



BEYOND AGEING PIPES. Urban Water Systems for the 21st Century.



Office of the
PARLIAMENTARY COMMISSIONER FOR THE ENVIRONMENT
Te Kaitiaki Taiao a Te Whare Pāremata



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PO Box 10-241, Wellington
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Preface

In my preface to *Ageing pipes and murky waters. Urban water system issues for the 21st Century* (PCE 2000), I noted that the first item on my ‘getting started’ shortlist would be to develop a detailed understanding of community and business expectations and knowledge, both about the current system and about future water management needs and options. There are major tensions between some communities and councils over existing or proposed ownership and delivery models. Privatisation fears are limiting vision and constraining dialogue. Until these tensions and fears are addressed, and there is some stakeholder consensus on needs and options, few opportunities to improve sustainable management of urban water systems will be realised.

Submitters to my paper reinforced the need for a substantive process of consensus-building around water management matters. In particular, submitters addressed the debate around water charging and pricing. Many called for greater understanding by communities, councils and central government agencies of the complexity of water systems, the demands of our economy, and the needs of our ecosystems. Current debates are often one-dimensional, with too little recognition or understanding of the complexities that must be accommodated if urban water systems are to be economically viable, socially just and ecologically sustainable.

It is easy to talk about increased understanding of water management. Actually making this happen will take much effort. Why? Primarily because the whole issue of urban water management does not have any centre of strategic focus within the public or private sector. Yes, we have a plethora of legislation that defines multiple requirements for water services delivered by local government, but there is no focal point for ‘sponsorship’ within central government. The result is that while the previous administration recognised the need to address water management, it passed the reform ‘ball’ to local government as soon as it started to look politically challenging. While the current Government has similarly recognised the importance of water issues, there is little enthusiasm for making policy action a priority. Meanwhile, local government, as represented by Local Government New Zealand (LGNZ) has made limited progress in achieving focus on the issue. Water matters were not among the first seven strategic priorities for local government in 2000.

Despite the lack of a ‘home’ for strategic focus on water, many communities and local government groups are taking innovative steps. The Wellington water plan, Auckland’s water services review and Taranaki’s plans for a single water entity are all examples. Ultimately, the success of these initiatives will require national action and leadership. I see these two factors as the key to progress, hence my recommendation to form a Task Force. Such a move would provide a platform to underpin local initiatives, linked with necessary legislative change, institutional redesign and support for research and innovation. It will be vital to resource and drive the changes in our approach to urban water systems within central government agencies, councils and communities.

There is no equivalent of the Energy Efficiency and Conservation Authority (EECA) to promote efficiency of water use. EECA’s role could be expanded to embrace another critical strategic resource: water. Whether or not EECA is an appropriate body, it is essential to provide information to promote community and business

awareness and understanding of water system issues. I make no apology for stressing the ‘education’ imperative. It is the only way to develop an informed consensus and a politically stable platform on which to advance water management.

To conclude, I leave the final word to the United Nations Secretary-General, Kofi Annan, drawn from his *Millennium Report* (United Nations 2000). The UN sees a need to confront the water crisis and to build a new ethic of global stewardship.

‘...major efforts in public education are needed. Real understanding of the challenges we face is alarmingly low. As more and more of us live in cities, insulated from nature, the need for greater awareness grows. Consumers everywhere have to understand that their choices often have significant environmental consequences.’

I believe the recommendations in this report, if adopted, will provide a framework for moving forward in addressing urban water management needs and options facing New Zealand.

A handwritten signature in black ink, reading "J Morgan Williams". The signature is written in a cursive, flowing style with a large initial "J".

Dr J Morgan Williams
Parliamentary Commissioner for the Environment

Executive Summary

This report contains the findings of the Parliamentary Commissioner for the Environment's (PCE) investigation into urban water systems. It follows the discussion paper *Ageing pipes and murky waters. Urban water system issues for the 21st Century* (PCE 2000) and the summary of submissions made in response to that document (PCE 2001).

The report addresses:

- the ecological context of an urban water system - including water supply, wastewater disposal and stormwater management;
- the water system infrastructure and technologies - now and in the future;
- the legislation, regulations and institutional arrangements for managing water - barriers and opportunities;
- community views and values - concern for equity and social justice; and
- tangata whenua and water - recognising cultural links and Treaty obligations.

Four major areas of challenge are identified and addressed by specific recommendations:

1. The fragmented nature of water systems management and the lack of a clear central government 'home' for the necessary policy and legislation that underpin this essential resource and its infrastructure.
2. The lack of stakeholder awareness and understanding of urban water systems and involvement in their management. One of the biggest challenges will be reaching consensus between the various stakeholders on the environmental, social and economic goals of urban water systems. There is a need for a more detailed understanding of community and business expectations and provision of information to promote awareness and understanding of the issues. More research is required on technologies, including those that can be adopted from overseas, as well as social and economic research into urban water systems and options.

Many of these needs could be met through the establishment of an independent central government agency charged with promoting efficiency of water use. One possibility would be to expand the scope of the Energy Efficiency and Conservation Authority (EECA) to include water resources.

3. The community and political tensions surrounding the way we currently construct our water businesses: who owns, who manages and how water is valued and priced. The issue of pricing and charging for water dominated the submission responses with widespread support for flow-based user charges. This support was coupled with recognition that community concerns about equitable access to water and privatisation of water systems were a major impediment to the implementation of flow-based charges.
4. The lack of appreciation of the need to manage waters in an integrated way according to ecosystem principles. This includes recognition that water is not an unlimited resource.

Recommendations:

To the Minister of Commerce (as the Minister chairing the group of ministers with responsibilities for urban water system management).

- i Establish and resource a Task Force to develop recommendations on a range of actions to improve the management of urban water systems in accordance with an ecologically sustainable and integrated approach. The Task Force needs to assess new options and models for the delivery of water services that meet the identified principles and criteria for sustainable urban water systems.
- ii Direct the proposed Task Force to develop a process, to be implemented jointly by central and local government, for increasing stakeholder input to developing urban water systems and business models. The process should ensure that knowledge and experience pertaining to water management, systems and technologies are freely exchanged between community, tangata whenua, agency and business interests to ensure that all parties appreciate and accept the reasons for any future legislation or policy initiatives.
- iii Direct the proposed Task Force to examine water valuing, pricing and charging options that maximise in the long term:
 - ecologically efficient allocation, use and treatment of all waters;
 - equitable delivery of water services to society; and
 - financially viable business models for water services that are based on the premise that all water resources and infrastructure remain in public ownership.

To all territorial authorities and water services providers.

Prepare an overarching water services strategic plan as a framework for the sustainable and integrated management of urban water systems. The strategic plan needs to be prepared with the involvement and participation of tangata whenua, the community and other stakeholders. It also needs to include the development of indicators for the ecological, social and economic sustainability of the whole system.

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1.0 Introduction and background

1.1 The issues

The importance of water to human health, community well-being, economic development and ecological systems ensures that management of this resource is complex and of major strategic importance. This is a worldwide phenomenon. Six years ago the World Bank was talking about this century's wars being fought over water, as worldwide demand for water doubles every 21 years (Leslie 2000). In New Zealand we think of ourselves as being water-rich. At a national level we are water-rich, with some areas of very high rainfall and extensive groundwater reserves. But often water is not super-abundant in our urban areas. Shifts in rainfall patterns also indicate greater variability of distribution and supply in the future, alongside trends for rising per capita demands. The outlook is for rising stresses on our supply and delivery systems, and pressures on treatment capacity.

The management of water resources is extremely complex in terms of ecology, institutional arrangements, and associated legislative regulations. Nevertheless local government has, for decades done a reasonable job at keeping systems going, expanding where necessary and cautiously innovating. However until recently there has been a widespread tendency to under-invest in the main parts of the systems - the pipes and treatment plants. Rising demand, higher drinking water standards and stricter discharge conditions are now forcing the pace for more investment in water systems.

