of the discharge of stormwater from sites involving the use, storage or disposal of hazardous substances, and

e. Where the discharge is from an existing local authority network, demonstration of a commitment to progressively improve the quality of the discharge to meet condition (c) as soon as practicable but no later than 2025.

4.16A Operators of reticulated stormwater systems implement methods to manage the quantity and quality of all stormwater directed to and conveyed by the reticulated stormwater system, and from 1 January 2025 network operators account for and are responsible for the quality and quantity of all stormwater discharged from that reticulated stormwater system.

4.17 Stormwater run-off volumes and peak flows are managed so that they do not cause or exacerbate the risk of inundation, erosion or damage to property or infrastructure downstream or risks to human safety.

3.6 Christchurch Water Strategy

In 2008, the Christchurch City Council and Environment Canterbury agreed on a 'Protocol for surface water management'.[12] The Protocol sets out how the two councils will work together to achieve integrated management of stormwater in Christchurch. The three primary Principles in the Protocol are:

1. Integrated land-use planning: Ensure that land-use planning and stormwater planning is integrated.
2. A multi-value approach: Improve the water quality, landscape, recreation, heritage and cultural values of surface water resources whilst managing flood risk.

[12] https://ccc.govt.nz/services/water-and-drainage/stormwater-and-drainage/policy-and-strategy/protocol-for-surface-water-management/

3. Collaboration: Work together, at all levels, to achieve Principles 1 and 2 in the most effective and efficient manner.

In September 2019, the Christchurch City Council adopted the non-statutory Te Wai Ora o Tāne Integrated Water Strategy.[13] This strategy addresses eleven key strategic issues relating to managing wastewater discharges, ensuring long term water supply, responding to stormwater management, flooding, and potential sea-level rise issues, improving water quality and waterway health, and ensuring that the community values its many different types of water resources.

The strategy recognises the various roles of local, regional and national governments, public and private organisations and the general public. Additionally it recognises how each can contribute to realising the strategy's vision. The strategy recognises and incorporates the Urban Water Principles - Ngā Wai Manga recommended by central government's Urban Water Working Group (see below).

The strategy also supports the implementation of the Canterbury Water Management Strategy, in particular with respect to the following targets: ecosystem health and biodiversity, kaitiakitanga, drinking water, recreational and amenity opportunities, water-use efficiency and environmental limits.

3.7 Christchurch City Plan

The Christchurch City Plan (2016) contains the following policy:

8.2.3.4 Policy - Stormwater disposal

a. District wide:
    1. Avoid any increase in sediment and contaminants entering water bodies as a result of stormwater disposal.
    2. Ensure that stormwater is disposed of in a manner which maintains or enhances the quality of surface water and groundwater.
    3. Ensure that any necessary stormwater control and disposal systems and the upgrading of existing infrastructure are sufficient for the amount and rate of anticipated runoff.
    4. Ensure that stormwater is disposed of in a manner which is consistent with maintaining public health.

b. Outside the Central City:
    1. Encourage stormwater treatment and disposal through low-impact or water-sensitive designs that imitate natural processes to manage and mitigate the adverse effects of stormwater discharges.
    2. Ensure stormwater is disposed of in stormwater management areas so as to avoid inundation within the subdivision or on adjoining land.
    3. Where feasible, utilise stormwater management areas for multiple uses and ensure they have a high quality interface with residential activities or commercial activities.
    4. Incorporate and plant indigenous vegetation that is appropriate to the specific site.
    5. Ensure that realignment of any watercourse occurs in a manner that improves stormwater drainage and enhances ecological, mahinga kai and landscape values.

[13] https://ccc.govt.nz/the-council/plans-strategies-policies-and-bylaws/strategies/te-wai-ora-o-tane-integrated-water-strategy

6. Ensure that stormwater management measures do not increase the potential for bird strike to aircraft in proximity to the airport.
7. Encourage on-site rain-water collection for non-potable use.
8. Ensure there is sufficient capacity to meet the required level of service in the infrastructure design standard or if sufficient capacity is not available, ensure that the effects of development are mitigated on-site.

