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REVIEW OF WATER SUPPLY PLANNING FOR AUSTRALIA'S NON-METROPOLITAN URBAN WATER UTILITIES

REPORT OF A STUDY BY THE AUSTRALIAN ACADEMY OF TECHNOLOGICAL SCIENCES AND ENGINEERING (ATSE) 2007

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URBAN WATER – Review of Water Supply Planning for Australia's Non-metropolitan Urban Water Utilities

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Executive Summary

Maintaining a reliable urban water supply to more than six million residents outside of Australia's capital cities is important for the ongoing success and livelihood of those communities. They contribute significantly to the Australian economy and social fabric of the nation by supporting tourism, agriculture and mining industries, amongst others.

This report provides a snapshot of the status of long-term urban water supply planning being undertaken by Australia's non-metropolitan urban water utilities. This report is based on a project conducted by the Academy of Technological Sciences and Engineering and is funded by the Australian Research Council.

This review has emerged from concerns about the ability of water utilities in some regional urban centres to undertake adequate planning in the context of highly variable and changing supply and demand conditions. The current ongoing drought across most of the country has highlighted the vulnerability of many supply systems to unforeseen climate conditions, with Bendigo, Ballarat, Goulburn and Toowoomba being notable, but not isolated examples. Technically sound water supply planning should cater for the high variability of Australia's climate and runoff.

There are certain elements within a water supply plan that one would expect to be evident if water supply planning is being adequately undertaken. These include consideration of population growth, climate variability, climate change and land use change, all of which have a major influence on future water supply availability and demand. This study postulates that there are two enabling steps that are necessary to create an environment in which prudent water supply planning will follow, namely:

- *Institutional support* – regulatory drivers, guidance, tools and datasets are available at a state, territory or national level for use by utilities in water supply planning; and
- *Technical rigour* – knowledge of the essential technical components of urban water supply planning.

This report reviews long-term urban water supply planning in each state and territory against these two elements. The degree of institutional support was assessed against available State policies, regulations, legislation and guidelines, whilst the degree of technical rigour was assessed with reference to an example plan sourced from each state or territory.

In some parts of Australia significant aspects of one or both of these two elements of institutional support and technical rigour for water supply planning were largely absent. This situation must be remedied if urban water supplies are to be adequately maintained in the face of uncertainties about future water availability and demand.

In states with local water utilities, financial incentives (subsidies) for completion of water supply plans in New South Wales and Queensland were less effective in ensuring completion of plans in accordance with state guidelines than regulation in Victoria. Only 29% of water utilities in New South Wales had commenced their long-term water supply plan by July 2005, which was more than two years after an example plan was made available by the State Government.

An example long-term urban water supply plan in areas outside of capital cities could be readily located in every state or territory except Tasmania, where no formal plan was able to be located. The Tasmanian Government called for tenders for a long-term water supply plan for the town of Bicheno in early 2007, indicating that an example plan is likely to be available in late 2007. In those states or territories where a good support framework had been established for water supply planners, evidence of at least one high quality non-metropolitan urban water supply plan was found.

Most states and territories have a policy, regulatory or legislative framework for managing water resource availability from an individual resource, but there is lack of consideration of how urban water utilities fit into this framework. Assigning resources from a single source for water resource planning, which has been a prime focus of the National Water Initiative, is a separate decision making process from selecting resources from a variety of sources for urban water supply planning. This distinction is not

universally acknowledged across Australia and there is no formal requirement for urban water utilities in South Australia, Tasmania, Western Australia and the Northern Territory to undertake long-term urban water supply planning. Current projects to review and reform aspects of water management and regulation in Western Australia and Tasmania present an opportunity to create a regulatory driver in these states. Ideally, water supply planning should also be linked with energy and land use planning decisions in an integrated manner.

Recommendation 1: Consideration should be given to providing greater regulatory drivers for water supply planning for urban water utilities in all states and territories, with the exception of Victoria, where a sound policy framework for urban water supply planning already exists. This will improve the quality, extent and transparency of urban water supply planning in these states and territories. Greater regulatory drivers should replace project subsidies in New South Wales and Queensland and be coupled with other appropriate project funding arrangements.

The extent and quality of water supply planning by local water utilities in Queensland is currently unknown by the Queensland Government, which is a significant information gap when assessing the adequacy of current planning activities.

Recommendation 2: Consideration should be given to monitoring the progress of water supply planning by local water utilities in Queensland as part of its existing annual water utility benchmarking report, similar to that which occurs in New South Wales.

The Tasmanian Government set up a taskforce in late 2006 to reform its water and sewerage sector, which ATSE believes should strongly consider establishing regulatory drivers for long-term urban water supply planning in that state. The absence of evidence of systematic urban water supply planning in Tasmania highlights the urgent need for urban water reform in that state.

Recommendation 3: Consideration should be given to establishing an urban water supply management and planning unit in the Tasmanian Government to guide and regulate local water utilities, similar to the role currently played by government agencies in Victoria (Department of Sustainability and Environment (DSE)), New South Wales (Department of Energy, Utilities and Sustainability (DEUS)) and Queensland (Queensland Water Commission (QWC) / Department of Natural Resources and Water (DNRW)) that have local water utilities.

There are a variety of institutional models for non-metropolitan urban water supply management at a state and territory-wide level, ranging from a single utility across most of a state or territory to a multitude (100+) of local council owned water utilities. The institutional model adopted is considered to have a direct impact on the extent and quality of urban water supply planning undertaken in each state and territory. A comparison of progress against state urban water supply planning guidelines in Victoria and New South Wales, and within New South Wales itself, highlights that smaller utilities are slower to commence their urban water supply planning despite the availability of State Government support.

Managing and planning water supplies is becoming increasingly more complex with more complicated water treatment technologies and a greater diversity of water sources. It is questionable whether institutional models of the past are adequate in the light of this increasing technical complexity that requires the ability to recognise the need for and effectively use highly specialised skills.

Recommendation 4: A study should be undertaken of the efficacy of the non-metropolitan urban water utility institutional models in the various state and territories to determine which models are most appropriate to adopt, as current arrangements are not uniformly producing desirable water supply planning (and potentially many other) outcomes, particularly for utilities managed by local councils.

States and territories typically do not give adequate consideration to uncertainty in their water supply planning. Most notably there was no quantification of the effect of climate change in water supply planning in Queensland, New South Wales, Tasmania and the Northern Territory. Given recent climate conditions and global warming trends, this oversight is of concern. Determining climate change impacts on runoff at a statewide level can significantly reduce the technical burden on water utilities, encourage scenario planning for a range of climate change conditions and promote consistency of information in broader planning forums, as seen in Victoria.

Triple bottom line (social, financial/economic and environmental) assessments of demand reduction and supply enhancement options were not evident in example water supply plans for Victoria, the Northern Territory, Queensland, Western Australia and Tasmania. This indicates that many water supply planning decisions are still being made without taking into account net social and environmental benefits and rely solely on financial cost comparisons. Triple bottom line assessment frameworks are known to exist in most states and territories.

All state and territory resource managers are yet to complete the setting of the size of the consumptive pool, which hampers the ability of water supply utilities to invest in new water infrastructure with certainty. Most states and territories are nearing completion of this task.

All states and territories lack information on the effect of climate change on groundwater yield and the effect of land use change on groundwater and surface water yields. The expansion of plantation forestry and the prevalence of bushfires in recent years in particular will have significant but currently largely unknown impacts on future urban water supplies. This technical issue has been addressed in some states by site specific studies, but no state or territory resource managers have yet provided uniform advice to water supply utilities on the nature and magnitude of this impact in all of their water supply areas.

Recommendation 5: The shortcomings identified in this review in the area of climate change, vegetation change and the setting of the size of consumptive pools should be immediately addressed and incorporated into future long-term urban water supply planning. This recommendation supports actions identified under the National Water Initiative that are currently being implemented by states and territories.

The above conclusions and recommendations are drawn from this overview of urban water supply planning in Australia. Further investigations and analysis are recommended to ascertain the extent to which sound urban water supply planning is being undertaken in all regional areas, rather than just the examination of readily available example plans.

Recommendation 6: Following on from this review, consideration should be given to undertaking a complete investigation of non-metropolitan urban water supply planning to gain a full picture of the extent to which individual utilities are undertaking long-term urban water supply planning and implementing the actions from those plans.

Almost all urban water utilities and state and territory agencies approached for this study shared information freely and responded to requests in a timely manner. This highlights the willingness of Australia's water supply managers and planners to participate in water industry reform despite the pressures of day to day water supply system management. There will nevertheless be a lag between instituting the above recommendations at a state and territory level, having them taken up by water utilities in their water supply planning and then implementing the actions identified in those plans. This lag means that urgent action is required in order to better prepare the nation's non-metropolitan urban water utilities to adequately balance supply and demand in the near future.

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A brief background on each of the authors of the report is given below:

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The Project was established and managed for ATSE by:

- Professor Ian D Rae FTSE, Technical Director (to February 2006), and
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Contents

1 Introduction

Maintaining a reliable urban water supply to communities outside of Australia's capital cities is important for the ongoing success and livelihood of those communities. They contribute significantly to the Australian economy and social fabric of the nation by supporting tourism, agriculture and mining industries, amongst others.

This report provides a snapshot of the status of long-term urban water supply planning being undertaken by Australia's non-metropolitan urban water utilities, firstly by examining the degree and nature of support at a state and territory wide level for urban water supply planning outside of Australia's capital cities and secondly by examining individual long-term water supply plans that have been produced to date by water utilities.

In this review, assessment of technical rigour in an example individual plan should be regarded as a demonstration of the capability of each state or territory to undertake appropriate urban water supply planning outside of capital cities and not as a measure of whether this planning is being undertaken universally throughout the state or territory. This review provides comment on the adequacy of urban water supply planning from a brief overview and further investigations and analysis are recommended to ascertain the extent to which sound urban water supply planning is being undertaken and implemented in all regional areas, rather than the examination of an example plan only in each state or territory.

The study acknowledges both the common elements and differences in the various jurisdictions of Australia. It reports on:

- a very brief overview of the organisational framework in which non-metropolitan urban water supplies are managed in Australia (Section 2);
- the common elements of water supply planning that would be expected as part of prudent planning (Section 3);
- the extent to which water supply planning is being undertaken in each state and territory (Sections 4 to 10), including:
  - whether state support for practitioners is available and how this is provided;
  - the extent to which water supply plans are readily available; and
  - the extent to which desired elements of water supply planning are incorporated into an example plan; and
- conclusions and recommendations arising from this analysis (Section 11).

Water industry reform in general and the reform of urban water supply management and planning in particular have attracted a high degree of interest in recent times. The water industry has made significant steps already in changing the way that it plans and manages water supply under the direction provided in the National Water Initiative (Council of Australian Governments (COAG), 2004). Nevertheless it is widely acknowledged that more progress can be made and the recent release of discussion papers by the Business Council of Australia (2006), the Department of Prime Minister and Cabinet (2006), Engineers Australia (2006b) and Marsden Jacob Associates (2006a) highlight many areas for improvement. None of these recent discussion papers specifically address the adequacy of non-metropolitan urban water supply planning in any detail, although Engineers Australia (2006a) does highlight the difficulties in finding water supply solutions for the regional centres of Toowoomba in Queensland, Goulburn in New South Wales and Bendigo in Victoria. These previously released discussion papers focus primarily on institutional reform and pricing reform, and provide little guidance or insight into the technical standard of water supply planning around the country. The Academy of Technological Sciences and Engineering (ATSE) seeks to address this knowledge gap in the current water debate by drawing on the high level technical expertise of its members within the water industry.

Engineers Australia (2006a) concluded in its discussion paper that "the principles for water management contained in the National Water Initiative are more than adequate" to address concerns

about water management in regional centres, but that "what is missing is agreement on detailed urban water reform action plans". This report by ATSE investigates this detail in the area of long-term urban water supply planning for these regional centres.

This study is a companion study to the recent review of water supply planning by Australia's major urban water utilities by the Water Services Association of Australia (WSAA, 2005b). For this reason, this study excludes consideration of water supply in Australia's capital cities, including Newcastle, the Gold Coast and the Australian Capital Territory. Together, the WSAA paper and this report inform government and industry about the nation's capacity to plan for and manage the future balance between water supply and demand in the long-term.

2 Background on Urban Water Utilities in Regional Australia

2.1 INTRODUCTION

Urban water supply management and planning arrangements are different in each state and territory. The arrangements in each jurisdiction are complex and will not be presented in detail here, however some basic knowledge of the relative size of water utilities and the broad water institutional model in each state and territory is considered useful in the context of this review of urban water supply planning.

2.2 DESCRIPTION OF ROLES IN THE WATER INDUSTRY FOR THIS REVIEW

The term "water utility" is used broadly throughout this document to describe the water service provider who is responsible for urban water supply planning. In practice, water utilities can consist of retail suppliers, where bulk water supply is provided to the utility by an external provider, or bulk and retail suppliers, where water is harvested and then delivered to the customer by a single utility.

The service provision role of a water utility is separate from the regulatory role of the resource manager. The water utility supplies water to consumers from its available water sources in accordance with any rules established by the resource manager of each water source. There can be separate resource managers for different sources of water, such as when a water utility draws both from rivers and aquifers, and more than one water utility can access water from the same water source.

2.3 RELATIVE SIZE OF NON-METROPOLITAN URBAN WATER UTILITIES IN AUSTRALIA

Water supply in Australia is managed by a combination of government owned utilities (including local government) and private utilities. The number of utilities in each state and territory and the approximate permanent population served by those utilities is shown in Table 2.1. It can be seen from this table that the population served by urban water utilities in Australia outside of capital cities is in the order of 6 to 7 million, which highlights their collective importance at a national level. The population served by these water utilities is likely to be even higher during peak holiday periods when residents in capital cities flock to the country and the coast. Failure to undertake adequate urban water supply planning outside of Australia's capital cities could therefore have significant ramifications. Table 2.1 also illustrates the varying way in which urban water management service provision is geographically divided in each state and territory:

- Northern Territory, South Australia and Western Australia have a large government entity to manage non-metropolitan urban water supply across most or all of the state or territory. Population densities outside of capital cities in these states and territories are low;
- New South Wales and Queensland manage urban water supply at the local council level, with small utilities covering relatively small areas;
- Victoria has amalgamated local water utilities run by local councils into regional water utilities accountable directly to the State Government; and
- Tasmania has a mixture of individual local councils operating independently (as per the NSW and

Queensland model), and local government utilities jointly owned by several councils (similar to the Victorian model).

Table 2.1 – Number of non-metropolitan urban water utilities in each state or territory outside of capital cities

State or Territory	Number of utilities	Approx. population served [1]
New South Wales	107	2,000,000
Northern Territory	1	77,000
Queensland	125	1,700,000
South Australia	3	400,000
Tasmania	12	330,000
Victoria	12	1,500,000
Western Australia	3	680,000
Total	263	6,687,000

[1] From a variety of sources including the Australian Bureau of Statistics (ABS) census information and water utility annual reports. These are approximate numbers for illustration purposes only and include rural areas unlikely to be serviced by water utilities.

The way in which support needs to be provided to water utilities is influenced by the institutional model adopted, which is discussed in greater detail in the review of urban water supply planning in each state and territory. It can readily be seen however that there is a diversity of institutional models for delivering non-metropolitan urban water supply services in the various state and territories. Smaller water supply utilities, such as those that exist in New South Wales, Queensland, Tasmania and isolated parts of Western Australia and South Australia, are largely a historical legacy of local communities organising their own water supply as those communities were established and developed. As communities grow and the risk associated with mismanagement and inadequate planning of water supplies increases, access to and effective use of better technical skills outside of relatively small local councils becomes essential.

Managing and planning water supplies is becoming increasingly more complex with more complicated water treatment technologies and a greater diversity of water sources. It is questionable whether institutional models of the past are adequate in the light of this increasing technical complexity that requires the ability to recognise the need for and effectively use highly specialised skills. The efficiency of the various institutional models for gaining access to those skills is currently unknown and should be the subject of review so that states and territories can be advised of the best institutional model for their communities. The information available on the extent of planning in each state or territory suggests that urban water supply planning has progressed more rapidly in Victoria, where local council authorities have been amalgamated into larger water utilities, than in States with water supply planning functions performed by local councils. Annual benchmarking in New South Wales highlights that the proportion of water utilities that have commenced their formal urban water supply planning is significantly lower for small water utilities (see Section 4.3 for more details).

Other factors to consider in a review of institutional models would include the desire to establish a competitive marketplace for competition between utilities and the political efficiency in co-ordinating urban water utility input into increasingly holistic water resource planning at a river basin scale. The natural tendency of states and territories of different population densities to adopt different institutional models suggests that different models may be appropriate in different circumstances. The viability of local councils in their current form without the provision of water supply services would need to be considered, as well as the ways in which water supply planning activities interact with other planning processes.

Pricing regulators in each state and territory have some involvement in reviewing water supply planning information as part of price determinations. There is considerable variation between the states in cost-recovery for water planning and management in Australia (National Water Initiative (NWI) Steering Group on Water Charges, 2007). The ability to review the role of pricing regulators in non-metropolitan urban water supply planning in this report has been limited and should be considered further as part of the wider review of institutional arrangements.

3 Elements of a Water Supply Planning Framework

3.1 INTRODUCTION

There are certain elements within a water supply plan that one would expect to be evident if water supply planning is being adequately undertaken, principally in the areas of population growth, climate change, climate variability and land use change, all of which have a major influence on future water supply availability and demand. Basic knowledge of current water availability, supply reliability and consumer demand is also considered essential for forward planning. This study postulates that there are two enabling steps that create an environment in which prudent water supply planning will generally follow, namely:

- Institutional support – regulatory drivers, guidance, tools and datasets available at a state, territory or nation wide level for use by utilities in water supply planning; and
- Technical rigour – knowledge of the essential technical components of urban water supply planning. Technical rigour is assessed by reviewing an example individual plan in each state and territory.

For each state and territory these two aspects are assessed independently and there are a number of review elements that are considered within these two aspects. Each review element has been assessed in subsequent sections of the report according to whether the element has been suitably taken into consideration for water supply planning (✓), as illustrated in Table 3.1. Where a review element has been assessed as not suitably taken into account, it will be denoted by the (–) symbol as an area for improvement. This assessment has been flexibly applied to take into account the different conditions in each state or territory. An element is regarded as suitably taken into account for water supply planning purposes even if it is not explicitly addressed if that particular review element is not relevant to local conditions.

Table 3.1 – Review element format

Review Element	✓	–
Review element name	Appropriate for water supply planning	Area for improvement

Individual review elements were developed independently of the paper developed by Professor Peter Cullen (2006) following the National Water Commission's feature session on water planning at the 2006 International River Symposium, but are consistent with those notes.

3.2 BASIC PROPERTIES OF WATER UTILITIES

Basic utility information within each state or territory is provided within each state or territory review in the format shown in Table 3.2. This is background information about the number of utilities operating in the state or territory and how many customers they have to give an indication of the average size of utilities in each state or territory. It is postulated that smaller utilities will have less capacity to develop suitable water supply plans because a critical mass of technical expertise is required to undertake or facilitate appropriate water supply planning. Further details on individual utilities are available in the annual benchmarking report by the Water Services Association of Australia (WSAA 2006) for a few of

the larger non-metropolitan urban water utilities, however most non-metropolitan urban water utilities are not covered in that publication because they are not WSAA members. The last comprehensive benchmarking report of Australia's non-major urban water utilities, which contains much background information about individual utilities, took place in 2001 (Australian Water Association (AWA), 2001). The national funding made available for that review has not since been renewed, however the National Water Commission and WSAA are due to publish a similar benchmarking report for all utilities with more than 10,000 connections in the 2005/06 year in April 2007. Detailed information on water utilities in individual states and territories is available for some states (for example DEUS, 2006) and should be referred to if more information is required on individual utilities.

Table 3.2 – Review element format for basic utility information

Element	Comment
Number of non-metropolitan urban water supply utilities	Specifies the number of bulk and number of retail utilities
Approx. population served	Excludes major urban utilities and is an indicator of utility size
Number of property connections	Indicator of average utility size
Total volume supplied to customers	Indicator of average utility size
Number of staff	Notional indicator of average resources available to run each utility

The information on number of staff for non-metropolitan urban water utilities in Table 3.2 is only a broad indicator of the likely in-house technical capability of those utilities. A water board in Western Australia provided a breakdown of total staff numbers for the utility. Of the 30 full time equivalent staff, approximately three were designated as engineers (AqWest, 2005). This will vary for different sized utilities, however it is clear that technical staff for water supply planning are likely to be only a small proportion of total staff numbers, particularly when technical services are outsourced. The total number of staff is therefore only a very broad indicator of the technical resources available to undertake water supply planning and is best considered in a relative sense.

Population figures are largely sourced from the Australian Bureau of Statistics (ABS) and are likely to be an overestimate of population numbers actually serviced by water supply utilities. This is because many rural areas do not have a reticulated water supply and are therefore not served by water utilities.

3.3 INSTITUTIONAL SUPPORT FOR WATER SUPPLY PLANNING

Water utilities have a wide range of skills available in-house, however the degree to which water supply planning is successful will depend to some extent on the degree of encouragement and support available to those utilities at a state and territory wide (or national) level. This is particularly important where specialist skills are required that affect planning beyond the water industry, such as atmospheric climate change modelling or demographic forecasting. It is also important where technical skills are required that may not lie directly within the skill set of many water utilities, such as skills in hydrology, hydrogeology, ecology, engineering design, financial analysis and socio-economic analysis.