How to fairly generate the necessary capital to keep delivery and treatment systems going and to address urban stormwater is now an essential part of the debate about how to meet community and industry needs in coming decades. From this overarching question of how best to fund water supply and treatment systems, spills a whole host of vexing issues that, unless substantially addressed, will cripple water management in coming years. Issues include matters of ownership, valuing and pricing, equity, business models, legislative impediments, design imperatives (such as meeting health and fire requirements) and adequacy of integration of water services.

In the PCE's 1998 report *The cities and their people: New Zealand's urban environment*, the management of urban water systems was identified as a priority area for investigation.

This included the integrated management of the delivery of water and the management of wastewater and urban stormwater consistent with sustainable development. Since this time the PCE has been identifying critical urban water system issues and monitoring progress with the national water services review, led by LGNZ.

A sustainable development framework approach is also taken in *The statement of policy direction for review of the Local Government Act 1974* (Department of Internal Affairs 2000), in which the proposed purpose of local government is to 'enable local decision-making by and on behalf of citizens in their local communities to promote their social, economic and environmental wellbeing in the present and for the future'.

Leadership, community engagement and ongoing provision of information and innovation are now needed to progress water management. Progress is defined as the use and treatment of all waters in a more ecologically sustainable manner, with the true value of supply and treatment reflected in prices. Some deep-seated beliefs and ideologies about the management of urban waters need to be unpicked if security of supply is to be assured.

1.2 Urban water systems and sustainability

Urban water systems are the natural, modified and built water systems that exist in towns and cities in New Zealand. The natural system includes the network of streams, rivers, groundwater, wetlands, estuaries, and adjacent coastal marine areas. The built system includes the network of water supply reservoirs, water supply plants, pipes, concrete channels, drains, wastewater treatment plants and outfalls. These water systems are interconnected and interact in both positive and negative ways. The functions provided by the built system of water supply, wastewater and stormwater infrastructure are commonly referred to as water services.

Sustainable urban water systems, in ecological, social and economic terms, have several key characteristics. Sustainable water systems are developed and operated in harmony with natural water cycles and water catchments. Integrated management and life-cycle

approaches are used to manage these complex systems. Such approaches:

- aim to increase the efficiency of water use, thereby reducing the need for new dams, pipelines and treatment plants;
- reduce wastewater by decreasing total potable water supply, reusing greywater and recycling biosolids from wastewater treatment plants; and
- reduce stormwater through better site design, with reduction in proportion of impervious surfaces, onsite collection use, and retention of natural streams and waterways.

Other features of sustainable urban water systems are:

- sufficient water flows allocated to natural and modified systems to maintain ecosystem health;
- water management and planning involves consultation with the whole community of interest, including residential users, industry, agencies, tangata whenua, agriculture and recreational users; and
- residents are guaranteed access to a minimum supply of potable water to maintain basic human health.

These characteristics of sustainable urban water systems not only apply to major metropolitan areas but are also highly appropriate for smaller urban areas. Small communities and townships may be better placed to make the transition to sustainable urban water systems than larger urban areas that are constrained by a legacy of existing infrastructure. Although there may be more scope for innovation in these smaller centres, an emerging issue is whether small communities with limited resources are likely to have sufficient finance, in-house knowledge, technology and motivation to achieve required efficiencies and efficacy, and operate urban water systems in a safe and sustainable way.

1.3 This investigation

This report contains the findings of an investigation by the PCE into the sustainability issues and significant risks affecting the management of urban water systems. The investigation has consisted of three phases. They are a discussion paper *Ageing pipes and murky waters. Urban water system issues for the 21st Century* (PCE 2000), an analysis of submissions on that paper (PCE 2001), and this

concluding report. Several recommendations for action are proposed.

The purpose of the initial discussion paper, released in June 2000, was to identify the key issues and significant risks affecting the sustainable management of urban water systems and to seek views from a wide cross-section of New Zealanders. The terms of reference for this report were as follows:

In accordance with section 16(1)(a) of the Environment Act 1986, this investigation will:

- i. identify proposals for future action by public authorities to improve the management of urban water systems based on the PCE discussion paper and analysis of submissions; and
- ii. report on the outcomes of the investigation to the House of Representatives and to relevant public authorities and to provide advice as appropriate by 5 April 2001.

The PCE received 82 submissions from central and local government, tangata whenua, non-governmental organisations (NGOs), community groups, researchers, and individuals on the urban water systems discussion paper. An overview of the submissions is presented in section 3 of this report, with a more detailed submissions analysis available as a separate report (PCE 2001). The Commissioner and his team have been assisted in their evaluation of submissions by the Reference Group – seven individuals who span public and private sector experience. They have expertise in local government, iwi, policy and technical areas.

1.4 What is being done at present?

In November 1998 the Government announced a comprehensive review of the delivery of water, wastewater (sewage and trade waste) and stormwater services. In July 1999, LGNZ was given the opportunity to co-ordinate the review of water services in New Zealand on behalf of local government. With the change of government in November 1999 it was decided to put the review on hold until such time as the expectations and priorities of the new Government could be clearly ascertained. LGNZ have informed us that the water review will not proceed on the basis envisaged by the previous Government, although some work on a number of water-related issues is still being undertaken.

In the absence of a national review, a number of local authorities in the Auckland, Taranaki and Wellington regions are proceeding with their own reviews. Some began several years ago. The regional groupings are exploring alternative models of delivery of water services in their respective regions. Ultimately, the regions will need central government to undertake some legislative reform, in some cases to allow the structural reform for the delivery of water services in their area. Law changes will also be needed to support and consolidate new and improved approaches to the management of urban water systems.

Six of the Auckland region's territorial authorities are currently sponsoring a review of water, stormwater and wastewater services in an effort to address some major water-related issues in the region.¹ These include the coordination and costs of water services, the issue of ageing pipes and the pressures arising from rapid population growth. The councils have agreed to a list of ten draft outcomes desired for the water industry and have presented a list of three available options for the future management of the region's water services. Public consultation is currently underway, and once a final agreed position among the Councils is reached, there may be a need to liaise with central government about possible legislative change.

Meanwhile, the Ministry of Health (MOH) has been reviewing and developing new water

supplies protection regulations to replace the outdated 1961 regulations. A feature of the new legislation will be a risk management/hazard analysis approach to the protection of drinking water from catchment to the point of supply. MOH has also been undertaking a pilot study in the Hokianga area to assist with the local provision of water supply systems. A central government subsidy for improving small water and wastewater schemes may be reinstated.

The Ministry for the Environment (MFE) has simultaneously been developing a long-term national agenda for sustainable water management. Urban water issues were identified as one of three key themes and were accorded a high priority. MFE is also coordinating a four-year microbiological research programme to provide the scientific basis for guidelines on managing water used for bathing and drinking.

In contrast to slow progress with resolving urban water system issues at the national level, central and local government have recently made good progress with a national waste management initiative. A multi-sector working group was established in July 2000 to prepare a discussion paper on waste management. The recently released paper *Towards a national waste minimisation strategy* (MFE 2000) identifies the important linkages between the management of waste and the management of wastewater, a true integrated management challenge.

¹ <http://www.aucklandwaterreview.co.nz>

2.0 Summary of the PCE urban water systems discussion paper

The June 2000 PCE urban water systems discussion paper raised a series of issues and questions by examining:

- the nature of urban water systems;
- the role of local authorities in water services;
- urban water systems and tikanga Maori;
- the challenges for urban water systems (ie the key environmental, social and economic issues);
- opportunities for progress (eg integrated management, water demand management, and new solutions);
- what other water services reviews were being undertaken; and
- requirements for the future evolution of more ecologically sustainable and economically viable water services.

Urban water system problems, and their underlying causes and impacts are summarised in table 1.

2.1 The nature of urban water systems

Water is central to all life and access to water is a basic human right. Natural water systems provide ecosystem services, maintain the 'health' of streams and rivers, provide habitat for flora and fauna, provide water for urban water supplies and wastewater assimilation, provide amenity values, and are used for a range of recreational purposes. Built water systems supply potable water, safeguard life and property from flooding, and remove, treat and dispose of waste.