In December 2019, the Environment Court issued a stormwater discharge permit to the Christchurch City Council which provides for stormwater management across the City. The permit is for a 25-year period and contains 65 conditions and 10 Schedules. The review condition[14] provides that the Regional Council may (but is not required to) review the conditions every 6 months for a range of purposes including:

- Achieving consistency of the consent in regard to catchment management planning and stormwater management with the provisions of the Christchurch--West Melton Sub-regional Section of the Canterbury LWRP within five years of the notification of the sub-regional section;
- Providing alternative Receiving Environment Attribute Target Levels for water quantity;
- Ensuring that improvements of the quality of the stormwater discharge occur over the duration of the consent to reduce any adverse effect on the environment;
- To provide alternative standards for the expected city-wide percentage contaminant load reductions in Condition 19, or targets for the contaminant load reductions set within SMPs that become apparent through the Christchurch Contaminant Load Model or alternative methods developed by the Consent Holder.

The Christchurch City Plan also provides a policy (but no rules) for a new commercial development. It is required to be "well-designed and laid out by" (inter alia) "incorporating principles of low impact design including energy efficiency, water conservation, the reuse of stormwater, on-site treatment of stormwater and/or integration with the wider catchment based approach to stormwater management, where practicable".[15]

3.8 National Science Challenge: Building Better Homes, Towns and Cities. Activating water sensitive urban design for healthy resilient communities

In 2018 and 2019, the Building Better Homes Towns and Cities National Science Challenge funded the 'Activating Water Sensitive Urban Design (WSUD) for healthy, resilient communities' research project.[16] The project delivered a range of research papers with the objective of enhancing capability to address critical current barriers to the uptake of WSUD in New Zealand.

The wellbeing benefits of Water Sensitive Urban Design and GI are summarised in a report, "Assessing the Full Benefits of WSUD".[17] This report notes that the potential benefits of WSUD, relative to conventional urban development approaches, are typically expected to include better hydrology and water quality and

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[14] *Condition 63*

[15] *Policy 15.2.4.2. Contrast this with industrial development which is only "encouraged to use a multi-value approach" for stormwater management and no reuse requirement (Policy 16.2.3.3), and residential development where the policy is to "promote" water efficiency, through non-regulatory methods only (Policy 14.2.4.8).*

[16] *See https://www.buildingbetter.nz/news/2019/wsud_green_infrastructure_fundamental_to_wellbeing.html*

[17] *https://www.buildingbetter.nz/publications/urban_wellbeing/Moores_Batstone_2019_Assessing_full_benefits_WSUD.pdf*

healthier aquatic ecosystems. While there remain evident gaps on the delivery of these outcomes, especially in New Zealand, monitoring and modelling methods for their assessment are well developed.

However, assessments of the benefits of WSUD that focus solely on these water-related outcomes are incomplete in their scope. WSUD has the potential to deliver a wide range of other environmental and social co-benefits. For instance: the preservation of natural soils; microclimate moderation; terrestrial habitat provision for native biodiversity; the provision of supplementary water supplies; better public safety; and improved health and wellbeing deriving from the use of green infrastructure (GI).

A number of tools developed overseas provide for assessments of the benefits of WSUD. These draw on established methods from the field of resource economics to infer economic benefits associated with the GI's delivery of a wide range of water-related and co-benefits. Combined with information on infrastructure costs, these methods can be used in assessments of cost-benefit and cost-effectiveness of WSUD compared to conventional water management approaches.

However, these tools are not readily applicable in New Zealand, for reasons that include uncertainty in benefit transfer from one jurisdiction to another, caution over the monetization of environmental benefits and an aspiration to adopt assessment methods that explicitly recognise Māori values.

Recognising this, the research team developed the qualitative 'More Than Water' assessment tool to help communities, designers, and funders compare the nature and extent of benefits of projects with and without Water Sensitive Urban Design.[18] The name 'More Than Water' reflects the potential for WSUD to deliver multiple benefits and cost-related advantages, in addition to more familiar considerations associated with management of the hydrological and water quality effects of urban development. MTW provides for the evaluation of a wide set of benefits and costs criteria using a simple qualitative assessment method. The tool generates graphical outputs that can be used to demonstrate how benefit and cost outcomes may vary under different development scenarios.