The review elements of Institutional Support (denoted with the prefix "IS") that are considered to promote effective water supply planning utilised in this review are as shown in Figure 3.1. These review elements are applied at a state and territory level and not to individual water utilities.

Regulatory drivers – Water utilities that have a regulatory driver to develop water supply plans will often develop them to avoid penalties or to obtain access to state or territory funding. In the absence of regulatory drivers, water supply planning will only be undertaken on an ad-hoc basis at the discretion of the utility. Regulatory drivers include legislative, regulatory or policy requirements that specify both that a plan must be prepared and the essential elements of that plan.

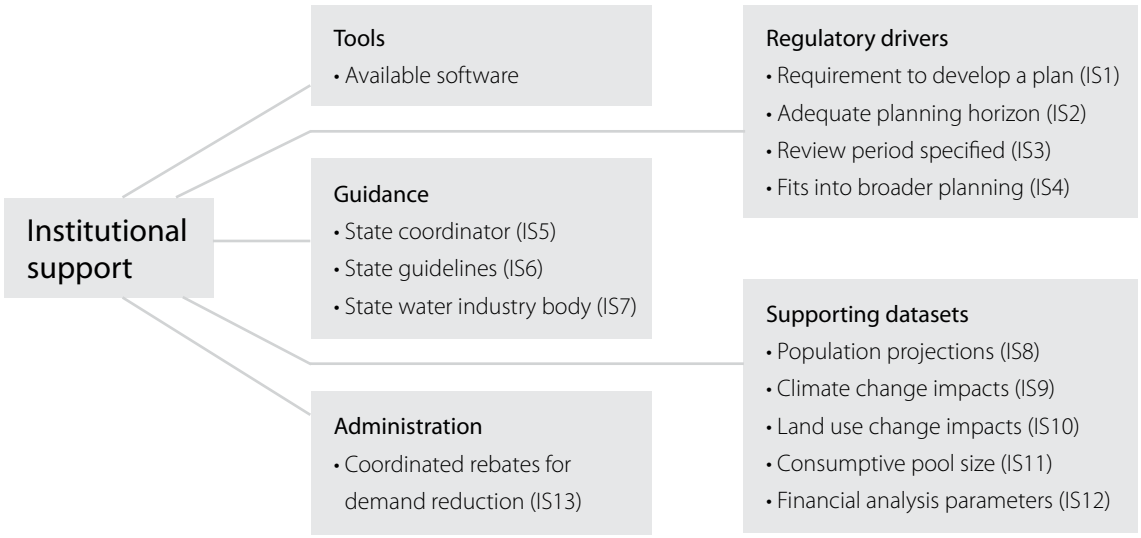

Figure 3 1 **Review elements for providing institutional support for water supply planning**

The review elements applied in this assessment are listed in Table 3 3. A minimum planning horizon of 20 years is considered appropriate for long-term water supply planning. Major infrastructure assets generally have a life span well in excess of 50 years and design and construction lead times of up to around 5 years. This planning horizon is consistent with assessment periods recommended by state or territory treasuries for financial assessment. Regular review at intervals not greater than 5 years will ensure that long-term changes in demand, climate and scientific knowledge can be incorporated into the urban water supply plans and directions appropriately modified.

Table 3.3 – Review element format for regulatory drivers

Review Element	✓
IS1: Requirement to develop urban water supply plan?	Yes
IS2: Planning horizon?	> 20 years
IS3: Review period for updating urban water supply plan?	< 5 years
IS4: Requirement to input into broader planning process?	Yes

Guidance – Over-arching guidance for water utilities can come at a number of levels, including having a designated co-ordinator within a regulatory authority, guidelines to assist water utilities and/or the establishment of state or territory wide industry bodies for non-metropolitan urban water utilities, such as the Victorian Water Industry Association. The national water utility industry body of the Water Services Association of Australia has increasing associate membership among non-metropolitan urban water utilities, with a total of 28 members and 25 associate members (WSAA, 2005b). Full membership is restricted to businesses that provide water services to 50,000 or more property connections, although associate membership for smaller utilities is also available. Other industry bodies are known to exist at a state or territory wide level to specifically support smaller utilities, as discussed in the review of each state or territory. The review elements that indicate whether some guidance is available to water supply utilities within each state or territory are shown in Table 3.4.

Table 3.4 – Review element format for state and territory guidance to water utilities

Review Element	✓
IS5: State or territory co-ordinator for urban water supply planning?	Yes
IS6: State or territory guidelines for urban water supply planning?	Guidelines exist
IS7: Water industry body to share water planning knowledge?	Body exists

Tools – Water resource modelling tools are an enabling technology that allows water utilities to assess reliability of supply. There are a number of tools currently in use in various jurisdictions for various tasks. These include water balance modelling software (for example, REALM, IQQM), rainfall-runoff modelling software (for example. HYDROLOG, AWBM), groundwater modelling software (for example. MODFLOW), etc. National co-ordination of software tools has improved significantly in recent years with the establishment of co-operative research centres. The multi-institutional e-Water Co-operative Research Centre (and its predecessor) developed and supports the freely available Catchment Modelling Toolkit (www.toolkit.net.au). This Co-operative Research Centre is also undertaking tool development in areas where a need for additional tools to support the industry is perceived. A number of international software companies provide software tools to support aspects of water resources planning as well. For this reason, tools for water resources planning are considered to be readily available to all states and territories and are not considered further in this review.

Applicable tools for some aspects of water resources management and planning are not readily available to water resource managers, who are likely to then pass on the tool or its output datasets to water utilities. These can include tools for incorporating land use change in water resources planning and tools for groundwater and surface water interaction analyses, which are currently the focus of a number of state or territory and federal research projects. The application of these tools is expected to be undertaken at a state or territory wide level in the future and then translated into supporting datasets, which are discussed in the following section.

Datasets – There are a number of datasets that are required for water supply planning that are generally considered to be outside of a water utility's core business areas. Water utilities must therefore often rely upon other agencies to provide this information as an input to their water supply planning. This is particularly important where specialist skills are required that affect planning beyond the water industry, where it would be overly onerous to expect a water utility to prepare this information that has a clear public good beyond the water utility's use.

The most basic external datasets are rainfall and evaporation information from the Bureau of Meteorology and streamflow information from state or territory agencies. It is beyond the scope of this review to assess the adequacy and quality of climate and streamflow gauging networks, however it is noted that Engineers Australia (2006b) recently prepared a discussion paper which stated that better management and more funding for streamflow gauging networks is required generally across Australia. The adequacy of available streamflow and climate data will be specific to each individual water utility and the data collection and management arrangements in each state and territory. Australia's highly variable climate means that long datasets are required to gain a thorough understanding of climate variability for water supply planning purposes. Gaining access to data that is collected is improving through state or territory and national initiatives such as the Victorian water resources data warehouse and the national water data information system.

The review elements for assessing whether supporting datasets are available to water utilities for their water supply planning are shown in Table 3.5.

The forecast period for state and territory population projections should align with the planning horizon as a minimum. If the planning horizon is too short then this will be evident in the previously mentioned review element for the designated planning horizon. In some cases the planning horizon may be dictated by the availability of population projections, so a 20 year minimum for available population projections is specified, even if the shorter period aligns with the planning horizon.

Determining climate change impacts on rainfall and evaporation lies well outside of the capability of water utilities and generally fall within the domain of CSIRO and state and territory government agencies. Determining climate change impacts on runoff is often handled by utilities, but in some jurisdictions such as Victoria it has been demonstrated that making this information available at a state wide level can significantly reduce the technical burden on water utilities, promote scenario planning for a range of climate change conditions and promote consistency between water utilities. Determining climate change impacts on groundwater is largely a problem that has not been tackled to date apart from

research investigations, primarily at a national level. This issue will be particularly important for urban water utilities, many of whom rely on baseflow (for example. river water sourced from groundwater) or groundwater bores.

Table 3.5 – Review element format for supporting datasets for water utilities

Review Element	✓
IS8: Forecast period for state or territory population projections?	Aligns with planning horizon and > 20yrs
IS9: Climate change impacts available?	
a) For rainfall and evaporation	Yes
b) For runoff	Yes
c) For groundwater	Yes
IS10: State or territory wide advice on land use change impacts on water supply?	
a) For logging	Yes
b) For bushfires	Yes
c) For plantations	Yes
IS11: Consumptive pool defined?	Yes
IS12: Financial analysis parameters available?	Yes

Advice on the impact of land use change (for example. plantation development, tree clearing and logging) on available supply also requires specialist technical skills that will generally not be available within water utilities. In the absence of state and territory wide advice, a wide range of approaches with a wide range of accuracies could be possible. Many water utilities would consider this issue too difficult to address without state or territory government support and in many cases, beyond their scope of activities.

The size of the consumptive pool from individual water supply sources such as a river basin or aquifer is currently being set by resource managers as part of requirements under the National Water Initiative. The most widely known consumptive pool is the Murray–Darling Basin Cap on surface water diversions in the Murray–Darling Basin. The size of the pool can change when more information is gained about ecosystem water requirements, climate variability and climate change, for example, and the current setting of the size of the pool does not imply that it is at sustainable levels or is fixed indefinitely. Nevertheless the setting of the size of the consumptive pool by the resource manager provides some certainty to water utilities about the maximum volume of water that can be harvested from an individual supply source for the foreseeable future.

Financial analysis parameters include the availability of preferred discount rates and accounting periods over which to apply those discount rates. The absence of this information at a state or territory wide level can lead to different analyses being applied to different and sometimes competing projects, making it difficult to fairly compare those projects. The costing of environmental externalities associated with supply enhancement and demand reduction options is typically not quantified in dollar terms and has not been considered further in this review from a financial point of view.

Co-ordinated demand management rebates – Administrative support from state or territory governments can be important for actions that require uniform investment across utility areas in order to be effective and consistent. A clear example of this is the use of rebate systems for demand reduction initiatives, shown in Table 3.6, such as the installation of rainwater tanks, water efficient showerheads, etc. These schemes are likely to be more successful and more readily adopted by utilities where state or territory government provides rebates or regulation for these actions. This is because it allows a consistent message to be conveyed using media that traverse water utility boundaries, particularly television and radio. The effectiveness of individual demand management rebates in penetrating the market and reducing demand has not been reviewed in this paper.

Table 3.6 – Review element format for co-ordinated demand management rebates for water utility plan actions

Review Element	✓
IS13: State or territory government rebates for demand reduction initiatives?	Yes

3.4 TECHNICAL RIGOUR

Water supply planning takes place from a base of reasonably certain current information and moves forward within a context of uncertainty about the future availability and use of water. This review focuses on the extent to which this basic information about the supply system that has relevance to future planning is known, as well as whether key uncertainties have been taken into consideration. Individual review elements for Technical Rigour (denoted with the prefix "TR") are illustrated in Figure 3.2. This review framework is used to review an example water supply plan in each state and territory where they have been obtained for this study.

The aspects covered in an individual water supply plan are partly self-selected according to local need. For example, if there are no farm dams in Alice Springs, then it is not surprising to see that they are not mentioned in that particular water supply plan. For this reason, the approach adopted attempts to take into account local variations.

Planning horizon – This review element shown in Table 3.7 is re-stated from the review of institutional support in Section 3.3, because planning horizons would be expected to vary where this is not regulated at a state or territory wide level.

Table 3.7 – Review element format for planning horizon

Review Element	✓
TR1: Planning horizon?	> 20 years

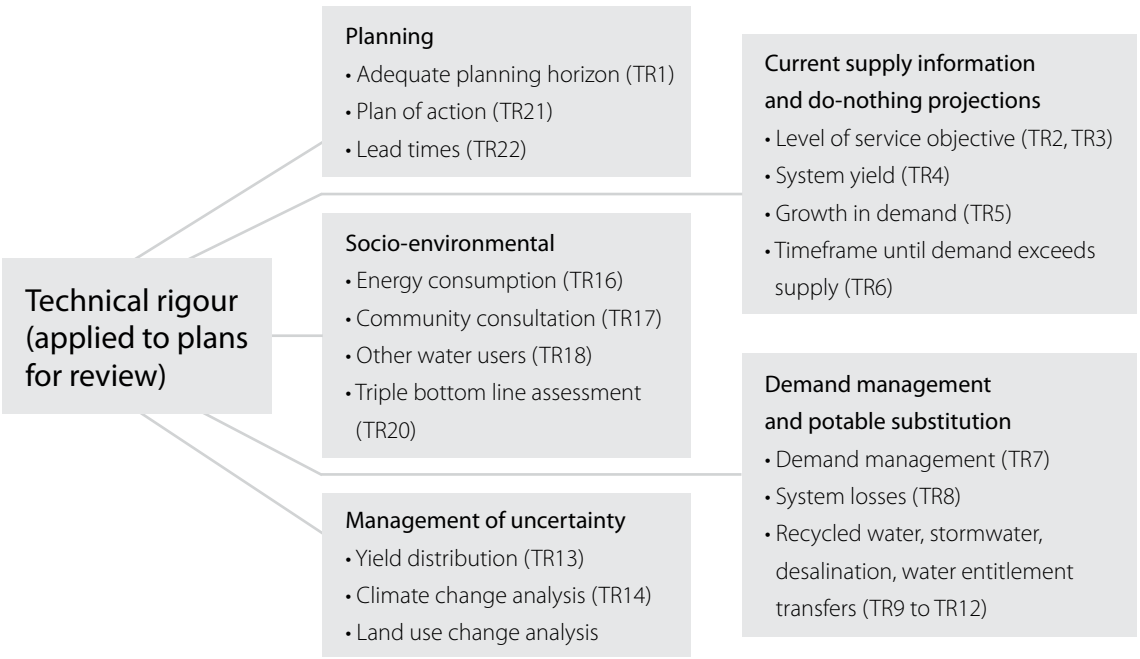

Figure 3.2 Review elements for applying technical rigour for water supply planning

Current supply information and do-nothing projections – Some basic background information is required on the current supply system and the level of service to be provided now and into the future. Do-nothing projections determine how urgent the need is for demand reduction or supply enhancement. Review elements in Table 3.8 include whether level of service objectives are stated, whether they are currently being met and whether they are expected to no longer be met under a do-nothing scenario.

Table 3.8 – Review element format for current information and do-nothing projections

Review Element	✓
TR2: Stated level of service objective?	Yes
TR3: Is level of service objective currently being met?	Yes
TR4: Is the current system yield stated?	Yes
TR5: Is the growth in demand over the planning horizon stated?	Yes
TR6: Timeframe stated until level of service objectives are no longer met under do-nothing scenario?	Yes

Demand management and potable water supply substitution – Demand management through improvements in water use efficiency is seen as an important way of deferring the need for augmentation of a supply system. Review elements associated with demand management and potable substitution are shown in Table 3.9. Demand management through simple measures such as more efficient showerheads or dual flush toilets can reduce the need for supply augmentation without any loss of amenity for consumers. Knowledge of the current profile of water use greatly assists in estimating the likely benefits of these demand management initiatives in individual supply systems, which can vary widely in their make up of residential and non-residential users. Basic knowledge of supply system losses will be important for addressing leak reduction, which similarly involves increasing water use efficiency without loss of amenity for consumers. Many water utilities have historically lacked this information due to inadequate metering. The alternative supply options of recycling treated effluent and use of stormwater to substitute the use of potable water where non-potable water would suffice (such as irrigating golf courses) are specifically considered to gauge the extent to which these methods of potable substitution are being taken up in different jurisdictions at the planning stage. Desalination will be relevant in coastal areas or areas with other saline water sources, notably groundwater.

Table 3.9 – Review element format for demand management and potable substitution

Review Element	✓
TR7: Consideration of demand management?	Yes
TR8: Knowledge of system losses?	Yes
TR9: Is recycled water considered as a supply option?	Yes
TR10: Is stormwater considered as a supply option?	Yes
TR11: Is desalination considered as a supply option?	Yes
TR12: Is water trading considered as a supply option?	Yes

Management of uncertainty – The future availability of water and the future demand for water are never exactly known and there will be many uncertainties that occur at a local level, as previously illustrated in WSAA (2005a). Only some larger scale uncertainties are considered in this review, as listed in Table 3.10. Uncertainty arises in the first instance from Australia's naturally very high climate and runoff variability and the potential for climate change. Supply system yield has traditionally been stated as a single value based on a single historical time series input. A number of Australia's capital cities are starting to embrace stochastic data generation as a way of understanding yield as a possible range of values with a probability distribution. This approach is more labour and technology intensive, but can provide

valuable information, particularly at the lower end of expected yields. Measurement and modelling errors are inherent in the determination of yields under given supply system configurations, particularly when input climate or streamflow data is sampled over only a few decades and hence lacks a more complete range of natural variability in input information. Shifts in climate or land use can also affect historical streamflow records which can further reduce the amount of relevant historical information available upon which to base planning decisions. Extracting as much information as possible about the range of possible streamflow sequences from this data is becoming increasingly important.

Climate change and land use change were previously discussed in Section 3.3. These two elements affect the whole of Australia and can significantly influence available supply. Climate change can also influence consumer demand.

Table 3.10 – Review element format for management of uncertainty

Review Element	✓
TR13: Is yield stated as a probability distribution?	Yes
TR14: Consideration of climate change?	Yes
TR15: Consideration of land use change?	Yes

Socio-environmental considerations – Historically, water supply planning decisions for selecting a supply enhancement option were based purely on the financial cost per unit of water supplied through the augmentation option. Consideration of social and environmental costs and benefits in a triple bottom line framework allows decisions to be made on the basis of a more complete knowledge set of the overall cost and benefits of a particular action and the relative merit of different actions. Some of the key elements of those costs and benefits include the degree of energy consumption and its associated greenhouse gas volumes and the extent to which other water users, including the environment, have been considered in the water supply plan. These review elements are listed in Table 3.11. Less emphasis is placed on environmental impacts in this review because it is generally now the role of the resource manager, not the water utility, to provide information on sustainable resource availability. It is assumed that all decisions about future water supply options would occur within the framework set by the resource manager. Nevertheless, when considering future supply options it would be expected that one of the components of the option assessment would be the extent to which the proposed option affects the environment. It is acknowledged in this review that many additional socio-environmental factors would need to be considered at a local level and that the review elements in Table 3.11 are merely selected as indicators of broader socio-environmental considerations. Community involvement in the plan development or approval are also important, particularly as decisions about demand management are expected to be embraced by the community and because decisions about supply enhancement have pricing implications for consumers.

Table 3.11 – Review element format for socio-environmental considerations

Review Element	✓
TR16: Energy consumption of options stated?	Yes
TR17: Evidence of community consultation?	Yes
TR18: Have impacts on other water users been considered?	Yes
TR19: Have impacts on the environment been considered?	Yes
TR20: Is there a triple bottom line assessment of options?	Yes

Plan outcomes – The outcome of a successful water supply planning process is to explicitly state the overall strategies for the water utility, the specific actions that will support those strategies and when they will be implemented. The review elements for consideration of outputs is shown in Table 3.12 and include whether a plan of action is stated and whether the lead times associated with those actions have been considered in the plan. Financing of plan actions through an appropriate investment and pricing

strategy is considered a secondary step that water utilities take as a result of completing their water supply plan and is not considered further in this review. Establishing the preparedness of the community to pay for new infrastructure will be an important part of detailed design and community consultation on the preferred option selected in the long-term water supply plan.

Table 3.12 – Review element format for plan outcomes

Review Element	✓
TR21: Is there a plan of actions to achieve and maintain the desired level of service over the planning horizon?	Yes
TR22: Is there consideration of lead times for actions?	Yes

3.5 WHAT IS NOT COVERED IN THIS REVIEW?

This is a review of long-term, non-metropolitan urban water supply planning. It focuses on whether water utilities are adequately planning to ensure that level of service objectives for reliability of supply continue to be met into the future. It does not cover financial planning, nor infrastructure replacement that is part of normal asset management.

4 New South Wales Water Supply Planning

4.1 INTRODUCTION

New South Wales has a range of water resource availability conditions, from relatively dry inland areas with large water supply catchments subject to periodic flooding to areas of more reliable rainfall in smaller catchments along the coast. Much of the state has experienced extreme drought conditions in recent years. This section of the review discusses the New South Wales approach to urban water supply planning.

4.2 URBAN WATER SUPPLY MANAGEMENT IN NEW SOUTH WALES

In 2004/05 there were 107 local water utilities in New South Wales (DEUS, 2006) providing water from 340 individual water supply schemes. This excludes the major water utilities of Sydney Water, the Sydney Catchment Authority, Hunter Water and three power generators. The majority of these local water utilities are local councils or groups of councils, with six non-council local water utilities created for specific purposes.

Management of urban water utilities is supported at a state level by the Department of Energy, Utilities and Sustainability (DEUS) predominantly on issues of governance and regulation, and by the industry body of the New South Wales Water Directorate on technical issues. Membership of the Water Directorate covers all local councils that provide water supply services in regional New South Wales. The New South Wales Water Directorate is a separate body to the Metro Water Directorate, which is a branch within the New South Wales Cabinet Office that co-ordinated the development of Sydney's Metropolitan Water Plan and which has no responsibilities in non-metropolitan areas. The State Water Management Outcomes Plan (Department of Natural Resources (DNR), undated) sets broad targets for water management in New South Wales, including emphasis on the consideration of alternative supply options and demand reduction targets for local water utilities.

Bulk water supply is managed by State Water for most regulated river systems, although some urban bulk water providers, such as Rous Water in the Lismore area, manage their own headworks independently of State Water.

A summary of basic information about water supply utilities in New South Wales is summarised in Table 4.1. The annual benchmarking of these utilities by DEUS (2006) meant that despite the high number of water utilities, information was still available on water utility characteristics at a statewide level. The approximate geographic distribution of those water utilities is illustrated in Figure 4.1.