An important but often unrecognised dimension of the urban water cycle is the provision of ecosystem services. Ecosystem services are the functions carried out by nature that maintain, for example, water, carbon, and oxygen cycles, which in combination with a vast array of other ecological functions, support life on this planet. Towns and cities directly and indirectly benefit from ecosystem services such as water supply and waste assimilation. Increased recognition and understanding of the role of the many ecosystem services is required. The value of these services needs to be factored into urban water systems decision-making.

2.2 The role of local authorities in water services

Local authorities have a number of roles in terms of the management of urban water systems and water services. These include infrastructure owner, customer representative, service provider, and regulator. Concern has been expressed about the multiple and potentially conflicting roles of local authorities with respect to unclear responsibilities, blurred accountabilities, lack of customer choice and lack of commercial focus. The lack of an appropriate legislative framework that applies to all water services providers has led to proposals for a consolidated Water Services Act.

Around 85% of the population receives water, wastewater and stormwater services from local authorities. Local authority water and wastewater infrastructure is valued at approximately \$7.5 billion with around \$600 million spent on operational costs each year. It has been estimated that around \$5 billion of investment will be required in New Zealand over the next 20 years to upgrade water, wastewater and stormwater infrastructure.

2.3 Urban water systems and tikanga Maori

Maori have always placed a high value on water, valuing it as a taonga because of its practical usefulness, and its spiritual and metaphysical properties. The practical and spiritual levels are inextricably bound together within the mauri or life-force, which flows through and empowers all things. Water, and water bodies such as rivers, lakes and wetlands, have their own mauri which it is important for tangata whenua, as kaitiaki, to protect from pollution, degradation or damage. Rivers, lakes and wetlands are also key elements in the identity, whakapapa and mana of iwi, hapu and whanau.

Water and water bodies form the basis of a number of claims to the Waitangi Tribunal, where tangata whenua have challenged the Crown's assumption of ownership of these resources. The Tribunal has concluded in some cases that the rivers and tributaries under claim were and are taonga of tangata whenua.²

² *The Mohaka River report (1992), the Te Ika Whenua report (1998) and the Whanganui River report (1999).*

Legislation such as the Resource Management Act 1991 (RMA), which incorporates Treaty principles, and the provisions of formal plans and policies, have established requirements for:

- recognition of the relationships of Maori and their culture and traditions to resources such as water;
- kaitiakitanga and culturally appropriate management;
- consultation with tangata whenua in the preparation of policy statements and plans; and
- paying regard to a number of matters, including iwi management plans, in the preparation of policy statements and plans.

2.4 What are the challenges for urban water systems?

There are a number of key challenges for the management of urban water systems common to all towns and cities. They include environmental, social and economic dimensions, with many of the underlying causes interrelated and overlapping (see table 1).

One of the biggest challenges will be reaching consensus between the various stakeholders on the environmental, social and economic goals and values of urban water systems. Improving the sustainability of current systems will be very difficult and painfully slow unless there is much more extensive community and cultural input, and greater understanding of water management options.

Other major challenges include:

- inadequate water flows from excessive and inefficient water use;
- contamination of surface waters and groundwater from uncontrolled or poorly managed stormwater drainage and wastewater disposal;
- increasing expectations of consumers and ratepayers about the provision and quality of water services, alongside often negative reactions to large rate increases or increased charges to fund required infrastructure;
- a lack of awareness and understanding of the value of urban water systems or of the costs of improving water supplies, wastewater management and stormwater management;
- poor recreational and bathing water quality, and poor information disclosure about this type of water quality;
- lack of investment and deferred

maintenance, in part through incomplete pricing and inadequate financial contributions from new urban developments;

- institutional and regulatory barriers to improved management; and
- potential risk of infrastructure failure and resulting economic, health and environmental impacts.

2.5 Opportunities for progress

There are a number of opportunities for progress with the management of urban water systems.

These include more integrated management of water services with efficient water use, recycling and reuse. Solutions are needed to support more efficient water use and to recognise the important linkages between the different water services components of water supply, treatment, use, and disposal of wastewater and stormwater.

Progress could also be made in the area of demand management and least-cost planning. In practice this will involve a package of measures including regulation, economic instruments, information and education, along with measures which directly address production as well as consumption patterns.

Finally, there are opportunities for better catchment management planning. Integrated management of land uses in catchment areas is critical in ensuring high quality water supply. The natural processes of ecosystems in terms of fresh water provision need to be recognised, valued and managed because the alternative is often more expensive filtration and treatment of water supplies assuming that the technology is available.

2.6 Future evolution of more ecologically sustainable and economically viable water services

There is a compelling need to develop a clearer understanding of the sustainability of urban water systems and to develop pathways towards achieving identified and widely-supported goals. Essentially this will mean planning, developing and operating urban water systems in harmony with the natural water cycle and encouraging more efficient resource use. This can be contrasted with the traditional approach to urban water systems of large pipes and treatment plants - a very linear system with few feedback loops and little reuse.

Table 1 Urban water system problems, underlying causes and impacts (from PCE 2000)

Issue	Problems	Underlying causes	Impacts
Environment	Inadequate water flows	Excessive extraction and use with supply-side focus, ie large dams/pipes Incomplete pricing and cross-subsidies Fire Service supply requirements mean larger networks (legislation) Poor asset management eg broken/leaking pipes Lack of awareness and information Lack of demand management and use of old/inefficient technology Little integration of water supply, wastewater and stormwater networks Lack of research into reuse and efficiency measures	Low environmental flows - adverse effects on instream values and biodiversity Adverse effects on taonga of tangata whenua, and on the mauri of the water resource Large volumes of wastewater requiring treatment and disposal Restricted economic development
	Contamination of surface waters and groundwater	Contamination at source or recharge area (which may include rural areas) due to inappropriate landuse and management Low or incomplete treatment of wastewater flows and reliance on assimilative capacity of surface waters Inadequate investment and poor asset management eg sewer overflows Some communities unable to fund required infrastructure Peak period overload for coastal/holiday centres Incomplete pricing and cross-subsidies (legislation) Inadequate management of trade waste (legislation) Limited stormwater management/lack of onsite control and recycling Inadequate monitoring and public disclosure of bathing water quality	Adverse effects on instream values and biodiversity Adverse effects on the coastal and marine environment and biodiversity Adverse effects on public health Adverse effects on taonga of tangata whenua, and on the mauri of the water resource Adverse effects on recreational values Community inability to pay for infrastructure
	Excessive flows eg flooding, stormwater flows	Increased flood peaks due to inappropriate landuse and catchment management: high proportion of impervious surfaces and runoff Some communities unable to fund flood control infrastructure Inadequate investment and maintenance eg failed channels and drains Inadequate investment in stormwater management Reliance on piped systems - neglect of natural waterways and wetlands Lack of 'whole catchment' approaches to urban water management	Localised flooding, damage to property, potential loss of life and economic impacts Adverse effects on instream values and biodiversity Adverse effects on taonga of tangata whenua, and on the mauri of the water resource Adverse effects on recreational values
Social/Cultural/Health	Perception that water is 'free'	Historical abundance – 'fundamental right' Societal/cultural attitudes influence water use Incomplete pricing and 'hidden' costs through funding by property rates Consumers not paying the 'true' costs of water services and have little understanding of the value of services – reduced incentives for change Lack of awareness and information – urban residents separated from environment	Excessive extraction and inefficient use Increased wastewater flows requiring large treatment systems Resulting environmental, economic, and social impacts Adverse effects on taonga of tangata whenua, and on the mauri of the water resource