The research team also prepared a report on alternative funding and incentive mechanisms to support implementation of WSUD in New Zealand.[19] This report considers the significant challenges in securing funds for stormwater managers to address the costs of operating and maintaining desired levels of service, and for planning for future growth while meeting community aspirations to maintain or enhance the quality of the environment. The report states that there is no 'silver bullet' which can solve the funding gap facing councils and network operators in New Zealand. Rather, a toolbox approach to funding is needed. The exact make-up of this funding approach needs further investigation, but it could include:

- New development (greenfield and large-scale brownfield) CAPEX costs to be funded through development and financial contributions and implemented in a way which provides greater flexibility for councils/ utilities to have more say in what types of assets are delivered;
- Targeted rates for stormwater OPEX funding of existing stormwater infrastructure and to cope with maintenance costs of new infrastructure;
- Incentives and reduced fees for properties incorporating green infrastructure;
- Road user charges to account for contamination from roads (up to 35% of impervious surfaces are located on non-rateable land, and 60% of expenditure associated with pollution control is required because of pollution caused by motor vehicles);

[18] https://www.landcareresearch.co.nz/science/living/cities,-settlements-and-communities/water-sensitive-urban-design/more-than-water-mtw-assessment-tool

[19] https://www.buildingbetter.nz/publications/urban_wellbeing/Ira_Batstone_2019_WSUD_Incentives_&_Funding.pdf

- Cap and trade schemes for urban catchments which incorporate large rural areas;
- Third party operators and/or public private operators to deliver and manage standalone integrated water schemes.
- A national government incentives programme (similar to the Melbourne Water "Living Rivers" programme) which allows regions to sustainably implement the NPS-FM and provides support to WSUD projects in local councils, financing activities and employees to build capacity and facilitate projects which councils would not otherwise take on.

The paper concludes by recommending that future research be undertaken that identifies: the current state of three waters funding by local authorities; opportunities to identify and resource common toolbox mixes of solutions; opportunities for co-benefit based funding; and gaps in capacities to pursue the opportunities afforded by alternative potential funding regimes. These enquiries are motivated around the refinement and investigation of an appropriate incentives and funding policy to support WSUD implementation across regional areas of New Zealand.

3.9 Urban Water Working Group

In 2017, the Ministry for the Environment convened the Urban Water Working Group, a collaborative body comprising practitioners and technical experts working in the field of urban water management. The Group comprised approximately 45 practitioners working in local government, the Three Waters sector, and the wider urban development and design sectors.

In its first phase, the group developed ten high-level urban water principles and values. The principles, or Ngā Wai Manga, reflect the Group's vision for improved urban water stewardship. They are intended to prompt action and promote alignment within government and industry.

These principles are intended to inform:

- urban water policy, planning and consenting decisions
- urban development and infrastructure design choices
- other activities that impact urban water outcomes.

The urban water principles are high-level principles and values, intended to inform urban water policy and planning decisions, infrastructure design choices, and other activities related to urban water outcomes. Overall, these principles are intended to help inform a national vision, promote alignment in government and industry, and prompt action to support the achievement of local and national objectives for urban water.[20] They have no regulatory role.

The ten Urban Water Principles are[21]:

Papatūānuku – Our relationship with the land – papatūānuku – will pre-determine our relationship with water

1. Protect and enhance ecosystem health of all receiving environments.
2. Co-design with nature an integrated and regenerative approach to urban development.

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[20] Urban Water Principles: Recommendation of the Urban Water Working Group.2018. Wellington: Ministry for the Environment. See https://environment.govt.nz/publications/urban-water-principles-recommendation-of-the-urban-water-working-group/

[21] For a detailed set of recommendations about practices for policy makers in relation to these principles see Appendix A: Practices for policy makers and regulators in Implementing Ngā Wai Manga – fn8

3. Address pressures on waterbodies close to source.

Ngā wai tuku kiri – Our waters are a gift of life provided to us by our tupuna

4. Recognise and respect mana motuhake – the whakapapa and relationship that mana whenua have with water ecosystems in their rohe.