Table 4.1 – Basic information about the utility (excludes Sydney and Newcastle)

Review Element	Comment
Number of non-metropolitan urban water supply utilities	107(1)
Approx. population served	2.0 million(1)
Number of property connections	790,000(1)
Total volume supplied to customers (ML/yr)	323,000(1)
Number of staff	Unknown(2)

(1) DEUS (2006)

(2) This information is collected by DEUS, but was not in a readily comparable format with information from other States because it had been standardised as a per 1000 properties figure

ORANA
Bogan Shire Council
Bourke Shire Council
Brewarrina Shire Council
Central Darling Council
Coonamble Shire Council
Dubbo City Council
Gilgandra Shire Council
Mid Western Regional Council
Narromine Shire Council
Walgett Shire Council
Warren Shire Council
Warrumbungle Shire Council
Wellington Council

NEW ENGLAND
Armidale Dumaresq Council
Glen Innes Severn Council
Gunnedah Shire Council
Guyra Shire Council
Gwydir Shire Council
Inverell Shire Council
Liverpool Plains Shire Council
Moree Plains Shire Council
Narrabri Shire Council
Tamworth Regional Council
Tenterfield Shire Council
Uralla Shire Council
Walcha Shire Council

NORTH COAST
Ballina Shire Council
Byron Shire Council
Clarence Valley Council
Kyogle Shire Council
Lismore City Council
Richmond Valley Council
Rous Water
Tweed Shire Council

MID NORTH COAST
Bellingen Shire Council
Coffs Harbour City Council
Gloucester Shire Council
Kempsey Shire Council
Nambucca Shire Council
Port Macquarie - Hastings Council

SOUTH WEST
Albury City Council
Balranald Shire Council
Berrigan Shire Council
Bland Shire Council
Carrathool Shire Council
Coolamon Shire Council
Cootamundra Shire Council
Corowa Shire Council
Deniliquin Shire Council
Goldenfields Water County Council
Greater Hume Council
Griffith City Council
Gundagai Shire Council
Hay Shire Council
Jerilderie Shire Council
Leeton Shire Council
Lockhart Shire Council
Murray Shire Council
Murrumbidgee Shire Council
Narrandera Shire Council
Riverina Water County Council
Temora Shire Council
Tumbarumba Shire Council
Tumut Shire Council
Urana Shire Council
Wagga Wagga City Council
Wakool Shire Council
Wentworth Shire Council

CENTRAL WEST
Bathurst Regional Council
Blayney Shire Council
Cabonne Shire Council
Central Tablelands Water
Cowra Shire Council
Forbes Shire Council
Lachlan Shire Council
Oberon Shire Council
Orange City Council
Parkes Shire Council
Weddin Shire Council
Young Shire Council

SOUTH EAST
Bega Valley Shire Council
Cooma-Monaro Shire Council
Eurobodalla Shire Council
Goulburn Mulwaree Council
Harden Shire Council
Palerang Shire Council
Queanbeyan City Council
Upper Lachlan Shire Council
Yass Valley Council

HUNTER
Dungog Shire Council
Muswellbrook Shire Council
Singleton Shire Council
Upper Hunter Shire Council

ILLAWARRA
Shoalhaven City Council
Wingecarribee Shire Council

Figure 4.1 – Water Directorate members in NSW, which incorporates all local council water utilities in regional NSW (Water Directorate, 2006)

4.3 URBAN WATER SUPPLY PLANNING

Local councils are responsible for urban water supply under the Local Government Act 1993. The Act and Regulations are non-specific on water supply planning, but do make provision for the preparation of management plans, adherence to sustainable development principles and a requirement to have regard to any relevant guidelines or directions issued by the State Director-General. Local councils are subject to different legislation than water supply authorities, which are subject to more transparent conditions under the Water Management Act 2000.

Urban water supply planning is undertaken by individual water supply utilities under the direction of DEUS. Urban water supply management by local water utilities is assessed against six performance criteria by an independent auditor. The local water utilities must comply with those criteria in order to be eligible for dividend (subsidy) payments from Treasury. One of the criteria is to develop an Integrated Water Cycle Management Plan, which is a long-term water supply and demand strategy. A checklist is provided within the Department's guidelines for best practice management (DEUS, 2004).

DEUS assesses progress towards the development of an Integrated Water Cycle Management Plan in its annual benchmarking report. At the end of the 2004/05 year, only 29% of water utilities had commenced their Integrated Water Cycle Management Plan (DEUS, 2006), despite the guidelines

having been available since October 2004 and example plans being available since April 2003. Greater progress was being made by the larger water utilities (defined by DEUS as >$10m annual turnover) with 49% having started their plan compared to only 21% of smaller utilities, which supports the suggestion that larger water utilities with greater access to technical skills are more likely to be in a better position to undertake water supply planning than smaller utilities.

Price setting by local urban water utilities is not directly linked to any mandatory reviews of expenditure forecasts and therefore of long-term water supply plans. The Independent Pricing and Regulatory Tribunal (IPART), which regulates prices for State Water, DNR and the major water utilities, does not regulate prices for smaller urban water utilities. DEUS monitors pricing for the smaller water utilities and monitors adherence to its best practice management guidelines on price setting, but does not formally regulate those prices. DEUS makes access to State Government funding for projects directly linked to following its guidelines for price setting.

4.4 INSTITUTIONAL SUPPORT

A summary of the regulatory drivers for urban water supply planning in New South Wales is shown in Table 4 2. As stated in Section 4.3, urban water supply planning is encouraged under government policy. DEUS encourages participation in integrated water cycle management by making dividends (subsidies) from government subject to successful completion of an integrated water cycle management plan in accordance with its guidelines (DEUS, 2004).

The Integrated Water Cycle Management Guidelines do not state what an appropriate planning horizon is, although within the detail of the guidelines there is a worked example that suggests a 25-year planning horizon. This is not particularly clear to readers of the guidelines. The review period for council management plans prepared under the Local Government Act 1993 is five years and as stated above, there is a requirement for local water utilities to respond to any requests for information from other parts of government for input to broader planning processes. In the absence of specific requests, there is no formal requirement for local water utilities to prepare a long-term water supply plan.

Table 4.2 – Regulatory drivers for urban water supply planning in New South Wales

Review Element	Comment	Suitability
IS1: Requirement to develop urban water supply plan?	No	–
IS2: Planning horizon?	Not explicitly stated. One worked example suggests 25-year planning horizon.	–
IS3: Review period for updating urban water supply plan?	5 years	✓
IS4: Requirement to input into broader planning process?	Yes	✓

The extent to which local councils are provided with guidance for water supply planning is listed in Table 4.3. In addition to DEUS, technical support is provided by the NSW Water Directorate as an independent source of advice to councils, providing direction on technical issues and providing networking opportunities for water supply engineers (Water Directorate, 2006).

Table 4.3 – Guidance for water supply planning in New South Wales

Review Element	Comment	Suitability
IS5: State co-ordinator for urban water supply planning?	Yes, DEUS	✓
IS6: State guidelines for urban water supply planning?	Yes	✓
IS7: Water industry body to share water planning knowledge?	Yes, Water Directorate	✓

The extent to which supporting datasets are available for local councils is summarised in Table 4.4. The New South Wales Department of Planning provides regular updates of population projections for a

25 to 45-year forecast period at a statewide level and a 25-year forecast period for local government areas (Department of Planning, 2006).

Climate change impacts on rainfall and evaporation are readily available in New South Wales. The Integrated Water Cycle Management Guidelines (DEUS, 2004) do not provide any specific guidance on how climate change impacts should be incorporated into the Integrated Water Cycle Management Strategy, other than to note that it is a potential impact on water availability.

Changes in runoff and groundwater levels due to climate change have not been tackled by the New South Wales Government and neither have changes in land use. The New South Wales Government has undertaken some site specific studies on the hydrologic impacts of farm dams on runoff in the Murray-Darling and Hawkesbury-Nepean basins, but has not undertaken these analyses across the whole of the state. The effect of changes in land use on water availability is highlighted as an area that the New South Wales State Government plans to address as part of its National Water Initiative implementation (NSW State Government, 2006).

The size of the consumptive pool has been set for 92% of New South Wales' 49 Surface Water Management Areas and all of New South Wales' 89 Groundwater Management Units (Commonwealth of Australia, 2006). This indicates that water resource availability information is available for most of the water resources accessed by water utilities in New South Wales.

The New South Wales Office of Financial Management has produced a set of Treasury guidelines for financial appraisal of projects (NSW Treasury, 1997).

Table 4.4 – Supporting datasets for water supply planning in New South Wales

Review Element	Comment	Suitability
IS8: Forecast period for State population projections?	NSW Dept. of Planning projections to 2026	✓
IS9: Climate change impacts available?		
a) For rainfall and evaporation	Yes	✓
b) For runoff	No	–
c) For groundwater	No	–
IS10: Statewide advice on land use change impacts on water supply?		
a) For logging	No	–
b) For bushfires	No	–
c) For plantations	No	–
IS11: Consumptive pool defined?	Complete for groundwater, incomplete for surface water	–
IS12: Financial analysis parameters available?	Yes	✓

There does not appear to be uniform funding for rebates for demand reduction initiatives across New South Wales, as indicated in Table 4.5. DEUS has released funding for areas of the State covered by the major water utilities, but the program and associated funding does not extend across the state. DEUS does encourage demand reduction initiatives but does not specify which initiatives should be implemented. Given the relatively small geographic area covered by each local water utility, there may be potential benefit in making rebates for demand reduction initiatives available to a uniform extent across the State. Transaction costs of administering demand management rebates in small communities may be higher than in large communities.

Table 4.5 – Co-ordinated demand management rebates in New South Wales

Review Element	Comment	Suitability
IS13: State government rebates for demand reduction initiatives?	Not uniformly	–

4.5 TECHNICAL RIGOUR

The Eurobodalla Shire Integrated Water Cycle Management Strategy was selected as an example long-term water supply plan in New South Wales (Eurobodalla Shire Council, 2003). The strategy was prepared as a pilot for the former NSW Department of Public Works and Services using the Integrated Water Cycle Management process developed by the former NSW Department of Land and Water Conservation and now overseen by DEUS. A handful of other local water utilities had prepared Concept Studies since the DEUS guidelines were produced in 2004, but the Tweed Council was the only other local water utility that had completed its strategy.

The Eurobodalla Shire Integrated Water Cycle Management Strategy was reviewed to assess the extent to which evidence could be found to indicate that water supply planning is being undertaken in the state. It is acknowledged that this plan may be unrepresentative of other plans yet to be prepared by local councils because the Eurobodalla Shire Council worked directly with the State Government to complete the plan. Other local councils may not necessarily receive the same level of technical input from the State Government in the future, but an insufficient number of plans have been produced to test the quality of other plans. The elements of water supply planning presented in Section 3 were utilised for the assessment below.

The planning horizon for this example water supply plan is adequate for long term water supply planning being 30 years, as shown in Table 4.6.

Table 4.6 – Planning horizon for example water supply plan

Review Element	Comment	Suitability
TR1: Planning horizon?	30 years	✓

Current water supply and demand information and the do-nothing demand and supply forecasts are well documented in the example plan, as illustrated in Table 4.7. The NSW Government provided uniform reliability of supply targets in a previous version of its Water Supply and Sewerage Management Guidelines (NSW Government, 1991). The example water supply plan clearly presents current yield against projected demands.

Table 4.7 – Current information and do-nothing projections for example water supply plan

Review Element	Comment	Suitability
TR2: Stated level of service objective?	Yes, 95% monthly reliability, 90% annual reliability and minimum storage buffer	✓
TR3: Is level of service objective currently being met?	Yes	✓
TR4: Is the current system yield stated?	Yes	✓
TR5: Is the growth in demand over the planning horizon stated?	Yes	✓
TR6: Timeframe stated until level of service objectives are no longer met under do-nothing scenario?	2015	✓

Demand management information is a key feature of the integrated water cycle management strategy, as shown in Table 4.8. A range of demand management scenarios are investigated. These scenarios also incorporate reducing system losses. A full range of alternative water supply options is considered in the

plan, which includes innovative consideration of mixing and matching various supply enhancement and demand reduction measures.

Table 4.8 – Demand management and potable substitution for example water supply plan

Review Element	Comment	Suitability
TR7: Consideration of demand management?	Yes	✓
TR8: Knowledge of system losses?	Yes, approximately 15%	✓
TR9: Is recycled water considered as a supply option?	Yes	✓
TR10: Is stormwater considered as a supply option?	Yes	✓
TR11: Is desalination considered as a supply option?	Yes	✓
TR12: Is water trading considered as a supply option?	Yes	✓

Aside from the uncertainties associated with future demands, key uncertainties are largely not considered in the example water supply plan, as shown in Table 4.9. Importantly, there is no consideration of climate change in the water supply plan. The plan does however explicitly acknowledge that climate change and land use change have not been considered in the yield analysis, which provides an indicator to the reader that these may need to be taken into account if they become issues in the future. An examination of a more recent strategy prepared by another shire also contained no mention of climate change or greenhouse gas emissions (Tweed Shire Council, 2006). This suggests that the absence of climate change information in the Integrated Water Cycle Management Strategy may not be an isolated occurrence. This is possibly a consequence of the absence of specific technical advice in the Integrated Water Cycle Management Strategy Guidelines for local councils on how climate change should be incorporated into its yield assessments and demand projections, as discussed previously in Section 4.4.

Table 4.9 – Management of uncertainty for example water supply plan

Review Element	Comment	Suitability
TR13: Is yield stated as a probability distribution?	No	–
TR14: Consideration of climate change?	No, but this is acknowledged in the plan	–
TR15: Consideration of land use change?	No, but this is acknowledged in the plan	–

Social and environmental considerations are given appropriate weighting within the Eurobodalla Shire water supply plan. This is summarised in Table 4.10. Community meetings were held as part of the plan development. The triple bottom line assessment of options incorporates a wide range of social, economic and environmental factors, including impacts of proposed options on greenhouse gas emissions. These greenhouse gas emissions are not quantified in the report, but are incorporated into a relative assessment using a sliding scale of impact.

Table 4.10 – Social and environmental considerations for example water supply plan

Review Element	Comment	Suitability
TR16: Energy consumption of options stated?	Yes	✓
TR17: Evidence of community consultation?	Yes	✓
TR18: Have the impacts on other water users been considered?	Yes	✓
TR19: Have impacts on the environment been considered?	Yes	✓
TR20: Is there a triple bottom line assessment of options?	Yes	✓

The water supply plan has a clear plan of action, as shown in Table 4.11. Lead times are considered in a timeline for implementation in the report.

Table 4.11 – Planning outcomes for example water supply plan

Review Element	Comment	Suitability
TR21: Is there a plan of actions to achieve and maintain the desired level of service over the planning horizon?	Yes	✓
TR22: Is there consideration of lead times for actions?	Yes	✓

4.6 CONCLUSIONS

New South Wales has a fragmented water supply institutional model that has historically relied upon local water supply management by a multitude of local councils. Despite this large number of local councils, the Department of Energy, Utilities and Sustainability, in conjunction with the New South Wales Water Directorate, has established a support framework to assist local councils in their water supply planning. This excellent overarching framework consists of comprehensive guidelines for water supply planning and the ability to facilitate exchange of technical information between local councils.

An examination of an example long-term water supply plan for the Eurobodalla Shire highlights that high quality water supply planning can be found in regional New South Wales, however it is acknowledged that this particular plan may be unrepresentative of plans produced by other water utilities in that this plan involves significant technical input from the State Government. The Integrated Water Cycle Management Strategy for the shire adopted a thorough triple bottom line approach incorporating a wide range of supply enhancement and demand management options. The linking of government surplus dividends (subsidies) to local councils with successful completion of Integrated Water Cycle Management Strategies against transparent assessment criteria provides incentive for councils to undertake this planning. Planning is well supported by technical guidelines and broader water utility benchmarking in New South Wales.

Despite this support, water supply planning by local water utilities has largely not occurred. Only 29% of water utilities had started their Integrated Water Cycle Management Strategy at the end of the 2004/05 financial year (DEUS, 2006), despite the guidelines being available in October 2004 and an example strategy being available from April 2003. This information on progress highlights the benefit of the annual monitoring by DEUS of urban water supply planning at the same time as bringing into question the ability of local water utilities in New South Wales to undertake that urban water supply planning. This indicates that greater regulation is needed to formally require local water utilities to complete their long-term water supply plans and/or responsibility for water supply planning needs to be vested in organisations with a greater number of technical specialists to carry out the work.

The main area where the example water supply plan, and to some extent the State guidelines, fall short of expectations is in the consideration of uncertainty. There was no attempt to quantify the potential impacts of climate change in the example water supply plan and no indicators within the State guidelines of why and how this issue should be addressed by local councils.

5 Northern Territory Water Supply Planning

5.1 INTRODUCTION

The Northern Territory has a relatively small population base coupled with a wide variety of climate conditions to deal with, from a tropical climate in the north to an arid climate in central Australia. This section of the review discusses the Northern Territory's approach to urban water supply planning.

5.2 URBAN WATER SUPPLY MANAGEMENT IN THE NORTHERN TERRITORY

The majority of water supply in the Northern Territory is managed by the Power and Water Corporation (PowerWater), which is a government owned corporation accountable to the Territory Treasurer and the Minister for Essential Services. PowerWater manages water supply, sewerage and power supply to the Northern Territory. A summary of basic information about the water supply utility in the Northern Territory is shown in Table 5 1.

There are five major urban centres for water supply in the Northern Territory, namely Darwin, Katherine, Tennant Creek, Alice Springs and Yulara. Water supply planning for Darwin was covered in WSAA (2005b) and is not considered further here. In addition to these major urban centres, there are a further 12 minor urban centres and approximately 80 indigenous communities with water supply managed by PowerWater. These are shown in Figure 5 1. There are also a further 400 to 600 outstations which are rural communities supported at a federal level by the Department of Families, Community Services and Indigenous Affairs. Water supply planning for these outstations is not considered further in this report.

Table 5.1 – Basic information about the utility (includes Darwin)

Review Element	Comment
Number of non-metropolitan urban water supply utilities	1 bulk and retail supplier (Power and Water Corporation)
Approx. population served	200,000 (~110,000 in Darwin)
Number of property connections	40,300(1)
Total volume supplied to customers (ML/yr)	68,500(1)
Number of staff	777 (includes electricity staff as well as water staff)

(1) Power and Water Corporation (2005), Annual Report, 2005.

5.3 URBAN WATER SUPPLY PLANNING

PowerWater prepares a water supply system asset management plan for all of its major and minor urban centres under the Water Supply and Sewerage Services Act 2002. Under Section 48 of the Act, the purpose of the asset management plan is "to ensure optimal arrangements for creating, repairing and replacing the licensee's water supply and services infrastructure". The plan must be updated annually and submitted to the Utilities Commission. The Utilities Commission does not provide further written guidance on the nature and content of those asset management plans. The Utilities Commission only has authority to request that an asset management plan is prepared and has no authority under the Act to review, amend or reject the plan. In practice, the Utilities Commission collects the plans, but regards the contents of those plans as being self-regulated. PowerWater was able to readily provide an example asset management plan.

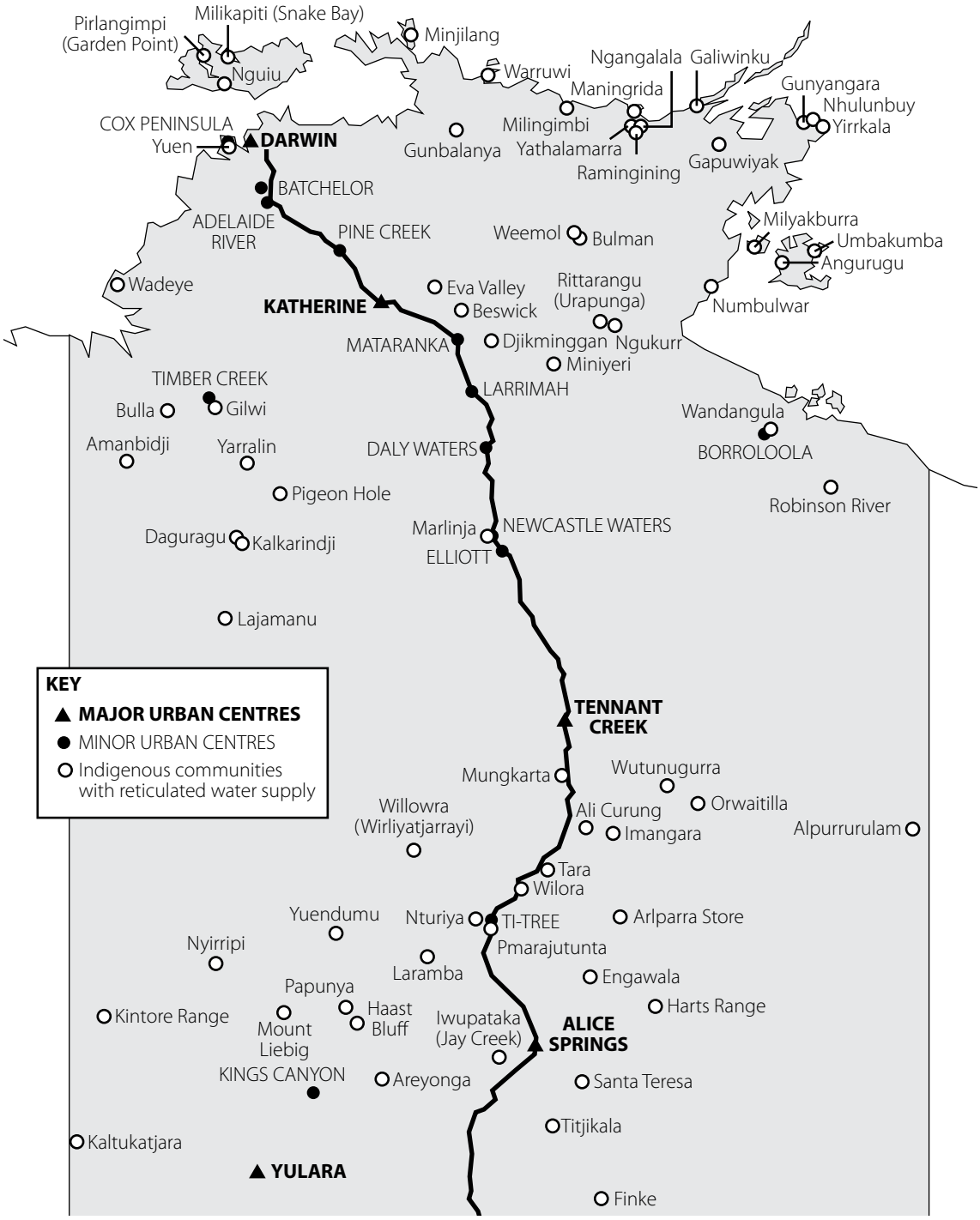

Figure 5 1 – Major and minor water supply centres including indigenous communities with reticulated water supply (adapted from http://www.powerwater.com.au)

These asset management plans are supplemented periodically by PowerWater with specific purpose investigations. Examples of these include a demand management study being undertaken by the Institute of Sustainable Futures and a groundwater study being undertaken by engineering consultants SKM. This highlights the ability of PowerWater to draw upon external resources for specialist technical input on aspects directly related to or an input to water supply planning.