Issue	Problems	Underlying causes	Impacts
Social/Cultural/Health cont.	Lack of access to potable water/low water quality/water-borne diseases eg giardia, cryptosporidium, campylobacter	Inadequate investment and asset maintenance Some communities unable to fund infrastructure Inadequate catchment management (legislation) No national drinking water standards – only guidelines Inadequate monitoring of water quality - no mandatory disclosure of water quality and service levels (legislation) Lack of small systems/local solutions – limited research	Potential health risks – individual and community Restricted economic development Water not always ‘fit for purpose’
	Poor recreational/bathing water quality/water-borne diseases	Inadequate investment and poor asset management eg sewer overflows Inadequate investment in stormwater management and lack of onsite control and reuse of stormwater Inadequate monitoring/reporting of bathing water quality (legislation)	Potential health risks – individual/community Adverse effects on taonga of tangata whenua, and on the mauri of the water resource Adverse effects on recreational values Adverse effects on economic development Customers unable to hold service provider to account for quality of service Lack of information to bring about change
Economic	Poor information disclosure	No mandatory requirements for formal contracts and customer charters (legislation)	Customers unable to hold service provider to account for quality of service Lack of information to bring about change
	Lack of investment and incomplete pricing	History of poor asset management - now improving Incomplete pricing and charging for services (legislation) Limited valuation and pricing of ecosystem services Difficulties with establishing and obtaining financial contributions via RMA processes (legislation)	Intergenerational payment issues Estimates of \$5 billion in new investment and deferred maintenance over next 20 years Community inability to pay for infrastructure
	Inefficient delivery of services	Inadequate investment and history of poor asset management – now improving Limited financial controls and ‘drivers’ for efficiency and no requirements to disclose information on operational performance (legislation) Fragmented and unclear legislation – responsibilities of consumers and suppliers are not clearly defined in legislation (legislation) Limited research and development of alternative service provision	Excessive extraction/inefficient use Increased wastewater flows requiring large treatment systems Reduced economic efficiency and potential loss of international competitiveness Difficult for customers to evaluate the quality of service provision
	Potential risk of infrastructure failure	Inadequate investment and poor asset management Lack of community awareness and information Limited research and development of alternative delivery approaches and cost-benefit analysis of different solutions	Potential health risks – individual/community Disruption to the community Impact on commerce and economic development, exports and tourism Effects on environment and ‘clean blue and green image’

3.0 Submission responses

The 82 submissions on the discussion paper were guided by the posing of 24 questions under nine topic headings as follows:

- recognition of the values of tangata whenua and their involvement in the management of urban water systems;
- the legislative framework for the provision, management and delivery of urban water services, ie the need for a consolidated Water Services Act;
- the provision of better pricing and charging systems for urban water services and associated community processes;
- the understanding and management of risks to urban water systems;
- improving management of urban ecosystems;
- the integrated management of water services, with demand management approaches and more efficient resource use;
- the potential, through research, for the emergence of new solutions and the identification of environmental externalities;
- the recognition and valuation of ecosystem services and their incorporation into asset management planning; and
- the linkages between, and integration of, existing water-related reviews and their contribution to broader sustainability issues.

A full list of the questions posed in the discussion paper is included in appendix 1.

The largest group of respondents were local government (45% of the total). The remainder included individuals, community groups, tangata whenua, NGOs, professional associations, central government agencies, Parliamentarians and research institutes.

Figure 1 presents a hierarchy of concern about the topics raised in the issues paper. It is based on the number of submitters responding to each topic area and the extent of that response. It also indicates how those engaged with water management and the discussion paper order their concerns. However, it does not differentiate between strategic/policy issues (eg outcomes sought) and operational issues (eg asset management). While this ordering indicates which issues have the highest profile

in the minds of the various stakeholders **it does not follow that these issues are the highest priority for action.** For example, recognising and valuing ecosystem services received relatively little comment, and may be poorly understood by many stakeholder groups. However the Reference Group were strongly of the opinion that an appreciation of the place and importance of ecosystem services is fundamental to planning for urban water systems that are to be sustainable in the long term.

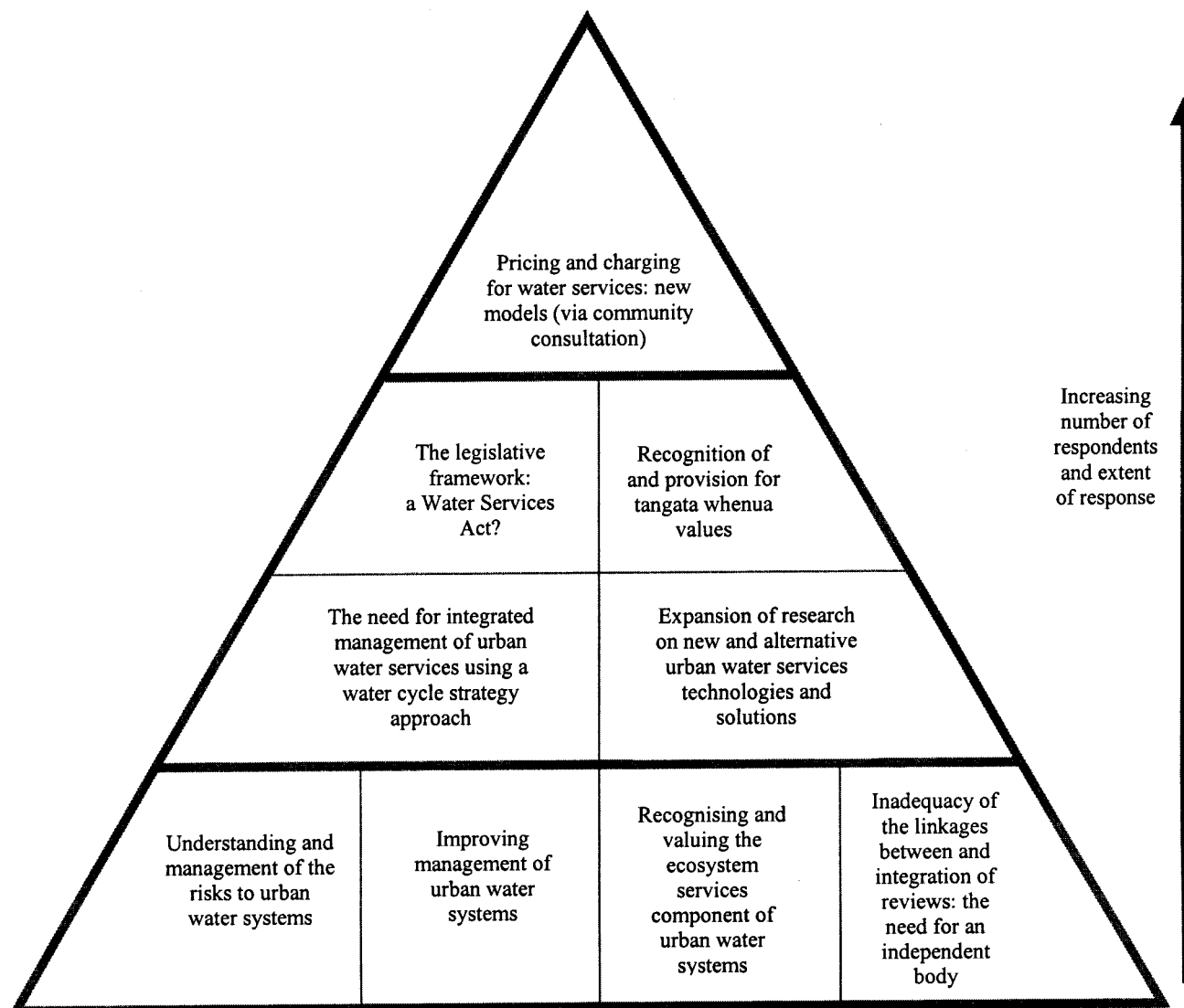
3.1 First order issue

One issue dominated the submission responses: **pricing and charging for water services.** Nearly 75% of submitters responded on this topic. No other topic generated a response from more than 50% of submitters.