Tāngata – Our environments are places of human occupation

5. Identify and consider the community values for urban water and reflect them in decision-making.
6. Optimise environmental, social and cultural benefits when investing in buildings and infrastructure.

Te hāpori me te wai – The community's love and care for water is enduring

7. Uphold and foster kaitiakitanga and custodianship of urban water ecosystems.
8. Collect and share information to promote common understanding of urban water issues, solutions and values.

Tiakina mō apōpō – In building future resilience, our connectedness with the environment is our strength

9. Increase resilience to natural hazards and climate change.
10. Conserve and reuse water resources.

In its second phase of its work, the Urban Water Working Group developed policies and practices that could implement Ngā Wai Manga. These policies and practices are aimed at central government, local government and the water sector.[22]

The Group's policy recommendations are aimed at central government. They are:

- Review primary and secondary legislation to identify changes to be made to protect and enhance Te Mana me te Mauri o te Wai in urban areas.
- Review and amend National Planning Standards to include provisions that require the implementation of Ngā Wai Manga and related practices (such as WSUD)
- Create a hub to share best practice, and develop guidance on best practices for urban water management
- Incorporate Ngā Wai Manga and related practices into guidelines for infrastructure providers and Crown agencies
- Develop a funding and incentives toolbox to promote best practices for urban water management
- Develop the educational pipeline and work with industry bodies to establish a national training and certification scheme for urban water practitioners and related professions, and promote widespread education of, and community participation in, urban water solutions.

[22] *Implementing Ngā Wai Manga – the Urban Water Principles through policy and practices – the Urban Water Working Group's recommendations to central government and the urban water sector. 2020. Wellington: Ministry for the Environment. See https://www.mfe.govt.nz/publications/fresh-water/implementing-nga-wai-manga-urban-water-principles-through-policy-and-practices*

In addition to the policy recommendations, the Urban Water Working Group's also made comprehensive recommendations about practice which reflect current and emerging best practice in New Zealand and around the world. The recommendations are[23]:

We recommend that the government:

- *incorporates these practices into official guidance*
- *leads the further development of these practices and creates a database of examples and case studies in the 'best practices hub' we have recommended*
- *engages with local government and infrastructure providers to promote and encourage the uptake of these practices*
- *considers how funding structures and incentives could support implementation of these practices*

***We recommend that the local government sector as policy makers and regulators**:*

- *incorporates these practices into their resource management plans and other council policies and plans*
- *promotes the adoption, uptake and implementation of these practices, both within their organisations and in their community*
- *works with infrastructure providers to promote the adoption and implementation of these practices*
- *creates pathways to enable innovation, and demonstrates willingness to take the risk on new approaches*
- *measures progress toward meeting Ngā Wai Manga, and provides good information to the public using State of the Environment and other environmental monitoring metrics*
- *resources non-regulatory methods, civic action and behaviour change programmes which support the implementation of the practices.*

We recommend that infrastructure providers (including councils, council controlled organisations and Crown agencies):

- *incorporate these practices into their policies and projects*
- *promote the adoption, uptake and implementation of these practices both within their organisations and in their communities*
- *works with key stakeholders and partners to promote the adoption and uptake of these practices.*

***We recommend that technical professionals**:*

- *adopt and promote the uptake of these practices within their organisations, industry sector, and clients*

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[23] The full recommendations can be seen in Appendices A – D of Implementing Ngā Wai Manga – the Urban Water Principles through policy and practices – the Urban Water Working Group's recommendations to central government and the urban water sector. 2020. Wellington: Ministry for the Environment. See https://www.mfe.govt.nz/publications/fresh-water/implementing-nga-wai-manga-urban-water-principles-through-policy-and-practices