Water Resource Strategies are prepared by the Department of Natural Resources, Environment and the Arts (NRETA) as Water Allocation Plans under Section 22B of the Water Act 1992. These strategies are designed, amongst other purposes, to ensure that water is allocated within sustainable limits. There is

some overlap between PowerWater's Asset Management Plans and NRETA's Water Resource Strategies, with the main difference being that the Water Resource Strategy must consider the needs of all water users within the context of the total available resource. The Asset Management Plan informs the Water Resource Strategy about urban water needs, whilst the Water Resource Strategy informs the Asset Management Plan about water resource availability. The Water Resource Strategy is a ten year plan with a review every five years. Example Water Resource Strategies are available from NRETA's website (http://www.nreta.nt.gov.au).

5.4 INSTITUTIONAL SUPPORT

This section of the report considers the adequacy of institutional support for water supply planning in the Northern Territory. As stated previously, PowerWater has a requirement to prepare an asset management plan, but it is not given direction about a suitable planning horizon in legislation or regulations. This is highlighted in Table 5.2. The review period for the Asset Management Plan is one year, reflecting that the focus of the Asset Management Plan is about asset management rather than about asset planning. Outputs from the Asset Management Plan feed into the NRETA's Water Resource Strategy, but this requirement is an informal arrangement only and there is no link between the two documents to ensure that the Asset Management Plan is useful in a broader water resources planning context. This results in some disjoint between the two documents, such as the fact that the planning horizon for the Asset Management Plan is five years shorter than the ten year planning horizon for the Water Resource Strategy.

The Water Resource Strategy prepared by NRETA remains in force for ten years and is required to be reviewed every five years, but no planning horizon is specified in legislation or regulations. In practice the planning horizon for the Water Resource Strategy is 100 years in line with the Arid Zone water allocation policy across most of the Northern Territory, which states that total extraction over a period of not less than 100 years will not exceed 80% of the total aquifer storage at the start of extraction (NRETA, 2005). Whilst it is outside of the scope of this review to comment on resource management policy, this particular policy as presented in NRETA (2005) effectively represents the mining of groundwater across this region over a 100-year period, which brings into question the long-term sustainability of water supply in this region.

Table 5.2 – Regulatory drivers for urban water supply planning in the Northern Territory

Review Element	Comment	Suitability
IS1: Requirement to develop urban water supply plan?	Yes	✓
IS2: Planning horizon?	Not stated in regulation or legislation	–
IS3: Review period for updating urban water supply plan?	Annual	✓
IS4: Requirement to input into broader planning process?	Not stated, but requirement exists informally	–

As summarised in Table 5.3, there are no guidelines provided to PowerWater or generated within PowerWater about the content of Asset Management Plans. PowerWater is a Territory-wide body and for this reason it has the advantage of being able to rely on skills and knowledge available throughout the organisation. The content of the Asset Management Plans is internally controlled by PowerWater and because the plans are updated annually, the content of the plans is largely governed by the previous year's plan. There would potentially be great benefit if NRETA formally specified its requirements for water supply planning from PowerWater to streamline the development and updating of Water Resource Strategies.

Table 5.3 – Guidance for water supply planning in the Northern Territory

Review Element	Comment	Suitability
IS5: State co-ordinator for urban water supply planning?	Yes, within PowerWater	✓
IS6: State guidelines for urban water supply planning?	No, but plans based on previous examples	✓
IS7: Water industry body to share water planning knowledge?	Yes, within PowerWater	✓

The Northern Territory lacks some key datasets that are considered essential for water supply planning, as demonstrated in Table 5.4. Population projections are only available up to the year 2021, which only allows a 15-year forecast of demands without further extrapolation of those forecasts. This means long-run marginal costs for large infrastructure projects, which rely upon knowledge of volumetric uptake of water associated with the new infrastructure, cannot easily be calculated over the 20 to 25-year period that is typically used.

It also means that questions surrounding resource availability from aquifers over a 100 year period relative to projected demands are more difficult to assess than they would be if using the longer population forecasts available in some other states.

Climate change information for rainfall and evaporation is available at a Territory wide level from the OzClim national dataset, but this is not being utilised by PowerWater across its supply systems. It also does not appear to be utilised in NRETA's Water Resource Strategies. Change in runoff and groundwater levels due to climate change have not been tackled by PowerWater or NRETA. The same conclusions can be drawn about land use change impacts, however land use change in the Northern Territory is considered to be less evident than in other parts of Australia, so it is likely that land use change will not affect the Territory's water supplies in the near future.

The size of the consumptive pool has been set for all surface water resources in the Northern Territory and 52 of the Territory's 55 Groundwater Management Units (Commonwealth of Australia, 2006). This indicates that water resource availability information is available for most of the water resources accessed by PowerWater.

The Northern Territory Treasury does not produce formal guidelines on financial analysis for major projects and financial analysis is not evident in PowerWater's Asset Management Plans. No net present value or long-run marginal cost information associated with augmentation options is presented. It is expected that direct advice would be available from Treasury, which could include the use of Commonwealth Treasury guidelines for financial analysis.

Table 5.4 – Supporting datasets for water supply planning in the Northern Territory

Review Element	Comment	Suitability
IS8: Forecast period for State population projections?	ABS projections to 2021	–
IS9: Climate change impacts available?		
a) For rainfall and evaporation	Exists, but not utilised in planning	–
b) For runoff	No	–
c) For groundwater	No	–
IS10: Statewide advice on land use change impacts on water supply?		
a) For logging	No, but not likely to be relevant to most of NT	✓
b) For bushfires	No	–
c) For plantations	No, but not likely to be relevant to most of NT	✓
IS11: Consumptive pool defined?	Complete for surface water, incomplete for groundwater.	–
IS12: Financial analysis parameters available?	May exist, but not utilised in planning	–

The Northern Territory Government does not currently have any rebates available to consumers for water saving devices (Australian Conservation Foundation (ACF), 2006), which limits PowerWater's

ability to achieve increased water use efficiency from its customers as part of its action plans. This is summarised in Table 5.5.

Table 5.5 – Co-ordinated demand management rebates in the Northern Territory

Review Element	Comment	Suitability
IS13: State government rebates for demand reduction initiatives?	No rebates	–

5.5 TECHNICAL RIGOUR

The Alice Springs Potable Water Supply System Asset Management Plan for 2006 was provided by PowerWater (2006) as an example Asset Management Plan and forms the basis of this review. The elements of water supply planning presented in Section 3 are utilised to assess the extent to which water supply planning is being undertaken in the Northern Territory. Information has also been sourced from NRETA's Water Resource Strategy for Alice Springs where there is evidence that elements missing from the Asset Management Plan have been catered for in broader water resource planning by NRETA.

Long-term water resources planning for Alice Springs is particularly important because it is recognised by NRETA that the available groundwater supply is being drawn down at a rate faster than it is being replenished. The current supply is a finite resource that needs to be carefully managed in order to prolong its availability to the current 80-100 year target time period to exhaustion of the resource.

The planning horizon for PowerWater's Asset Management Plan is only five years, as shown in Table 5.6. This is relatively short because major infrastructure projects can have longer lead times than five years. ABS population growth information is presented up to the year 2021, but this information is not subsequently used in any systematic way to inform decisions about future augmentation dates. This planning horizon does not align with NRETA's planning horizon for its Water Resource Strategy.

Table 5.6 – Planning horizon for example water supply plan

Review Element	Comment	Suitability
TR1: Planning horizon?	5 years	–

The extent to which current information and do-nothing projections are presented in the example water supply plan is summarised in Table 5.7. PowerWater has a good understanding of its current water supply system and its ability to meet level of service objectives. Efforts are made to assess the timeframe until level of service objectives are no longer met, however in this particular supply system the ability to make this assessment is hampered by lack of knowledge from NRETA about sustainable aquifer yields, which is acknowledged in the plan. NRETA is in the process of assigning sustainable yields for aquifers that supply Alice Springs and it is expected that the outcomes of the final Water Resource Strategy will be incorporated into PowerWater's Asset Management Plan next year. NRETA does consider the demand for water over the next ten years and states that this volume lies within its target to not deplete more than 10% of aquifer storage in any given ten year period. NRETA does not however consider the likelihood of this target being met over subsequent ten year periods, presumably because of the absence of supporting population projections.

Growth rates used by NRETA are roughly double the growth rate used by PowerWater, however this is because the resource manager NRETA is taking an appropriately cautious approach to water resources planning that is not necessarily warranted for a water utility. Agreement between the two agencies on appropriate growth rates would facilitate more consistent planning.

Table 5.7 – Current information and do-nothing projections for example water supply plan

Review Element	Comment	Suitability
TR2: Stated level of service objective?	Unrestricted supply with targets for interruptions	✓
TR3: Is level of service objective currently being met?	Yes, reliable groundwater supply	✓
TR4: Is the current system yield stated?	System yield in Water Resource Strategy is expected to be incorporated into next year's Asset Management Plan	✓
TR5: Is the growth in demand over the planning horizon stated?	1.0-1.5% p.a. based on historical growth and ABS projections	✓
TR6: Timeframe stated until level of service objectives are no longer met under do-nothing scenario?	Only looks 5 years ahead, so difficult to tell. Acknowledged that new headworks infrastructure is likely to be required following regulatory review of resource availability by NRETA	✓

Information available on demand management and potable substitution is summarised in Table 5.8. PowerWater commissioned the Institute of Sustainable Futures to provide advice on demand management. The Institute is a nationally recognised organisation with technical skills in this area. Per capita demand information is well documented and points out that per capita water use in Alice Springs is the highest in Australia, which highlights the potential for demand management in this particular city. Specific investment in demand management options has not however been elaborated upon, most likely because it does not have a direct link to short-term asset management. PowerWater has a good understanding of its system losses, which highlights its strength in asset management, which will have benefits for leak reduction and minimising loss of water through pipe breakages.

PowerWater does not generally consider alternative supply options in its Asset Management Plan and focuses solely on groundwater as the future supply augmentation option. The use of recycled water is given only cursory consideration in NRETA's Water Resource Strategy and is absent from PowerWater's Asset Management Plan. A $10m recycling scheme was however being considered for Alice Springs and a recycling scheme at Yalara has been offered funding under the Australian Government Water Fund Smart Water Australia program. This scheme has not been integrated into PowerWater's water supply planning.

Other options such as stormwater, desalination of brackish groundwater and trading water entitlements with agricultural water users are not considered.

Table 5.8 – Demand management and potable substitution for example water supply plan

Review Element	Comment	Suitability
TR7: Consideration of demand management?	Yes, advice from Institute of Sustainable Futures	✓
TR8: Knowledge of system losses?	Yes, losses 16.5%	✓
TR9: Is recycled water considered as a supply option?	No	–
TR10: Is stormwater considered as a supply option?	No	–
TR11: Is desalination considered as a supply option?	No	–
TR12: Is water trading considered as a supply option?	No	–

Uncertainty is largely not dealt with in the Asset Management Plan and the Water Resource Strategy, as shown in Table 5.9. There is no consideration of risks associated with alternative population growth

rates or climate change. The potential impact of climate change on urban water demand and groundwater recharge rates is not discussed, which is potentially a concern because it could influence the time available until the current aquifer storage is expected to be exhausted.

Table 5.9 – Management of uncertainty for example water supply plan

Review Element	Comment	Suitability
TR13: Is yield stated as a probability distribution?	Single value, but appropriate for groundwater supply	✓
TR14: Consideration of climate change?	No	–
TR15: Consideration of land use change?	No, but not likely to be relevant to NT	✓

The inclusion of socio-environmental considerations in the example water supply plan is summarised in Table 5.10. The Asset Management Plan reports on both water use and energy consumption, which is partly an artefact of being an integrated power and water supply utility. This energy consumption quoted is not however converted into a greenhouse gas equivalent. The decision to pursue additional groundwater supply appears to have been made without considering all of the costs and benefits of this supply, as there is no triple bottom line assessment provided. The Water Resource Strategy involves extensive consultation and is required to report to a Water Resource Committee that includes various stakeholders.

Table 5.10 – Socio-environmental considerations for example water supply plan

Review Element	Comment	Suitability
TR16: Energy consumption of options stated?	Yes, 1046 kWh/ML	✓
TR17: Evidence of community consultation?	Yes, in Water Resource Strategy	✓
TR18: Have impacts on other water users been considered?	Yes, in Water Resource Strategy	✓
TR19: Have impacts on the environment been considered?	Yes, in Water Resource Strategy	✓
TR20: Is there a triple bottom line assessment of options?	No	–

The Asset Management Plan prepared by PowerWater presents an infrastructure investment program, however there is little technical justification for the capital and annual costs forecasts for the next five years. The Water Resource Strategy provides a clear picture of specific actions that need to be undertaken over the coming ten years, including a target date for their implementation, as shown in Table 5.11.

Table 5.11 – Planning outcomes for example water supply plan

Review Element	Comment	Suitability
TR21: Is there a plan of actions to achieve and maintain the desired level of service over the planning horizon?	Yes, in Water Resource Strategy	✓
TR22: Is there consideration of lead times for actions?	Yes, in Water Resource Strategy	✓

5.6 CONCLUSIONS

The findings of this review are that the Northern Territory has a good understanding of current water supply conditions, but could improve its water supply planning in some areas, most notably:

- The use of regulatory instruments to provide a driver for water supply planning could be strengthened. The focus of PowerWater's Asset Management Plans is on short to medium term asset management and not on longer-term decisions about demand and supply availability. An alternative and more encompassing planning vehicle with a longer review cycle of say 3 to 5 years would be more likely to promote improved water supply planning in the Northern Territory. PowerWater's water supply planning does not currently align well with NRETA's broader water supply planning processes, which could be addressed through regulation;
- The availability and use of Territory-wide datasets for water supply planning could be improved. The

absence of sufficiently long population projections hampers long-term demand forecasting. Climate change and financial analysis information is available at a Territory-wide level, but does not appear to have been utilised in current water supply planning. Making this information readily available or promoting its use between government departments would speed up the process of water supply planning as well as potentially having benefits for other areas of government;

- A water supply planning decision making process that encompasses social, economic and environmental costs and benefits could be better formalised and embraced. Currently there is limited evidence of a triple bottom line approach for assessing demand reduction and supply enhancement options. It is likely that these factors are taken into account informally; and
- Greater emphasis could be placed on addressing uncertainty, particularly in relation to climate change and land use change.

6 Queensland Water Supply Planning

6.1 INTRODUCTION

Queensland has experienced rapid population growth in the south-east of the state and despite its high volume of average annual rainfall, has been experiencing drought conditions across much of the state in recent times. The recent debate surrounding the use of recycled water for potable use in Toowoomba, for example, highlighted both the dire water supply situation and the level of community involvement and interest in water supply planning decisions. This section of the review discusses the Queensland approach to urban water supply planning.

6.2 URBAN WATER SUPPLY MANAGEMENT IN QUEENSLAND

As of 30 June 2004 there were 228 registered water service providers, with most of these consisting of shire councils and rural water boards that manage services locally (NRM, 2005a). The number of non-metropolitan urban water utilities has been estimated at around 125, as shown in Table 6.1.

There are a handful of bulk water suppliers in Queensland, including:

- South East Queensland Water, which supplies 12 councils in south-east Queensland;
- Sun Water, which supplies 12 councils in different parts of the state;
- Gladstone Area Water Board, which supplies the Gladstone City and Callope Shire in central Queensland; and
- Fitzroy River Water, which supplies the Livingstone and Fitzroy Shires.

Local councils retain their water service delivery functions to customers in their individual council areas. A map of local council areas is shown in Figure 6.1, which is broadly representative of local water utility boundaries.

The exact nature of water supply utilities across Queensland is difficult to characterise, because individual providers vary significantly in size and the type of service they provide. A summary of basic information about water supply utilities in Queensland is summarised in Table 6.1. This is largely based on designated medium and large water service providers with more than 1,000 connections. Summaries of urban water service provider information can be found in annual reviews by the Department of Natural Resources and Mines (NRM) (2005a, 2005b) and the Department of Local Government, Planning, Sport and Recreation (2006).

Table 6.1 – Basic information about the utility (excludes Brisbane and Gold Coast)

Review Element	Comment
Number of non-metropolitan urban water supply utilities	125 service providers[2] and 4 bulk water suppliers
Approx. population served	1.7 million
Number of property connections	387,000[1]
Total volume supplied to customers (ML/yr)	272,000[1]
Number of staff	Unknown

(1) NRM (2005a) for service providers with more than 1,000 connections

(2) Marsden Jacob Associates (2006b)

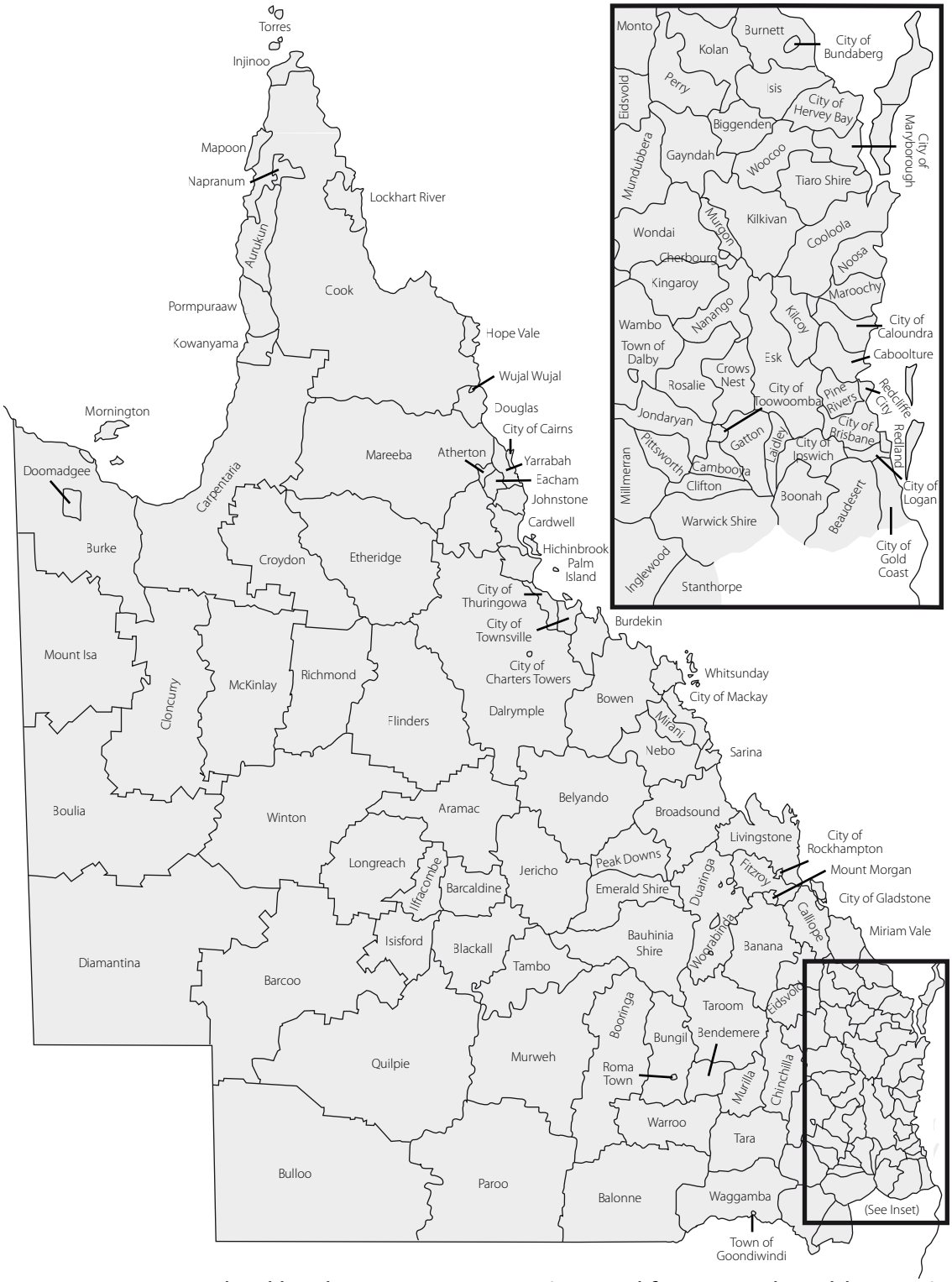

Figure 6.1 – Queensland local government areas (sourced from www.lgp.qld.gov.au)

6.3 URBAN WATER SUPPLY PLANNING

Urban water supply planning is undertaken by individual water supply utilities. Technical guidance across most of the State is provided by the Department of Natural Resources and Water (DNRW), which also acts as the referral agency for planning approval of water infrastructure projects by the Department of Local Government and Planning. Local councils must have their planning reports approved by the Department of Local Government and Planning (on advice from DNRW) in order to be eligible for project subsidies from the State Government.