The responses indicated:

- widespread support for metering and flow-based user charges for water, with some support for this to also be extended to wastewater and stormwater;
- clear recognition that community concerns about privatisation and commercialisation of water systems was a major impediment to the development and adoption of flow-based charging systems;
- the need for processes to work with communities to develop models that are transparent, fair and trusted;
- considerable support for enabling local communities to choose their own ownership arrangements and charging systems;
- some strong objections to commercialisation of water services and the potential for privatisation; and
- support amongst a few submitters for keeping water services in public ownership.

Figure 1: Submissions response hierarchy



3.2 Second order issues

There were four main second order issues. These were the legislative framework, the recognition and input of tangata whenua values to the sustainable management of urban water systems, the integrated management of urban water services and the need for research on new urban water services technologies and solutions.

3.2.1 The legislative framework

Three times as many submitters were in favour of a consolidated Water Services Act as were in favour of making more incremental changes. However, support ranged from seeing a new Act as an ‘essential’ and ‘urgent requirement’ to suggestions that a new Act should only be seen as a long-term objective. Some argued that a single government entity should be charged with

developing new legislation. Several commented that a rationalisation of legislation should not necessarily lead to radical change. A common theme was that any new legislation should not be too prescriptive, enabling communities to meet their own needs.

3.2.2 Urban water systems and tikanga Maori

Approximately half the submitters that addressed this issue supported greater recognition of tangata whenua values. The balance argued that existing RMA mechanisms are sufficient in this area. Suggestions for giving greater recognition focused on better participation procedures with earlier involvement of tangata whenua in consultation. Most responses were also in favour of involving tangata whenua more, as kaitiaki, in the

management of urban water systems. It was suggested that more time needs to be provided for early consultation, to ensure better involvement of tangata whenua. Some suggested that existing RMA procedures need to be better applied.

3.2.3 Integrated management of water services

Submitters suggested that more collaboration, both between and within agencies, is needed to encourage an 'urban water cycle' approach for management of waters. There were arguments for industry-wide standards and regulatory requirements to be set. To give greater priority to demand management responses, some submitters suggested that standards and performance measures could be introduced. Community education was also identified as a priority. Some suggested that water services providers should be legally required to develop demand management strategies. Opportunities for increased 'water harvesting' were considered to include reusing greywater for toilets and irrigation and using roof water for non-potable domestic use. Health and environmental issues were stressed as needing careful consideration. Cultural issues (for example, Maori concerns about recycling wastewater) were not addressed. Several submitters also mentioned economic considerations. Suggestions for better stormwater management focused on onsite solutions and again mentioned the need for better education. Some submitters suggested that stormwater should also be charged for.

3.2.4 New urban water services technologies and solutions

Submitters were generally in favour of more research, although some did not believe a need for more innovation exists. A number suggested that overseas research should be utilised, providing it was adapted to New Zealand circumstances. Some responses argued that central government should co-ordinate any new research. Very few submitters suggested how environmental externalities could be identified and priced. Many difficulties were highlighted, with some questioning the need to identify these externalities in the first place.

3.3 Third order issues

While the remaining four topic areas attracted responses from less than 35% of submitters, some important points are made.

3.3.1 Understanding and management of risk

Submitters were generally divided on the level of understanding of risks. Several risks identified as being adequately understood by some were criticised as being poorly understood by others. It was argued that risk management practices vary considerably throughout the country. Only a small number of councils argued that existing risk management practices were adequate, while a few suggested that improvements might be emerging. Several submitters applauded the MOH's involvement in this area, but expressed a concern that risk management plans are only being designed for drinking water. There was very little suggestion that appropriate contingency plans are in place.

3.3.2 Urban ecosystem management

Submitters suggested how integrated management of urban water systems could be encouraged. These focused on suggestions for more cooperation, strategic planning and increased involvement of regional and central government authorities. Some suggested that national and regional policy statements should be developed, with the possible implementation of a national framework. A number of submitters agreed that legislative requirements should be strengthened in this area. Only a few submitters suggested how water catchment management could be improved. Of those that did, it was suggested that better planning and more integration is needed at all levels. Responses to the question on sustainability indicators argued for more pressure to be placed on water services providers. It was suggested that legislative requirements might be needed, with some calls for indicators to be developed at a national level.

3.3.3 Recognition and valuation of ecosystem services

The majority of submitters that commented on this issue stressed the difficulties involved in applying ecosystem concepts. While some expressed support for more emphasis in this area, others had reservations about the importance and timeliness of valuation techniques. Some argued that 'we need to get our house in better order first' and that an 'ecosystem paradigm' is too complex. Several councils were concerned that accounting systems could not recognise the 'invaluable' nature of ecosystems. Others suggested that valuing natural assets could help to justify

expenditure to enhance and maintain them. Very few submitters commented on how asset management planning could be enhanced.

3.3.4 Linkages between the reviews

There was hardly any suggestion that sustainability issues are being given adequate consideration in current reviews. While some submitters called for greater emphasis in this area, one expressed a concern that more immediate action is required. Concern was also expressed about the integration of existing

reviews, with their separate and fragmented focus. Again, there were calls for more central government leadership in this area. Few responses were in favour of the LGNZ review, and it was suggested that the review is perceived as a low priority issue with a lack of funding and resources. Few submitters commented on the question of how a future national sewage subsidy could address broader sustainability issues. However, a couple of submitters argued that ‘sustainability criteria’ should be met before any subsidy is granted.

4.0 Challenges and recommendations

Enhancing and advancing water management is primarily a socio-political challenge rather than an economic or technical one. Certainly capital constraints will and do restrict opportunities as do some technical issues. But it is the way our water systems are organised - the legislation, policies, infrastructure, institutions and community expectations - which embrace the areas of greatest challenge. Discussion with many stakeholders, comments from submitters and input from the PCE Reference Group members indicate there are four major areas of challenge. These are:

1. The fragmented nature of water systems management and the lack of a clear central government 'home' for the needed policy and legislation that underpin this essential resource and its infrastructure.
2. The lack of stakeholder awareness and understanding of urban water systems and involvement in their management.
3. The community and political tensions surrounding the way we currently construct our water businesses: who owns, who manages and how water is valued and priced.
4. The lack of appreciation of the need to manage waters in an integrated way according to ecosystem principles. This includes recognition that water is not an unlimited resource.

These four dimensions embrace several areas that need substantive action. These areas, which underpin the recommendations, are elaborated on below.

4.1 The fragmented framework for the management of urban water systems

4.1.1 Central government agencies

The central government framework and responsibilities for the management of urban water systems is split between a number of Ministers, their ministries and various legislation and regulations (table 2).

The lack of a specific Minister for this very broad sector does not assist overview and accountability, nor does it offer direct leadership to improve the current framework and overall performance. This can be contrasted with other services and utilities such as telecommunications (overseen by the Minister of Communications) and electricity (Minister of Energy). These two sectors have received considerable attention from Government in recent years.

The Government has attempted to improve coordination and leadership of the sector through the establishment of a small Ministerial group under the leadership of the Hon. Paul Swain, Minister of Commerce. The group includes the Ministers of Commerce, Local

Table 2 Central government and urban water systems management

Minister	Ministry	Key Legislation
Commerce	Ministry of Economic Development	Commerce Act 1986
Consumer Affairs	Ministry of Consumer Affairs	Consumer Guarantees Act 1993
Environment	Ministry for the Environment	Resource Management Act 1991
Finance	The Treasury	Public Finance Act 1989 Fiscal Responsibility Act 1994
Health	Ministry of Health	Health Act 1956 Water Supplies Protection Regulations 1961
Internal Affairs	Department of Internal Affairs	Land Drainage Act 1908 Fire Service Act 1975 Rating Powers Act 1988 Building Act 1991 Building Regulations 1992
Local Government	Department of Internal Affairs	Local Government Act 1974
Maori Affairs, Treaty of Waitangi Negotiations	Te Puni Kokiri, Waitangi Tribunal and Office of Treaty Settlements	Treaty of Waitangi Act 1975 and other legislation

Government, Environment and Health. Despite this, there appears to be some inertia and an overall reluctance to tackle the pressing needs.