- *support the establishment of a national training and certification programme for practitioners in the urban water sector and related professions*
- *support the establishment and ongoing development of a best practices hub*
- *share knowledge and help upskill and mentor others.*

4. 2020 – THE NEED FOR ADDITIONAL REGULATION

Having regard to:

- The NPSFM 2014;
- The NZCPS 2010;
- The non-regulatory 2019 Urban Water Principles (and the subsequent recommendations on policy and practice by the Urban Water Working Group); and
- The regulatory powers of regional and district councils as evidenced by the relevant Auckland and Canterbury statutory planning documents and the comprehensive discharge permits granted by the Environment Court to the Auckland Council and the Christchurch City Council

Arguably, in combination, there was an adequate regulatory regime for the proper implementation of integrated stormwater management and the adoption of WSUD. Nonetheless, in 2020 several regulatory changes were made to further strengthen the position.

4.1 National Policy Statement for Freshwater Management 2020

The National Policy Statement on Freshwater Management (NPS-FM) 2020 came into force in 3 September 2020. It contains several provisions relevant to stormwater management. The policy on 'Integrated Management' builds on a similar policy in the NPS 2014 (as amended in 2017). This policy provides:

> **3.5 Integrated management**
>
> (1) Adopting an integrated approach, ki uta ki tai, as required by Te Mana o te Wai, requires that local authorities must:
>
> (a) recognise the interconnectedness of the whole environment, from the mountains and lakes, down the rivers to hāpua (lagoons), wahapū (estuaries) and to the sea; and
>
> (b) recognise interactions between freshwater, land, water bodies, ecosystems, and receiving environments; and
>
> (c) manage freshwater, and land use and development, in catchments in an integrated and sustainable way to avoid, remedy, or mitigate adverse effects, including cumulative effects, on the health and well-being of water bodies, freshwater ecosystems, and receiving environments; and
>
> (d) encourage the co-ordination and sequencing of regional or urban growth.
>
> (2) Every regional council must make or change its regional policy statement to the extent needed to provide for the integrated management of the effects of:
>
> (a) the use and development of land on freshwater; and
>
> (b) the use and development of land and freshwater on receiving environments.

(3) In order to give effect to this National Policy Statement, local authorities that share jurisdiction over a catchment must co-operate in the integrated management of the effects of land use and development on freshwater.

(4) Every territorial authority must include objectives, policies, and methods in its district plan to promote positive effects, and avoid, remedy, or mitigate adverse effects (including cumulative effects), of urban development on the health and well-being of water bodies, freshwater ecosystems, and receiving environments.

This policy is strengthened from the 2014 NPS version. For the first time, there is an explicit requirement on territorial local authorities to include objectives, policies, and methods in their district plans to promote positive effects, and avoid, remedy, or mitigate adverse effects on water quality of urban development. Formerly, the NPS only had such requirements on regional councils.

The Regulatory Impact Analysis (RIA) on the NPS is instructive about why the policy in the NPS is not more explicit about WSUD. Several submissions had called for an explicit reference to WSUD to be included. The interim Regulatory Impact Statement[24] noted there would be a range of indirect costs and benefits of the proposed option, and again these would depend on the types of planning provisions territorial local authorities chose to use to give effect to the policy. The proposed policy involved placing a broad requirement on territorial authorities to manage the effects of land use for urban development on water bodies, rather than directing specific approaches that must be used. It "was expected" that "in general" councils would respond to this requirement with some combination of:

- protection of streams, lakes, estuaries etc. and related habitats, or restoration where degradation has already occurred
- use of best practice Water Sensitive Urban Design or Low Impact Design techniques, including regulating impervious surface cover, requiring on-site infiltration, and provision of green infrastructure for stormwater management (this can be promoted through guidelines or by working closely with land developers during initial structure planning and design phases).[25]

The Ministry for the Environment's Interim RIA noted[26] that while water sensitive design can have a range of environmental and community benefits, "these benefits can be difficult to quantify in financial terms and are highly site-specific".[27] It went on to state: "While water sensitive design approaches are the main response envisaged by this policy, the policy is deliberately broad and non-prescriptive to enable [Territorial Authorities] to respond in the most appropriate way for their circumstances".[28]