Urban water supply planning has been actively undertaken in south-east Queensland by Brisbane Water, Gold Coast Water and more recently throughout the region in studies co-ordinated by the Queensland Water Commission. The Queensland Water Commission is a group of technical staff formed in 2006 that reports directly to the Deputy Premier, Treasurer and Minister for Infrastructure. The creation of the Commission was deemed to be necessary because of the integrated nature of the supply system and the increasing trend towards interlinking of the supply system into a water supply grid. The legislation governing the Commission's operations allows the State Government to extend its area of interest to other regions, but to date this has not occurred.

There is evidence of some urban water supply planning being undertaken throughout other areas of the State by local councils, however due to the vast number of local councils in Queensland, the adequacy and extent of that planning for each individual council cannot be commented upon. DNRW does not maintain any records of whether local water utilities are undertaking adequate planning because it does not consider itself to be a regulator of those utilities. It is therefore difficult to readily obtain a clear picture of the extent to which long-term urban water supply planning is being undertaken in Queensland, however evidence of such planning in the public domain is largely absent from utility websites.

Overall direction for water supply planning is provided at a State level in the Queensland Water Plan (Queensland Government, 2005). Regional Water Supply Strategies are currently being undertaken for south-east Queensland, central Queensland, Cairns-Atherton Tablelands, and the far north. Two more strategies are planned for the Mackay-Whitsunday and Wide Bay-Burnett areas (Queensland Government, 2005). The Regional Water Supply Strategies will consider how to best meet long-term demands from a range of water supply and demand reduction measures available at a regional scale.

Price setting is overseen by the Queensland Competition Authority (QCA), which provides guidance on price setting in relation to new capital expenditure in its Statement of Regulatory Pricing Principles for the Water Sector (QCA, 2000). The authority itself has completed only three reviews in relation to water issues, because it can only investigate water pricing if a person makes a claim that a water utility is engaging in monopoly pricing. For this reason, the QCA does not have a strong role in reviewing urban water supply planning by water utilities.

6.4 INSTITUTIONAL SUPPORT

There is no formal legislative or regulatory requirement for water utilities to prepare long-term water supply plans for their customers, however the Water Act 2000 does provide for the Minister to request relevant information. The Minister has an obligation under Section 35 of the Act to plan to meet Queensland's future water requirements including maintaining security of supply to water users. Under Section 36 of the Act, the government can request information from water utilities about current and projected future water consumption, demand management programs and measures that the utility intends to take such as constructing or changing infrastructure. The Water Act 2000 also requires water service providers to prepare a Strategic Asset Management Plan, set Customer Service Standards and prepare a System Leakage Management Plan and Drought Management Plan.

A summary of the regulatory drivers for urban water supply planning in Queensland is shown in Table 6.2. The requirement to develop urban water supply plans is not covered in regulation and legislation, but does enable and promote urban water supply planning under government policy, as discussed below.

Table 6.2 – Regulatory drivers for urban water supply planning in Queensland

Review Element	Comment	Suitability
IS1: Requirement to develop urban water supply plan?	No	–
IS2: Planning horizon?	Not stated	–
IS3: Review period for updating urban water supply plan?	Not stated	–
IS4: Requirement to input into broader planning process?	Yes	✓

The extent to which local councils are provided with guidance for water supply planning is listed in Table 6 3. Guidance for urban water supply planning is provided by the "Planning Guidelines for Water Supply and Sewerage", which were last updated by NRM in 2005 (NRM, 2005c). There is no formal requirement to prepare a long-term water supply plan, as illustrated in the review of the regulatory framework provided within the guidelines themselves. The guidelines state that they are designed to "facilitate strategic thinking in the planning process" rather than to require water utilities to undertake such planning in the manner deemed most appropriate by the Department.

A forum exists for exchange of technical information between local councils through the Queensland Water Directorate, which is an association of water service providers established for that purpose. Membership of the Water Directorate is voluntary and currently covers 80% of councils (Queensland Water Directorate, 2006). The Water Directorate releases regular newsletters, holds workshops and convenes a technical reference group that meets every second month.

Table 6.3 – Guidance for water supply planning in Queensland

Review Element	Comment	Suitability
IS5: State co-ordinator for urban water supply planning?	Yes, DNRM	✓
IS6: State guidelines for urban water supply planning?	Yes	✓
IS7: Water industry body to share water planning knowledge?	Yes, Water Directorate	✓

The extent to which supporting datasets are available for local councils is summarised in Table 6.4. The Queensland Department of Local Government, Planning, Sport and Recreation provides regular updates of population projections for a 50-year forecast period at a statewide level and a 20-year forecast period for local government areas. Climate change impacts on rainfall and evaporation are readily available.

Change in runoff and groundwater levels due to climate change has not been tackled by the Queensland Government and neither have changes in land use. Some site specific studies on the hydrologic impacts of farm dams on runoff have been undertaken, such as in the Border Rivers catchment, and the effects of land use change, but these analyses have not undertaken across the whole of the state. The effect of plantations is an ongoing initiative under the National Water Initiative for the Queensland Government, which will progressively introduce this issue into existing and future water resource plans (Queensland Government, 2006).

The size of the consumptive pool has been set for 30% of Queensland's 64 Surface Water Management Areas and 47% of Queensland's 34 Groundwater Management Units (Commonwealth of Australia, 2006). This indicates that water resource availability information is available for only some of the water resources that could be accessed by water utilities in Queensland.

The Queensland Treasury has produced a set of guidelines for the financial evaluation of public sector projects (Queensland Treasury, 2006).

Table 6.4 – Supporting datasets for water supply planning in Queensland

Review Element	Comment	Suitability
IS8: Forecast period for State population projections?	Qld. Dept. of Planning projections to 2026	✓
IS9: Climate change impacts available?		
a) For rainfall and evaporation	Yes	✓
b) For runoff	No	–
c) For groundwater	No	–
IS10: Statewide advice on land use change impacts on water supply?		
a) For logging	No	–
b) For bushfires	No	–
c) For plantations	No	–
IS11: Consumptive pool defined?	Incomplete	–
IS12: Financial analysis parameters available?	Yes	✓

The presence of rebates to support demand management initiatives is highlighted in Table 6.5. Some local councils offer rebates for purchasing water saving devices. The State Government has stated a commitment to extend the current "Home Waterwise Rebate Scheme" operating in South East Queensland to cover the rest of the state (Queensland Water Directorate, 2006).

Table 6.5 – Co-ordinated demand management rebates in Queensland

Review Element	Comment	Suitability
IS13: State government rebates for demand reduction initiatives?	Yes	✓

6.5 TECHNICAL RIGOUR

The Cairns Water Least Cost Planning Study (MWH, 2005) and Water Demand Management Strategy (Cairns Water, 2006) were taken collectively as an example long-term urban water supply plan in Queensland. These documents were reviewed to assess the extent to which water supply planning is being undertaken in the state. The elements of water supply planning presented in Section 3 were utilised for this assessment.

The planning horizon for this water supply plan is adequate for long term water supply planning being 40 years, as shown in Table 6.6.

Table 6.6 – Planning horizon for example water supply plan

Review Element	Comment	Suitability
TR1: Planning horizon?	40 years	✓

Current water supply and demand information and the do-nothing demand and supply forecasts are well documented in the example plan, as illustrated in Table 6.7. A target reliability of 90% was used in the supply assessment, however it is not stated whether this is an annual, monthly or other reliability and it is quoted with reference to targets in capital cities around Australia rather than being an expression of customer requirements. The report has a strong focus on understanding demands, but this appears to take place at the expense of information on supply availability. Current yield, for example, is not expressly stated or depicted graphically, although it can be calculated from statements about when demands are expected to exceed available supply.

Table 6.7 – Current information and do-nothing projections for example water supply plan

Review Element	Comment	Suitability
TR2: Stated level of service objective?	Modelled as 90% reliability	✓
TR3: Is level of service objective currently being met?	Yes	✓
TR4: Is the current system yield stated?	Not explicitly stated, but can be calculated from information provided in the text	✓
TR5: Is the growth in demand over the planning horizon stated?	Yes	✓
TR6: Timeframe stated until level of service objectives are no longer met under do-nothing scenario?	2008	✓

Demand management information is well considered, as illustrated in Table 6.8. A range of demand management scenarios are investigated. These scenarios also incorporate system losses. Alternative supply options such as stormwater and desalination are not mentioned in the Cairns Water reports, however recycled water is considered for use in the city's botanic gardens. Water trading with agricultural water users is a component of its surface water supply enhancement option.

Table 6.8 – Demand management and potable substitution for example water supply plan

Review Element	Comment	Suitability
TR7: Consideration of demand management?	Yes	✓
TR8: Knowledge of system losses?	Yes	✓
TR9: Is recycled water considered as a supply option?	Yes	✓
TR10: Is stormwater considered as a supply option?	No	–
TR11: Is desalination considered as a supply option?	No	–
TR12: Is water trading considered as a supply option?	Yes	✓

Key uncertainties are largely not considered in the example water supply plan, as shown in Table 6.9. Importantly, there is no consideration of climate change in the water supply plan.

Table 6.9 – Management of uncertainty for example water supply plan

Review Element	Comment	Suitability
TR13: Is yield stated as a probability distribution?	No	–
TR14: Consideration of climate change?	No	–
TR15: Consideration of land use change?	No	–

Social and environmental considerations are given little weighting within the water supply plan, with the main emphasis being on establishing a financial argument for the proposed plan. This is summarised in Table 6.10. Community consultation is not undertaken as part of plan development, but there is clear direction of the need for community consultation to implement the plan and achieve endorsement and acceptance of the plan by the community. It is acknowledged in the supply options that one option, for example, will involve the purchasing of water entitlements from agricultural water users, however there is no attempt to consider the social and broader economic implications of this option as part of a triple bottom line assessment. All decisions appear to have been made on a purely financial basis.

Table 6.10 – Social and environmental considerations for example water supply plan

Review Element	Comment	Suitability
TR16: Energy consumption of options stated?	No	–
TR17: Evidence of community consultation?	No, but clearly recommended as an outcome for Cairns Water to pursue	✓
TR18: Have the impacts on other water users been considered?	No	–
TR19: Have impacts on the environment been considered?	No	–
TR20: Is there a triple bottom line assessment of options?	No	–

The water supply plan has a clear plan of action, as shown in Table 6.11. Lead times are considered in a general sense, with most actions requiring immediate implementation.

Table 6.11 – Planning outcomes for example water supply plan

Review Element	Comment	Suitability
TR21: Is there a plan of actions to achieve and maintain the desired level of service over the planning horizon?	Yes	✓
TR22: Is there consideration of lead times for actions?	Yes	✓

6.6 CONCLUSIONS

Queensland has a fragmented water supply institutional model that has historically relied upon local water supply management by a multitude of local councils. The Department of Natural Resources and Water

(DNRW), and more recently the Queensland Water Commission (QWC) have established a support framework to assist local councils in their water supply planning, and local councils have formed their own industry group known as the Queensland Water Directorate. This excellent overarching framework consists of comprehensive state guidelines for water supply planning and the ability to facilitate exchange of technical information between local councils. A dedicated group of technical specialists in the QWC has also been created to assist in water supply planning, but the Commission currently only operates in south east Queensland.

The QWC and local councils in south east Queensland have demonstrated their ability to adequately undertake long-term water supply planning. Similar water supply plans could largely not be found in other parts of the state, which indicates that despite the availability of comprehensive guidelines and example plans in south east Queensland, local councils have generally not undertaken sound urban water supply planning. This brings into question the ability of those relatively small local councils to recognise the need for formal planning and the ability to undertake that planning.

This indicates that greater regulation is needed to formally require local water utilities to complete their long-term water supply plans and/or responsibility for water supply planning needs to be vested in organisations with a greater number of technical specialists to carry out the work. There is a strong case for greater involvement of the QWC or the DNRW in the long-term water supply planning by local councils, as well as a need for better monitoring of progress towards the preparation of long-term water supply plans, similar to the monitoring that is undertaken in New South Wales (see Section 4 for details).

An examination of an example long-term water supply plan for Cairns, which most likely represents one of the better examples in Queensland, contained outstanding detail on demand management options, but did not adequately consider and investigate the full range of supply enhancement options. Notably there was no planning for climate change and all decisions were based on financial analysis alone without considering social and environmental costs and benefits.

7 South Australian Water Supply Planning

7.1 INTRODUCTION

The majority of South Australia's population is concentrated in Adelaide, however there are many smaller urban communities and important industrial water users in regional centres. South Australia's water supply is sourced from surface water in the Eastern Mount Lofty Ranges and along the River Murray, with a high reliance on groundwater in the arid regions elsewhere in the State. This section of the review discusses the South Australian approach to urban water supply planning. A summary of basic information about water supply utilities in South Australia is summarised in Table 7.1.

7.2 URBAN WATER SUPPLY MANAGEMENT IN SOUTH AUSTRALIA

Urban water supply in South Australia is managed in most areas by the South Australian Water Corporation (SA Water), which is a government owned water utility. SA Water contracts out its water supply operation and management in metropolitan Adelaide to a private company United Water, but this contract does not include planning activities, which are retained within the functions of SA Water. United Water does not operate and maintain water supply systems outside of Adelaide.

SA Water operates regional water supplies in eight areas, as shown in Figure 7.1. These are:

- Eyre Peninsula, which includes the industrial centre of Port Lincoln, which is currently supplied from the Tod River and groundwater, but is expected to be connected to the River Murray in 2007;
- Barossa Valley and Yorke Peninsula, which are supplied from the River Murray;
- Upper Spencer Gulf, which includes Whyalla, Port Pirie and Port Augusta. These towns are supplied from the River Murray;
- Far North and Upper Mid-North, which includes northern inland areas primarily supplied from local groundwater bores, springs and small dams. Reticulated supplies are provided at Crystal Brook, Moonta, Burra, Hawker, Quorn, Wilmington and other centres;
- Riverland, which includes Loxton, Barmera, Berri, Renmark, Waikerie, Murray Bridge and other smaller towns supplied directly from the River Murray;
- South East, which includes water supplied from the River Murray to areas such as Keith, and local water supplies to areas such as Mount Gambier and Robe;
- Kangaroo Island, which is supplied from a combination of local water supply catchments and desalination; and
- Clare Valley, a wine growing region which was recently connected to the River Murray.

Local councils assume responsibility for some isolated supply systems, most notably Coober Pedy and Roxby Downs. Both towns are important mining centres. Roxby Downs, which is home to a local uranium mine, is a township of around 4,000 people. Other smaller settlements supplied by local councils include Andamooka and Glendambo in the north of the state.

SA Water has a memorandum of understanding with the Department of Aboriginal Affairs and Reconciliation (DAARe) to ensure the efficient management and monitoring of water related infrastructure across 18 indigenous communities. Twelve of these communities depend on bore water, some with desalination facilities and often supplemented by rainwater tanks, while others are supplied via the River Murray or through Council systems (SA Water, 2005).

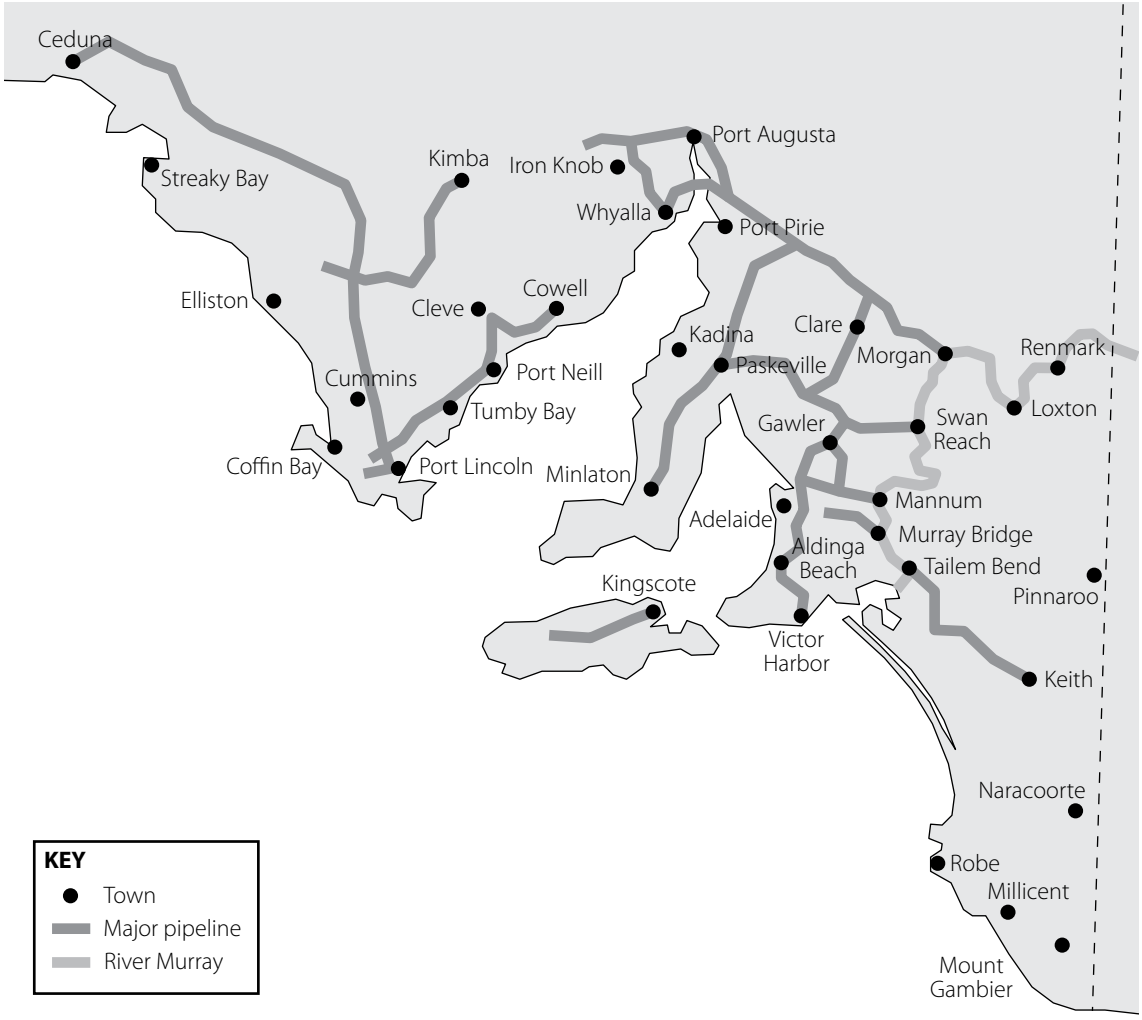

Figure 7.1 – Water supply systems managed by SA Water

Table 7.1 – Basic information about the utility (includes Adelaide)

Review Element	Comment
Number of non-metropolitan urban water supply utilities	1 bulk and retail supplier across most of the State (SA Water) plus 2 local councils
Approx. population served	1.4 million (approx. 400,000 outside of Adelaide)
Number of property connections	660,000[1]
Total volume supplied to customers (ML/yr)	260,000[1] (approx. 85,000 ML outside of Adelaide)
Number of staff	1,300
(1) SA Water (2005)	

7.3 URBAN WATER SUPPLY PLANNING

Urban water supply planning within South Australia is only required to take place within the context of water resource planning undertaken by State Government. Natural Resource Management (NRM) Boards have responsibility for water resource planning with broad policy direction provided by the State NRM Plan (Government of South Australia, 2006). NRM Boards are required to prepare an NRM Plan, which includes consideration of the future availability and use of water resources through preparation of a Catchment Water Management Plan and in prescribed areas, a Water Allocation Plan. This overall structure means that responsibility for water resource planning is vested in NRM Boards in the first instance and that water supply planning is only required from the water utilities when and if they receive

direction from the NRM Boards for input into NRM plans.

Urban water supply planning is predominantly undertaken by SA Water, which has many water supply engineers and access to broader knowledge through the Water Services Association of Australia. The skills and knowledge gained from water supply planning for Adelaide (Government of South Australia, 2005a) can be readily applied to areas outside of the metropolitan area. The two local councils that have responsibility for water supply outside of SA Water's area of operation have far fewer in-house engineers and planners and are exposed to possible inadequate planning if links are not made with SA Water or if there is a lack of water supply planning expertise within regional NRM boards to make relevant planning requests of those councils. This arrangement brings into question why local councils maintain water supply to two regional centres in South Australia long after these mining settlements have been established as permanent townships, rather than having them managed by SA Water.

Price setting by SA Water is reviewed by Cabinet (South Australian Government, 2005). The Essential Services Commission of South Australia inquires into the price setting processes undertaken in the preparation of advice to Cabinet, resulting in Cabinet making its decision on the level and structure of SA Water's water and wastewater prices in metropolitan and regional South Australia. The Essential Services Commission does not have a regulatory role in relation to the water industry. There does not appear to be a formal review of expenditure forecasts from a long-term infrastructure and demand planning point of view as part of this price setting exercise in the transparency statement issued by cabinet.