The absence of a specific agency or unit to advise the Ministerial group limits what information and technical advice the Ministers receive. New Zealand has no Ministry of Infrastructure or equivalent infrastructure policy unit within an existing ministry that can provide sufficient information on all urban water system management issues and, more importantly, their inter-relationships and integrated management challenges. There is no Government ministry promoting an integrated response to urban water systems. Nor is there a ministry helping with models and tools to assist integrated management, water efficiency and conservation, equitable and efficient pricing and charging, and research. The lack of focused research on urban issues within the Crown Research Institute (CRI) system is also a major weakness.

In late 1996 the Department of Internal Affairs was requested by the Minister of Local Government to review the adequacy of the existing legal powers of local authorities to deliver water and wastewater services. In March 1997 the Department of Internal Affairs sent a questionnaire on water and wastewater management to all local authorities. The results of this questionnaire were released in April 1998.

In late 1998 the Ministry of Commerce (now the Ministry of Economic Development) was given the task of undertaking a major water services review. In mid-1999 this review was given to local government, with LGNZ to coordinate the sectoral response and report back to Government in 18 months. Although the review was put on hold in November 1999, and is now not proceeding, LGNZ did help its members develop terms of reference for the review of the framework for water services and raised awareness of key issues. Given the general information and advocacy roles of LGNZ, and limited resourcing from the sector for the review, it may be more appropriate for such a review to be led by an independent group. This would entail, for example, a task force approach.

4.1.2 The legislative framework

The legislative framework that provides for the management of water services is outdated. Some Acts appear to be in conflict, impeding effective and efficient management (see box 1).

While in isolation many of the legislative barriers are small, collectively they highlight systemic problems with the framework that need to be addressed sooner rather than later. Many submitters to the PCE discussion paper strongly favoured a consolidated Water Services Act. Relatively few were in favour of making more incremental changes.

The current review of the Local Government Act 1974 and the favoured approach of 'enabling' local government legislation will inevitably force the development of new water services legislation. Time constraints may not allow for detailed consideration of an appropriate framework for the management of water services, creating the danger that an inappropriate framework could develop. A more focused and considered response is required.

A new framework will need to recognise the cyclical nature of urban water systems and promote an integrated response to water supply, wastewater and stormwater issues. Any new Water Services Act should not duplicate or circumvent the RMA, which would continue to be the primary resource management legislation for water. A new framework would also need to be enabling rather than prescriptive, in recognition of the range of approaches used by local authorities and the existing private sector.

4.1.3 A way forward

There has been a lack of commitment by both central and some local government agencies towards advancing urban water system issues. Variable government interest, changing agency leadership of the water services review and inadequate resourcing have resulted in a lack of progress.

To help overcome the current inertia, central government should establish a Task Force to develop recommendations on a range of actions to improve the management of urban water systems. This could be on an initiative similar to the current Oceans Policy. There is no need for the Task Force to start from scratch. The PCE's work and that done by many others (e.g. LGNZ, New Zealand Water and Wastes Association, the Auckland Water Review, Taranaki Councils and Wellington Councils, all provide 'feed stock' for an action plan. There is an urgent need to be 'doing', rather than leaving water systems issues in the 'too hard basket'.

Box 1 Key legislative barriers to improved management of urban water systems

Examples of legislative barriers that impede more efficient management of urban water systems and the development of more effective and equitable pricing mechanisms include:

Rating Powers Act 1988

- no provision for local authorities to charge for wastewater by volume/contaminant loading except in respect of trade waste
- no provision for local authorities to charge for stormwater by area of impervious surface
- no provision for local authorities to charge for the capital cost of existing infrastructure for new developments in a particular area

Health Act 1956

- a lack of clarity with the framework for water delivery and unclear criteria eg 'potable'

Water Supplies Protection Regulations 1961

- do not apply to all water supplies (eg private) and are not enforceable in order for required standards of water supply to be met (MOH has been reviewing the WSPRs and is proposing legislative changes)

Building Act 1991

- no provisions requiring local authorities to address water efficiency and undertake appropriate water demand management (eg low flow showerheads, dual flush toilets and on-site storage)
- no provision for local authorities to protect public reticulation against backflow and apparent conflict between the Building Act 1991 and the Water Supplies Protection Regulations 1961

Local Government Act 1974

- no provision requiring local authorities to prepare a water services plan that would enable a strategic approach to the management of all water services and infrastructure (this could be similar to the requirement for a waste management plan)
- a lack of congruency between the RMA and LGA provisions regarding trade waste. A council faces the risk of breaching its resource consent conditions for discharge of wastewater from its sewage treatment plant when it is unable to control the discharge of trade wastes into council sewers.

Representation on the Task Force will be critical, as there are many stakeholders with an interest in and extensive knowledge of the management of urban water systems. The group will need to include representatives from central and local government, the tangata whenua, business, professional groups, the research sector and the community. Representatives should have an appropriate skill-base and expertise in different aspects of the management of urban water systems. A chair, independent from central and local government, should be appointed.

The work of the Task Force should be supported by a series of hui, sponsored by central and local government, with tangata whenua. The purpose of these hui would be for iwi and hapu to inform government agencies of particular issues with the management of urban water systems in their rohe, and the effects of those systems on other natural taonga and tikanga, and to explore opportunities for resolution of these issues.

The Task Force would need to address a wide range of issues including:

- how to reach consensus between the various stakeholders on the environmental, social and economic goals and values of urban water systems;
- how best to recognise and provide for the values and priorities of tangata whenua, in respect of water as a resource, and of waterways and water bodies (lakes, rivers, streams, wetlands, etc);
- how best to adopt a sustainable development framework approach to urban water systems management (see box 2);
- how best to take an integrated catchment approach to the management of urban water systems, so that they operate in harmony with natural water cycles and ecological systems;
- what structural models best deliver on the management of urban water systems;

Box 2 Sustainable urban water systems will require management that:

- adheres to the principles of sustainable development, ie is ecologically sound, socially acceptable and economically viable;
- enables meeting the needs of present generations without compromising the needs of future generations to meet their own needs;
- is based on boundaries defined by natural water systems and natural hydrology with full recognition of the role and value of ecosystem services;
- takes into account water quantity, water quality, and the use and delivery of water in the most efficient manner while maintaining flexibility for future changes;
- assesses the public health, environmental and economic costs to the nation of a failure of the systems and recommends appropriate mitigation mechanisms;
- fosters use of innovative technologies that increases the efficiency of water use and creates opportunities to reduce, reuse and recycle;
- recognises and provides for the values of water, waterways and water bodies to tangata whenua, while fostering the involvement of kaitiaki through partnership, co-management and other practical approaches;
- recognises and incorporates the principles of the Treaty of Waitangi;
- coordinates the needs, goals and objectives of individuals, the community, and economic development while sustaining ecosystem requirements;
- takes into account land uses as they relate to water resources; and
- has well designed, yet flexible monitoring systems, that can detect cumulative effects and long term changes.

- how to value, price and charge for water supply and wastewater and stormwater treatment services;
- how best to manage the monopoly elements of urban water systems and achieve an efficient and sustainable response;
- whether a new Water Services Act is required to overcome existing legislative barriers (see box 1), consolidating all water services legislation; and whether current institutional arrangements can support any legislative amendments;
- how best to address capacity issues for small territorial authorities and economies of scale;
- quantifying levels of risk and how to improve risk management; and
- how best to improve stakeholder awareness and understanding of urban water systems, including developing a process to reach consensus on future water systems and models.

Central government would need to resource the Task Force and provide for relevant ministries and agencies to assist with administrative and technical support. Local government, as the primary resource managers of urban water systems and providers of water services, would also need to give priority to assisting the Task Force and providing technical support.

Recommendation 1

To the Minister of Commerce (as the Minister chairing the group of Ministers with responsibilities for urban water system management).

Establish and resource a Task Force to develop recommendations on a range of actions to improve the management of urban water systems in accordance with an ecologically sustainable and integrated approach. The Task Force needs to assess new options and models for the delivery of water services that meet the identified principles and criteria for sustainable urban water systems.