The final RIA confirmed that position.[29] The RIA states: "By requiring TAs to consider freshwater outcomes in their district plans we are directing them to **think about** urban development and freshwater management in

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[24] *Interim Regulatory Impact Analysis for Consultation: Essential Freshwater. Part II: Detailed Analysis 8 August 2019 Pages 234 - 247* https://www.mfe.govt.nz/more/briefings-cabinet-papers-and-related-material-search/regulatory-impact-statements/interim

[25] *Page 244*

[26] *Page 245*

[27] *Ibid.*

[28] *Ibid.*

[29] *Regulatory Impact Analysis Action for healthy waterways. Part II: Detailed Analysis 6 May 2020* https://www.mfe.govt.nz/regulatory-impact-statements/action-for-healthy-waterways-part-11

an integrated manner. The proposed policy involves placing a broad requirement on TAs to manage the effects of land use and development on freshwater, rather than directing specific approaches that must be used. The existing NPS-FM already requires freshwater to be managed in urban areas to meet freshwater objectives and limits that are set for freshwater bodies in regional plans. This policy is intended **to make it more likely that these requirements would be met**, by ensuring that when urban growth and development occurs it is accompanied by active consideration of, and decisions about, how to manage the effects of that growth on freshwater". [emphasis added]

In relation to WSUD specifically, the RIA stated: "We believe that while there is merit in requiring the implementation of WSUD, the aim of this policy proposal is to not provide specific direction about approaches TAs should use to manage the effects of land use and development on freshwater… Ongoing development in the sector is bringing WSUD forward, and will likely be a key consideration for most TAs, particularly because of the proposed policy requirement for TAs to consider adverse effects on freshwater from use and development".

And "We do not recommend making WSUD a mandatory requirement under the NPS-FM, but we instead propose to offer extensive guidance to councils in the wider implementation package. We also recommend removing the information note in the NPS-FM that reference WSUD as these are better covered in the implementation guidance".

This appears a timid approach and a lost opportunity. Other than this, there is no rationale for not having required all regional and district plans to include the Auckland provisions (or similar). That would have avoided the need for each council to go through its own (possibly lengthy and expensive) process. This could have been done under section 55(2A) of the RMA which means that the changes must be made without using the publicly notified process in Schedule 1 of the Act. If it is good enough for policies to be directly imported in regional plans in relation to wetlands, the loss of river extent and values, and fish passage,[30] then why not for urban design effects on urban streams?

4.2 National Policy Statement on Urban Development 2020

The NPS-UD 2020 recognises the national significance of:

- having well-functioning urban environments that enable all people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety, now and into the future
- providing sufficient development capacity to meet the different needs of people and communities.

This NPS does not address the environmental effects of urban development. As was noted in the Regulatory Impact Analysis on the Freshwater Reforms: "Although we expect the NPSUD will have beneficial effects for streams in urban areas, it is not the purpose of the NPSUD to directly address the management of freshwater and the Ministry does not consider the NPSUD on its own will provide adequate protection for urban streams".[31] This appears to have been left to the NPS-FM.

[30] *2000 NPS Clause 1.7*

[31] *Regulatory Impact Analysis: Action for Healthy Waterways. Part II Detailed Analysis. 6 May 2020 page 43*

4.3 Taumata Arowai - the Water Services Regulator

In September 2019, Cabinet made decisions about the creation of a new Water Services Regulator to administer and enforce the new drinking water regulatory system, while contributing to improved environmental outcomes from wastewater and stormwater.

On 6 August 2020, the Taumata Arowai—the Water Services Regulator Act 2020 became law. The Act establishes Taumata Arowai as a Crown Agent and provides for its objectives:

(a) protect and promote drinking water safety and related public health outcomes; and

(b) effectively administer the drinking water regulatory system; and

(c) build and maintain capability among drinking water suppliers and across the wider industry; and

(d) give effect to Te Mana o te Wai, to the extent that Te Mana o te Wai applies to the functions and duties of Taumata Arowai; and

(e) provide oversight of, and advice on, the regulation, management, and environmental performance of wastewater and stormwater networks; and

(f) promote public understanding of the environmental performance of wastewater and stormwater networks.