7.4 INSTITUTIONAL SUPPORT

There is no formal legislative or regulatory requirement for water utilities to prepare long-term water supply plans for their customers. This is partly addressed through the requirements of NRM Boards. Under the Natural Resource Management Regulations 2005, SA Water and all other persons who provide reticulated water supply are required to provide a range of information to the Minister to support NRM planning. This information includes infrastructure details, volume supplied, water losses and any such other information as the Minister thinks fit. This provides NRM Boards with the authority to direct SA Water and local councils to provide the information that the Boards need to incorporate water supply planning outputs into their NRM planning. This system of sourcing information from water utilities by NRM Boards relies upon the NRM Boards having the relevant expertise to ask appropriate questions of the water utilities. For smaller NRM Boards, it is unclear at the current time whether this arrangement will be effective, however the requirement for NRM Boards to communicate with neighbouring NRM Boards and to have their plans signed off by the Minister is an appropriate safeguard to promote consistent and adequate water supply planning inputs into NRM planning.

Water Allocation Plans are expected to provide more detail about how water is allocated now and into the future and would necessarily require some consideration of future water needs. The contents of the Water Allocation Plan for prescribed water resources, as specified in the Natural Resource Management Act 2004, contain the requirements for some of the fundamental elements of water supply planning, including consideration of environmental, social and economic water needs, intergenerational equity, efficiency and sustainability.

This approach of allocating entitlements from a resource to water users answers the question of how a given resource should be allocated to the various competing uses of that water. It does not however consider whether the provision of that water to a water utility represents the best decision for that utility, particularly where there are potentially multiple sources of water available or where there is the potential for investment in alternative water sources. It is unclear how the current framework weighs up, for example, how for a growing coastal town currently supplied by groundwater a decision would be made about whether to drill a second groundwater bore, construct a desalination plant or connect a pipeline to the River Murray. Unless directed by their individual NRM Board, it would appear that water utilities have no requirement to undertake such an analysis.

A summary of the regulatory drivers for water supply planning in South Australia is provided in

Table 7.2. NRM Plans and Water Allocation Plans are required to be updated every 5 years, which would suggest an adequate review period for an urban water supply input into these plans. The life of NRM Plans appears to be 10 years, however the need to consider intergenerational equity suggests that the planning horizon is likely to be longer than this to meet this objective.

Table 7.2 – Regulatory drivers for urban water supply planning in South Australia

Review Element	Comment	Suitability
IS1: Requirement to develop urban water supply plan?	No, but broader NRM planning is required	–
IS2: Planning horizon?	10-year minimum, but likely to be longer	–
IS3: Review period for updating urban water supply plan?	Not stated; directed by individual NRM Boards	–
IS4: Requirement to input into broader planning process?	Yes	✓

There are no guidelines provided to local councils or generated within SA Water about water supply planning, as illustrated in Table 7.3. SA Water is a statewide body and for this reason it has the advantage of being able to rely on skills and knowledge available throughout the organisation. Local councils must seek this support from SA Water. A Water Industry Alliance exists in South Australia, encompassing 185 local and international water companies and related organisations offering research and development, consultancy, engineering, technology, manufacturing, education, operations and commercial know-how required by global markets. The Water Industry Alliance could be a vehicle for reaching the few local councils that fall outside of SA Water's area of operation

NRM Boards can rely upon the State NRM Plan for broad direction on the information content required in their Water Allocation Plans and Regional NRM Plan.

Table 7.3 – Guidance for water supply planning in South Australia

Review Element	Comment	Suitability
IS5: State co-ordinator for urban water supply planning?	Yes, within SA Water but not for Local Councils	–
IS6: State guidelines for urban water supply planning?	No, although good historical plans exist as examples	–
IS7: Water industry body to share water planning knowledge?	Yes, within SA Water and the Water Industry Alliance	✓

South Australia appears to have all of the basic datasets available to complete urban water supply planning, but lacks datasets on some of the emerging issues in water supply planning. Population projections are available up to the year 2026 and climate change impacts on rainfall and evaporation are readily available. The extent to which supporting datasets are available in South Australia is presented in Table 7.4.

Change in runoff and groundwater levels due to climate change has not been tackled by the South Australian Government and neither have changes in land use. The South Australian Government has undertaken several studies on the hydrologic impacts of farm dams on runoff in the Mount Lofty Ranges and introduced this theme into NRM Plans. The effect of plantations on water availability in the south-east of South Australia has been designated as a water affecting activity in regional water plans, and further technical input to support this policy is due for completion by December 2008 (Government of South Australia, 2005b).

The size of the consumptive pool has been set for 34% of South Australia's 65 Surface Water Management Areas and 47% of South Australia's 59 Groundwater Management Units (Commonwealth of Australia, 2006). This indicates that water resource availability information is available for only some of the water resources that could be accessed by water utilities in South Australia in the future.

The South Australian Treasury has produced a set of guidelines for the financial evaluation of public sector projects (Department of Treasury and Finance, undated).

Table 7.4 – Supporting datasets for water supply planning in South Australia

Review Element	Comment	Suitability
IS8: Forecast period for State population projections?	ABS projections to 2026	✓
IS9: Climate change impacts available?		
a) For rainfall and evaporation	Yes	✓
b) For runoff	No	–
c) For groundwater	No	–
IS10: Statewide advice on land use change impacts on water supply?		
a) For logging	No	–
b) For bushfires	No	–
c) For plantations	Not available statewide, but South-East NRM Board has done significant work	–
IS11: Consumptive pool defined?	Incomplete	–
IS12: Financial analysis parameters available?	Yes	✓

The presence of rebates to support demand management initiatives is highlighted in Table 7.5. SA Water offers rebates for purchasing water-saving devices such as tap timers, water efficient shower heads and flow restrictors. The value of those rebates is $10 per item up to a total of $50 (or $20 per item up to $100 for concession card holders) (ACF, 2006). The South Australian Government has also introduced permanent water saving measures and regulations that require rainwater tanks to be included in the design of all new or substantially renovated homes south of and including Port Augusta.

Table 7.5 – Co-ordinated demand management rebates in South Australia

Review Element	Comment	Suitability
IS13: State government rebates for demand reduction initiatives?	Yes	✓

7.5 TECHNICAL RIGOUR

The Eyre Peninsula Water Supply Master Plan for 2003 was taken as an example Water Supply Master Plan for South Australia (Parsons Brinckerhoff, 2003). This document was reviewed to assess the extent to which water supply planning is being undertaken in the State. The elements of water supply planning presented in Section 3 were utilised for this assessment. It is curious that the requirement to develop this particular plan arose from the conditions specified by the Water Treatment and Economic Development Agreement between SA Water, the Minister for Government Enterprises and a private consortium known as Riverland Water (United Utilities, AMP Investments and Bechtel Enterprises). This requirement has therefore arisen from a public-private partnership and is considered to be a public expression of SA Water's unwritten, internal standards for water supply planning. There does not currently appear to be a similar written requirement for SA Water or local councils to contribute water supply plans to NRM Boards, however they are expected to be involved in the NRM planning process.

The planning horizon for this asset management plan is adequate for long term water supply planning being 25 years, as shown in Table 7.6.

Table 7.6 – Planning horizon for example water supply plan

Review Element	Comment	Suitability
TR1: Planning horizon?	25 years	✓

The report gives a comprehensive view of the current water supply system and its ability to meet

demands both now and into the future, as summarised in Table 7.7. Particular attention is paid to the issues of declining groundwater yield and poor water quality. As population is projected to decrease in the future, the key driver for system augmentation is supplying current levels of demand plus allowing for potential economic development.

Table 7.7 – Current information and do-nothing projections for example water supply plan

Review Element	Comment	Suitability
TR2: Stated level of service objective?	Not stated but implied to be 100% which is appropriate for systems supplied predominantly from groundwater	✓
TR3: Is level of service objective currently being met?	Yes, but supply is near capacity in summer months, and is impacted by water quality issues	✓
TR4: Is the current system yield stated?	Long term sustainable yield and 2001/02 allowable yield are reported for groundwater sources. Yield versus reliability is reported separately for surface water sources	✓
TR5: Is the growth in demand over the planning horizon stated?	Predicted for both high and low population projections, -0.5% to -2.5% between 99/00 and 2026	✓
TR6: Timeframe stated until level of service objectives are no longer met under do-nothing scenario?	Not specifically stated but inferred, for example. "supply is near capacity in summer months"	✓

The extent to which demand management and potable substitution are considered as options in the example plan is shown in Table 7.8. There is some discussion of distribution system losses lumped in with metering error in the example plan, however loss reduction is not considered as a water saving mechanism. Water reuse and recycling has been considered, and SA Water undertook further study following the initial Master Plan in 2001 taking account of effluent reuse and demand management opportunities. Desalination forms a key part of augmentation options investigated, along with the establishment of new borefields and the connection to existing pipelines. Water trading is not mentioned but is unlikely to be an option for this system.

Table 7.8 – Demand management and potable substitution for example water supply plan

Review Element	Comment	Suitability
TR7: Consideration of demand management?	Yes	✓
TR8: Knowledge of system losses?	Yes, metering error plus losses are calculated at between 21-29% over the last 4 years	✓
TR9: Is recycled water considered as a supply option?	Yes	✓
TR10: Is stormwater considered as a supply option?	Yes	✓
TR11: Is desalination considered as a supply option?	Yes	✓
TR12: Is water trading considered as a supply option?	Not applicable	✓

Management of uncertainty in the example plan is summarised in Table 7.9. Long-term yield and short-term allowable yield from aquifers is discussed in some detail, as yields have and are expected to continue to decline in future. Yield of the Tod River surface water supply is reported as a curve showing the percentage of time yield could not be met. Land use change in the form of tillage techniques, crop

types and native re-vegetation have been considered in terms of their impact on losses and runoff. The impact of climate change is discussed but not analysed.

Table 7.9 – Management of uncertainty for example water supply plan

Review Element	Comment	Suitability
TR13: Is yield stated as a probability distribution?	Single values for groundwater sources, but appropriate for this type of supply. Probability distribution for surface water	✓
TR14: Consideration of climate change?	Discussed but not evaluated, for example. "Specific climate change scenarios have not been run because of the uncertainty in prediction"	–
TR15: Consideration of land use change?	Yes	✓

The extent to which socio-environmental considerations are incorporated into the example plan in South Australia is summarised in Table 7.10. Stakeholder consultation (predominantly with councils) was undertaken at project outset, and again at draft stage. The draft was also issued for public comment and 19 responses were received.

The report considers the physical power supplies required for each option and the potential for using alternative energy sources. Energy consumption for each option in terms of greenhouse impacts is not stated, but the potential to use alternative energy sources is investigated. The cost of power supply and pumping is included in operational costs. A triple bottom line assessment has been undertaken, and the impact of options on other water users has been considered.

Table 7.10 – Socio-environmental considerations for example water supply plan

Review Element	Comment	Suitability
TR16: Energy consumption of options stated?	Not directly, but consideration has been given to alternative energy sources	✓
TR17: Evidence of community consultation?	Yes, but only at draft stage	✓
TR18: Have the impacts on other water users been considered?	Yes	✓
TR19: Have impacts on the environment been considered?	Yes	✓
TR20: Is there a triple bottom line assessment of options?	Yes	✓

The Water Supply Plan prepared for the Eyre Peninsula presents a proposed potable supply augmentation capacity with dates for various stages of implementation. This provides a clear plan of action arising from the planning undertaken, as summarised in Table 7.11.

Table 7.11 – Planning outcomes for example water supply plan

Review Element	Comment	Suitability
TR21: Is there a plan of actions to achieve and maintain the desired level of service over the planning horizon?	Yes, in Water Resource Strategy	✓
TR22: Is there consideration of lead times for actions?	Yes, in Water Resource Strategy	✓

7.6 CONCLUSIONS

South Australia has an excellent framework for managing the sustainability of all of its natural resources using a holistic approach. This approach ensures that a given water source is available for future generations and in the face of uncertainties such as climate change. The requirement for water utilities to input into this process and the nature of this input has not been formalised and currently relies upon individual Natural Resource Management Boards to have the expertise to know the type of information to request

from water utilities. A requirement for water utilities to prepare water supply plans and a specification of the broad contents of such plans would eliminate any potential failure for NRM Boards and water utilities to work together to achieve a desirable NRM outcome. In particular, the current framework does not guarantee that water utilities (principally SA Water) will think about the most appropriate way to maintain level of service to customers into the future from the full range of available supply enhancement and demand management options.

The current water supply management arrangements promote a high standard of water supply planning across most of South Australia by centralising technical expertise within SA Water. There is limited evidence of long-term water supply planning by the two local councils that still operate water supply systems at Roxby Downs and Coober Pedy and there would appear to be a case for integrating those operations into SA Water given that these mining settlements have been established as permanent townships. Technical quality within local councils currently relies upon the engineer(s) within those councils actively liaising with SA Water.

Where a water supply plan was prepared by SA Water for the Eyre Peninsula, the quality of the plan was high and included thoughtful consideration of the majority of the essential elements of water supply planning. This highlights the internal capability of SA Water to adequately plan the ongoing management of its water supply systems.

8 Tasmanian Water Supply Planning

8.1 INTRODUCTION

Tasmania has a combination of low population density and high, reliable rainfall. Outside of Hobart, there are some large towns such as Devonport and Launceston, however most other towns consume only very small volumes of water. Areas of the east and north coast of Tasmania in particular have experienced drought in the recent past. This section of the review discusses the Tasmanian approach to urban water supply planning.

8.2 URBAN WATER SUPPLY MANAGEMENT IN TASMANIA

Urban water supply in Tasmania is managed by three local government owned utilities that cover around one third of the State, with water supply management in the remaining area being conducted by individual local councils. These government-owned utilities are accountable to the participating councils that agreed to form each utility.

The three water utilities are:

- Hobart Water covering the Hobart City, Kingsborough, Derwent Valley, Southern Midlands, Sorell, Clarence, Glenorchy and Brighton Local Council Areas;
- Esk Water covering the Meandar Valley, West Tamar, George Town and Launceston Local Council Areas; and
- Cradle Coast Water covering the Circular Head, Waratah-Wynyard, Central Coast, Kentish, Devonport and Latrobe Local Council Areas.

There are a further 10 individual local councils not covered by these water utilities, as shown in Figure 8.1. Tasman Council does not supply water. Burnie is supplied by its own water supply system and is not part of the surrounding Cradle Coast Water supply area. A summary of basic information about water supply utilities in Tasmania is summarised in Table 8.1.

Table 8.1 – Basic information about the utilities

Review Element	Comment
Number of non-metropolitan urban water supply utilities	13 bulk suppliers. Retail services provided by 18 local councils for 3 of these bulk suppliers
Approx. population served	330,000 (excluding Hobart)
Number of property connections	unknown
Total volume supplied to customers (ML/yr)	unknown
Number of staff	unknown

8.3 URBAN WATER SUPPLY PLANNING

Water resource planning and management by the resource manager (Tasmanian Department of Primary Industries and Water (DPIW)) in Tasmania has a strong emphasis on the protection of ecological values and major irrigation and industrial developments, but relatively little focus on urban water supply planning.

The preparation of a Water Management Plan can be directed by the Minister under the Water Management Act 1999. Under Section 15 of the Act, the plan must "include an assessment of the capacity

of the relevant resource to meet the likely demands for water by existing and future users" and "take into account the needs of existing and future users and state the likely effect of the plan on those users". The Act also requires that the Secretary must consult with any council within the municipal area of which a relevant water resource is situated.

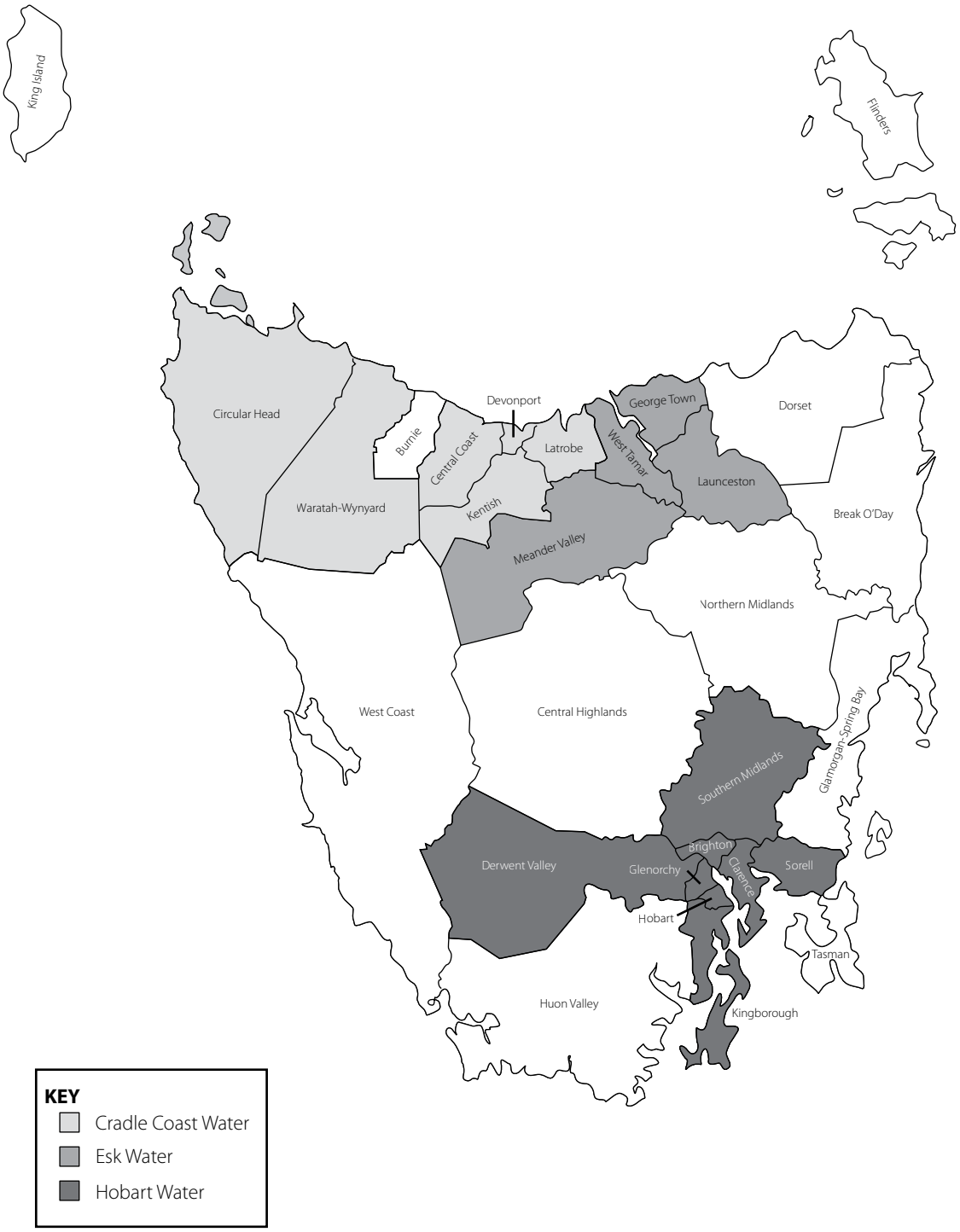

Figure 8.1 Water supply areas in Tasmania

Water Management Plans have been prepared to date for only five water sources. All of these plans are for areas with no or only small urban demands for water. There is no formal requirement for water utilities or councils to prepare water supply plans other than as part of the consultation process when DPIW is developing Water Management Plans for a region.

Broader water supply planning was undertaken in 2001 with the preparation of the Water Development Plan for Tasmania (DPIWE, 2001). The main focus of the report was the development of water sources for irrigation and industrial activities. The plan did consider statewide trends in water demand for urban water users and acknowledged that some water supply shortfalls occurred in 2000 (and have occurred since), however it was stated that all of Tasmania's urban water supply systems currently have spare capacity.

The Government Prices Oversight Commission (GPOC) has undertaken an annual review of cost recovery compliance for local government water businesses (for example. GPOC, 2006), but the emphasis in these reviews is on the method of calculating prices rather than the decision making process for selecting options for infrastructure augmentation or demand reduction, which is considered to be an internal council matter. The pricing regulator in Tasmania therefore does not have a role in regulating non-metropolitan urban water supply planning.

8.4 INSTITUTIONAL SUPPORT

The regulatory drivers for urban water supply planning in Tasmania are summarised in Table 8.2. There is no formal legislative or regulatory requirement for water utilities to prepare long-term water supply plans for their customers. Informally, water utilities are required to contribute to regional Water Management Plans prepared by DPIW. The focus of this review has therefore been on the role of urban water planning within the context of the development of Water Management Plans.

The approach within Water Management Plans of allocating individual water resources to users addresses the question of how a given resource should be allocated to the various competing uses of that water. Urban water supplies are given the highest surety of all users in this allocation process. This approach does not however consider whether the provision of water to a water utility represents the best decision for that utility, particularly where there are potentially multiple sources of water available or where there is the potential for investment in alternative water sources. It is unclear how a decision would be made within the current framework, for example, on whether a growing coastal town currently supplied by a dam should increase the dam capacity, construct a desalination plant or connect a pipeline to a neighbouring supply system. Unless specifically requested by DPIW, it would appear that water utilities have no requirement to undertake such an analysis.