4.2 Stakeholder awareness, concerns and understanding

One of the biggest challenges for achieving progress will be reaching consensus between the various stakeholders on the environmental, social and economic goals of urban water systems. Without more extensive community input, and greater understanding of water management options, improving the sustainability of current systems will be both difficult and painfully slow.

It will be vitally important to promote awareness and understanding of the different cultural relationships with water of Maori and non-Maori. Understanding is also needed of the range of management issues that arise from those cultural frameworks, and of the opportunities for progress offered within different cultural approaches. Often, in debates over concepts of sustainable development, more thorough and careful attention should be given to the Maori perspective. This is particularly important where ecological imperatives are the starting point, where human communities are inextricably linked in with the natural environment, where intangible values are fundamentally important alongside the quantifiable, and where an integrating and relational kaupapa is followed.

There is also a need for a more detailed understanding of community and business expectations and knowledge of urban water system management needs and options. There are major tensions between some communities and councils over current or proposed

ownership and delivery models. Until these are resolved and there is some community consensus on needs and options, few opportunities for improvement will be realised.

There is a need for a 'gaps analysis' of urban water systems research in New Zealand including social and economic research. While there is a good body of international knowledge on integrated water management, the translation of this body of knowledge to community benefits will require considerable social research.

Many of these needs could be met through the establishment of an independent central government agency charged with promoting efficiency of water use. As with the Energy Efficiency and Conservation Authority (EECA), this role could be fulfilled through education to bring about voluntary changes in behaviour, coupled with regulation to ensure minimum water efficiency standards in household appliances and fittings. Indeed, the parallels with the role of EECA are so strong that it is suggested that EECA's scope could be expanded to include water resources.

Whatever the mechanism, it is essential to provide information to promote stakeholder awareness and understanding of the full range of urban water system issues. These issues range from resource constraints and the importance of an integrated ecosystem approach, through to management needs and options. Raising awareness will help ensure the sustainable management of New Zealand's water resource.

Recommendation 2

To the Minister of Commerce (as the Minister chairing the group of Ministers with responsibilities for urban water system management)

Direct the proposed Task Force to develop a process, to be implemented jointly by central and local government, for increasing stakeholder input to developing urban water systems and business models. The process should ensure that knowledge and experience pertaining to water management, systems and technologies are freely exchanged between community, tangata whenua, agency and business interests to ensure that all parties appreciate and accept the reasons for any future legislation or policy initiatives.

4.3 Valuing, pricing and charging of water services

There is a lack of recognition and understanding of the role of ecosystem services. The result is we undervalue the associated benefits that we gain from these services which include pure

water supply, waste treatment and waste assimilation. Economists Patterson and Cole (1999) estimated the annual value of indirect uses of ecosystem services on land in 1994 in New Zealand at \$30 billion. The value of these ecosystem services needs to be factored into decision-making and incorporated into asset management planning.

Current pricing and charging approaches for water and wastewater vary between different territorial authorities and different cities and towns. Charges based on property rates, uniform annual charges, and flow-based or consumption charges are used individually or in combination for water supply. Property rates based charges or uniform annual charges are used for wastewater. Property rates based charges are used to finance stormwater management.

There are problems with the continuing use of property rates for the payment of water services, particularly for water supply and wastewater services. There is a weak relationship between the value of a property and the actual use of water services. Small or efficient water users may therefore subsidise high or profligate water users.

The increasing use of uniform annual charges is not a suitable replacement for property rates. Uniform annual charges result in all properties being charged the same amount regardless of use of water services. Uniform annual charges again penalise small or efficient water users who have to pay for more than they use and subsidise high and inefficient users.

With uniform annual charges and charges based on property rates there is no economic incentive for consumers to reduce their water consumption through efficiency measures. Where meters and flow-based charges have been introduced, both in New Zealand and overseas, there has been a significant change in behaviour and a decrease in demand on a per capita basis (OECD 1999).

It is acknowledged that the introduction of flow-based charges for water supply is a sensitive political and community issue. Three major areas of concern can be identified:

1. *Flow-based charging is perceived to be a precursor to privatisation.*

The management and ownership of community water and wastewater systems are separate issues. Flow-based charging regimes are in use in both New Zealand and overseas, where the vast majority of water utilities remain in public ownership. Looking at international trends, privatisation is neither inevitable nor probable following the introduction of flow-based charges. Most OECD countries have opted for the 'concession' model whereby the private sector participates in managing some

services, but the public sector retains ownership control over the system (OECD 1999).

2. *Flow-based or uniform annual charges may adversely affect low-income households in comparison with charges based on property rates.*

This is an important social equity issue that is not unique to water supply. However not all low income households are high water users. Many may be better off under a flow-based charging regime than they are under a regime where payment is based on property values or uniform annual charges. There is a need for more research into this issue, to distinguish between the perceptions and reactions of some pressure groups and the actual affects on economically disadvantaged households.

In the interests of public health and community well being, it is essential that all residents have access to a minimum supply of potable water. One approach may be to have a fixed charge for the provision of a base level of water supply to maintain basic human health, allow adequate sanitation and provide for food preparation and washing. Water use above this base level could be charged at increasing rates and/or at variable rates, depending on the timing of use with respect to peak demand periods. Many OECD countries offer special exemptions or discounts, that are targeted toward those consumers most in need of price reductions (OECD 1999). Well-designed pricing systems, based on volumes and patterns of use, can result in more equitable charges to all in the community.

3. *Water supply could be cut off with non-payment of charges.*

Non-payment of bills typically results in the withdrawal of the supply, as with power, gas and telephone services. Some argue that this should also be the case for water supply, but this creates a risk to both personal and public health. In some countries, a water restrictor is used to limit water supply when the bill has not been paid. This approach ensures a minimum supply for basic personal health and sanitation purposes.

There is little hope of substantive progress on most aspects of water management until:

- there is a mechanism established to develop a consensus as to how the desired public ownership of water assets can be guaranteed;
- the value and community benefits of managing water in an efficient and

effective manner (the ‘business model’) is understood; and

- the rationale for flow-based charging for water is more widely understood, and seen as being a separate issue from ownership.

Recommendation 3

To the Minister of Commerce (as the Minister chairing the group of Ministers with responsibilities for urban water system management).

Direct the proposed Task Force to examine water valuing, pricing and charging options that maximise in the long term:

- ecologically efficient allocation, use and treatment of all waters;
- equitable delivery of water services to society; and
- financially viable business models for water services that are based on the premise that all water resources and infrastructures remain in public ownership.

4.4 Integrated management of the urban water system

The current disaggregated view of urban water management needs, shaped by current infrastructure models, is a major barrier to developing more sustainable, fully integrated and cost-effective systems.

The traditional approach to the management of urban water systems is outdated. It is characterised by the splitting up of the various parts of the water system, with those components at times managed in isolation from each other by different units or organisations. A more integrated and life-cycle approach is required. This involves treating the various components of water catchment, supply, wastewater and stormwater as one system or life-cycle. Integrated management of urban water systems also involves considering both supply and demand management options for effective and efficient resource use.

Submitters to the PCE discussion paper suggested how integrated management of urban water systems could be encouraged. They made calls for more co-operation, greater strategic planning and increased involvement of regional and central government authorities. A number of submitters agreed that legislative requirements should be strengthened in this area.

Although there was general support for more integrated management of urban water systems, it was also acknowledged that this was a difficult task. There appears to be a lack of tools for assisting territorial authorities and water services providers to improve on the integrated management of urban water systems. New methods and models are required, building on existing mechanisms within the RMA and the asset management plan requirements of the Local Government Act.

Submitters argued for industry-wide standards and regulatory requirements to be set. They also proposed that water services providers should be legally required to develop demand management strategies.