In relation to stormwater, its functions include:

- provide national-level oversight, leadership, communication, and co-ordination in relation to the environmental performance, management, and regulation of stormwater networks; and
- identify and monitor matters that affect the environmental performance of stormwater networks, including current and emerging contaminants; and
- provide oversight of, and information to central and local government in relation to (i) the development, operation, and effectiveness of standards, regulations, and other statutory requirements for stormwater; and (ii) compliance with, monitoring of, and enforcement of standards, regulations, and other statutory requirements affecting stormwater networks and stormwater network operators; and
- identify, prepare, or promote national guidelines and good practices that relate to stormwater networks and stormwater network operators.

On 28 July 2020, the Water Services Bill 2020 was introduced into Parliament. Subpart 7 provides for monitoring and reporting on environmental performance of wastewater and stormwater networks.

In relation to stormwater, Clause 136 - 141 requires Taumata Arowai to:

- monitor and report on the environmental performance of stormwater networks and network operators for specified purposes;
- collect information for the purposes of monitoring and reporting on the environmental performance of stormwater networks and network operators;
- establish and maintain public registers for stormwater networks;
- develop, publish, and maintain environmental performance measures for stormwater networks; and
- publish an annual report on the environmental performance of wastewater and stormwater networks and network operators.

In terms of stormwater and wastewater, these reforms are designed to:

- lift the environmental performance and transparency of wastewater and stormwater networks; and
- improve national-level leadership, oversight, and support relating to wastewater and stormwater.

This national body has real potential to make a difference in encouraging and supporting best practice stormwater management. This will depend on it having adequate resources. It may find itself at capacity addressing the (higher profile) issues of drinking water and wastewater, which have more clearly demonstrable links to public health.

4.4 Proposed Ministry for the Environment guidance

The Ministry for the Environment has signalled[32] that it is working on non-statutory guidance in three areas:

1. Model plan provisions referring to WSUD/water quality and integrated management
2. Structure planning provisions for stormwater
3. Model conditions for comprehensive stormwater discharge permits

5. CONCLUSION

In conclusion, good environmental outcomes could have been achieved without the 2020 amendments. As there was no time to assess their implementation, it remains unclear why the 2020 amendments were thought necessary, and what changes in practice the amendments were designed to encourage or require.

The regulation of stormwater management is not enough by itself to bring about the desired changes. The regulatory changes relate to just one of the seven primary recommendations of the Urban Water Working Group. It appears that to achieve the best outcomes, there is a need to implement the other recommendations from both the 'Activating water sensitive urban design for healthy resilient communities' work of the National Science Challenge and the Policy and practice recommendations of the Urban Water Working Group and the Activating WSUD work as part of the National Science Challenge. The latter's recommendations are:

- review and amend National Planning Standards to include provisions that require the implementation of Ngā Wai Manga and related practices
- create a hub to share best practice, and develop guidance on best practices for urban water management
- incorporate Ngā Wai Manga and related practices into guidelines for infrastructure providers and Crown agencies
- develop a funding and incentives toolbox to underpin and support implementation of best practices for urban water management
- develop the educational pipeline and work with industry bodies to establish a national training and certification scheme for urban water practitioners and related professions
- promote widespread education of, and community participation in, urban water solutions
- create capacity within local authorities to be able to move to WSUD as business as usual (which requires understanding of and access to funding)

[32] *MFE's perspective on WSD and freshwater management in urban areas – Tauranga WSD seminar 2019 - https://www.youtube.com/watch?v=ve6rzlZZJe4&list=PLEB3rzfl95tuaxF1fJvboZ2LXc_sHmzlC&index=14*

Alongside the work of the Ministry, the professional services firms who are advising developers and local government in this area (many of whom have access to international resources) will need to exercise leadership and collaborate with each other on supporting local government and developers to identify and apply international best practice on urban stormwater management.

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