The review period for updating existing Water Management Plans is outlined in the Tasmanian Government's Implementation Plan for the National Water Initiative (DPIW, 2006). Review periods for individual plans range from immediate review to review in 2015, but are on average around five years from initial publication. A planning horizon is not specified within the plans other than the broad requirement that the plan cater for existing and future uses.

Table 8.2 – Regulatory drivers for urban water supply planning in Tasmania

Review Element	Comment	Suitability
IS1: Requirement to develop urban water supply plan?	No	–
IS2: Planning horizon?	Not stated	–
IS3: Review period for updating urban water supply plan?	Timetable for review of Water Management Plans in DPIW (2006)	✓
IS4: Requirement to input into broader planning process?	Yes, via consultation of councils with DPIW	✓

The degree of guidance provided to local water utilities for water supply planning is summarised in Table 8.3. A set of Generic Principles for Water Management Planning were produced (DPIWE, 2005), however these principles do not provide any specific guidance to water utilities about how to undertake water supply planning. There is a Local Government Association of Tasmania and a Tasmanian Association of Municipal Supervisors, however there is no evidence of technical support or facilitation being provided by those associations to local councils in the area of water supply planning.

Table 8.3 – Guidance for urban water supply planning in Tasmania

Review Element	Comment	Suitability
IS5: State co-ordinator for urban water supply planning?	No	–
IS6: State guidelines for urban water supply planning?	No	–
IS7: Water industry body to share water planning knowledge?	No	–

Tasmania lacks some of the basic datasets required for urban water supply planning, as shown in Table 8.4. Population projections are only available up to the year 2021 for local government areas (Jackson, 2006), however the ABS does produce a population projection up to 2051 for Tasmania as a whole. Climate change impacts on rainfall and evaporation are readily available.

Change in runoff and groundwater levels due to climate change has not been tackled by the Tasmanian Government and neither have changes in land use. DPIW has recently commissioned some site specific studies to examine the effect of changes in land use on water resource availability and has an Implementation Plan for the National Water Initiative that proposes to address these issues (DPIW, 2006). The hydrologic effect of farm dams has been incorporated into the Water Management Plans produced to date.

The size of the consumptive pool has been set for 38 of Tasmania's 48 Surface Water Management Areas and all 17 Groundwater Management Units. This indicates that water resource availability information is available for most of the water resources that could be accessed by water utilities in Tasmania.

The Tasmanian Government has produced a website that provides details on the process that should be undertaken by agencies seeking government funding through the capital investment program. The "Budget Analysis" section provides some information on undertaking financial evaluation of projects (http://www.purchasing.tas.gov.au/buyingforgovernment/)

Table 8.4 – Supporting datasets for urban water supply planning in Tasmania

Review Element	Comment	Suitability
IS8: Forecast period for State population projections?	Local projections to 2021	–
IS9: Climate change impacts available?		
a) For rainfall and evaporation	Yes	✓
b) For runoff	No	–
c) For groundwater	No	–
IS10: Statewide advice on land use change impacts on water supply?		
a) For logging	No	–
b) For bushfires	No	–
c) For plantations	No	–
IS11: Consumptive pool defined?	Complete for groundwater, incomplete for surface water	–
IS12: Financial analysis parameters available?	Yes	✓

The Tasmanian State Government does not provide rebates for demand reduction initiatives in Tasmania, as shown in Table 8.5. Some local councils provide rebates for water efficient devices, however these are specific to each individual council.

Table 8.5 – Co-ordinated demand management rebates in Tasmania

Review Element	Comment	Suitability
IS13: State government rebates for demand reduction initiatives?	No	–

The Tasmanian State Government has established a Ministerial taskforce to review and reform water supply and sewerage arrangements in Tasmania. The taskforce released a discussion paper in December 2006 (Ministerial Water and Sewerage Taskforce, 2006) which stated that the ultimate objective of the

taskforce is "to establish the most appropriate structural arrangements for Tasmania, which will provide all Tasmanians with access to the most efficient and cost-effective water and sewerage solutions". A number of the issues highlighted in this review by ATSE warrant consideration by the taskforce.

8.5 TECHNICAL RIGOUR

No example urban water supply plans were available for review in Tasmania. One local council and one water utility were approached but were unable to provide a water supply plan. There is some evidence of water supply planning occurring on an ad-hoc basis in response to development applications and as a result of recent water restriction periods. Cradle Coast Water, for example, is undertaking an investigation to determine the long-term adequacy of the Cam River supply system and a number of water supply investigations are known to have occurred for a specific tourism development at Coles Bay on the east coast of Tasmania.

The Tasmanian Government called for tenders for a long-term water supply plan for the town of Bicheno in early 2007, indicating that an example plan is likely to be available in late 2007. The funding for the Bicheno plan was provided by the Commonwealth Government and according to DPIW is not part of a broader plan to undertake urban water supply planning more generally. Given that no plan could be located for this review, the following is based on the information that could be obtained from internet searches, discussions with individual water utility engineers and the five Water Management Plans that have been produced to date by DPIW. The Water Management Plans are however in areas with none or negligible urban water supply and hence it is difficult to ascertain the extent to which urban water supply planning would feature in other areas for which Water Management Plans have not yet been developed.

There is no evidence in any of the information gathered that there is a consistent and considered planning horizon for water supply planning, as summarised in Table 8.6. Water Management Plans have a requirement to consider future water uses and to be sustainable, however a specific timeframe is not associated with this.

Table 8.6 – Planning horizon for example water supply plan

Review Element	Comment	Suitability
TR1: Planning horizon?	None specified	–

Water Management Plans provide scant detail on the extent to which level of service objectives are being met for urban water use, as summarised in Table 8.7. A level of reliability is expressed in a relative sense by specifying sureties, which designate priorities for restricting water use during periods of low water availability, however a reliability of supply is not associated with individual users or user groups. There is no sense of projections in water demand and availability looking into the future in the Water Management Plans. Examination of the annual report of a water utility indicated that level of service objectives had been formulated by the utility.

There was no evidence of demand management and potable substitution considerations in urban water supply planning in Tasmania, as shown in Table 8.8, apart from isolated examples. The approach within Water Management Plans is to place limits on resource availability and as a consequence encourage individual users or user groups to reduce their water consumption through market mechanisms. General demand management was being supported at a local council level, but there was no evidence of demand reduction targets being set.

The Tasmanian State Government has indicated its support for water sensitive urban design in new developments (DPIWE, 2005), but not for existing customers. Knowledge of system losses is likely to be held within councils, but was not expressed in the annual report of a water utility that was reviewed. There was also no statement about the current level of reuse of recycled water from wastewater treatment plants.

Table 8.7 – Current information and do-nothing projections for example water supply plan

Review Element	Comment	Suitability
TR2: Stated level of service objective?	No, not expressed in water management plans	–
TR3: Is level of service objective currently being met?	Unknown	–
TR4: Is the current system yield stated?	No	–
TR5: Is the growth in demand over the planning horizon stated?	No, not expressed in water management plans	–
TR6: Timeframe stated until level of service objectives are no longer met under do-nothing scenario?	Not stated	–

Table 8.8 – Demand management and potable substitution for example water supply plan

Review Element	Comment	Suitability
TR7: Consideration of demand management?	No	–
TR8: Knowledge of system losses?	No	–
TR9: Is recycled water considered as a supply option?	No	–
TR10: Is stormwater considered as a supply option?	No	–
TR11: Is desalination considered as a supply option?	No	–
TR12: Is water trading considered as a supply option?	No	–

Uncertainty was not considered in any elements of urban water supply planning reviewed, as shown in Table 8.9. A discussion with a local council engineer indicated that climate change is not being considered in its water supply planning. There is no evidence of the incorporation of land use change into urban water supply planning.

Table 8.9 – Management of uncertainty for example water supply plan

Review Element	Comment	Suitability
TR13: Is yield stated as a probability distribution?	No	–
TR14: Consideration of climate change?	No	–
TR15: Consideration of land use change?	No	–

The extent to which socio-environmental considerations are taken into account in urban water supply planning is shown in Table 8.10. Stakeholder consultation (including consultation with councils) is undertaken by DPIW in the development of Water Management Plans. This consultation is fairly extensive and includes initial community workshops and a formal and transparent review process for addressing community comments on draft plans. Providing water for the environment is a primary focus of a Water Management Plan and appropriate analysis is undertaken on environmental water needs when developing the plan. The plan considers all water users. Water development options are not presented or considered in Water Management Plans and hence there is no option assessment per se. There was no evidence of option assessment by local councils in water supply planning.

Table 8.10 – Socio-environmental considerations for example water supply plan

Review Element	Comment	Suitability
TR16: Energy consumption of options stated?	No	–
TR17: Evidence of community consultation?	Yes	✓
TR18: Have the impacts on other water users been considered?	Yes	✓
TR19: Have impacts on the environment been considered?	Yes	✓
TR20: Is there a triple bottom line assessment of options?	No	–

Given the lack of available urban water supply plans in Tasmania, action plans were not available from local councils or DPIW, as shown in Table 8.11.

Table 8.11 – Planning outcomes for example water supply plan

Review Element	Comment	Suitability
TR21: Is there a plan of actions to achieve and maintain the desired level of service over the planning horizon?	No	–
TR22: Is there consideration of lead times for actions?	No	–

8.6 CONCLUSIONS

Tasmania has established a water planning framework that in principle requires consideration of the current and future water needs of urban water users. The current planning is approached from a resource management perspective only and not from the perspective of individual water utilities. As a result, it does not guarantee that water utilities will think about the most appropriate way to maintain level of service to customers into the future from the full range of available supply enhancement and demand management options.

DPIW is required to consult with local councils in the development of its Water Management Plans, which provides an informal process for local councils to input into regional water planning. The five Water Management Plans prepared by DPIW to date are in areas of no or negligible urban water use and hence it is not possible to review the adequacy of those plans for urban water supply systems in any detail.

Examination of information available from local councils and through discussions with some councils, it is evident that urban water supply planning in Tasmania is ad hoc and is generally only conducted as a short-term response to development applications as they arise. There is little formal evidence of any of the elements of water supply planning that one would expect to see. Notably, there was no evidence of the use of population forecasts, no evidence of future supply availability versus projected demands and no evidence of a long-term plan of action based on a triple bottom line assessment.

Consideration of the potential effects of climate change and land use change was also absent. Demand management was being promoted, but without any clear targets being set and without any clear incentive other than links to the National Water Initiative.

It is speculated that the reason for the absence of evidence of urban water supply planning in Tasmania is because councils are relatively small and because both water availability and reliability has traditionally been high. This is however contrary to recent water restrictions in some parts of Tasmania and signals a need for more co-ordinated and more rigorous urban water supply planning in this state. The lack of planning indicates that greater regulation is needed to formally require local water utilities to complete their long-term water supply plans and/or responsibility for water supply planning needs to be vested in organisations with a greater number of technical specialists to carry out the work.

When viewed in the light of institutional models adopted for water supply planning in other states, the Tasmanian Government has inherited a localised water service delivery model, similar to that in New South Wales and Queensland, with partial reform into a regional water delivery model, similar to that in Victoria, but without the presence of larger entities to regulate and facilitate technical exchange of information for urban water supply planning. This is in contrast to states with low population densities similar to Tasmania, namely the Northern Territory, Western Australia and South Australia, which have a single or very few urban water utilities that appear to better achieve water supply planning outcomes.

The Tasmanian State Government has established a Ministerial taskforce to review and reform water supply and sewerage arrangements in Tasmania. A number of the issues highlighted in this review by ATSE warrant consideration by the taskforce.

9 Victorian Water Supply Planning

9.1 INTRODUCTION

Victoria has a number of reasonably large regional centres throughout the State including Geelong, Ballarat, Bendigo and the Latrobe Valley. There are significant contrasts in water demand and supply availability in different parts of the state, and water supply systems have evolved to suit each particular region. Most of the state has experienced an extreme prolonged drought over the last ten years. This section of the review discusses the approach in Victoria to urban water supply planning.

9.2 URBAN WATER SUPPLY MANAGEMENT IN VICTORIA

Urban water supply in Victoria is managed by a number of government owned water utilities that operate in particular geographic regions. This review excludes the water suppliers in the Melbourne metropolitan area, which include the bulk water supplier Melbourne Water and the three retail companies of City West Water, South East Water and Yarra Valley Water. In areas outside of Melbourne there are 12 regional urban water utilities, namely Barwon Water, Central Highlands Water, Coliban Water, East Gippsland Water, Goulburn Valley Water, Grampians Wimmera Mallee Water, Lower Murray Water, North-East Water, South Gippsland Water, Wannon Water, Western Water and Westernport Water. The geographic location of these water utilities is shown in Figure 9.1.

These utilities have a combination of urban and rural customers, ranging from opportunistic tappings from supply headworks (for example in parts of Gippsland) to large-scale irrigation district customers such as those served by Lower Murray Water, Coliban Water and Grampians Wimmera Mallee Water. Most of these water utilities operate their own headworks and hence have the role of both bulk water supply operator and service provider to customers. Basic information about these utilities is presented in Table 9.1.

Table 9.1 – Basic information about Victoria's non-metropolitan urban water utilities

Review Element	Comment
Number of non-metropolitan urban water supply utilities	12 bulk and retail suppliers
Approx. population served	1.5 million
Number of property connections	1.19 million[2]
Total volume supplied to customers (ML/yr)	410,500[1]
Number of staff	1,700[2]

(1) DSE (2006), excludes Melbourne and is for 2004/05 year only

(2) Victorian Water Industry Association (2004)

9.3 URBAN WATER SUPPLY PLANNING

The Victorian State Government's White Paper on Water (DSE, 2004) sets out the State's urban water planning framework, which consists of two tiers. In the first instance, urban water utilities are required to prepare a Water Supply Demand Strategy, which is a 50-year water supply plan for the utility. This information then feeds into one of five Region Sustainable Water Strategies, which consider broader water supply planning issues, including competing needs for water between urban water utilities, other consumptive users and the environment. The Water Supply Demand Strategy is also linked directly

with expenditure forecasts and price setting provided to the pricing regulator, the Essential Services Commission. A diagram of the urban water supply planning interface in Victoria is shown in Figure 9.2.

Figure 9.1 – Water supply utility boundaries in Victoria (Victorian Water Industry Association, 2006)

The Victorian Guidelines for preparing urban Water Supply Demand Strategies require a draft plan to be provided to the Minister by the end of November 2006 and a final plan by February 2007. Indications from the State Co-ordinator are that all water utilities have commenced their plans and that most plans are expected to be provided to the State Government by the required dates. A handful of plans have already been completed and the remainder are substantially complete.

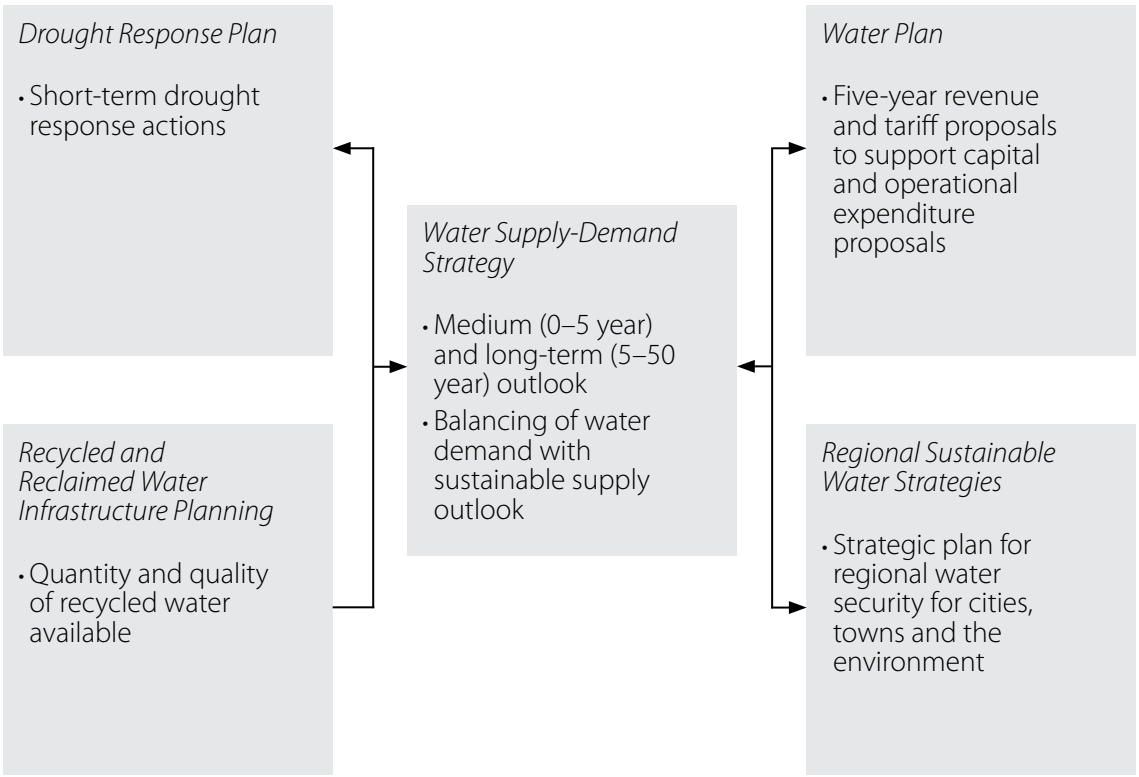

Figure 9.2 – Water supply planning framework in Victoria

9.4 INSTITUTIONAL SUPPORT

The drivers for urban water supply planning in Victoria are provided through the policy document "Securing Our Water Future Together" produced by the Department of Sustainability and Environment (DSE, 2004). This document provides a policy framework for urban water supply planning that includes four basic elements of achieving a long term sustainable balance within a risk management setting, managing demand, considering alternative supplies and better managing current water supply infrastructure (see Figure 9.3).

Balancing Water Supply and Demand

To achieve sustainable urban water management, our demand for water in our cities and towns will be balanced with the available supply. The balance between water supply and demand will be achieved taking into consideration:

- a long-term outlook;
- the total water cycle;
- social, environmental and economic costs and benefits; and
- risks, such as climate change.

Reducing Water Demand

The priority action for sustainable urban water management is to use our traditional water supplies more wisely, reducing demand for drinking water (for uses other than drinking).

This will be achieved by a range of measures, including education and awareness, pricing, regulation, rebates and water sensitive urban development.

Recycling and Using Alternative Supplies

Urban water supplies can be drawn from all available water resources including recycled water, rainwater and stormwater. We will use water that is fit-for-purpose – many uses of water do not require treatment to a drinking-water standard. We will use recycled water and alternative water supplies for non-drinking water uses where there is a net benefit to the urban community and to minimise detrimental discharges to the environment.

Securing Our Urban Water Supplies

Our urban supplies will be secured by using our existing water supply infrastructure more effectively and by developing new innovative approaches.

Figure 9.3 – Policy framework for sustainable urban water management

A summary of the regulatory drivers for urban water supply planning in Victoria is provided in Table 9.2. The Water Supply Demand Strategies have a planning horizon of 50 years, which could be considered as too long given the high degree of uncertainty in information beyond a couple of decades, however there is also a focus on providing specific short to medium term actions (up to 5 years) to align with price setting by the Essential Services Commission. The Water Supply Demand Strategies are designed to feed into the Region Sustainable Water Strategies that consider water planning for all users.

Table 9.2 – Regulatory drivers for urban water supply planning in Victoria

Review Element	Comment	Suitability
IS1: Requirement to develop urban water supply plan?	Yes	✓
IS2: Planning horizon?	50 years	✓
IS3: Review period for updating urban water supply plan?	Every 5 years	✓
IS4: Requirement to input into broader planning process?	Yes	✓

Victoria has a good support framework set up for the urban water utilities to undertake their long-term water supply planning, as demonstrated in Table 9.3. The Department of Sustainability and Environment (DSE 2005) prepared a set of guidelines to assist water utilities in preparing their water supply plans. The guidelines specify minimum criteria that the water utilities must adhere to, provide information on available datasets and methodologies, and seek to standardise outputs so that water utility proposals would be comparable at a regional level. A self-audit checklist is also provided within the guidelines for water utilities to assess their own plans prior to submission to DSE.

DSE has a designated State co-ordinator within its institutional and regulation section. This State co-ordinator has held workshops with the utilities and provided updates to the guidelines as more information has become available. This allowed DSE, for example, to specify the format and assessment criteria of triple bottom line assessments arising from the Central Region Sustainable Water Strategy, which occurred after the initial water supply planning guidelines were issued.

The water utilities also have industry support through the Victorian Water Industry Association, also known as VicWater. VicWater has convened a number of technical working groups to address issues relevant to water supply management and planning, such as the likely water saving effect of the introduction of permanent water saving measures. This process then provides guidance to all water utilities in Victoria and obviates the need for those utilities to undertake their own research.

Table 9.3 – Guidance for water supply planning in Victoria

Review Element	Comment	Suitability
IS5: State co-ordinator for urban water supply planning?	Yes, designated co-ordinator in DSE	✓
IS6: State guidelines for urban water supply planning?	Yes, DSE (2005)	✓
IS7: Water industry body to share water planning knowledge?	Yes, Victorian Water Industry Association	✓

Victoria has most of the required datasets for water supply planning, as shown in Table 9.4. The demographic unit within DSE provides Victoria In Future population projections for statistical local areas up to 2031 and for regional Victoria as a whole up to 2051. Changes in household numbers are also available for each Statistical Local Area up to 2031.

DSE commissioned CSIRO to summarise changes in temperature, rainfall and evaporation for each of Victoria's river basins. It subsequently provided advice on the change in runoff in each river basin and released a spreadsheet tool that enables water utilities to readily calculate climate change impacts on these variables (Jones and Durack, 2005). There is currently no information on changes in recharge to groundwater and subsequent changes in groundwater yield and baseflow discharge that may arise as a result of climate change.