One mechanism for bringing holistic and integrated management to urban water systems would be the preparation of an overarching water services strategic plan for all water services, ie water supply, wastewater and stormwater. This would improve integration of the services, address supply and demand management options, and promote the sustainable use of water resources. The strategic plan would need to be prepared with the involvement and participation of tangata whenua, the community and other stakeholders.

In recognition of the strong linkages between urban water systems, wastewater and waste management, the water services strategic plan would need to recognise and address the range

of cross-media issues such as the management of trade waste and the final disposal of end products from wastewater treatment.³

Recommendation 4

To all territorial authorities and water services providers.

Prepare an overarching water services strategic plan as a framework for the sustainable and integrated management of urban water systems. The strategic plan needs to be prepared with the involvement and participation of tangata whenua, the community and other stakeholders. It needs to include the development of indicators for the ecological, social and economic sustainability of the whole system.

³ *In the absence of a definition of 'waste' in the Local Government Act 1974 (LGA), a recent High Court judgement concluded that wastewater, ie both sewage and stormwater, is waste for the purposes of Part XXXI of the LGA. As a result, territorial authorities are now required to include solid waste **and** wastewater in their application of that Part of the Act, including the adoption of a Waste Management Plan, as required by s 539. Manakau City Council Attorney-General (Unreported, High Court, Auckland Registry M 1054-IM99, 8 February 2000, Laurenson J.), p19.*

Glossary

Biosolid	sewage sludge, treated sufficiently so as to be suitable for beneficial reuse.
Demand management	management actions for influencing and reducing resource flows. Possible approaches include user charges, education, information, retrofitting and installation of water-efficient devices.
Ecosystem	a biological system comprising a community of living organisms (including humans) and its associated non-living environment, interacting as an ecological unit.
Ecosystem services	the functions performed by ecosystems that ensure natural cycles (eg water, carbon, oxygen, and nitrogen), processes and energy flows continue to provide an environment that supports life on this planet. Ecosystem services such as pure water from catchments and wastewater assimilation by wetlands represent the benefits that people derive, directly or indirectly, from ecosystem functions. These natural services from ecological systems are critical for the continued functioning of urban areas.
Effluent	generally refers to wastewater from sewage treatment or an industrial process.
Externality	or external cost. Something that affects a buyer's or seller's utility or profit which is not included in the price of goods and services exchanged in the market, eg the environmental and health costs of water pollution.
Greywater	wastewater from washing machines, showers, baths, and sinks that are not used for disposal of waste.
Groundwater	water within geological formations that can emerge at the surface through wells and springs.
Hapu	family or district groups, communities.
Hui	gatherings, discussions, meetings, usually on marae.
Impervious	the quality or state of being impermeable, for example to penetration by water. Impervious surfaces like concrete and asphalt affect the quantity and quality of runoff.
Instream use	use of water that does not require withdrawal or diversion from the natural watercourse, eg the use of water for habitat for fish and wildlife, navigation and recreation.
Iwi	tribal groups.
Kaitiaki	iwi, hapu or whanau group with the responsibilities of kaitiakitanga.
Kaitiakitanga	the responsibilities and kaupapa, passed down from the ancestors, for tangata whenua to take care of the places, natural resources and other taonga in their rohe, and the mauri of those places, resources and taonga.
Kaupapa	plan, strategy, tactics, methods, fundamental principles.
Mana	respect, dignity, status, influence, power.
Mauri	essential life force, the spiritual power and distinctiveness that enables each thing to exist as itself.

Non-potable	water not safe or not suitable for drinking.
Outfall	the place where a wastewater treatment plant discharges treated wastewater into the environment, generally into a receiving body of water.
Potable	water safe or suitable for drinking.
Reclaimed water	domestic wastewater that is under the direct control of a treatment plant owner/operator which has been treated to a quality suitable for a beneficial use.
Rohe	geographical territory customarily occupied by an iwi or hapu.
Stormwater discharge	rain and other precipitation that does not evaporate or infiltrate into the ground due to impervious land surfaces, but instead flows onto adjacent land or watercourses and into drain or sewer systems.
Tangata whenua	the people of the land, Maori people.
Taonga	valued resources, assets, prized possessions both material and non-material.
Tikanga	customary correct ways of doing things, traditions.
Trade waste	any liquid discharged from trade premises in the course of any trade or industrial process, not including condensing water, surface water or domestic wastewater.
Wastewater	water containing waste including greywater, blackwater or water contaminated by waste contact, including process-generated and contaminated rainfall runoff.
Water cycle	the natural pathway water follows in changing between liquid, solid, and gaseous states as it moves in various forms through the ecosphere. Also called the hydrologic cycle.
Whakapapa	genealogy, ancestry, identity.

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Appendix 1

Issues and Questions raised in the Discussion Paper:

ISSUE 1: URBAN WATER SYSTEMS & TIKANGA MAORI

A: How can the values of tangata whenua be given greater recognition, and provided for, with the sustainable management of urban water systems?

B: How can tangata whenua, as kaitiaki, be more involved in the management of urban water systems through partnerships, co-management and other approaches?

ISSUE 2: THE LEGISLATIVE FRAMEWORK

Does New Zealand need a consolidated Water Services Act for the provision, management and delivery of water services? This Act would address utility, service provision, supply and demand management, accountability and transparency issues. It would not replicate the Resource Management Act 1991. Alternatively, can incremental changes be made to the existing legislative framework to bring required improvements?

ISSUE 3: PRICING AND CHARGING FOR WATER SERVICES

A: How can better pricing and charging systems for the provision of water services be developed and implemented – what community processes need to be developed?

B: What changes are required to the current system for establishing and charging financial contributions from new subdivisions in order to fund new infrastructure?

C: What research is needed to assist the implementation of better pricing and charging systems?

ISSUE 4: RISK MANAGEMENT

A: Do we have adequate understanding of what the risks are to urban water systems and the nature and inter-relationship of these risks?

B: Is there adequate risk management for urban water systems and water services?

C: Are there appropriate contingency plans to respond to the range of environmental and public health risks to urban water systems?

ISSUE 5: URBAN ECOSYSTEM MANAGEMENT

A: How can integrated management of urban water systems be improved, particularly issues relating to growth management and the adequate provision of water services?

B: What changes are required in legislative functions and/or policies and practices to improve the management of urban water catchments for water supply purposes?

C: How can water service providers be encouraged to develop and report on sustainability indicators?

ISSUE 6: INTEGRATED MANGEMENT OF WATER SERVICES

A: How can more water services providers be encouraged to take an urban water cycle strategy approach to the management of urban water systems with integrated management of all waters?

B: How can greater priority be given to demand management responses, including preparation of a demand management strategy?

C: What are the opportunities for increased ‘water harvesting’ and reuse of reclaimed water in NZ given the need to manage a range of public health, cultural and environmental issues?

D: How can the management of stormwater be improved through the use of the full range of onsite and offsite solutions?

ISSUE 7: NEW SOLUTIONS

A: As a contribution to water services reform, how can New Zealand research and examine the costs and benefits and potential applications of new and alternative water services technologies and solutions?

B: How can we identify and price the environmental externalities of different systems as part of the provision of water services?

ISSUE 8: RECOGNITION AND VALUATION OF ECOSYSTEM SERVICES

A: How can the concept of ecosystem services be better applied to the management of urban water systems with enhanced recognition and valuation of these services?

B: How can asset management planning be enhanced to recognise, value and incorporate the roles provided by ecosystem services resulting in more appropriate financial charges and incentives?

ISSUE 9: LINKAGES BETWEEN THE REVIEWS

A: Despite the substantial number of reviews and policy developments, what consideration is being given to addressing broader sustainability issues, for example, resource efficiency and ecosystem services?

B: What is the degree of integration between the various water-related reviews?

C: How will the LGNZ national water services review promote more sustainable water systems by improving ecological efficiency and economic efficiency?

D: While addressing local water quality and health issues, how can any future national sewage subsidy address broader sustainability issues and also address ecological efficiency? New systems and management processes may allow small communities to meet a range of economic, environmental, social and cultural goals.