Change in land use is considered in the State guidelines and general advice is available on the impact of change in vegetation cover, whether it is from logging, bushfires or change in land use. The effect of each of these changes in vegetation cover is not available as a volumetric impact specific to each river basin and is only available from some site specific studies. Changes in water availability to other users arising from plantations is potentially the largest unquantified impact on water availability in Victoria. Investigations on this issue are planned under Victoria's Implementation Plan for the National Water Initiative (Victorian Government, 2006). The hydrologic effect of farm dams on runoff has been assessed across the whole of Victoria.

The size of the consumptive pool has been set for all 29 surface water management areas in Victoria. The size of the consumptive pool has been set for 62 of the State's 65 groundwater management units (Commonwealth of Australia, 2006). This indicates that water resource availability information is available for most of the water resources that could be accessed by water utilities in Victoria.

The Victorian Department of Treasury and Finance provides guidelines on financial analysis which have been distilled for water utilities in the DSE guidelines for water supply planning (DSE, 2005).

Table 9.4 – Supporting datasets for water supply planning in Victoria

Review Element	Comment	Suitability
IS8: Forecast period for State population projections?	Victoria In Future projections to 2051	✓
IS9: Climate change impacts available?		
a) For rainfall and evaporation	Yes	✓
b) For runoff	Yes	✓
c) For groundwater	No	–
IS10: Statewide advice on land use change impacts on water supply?		
a) For logging	General advice only	–
b) For bushfires	General advice only	–
c) For plantations	General advice only	–
IS11: Consumptive pool defined?	Complete for surface water.	
	Incomplete for groundwater.	–
IS12: Financial analysis parameters available?	Yes	✓

Co-ordinated rebates for demand management initiatives are available in Victoria, as shown in Table 9.5. The Victorian Government has established a Water Smart Gardens and Homes Rebate Scheme which provides rebates on rainwater tanks, grey water systems, dual flush toilets, shower roses, and home audits (ACF, 2006). The program has $10m funding over four years.

Table 9.5 – Co-ordinated demand management rebates in Victoria

Review Element	Comment	Suitability
IS13: State government rebates for demand reduction initiatives?	Yes	✓

9.5 TECHNICAL RIGOUR

9.5.1 Water supply plan

Coliban Water's Water Supply Demand Strategy was taken as an example of an urban water utility Water Supply Plan for Victoria (Coliban Water, 2006). This document was reviewed to assess whether evidence was available that water supply planning is being undertaken in non-metropolitan areas in Victoria. The elements of water supply planning presented in Section 3 were utilised for this assessment. Coliban Water supplies Greater Bendigo and surrounding areas, which have a total population of around 130,000 people.

The planning horizon for this water supply plan is adequate for long term water supply planning being 50 years, as illustrated in Table 9.6.

Table 9.6 – Planning horizon for example water supply plan

Review Element	Comment	Suitability
TR1: Planning horizon?	50 years	✓

The report provides a clear picture of current reliability and yield, and graphically depicts how water availability and demand would be expected to change over the next 50 years, as shown in Table 9.7.

The extent to which demand management and potable substitution have been considered in the plan is shown in Table 9.8. Supply system losses have been quantified for both urban and rural water users, which is a sound basis for considering demand reduction initiatives. Coliban Water released an options paper as part of its community consultation, which included consideration of four primary options to improve its demand and supply balance. These were to save water in the urban supply system through demand management, to save water in the rural water supply system by reducing losses and wastage, to reuse recycled water and to obtain additional water from existing or new water sources. Each

of these measures is discussed in detail in the water supply plan. A variety of supplementary options were also considered and briefly discussed, including stormwater and cloud seeding. Desalination is not specifically considered because the Coliban Water supply system is remote from the sea, which is considered appropriate, although the potential for desalination of saline groundwater was not stated. Coliban Water considered water trading, in particular an option to allow rural water users in the Coliban system to trade water externally, which would potentially assist in the channel reconfiguration process and reduction in system losses.

Table 9.7 – Current information and do-nothing projections for example water supply plan

Review Element	Comment	Suitability
TR2: Stated level of service objective?	Yes, 95% monthly reliability	✓
TR3: Is level of service objective currently being met?	Yes	✓
TR4: Is the current system yield stated?	Yes, 39 GL/yr	✓
TR5: Is the growth in demand over the planning horizon stated?	Yes, 45% increase over 50 years under do-nothing scenario	✓
TR6: Timeframe stated until level of service objectives are no longer met under do-nothing scenario?	Yes, by around 2008	✓

The example plan includes consideration of uncertainty due to the effects of climate change and presents both supply and demand curves as a band rather than a single line. Yield analysis is undertaken based on a single historical sequence rather than by using stochastic data generation to quantify uncertainty in yield. The effect of land use change on supply availability is not considered. Consideration of uncertainty in the plan is summarised in Table 9.9.

Table 9.8 – Demand management and potable substitution for example water supply plan

Review Element	Comment	Suitability
TR7: Consideration of demand management?	Yes	✓
TR8: Knowledge of system losses?	Yes. Rural and urban losses separately accounted for	✓
TR9: Is recycled water considered as a supply option?	Yes	✓
TR10: Is stormwater considered as a supply option?	Yes	✓
TR11: Is desalination considered as a supply option?	Not applicable	✓
TR12: Is water trading considered as a supply option?	Yes	✓

Table 9.9 – Management of uncertainty for example water supply plan

Review Element	Comment	Suitability
TR13: Is yield stated as a probability distribution?	No	–
TR14: Consideration of climate change?	Yes	✓
TR15: Consideration of land use change?	No	–

The extent to which social and economic aspects of water supply planning were considered is illustrated in Table 9.10. Stakeholder consultation was undertaken throughout the development of the plan, including the preparation of an initial community workshop, an options paper provided for community comment, a follow up workshop and on-going consultation with various advisory groups. A formal triple bottom line assessment does not appear in the public plan, however there is discussion of potential community concerns associated with transferring water from rural to urban water use.

The report presents a series of actions that are required to maintain supply over the coming decades,

however the way in which those actions have been selected is not transparent in the document, particularly when considering which options are to be implemented first. The document tends to present simply whether an option is considered feasible or not. There is relatively little consideration of environmental impacts because most options appear to be underdeveloped in terms of their technical assessment.

Table 9.10 – Socio-environmental considerations for example water supply plan

Review Element	Comment	Suitability
TR16: Energy consumption of options stated?	No	–
TR17: Evidence of community consultation?	Yes	✓
TR18: Have the impacts on other water users been considered?	Yes	✓
TR19: Have impacts on the environment been considered?	No	–
TR20: Is there a triple bottom line assessment of options?	No	–

The extent to which planning outcomes are considered in the plan is shown in Table 9.11. The Water Supply Demand Strategy prepared by Coliban Water presents a range of options for implementation over the next fifty years. Lead times are not specifically expressed, however there is suggestion in the long-term supply and demand curves that the timing of actions has been considered. Short-term actions have clear target dates.

Table 9.11 – Planning outcomes for example water supply plan

Review Element	Comment	Suitability
TR21: Is there a plan of actions to achieve and maintain the desired level of service over the planning horizon?	Yes	✓
TR22: Is there consideration of lead times for actions?	Yes	✓

9.6 CONCLUSIONS

Victoria has established a very good example of an integrated urban water supply planning framework. This framework provides guidance and support to water utilities throughout the planning process, sets appropriate regulatory parameters within which to prepare the plans and promotes participation of water utilities in regional water supply planning with outputs being produced on a comparable basis. The establishment of this framework has meant that all urban water utilities are expected to have 50 year water supply plans completed by early 2007. Some of these plans have already been completed and most are substantially complete.

The only areas for improvement are in the availability of supporting datasets on the effect climate change on groundwater yield and the effect of land use change on both surface water and groundwater yield.

The water supply plan prepared by Coliban Water that was reviewed for this study was of a high standard. The do-nothing scenario provides a clear picture of the need to take action to address potential future shortfalls in supply. The main shortcoming of the plan was the absence of a triple bottom line assessment of proposed options to justify the implementation plan. For example, the impact of individual scenarios on streamflows for the environment and the greenhouse gas implications of each option are not presented. This is believed to be because many of the options are in their infancy, however it would still be expected that a cursory triple bottom line assessment could be made of each option. State guidelines require a triple bottom line assessment and calculation of greenhouse gas emissions to be calculated. If a triple bottom line assessment has been undertaken, then it is not mentioned in the report that this is the case.

10 Western Australian Water Supply Planning

10.1 INTRODUCTION

The majority of Western Australia's population is concentrated in Perth, however there are many smaller urban communities and important industrial water users outside of Perth. Surface water has traditionally been used in the south-west of the State, however supply has diversified with the drying of climate conditions in that region over the last few decades. There is a high reliance on groundwater, particularly in the arid regions elsewhere in the State. Western Australia was also the first state in Australia to introduce large-scale desalination as a source of urban water supply. This section of the review discusses the West Australian approach to urban water supply planning.

10.2 URBAN WATER SUPPLY MANAGEMENT IN WESTERN AUSTRALIA

Urban water supply in Western Australia is managed in most areas by the Water Corporation, which is a government owned water utility. Water Corporation provides over 90% of the State's water supply outside of Perth. In the south-west of the State, Aqwest (Bunbury Water Board) provides water services to the city of Bunbury, whilst the Busselton Water Board provides water services to the town of Busselton.

Water Corporation operates a total of 114 dams and weirs, 725 bores and 103 borefields (Water Corporation, 2006) and provides water supply for 300 cities and towns in seven regions, as shown in Figure 10 1. These are:

- North-west region, which includes Broome;
- Mid-west region, which includes Geraldton;
- Goldfields region, which includes Kalgoorlie;
- Agricultural region, which includes the wheat belt;
- Great southern region, which includes Albany;
- South west region (excluding Bunbury and Busselton); and
- Perth region.

The majority of the State's population and water supply infrastructure is concentrated in the south-west of the State and in the goldfields. These areas are largely supplied by the Integrated Water Supply Scheme, which links surface water, groundwater and desalinated seawater supplies across the south-west of the State.

Local councils across the State assume responsibility for some non-potable water supply, wastewater and drainage services, but not potable water supply services. Hammersley Iron has a licence to provide potable water supply in the Dampier, Paraburdoo and Tom Price town sites, and the Rottnest Island Authority has a licence to provide potable water supply on Rottnest Island.

10.3 URBAN WATER SUPPLY PLANNING

Long-term water supply planning has been driven by necessity in Perth, where water availability has reduced significantly in recent decades. Water Corporation has a "Security through Diversity" policy for integrated water resource management and planning which has led to the development of the Integrated Water Supply Scheme Source Development Plan (Water Corporation, 2005). The skills and knowledge of water supply planners for the Integrated Water Supply Scheme can readily be transferred to other parts

of the state managed by the Water Corporation. The Integrated Water Supply Scheme also covers areas outside of Perth, such as Kalgoorlie.

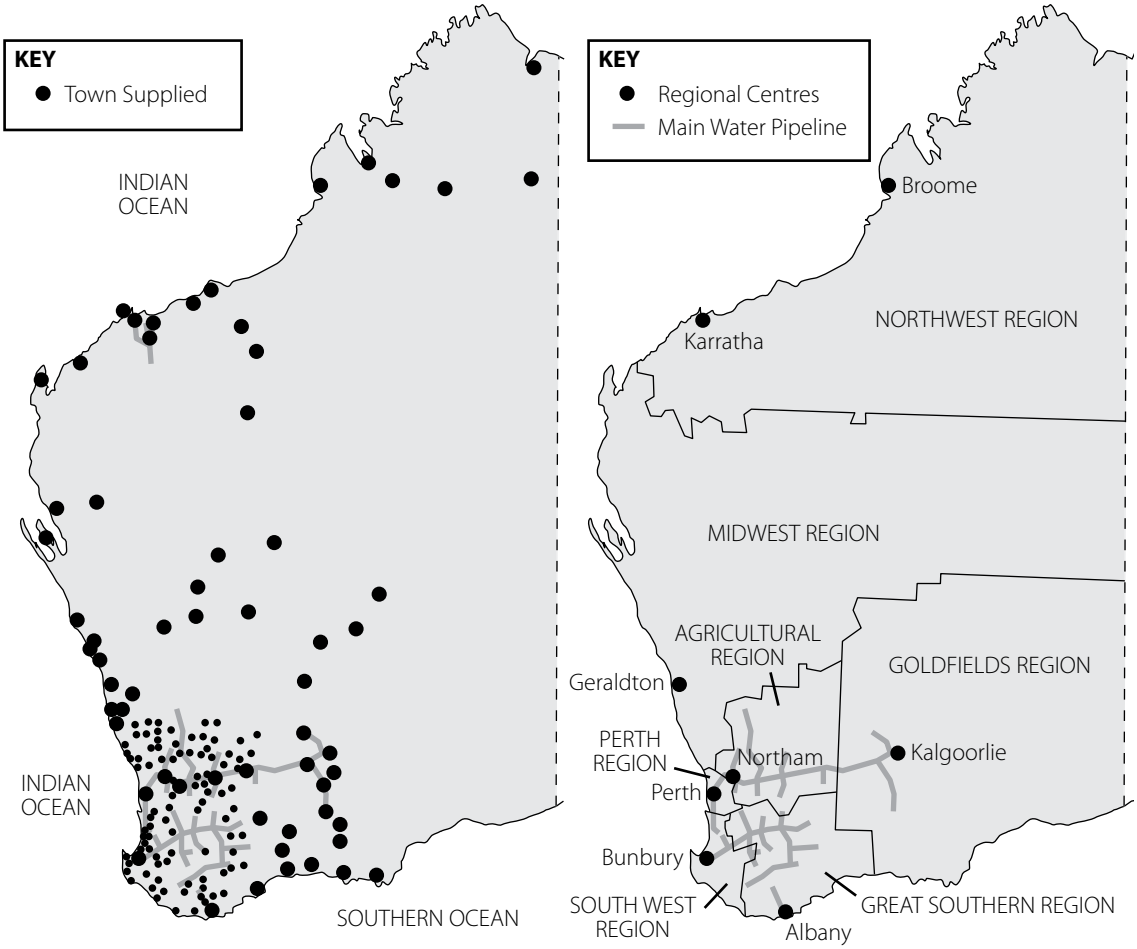

Figure 10.1 – Water supply systems and regions managed by Water Corporation (adapted from Water Corporation (2006a, 2006b))

Table 10.1 – Basic information about the utility (excludes Perth)

Review Element	Comment
Number of non-metropolitan urban water supply utilities	1 main bulk and retail supplier (Water Corporation) plus 4 regional bulk and retail suppliers
Approx. population served	675,000
Number of property connections	214,000[(1)]
Total volume supplied to customers (ML/yr)	130,000[(1)]
Number of staff	2,300[(1)(2)]

(1) Sourced from annual reports (2) Includes staff servicing Perth

According to the State Water Plan, the water utilities "have accountability for source development planning" (DPC, 2006). However the formal mechanism for that accountability is unclear. There is evidence of long-term water supply planning taking place outside of the Integrated Water Supply Scheme area. In submissions to the Economic Regulatory Authority in 2003, both the Busselton Water Board (BWB) and Aqwest demonstrated that they have been undertaking long-term water supply planning as part of their business operations (BWB, 2004 & AqWest, 2004). Both the Busselton Water Board and Aqwest have allocations in excess of their usage. Busselton Water Board has an allocation of 18 GL/yr and a current usage of 4 GL/yr (BWB, 2004), whilst Aqwest has a current allocation of 9 GL/yr and a current use of 7 GL/yr (AqWest, 2004).

Water Corporation was unable to provide source development plans for other schemes around the State, because these are considered internal documents in development and therefore not for the public domain. A formal plan is currently being developed for the Bridgetown scheme and planning for other schemes takes place to varying degrees. The prioritisation process for determining which schemes should have long-term plans developed for them at any given time is an internal process that takes place under the Water Corporation's Statewide Planning Program, which brings together regional officers and head office planners to consider growth in demand for water and the risk of inadequate planning for individual schemes.

Broader water resource management planning occurs through the Department of Water, which has a requirement to develop water management plans under the Rights in Water and Irrigation Act 1914. There is no specific requirement under the Act for urban water supply planning to be input into this process.

A Western Australian water services legislation reform program is currently underway and provides an opportunity to review the mechanisms by which urban water supply planning is promoted in Western Australia. The program is examining whether water service licences issued under the Water Services Licensing Act 1995 should have planning requirements, amongst other issues.

10.4 INSTITUTIONAL SUPPORT

As discussed above, there is no formal legislative or regulatory requirement for water utilities to prepare long-term water supply plans for their customers. Under the Water Corporation Act 1995, the Water Corporation is required to prepare a Strategic Development Plan, however such plans only have a forecast period of 5 years and focus on business activities rather than water supply and demand balances. There is no specific requirement under the matters to be included in the Strategic Development Plan to consider long-term demands and water resource availability and the plan is not a publicly available document.

The Economic Regulation Authority (ERA) appears to provide the only clear requirements for water utilities to undertake long-term water supply planning in Western Australia. As part of its inquiry on urban water and wastewater pricing, it released a methodology paper which contained a water pricing framework (ERA, 2004). This was developed "as a guide for service providers when preparing their pricing submissions". In this framework, water utilities were asked:

- whether the utility's strategy to balance supply and demand over the next twenty to thirty years was appropriate?;
- whether demand projections are robust?;
- whether security buffers are justified?;
- whether source development timetables are justified?;
- how management of leakage and losses have been incorporated?; and
- how demand management options have been incorporated?

The ERA's objective in undertaking this review of water utilities was to ensure that price setting is appropriate and that any price increases are justified by appropriate technical planning. The ERA also endeavoured to ensure that long-run marginal costs are calculated over an appropriate time frame. The phrasing of questions by the ERA suggests that it takes a flexible approach to some of the technical aspects of urban water supply planning because it is primarily interested in information relevant to price submissions. The ERA has far reaching powers under the Economic Regulation Authority Act 2003 to request information for its inquiries, which could include a requirement for water utilities to prepare a report on its water pricing submissions, for example. The ERA does not have any ongoing mandate to monitor urban water supply planning and can only undertake individual inquiries under instruction from the State Treasurer.

Guidelines were produced for urban water utilities in preparing their price submissions to the Economic Regulation Authority. Those guidelines were largely non-technical in nature from a water supply planning point of view, however they did include some important key parameters within which

water utilities were to work, as subsequently discussed. Water Corporation is a statewide body and for this reason it has the advantage of being able to rely on skills and knowledge available throughout the organisation. Water Corporation has demonstrated with its Source Development Plan for the Integrated Water Supply Scheme that it has the capability to prepare an appropriate long-term water supply plan for its supply systems and external guidance is not critical for the successful completion of future plans for areas outside of Perth. Indications are that the two water boards have access to expertise within Water Corporation and have relied upon external consultants to assist in water supply planning to compensate for the absence of a water industry association in Western Australia.

Table 10.2 – Regulatory drivers for urban water supply planning in Western Australia

Review Element	Comment	Suitability
IS1: Requirement to develop urban water supply plan?	Yes, as part of pricing submission	✓
IS2: Planning horizon?	20-30 years	✓
IS3: Review period for updating urban water supply plan?	Not specified	–
IS4: Requirement to input into broader planning process?	No	–

Table 10.3 – Guidance for water supply planning in Western Australia

Review Element	Comment	Suitability
IS5: State co-ordinator for urban water supply planning?	ERA plays this role and internal co-ordinator within Water Corporation	✓
IS6: State guidelines for urban water supply planning?	Yes, but largely non-technical in nature	✓
IS7: Water industry body to share water planning knowledge?	Yes, within Water Corporation	✓

The extent to which supporting datasets are available for water supply planning in Western Australia is summarised in Table 10.4. The Western Australian Planning Commission (2005) produced population forecasts from 2004 to 2034 for nine planning regions outside of Perth. These are supplemented by local government areas population forecasts for all local government areas from 2004 to 2021. The local government area projections are based on fairly small geographic areas and would generally be suitable for urban water supply planning. Whilst they have been forecast for a period just under 20 years, the existence of the planning region forecasts would readily enable the extrapolation of local government area projections up to 2034.

Climate change impacts on rainfall and evaporation are readily available and are being used in the south-west of Western Australia. Change in runoff and groundwater levels due to climate change has not been tackled by the Western Australian Government, although the problem is acknowledged in the State Water Strategy (Government of Western Australia, 2003) and there is significant investment in climate change research and planning proposed by the State Government in its strategy. A number of studies have been undertaken in the south-west of Western Australia looking at the effect of changes in land use on runoff and groundwater recharge, such as innovative work on the effect of increasing land salinisation on runoff rates (Bowman and Ruprecht, 2000) and the effect of changes in vegetation cover on groundwater recharge (Bekele et al. 2006). Information on the hydrologic effect of farm dams on runoff is not available in the south-west. The effect of land use change on runoff and groundwater recharge has not been undertaken across all of Western Australia.

The size of the consumptive pool has not been set for surface water resources in Western Australia because usage is generally low compared to sustainable yield, as determined by the West Australian Government. Sustainable yields have been assessed for all Surface Water Management Areas and would enable the size of the consumptive pool to be set at an appropriate time in the future and provide an indication to water utilities of likely available volumes. Of the 46 Groundwater Management Units in Western Australia, only two do not have a consumptive pool defined (Commonwealth of Australia, 2006). This indicates that water utilities in Western Australia have reasonable guidance about the available resource for new supply options, but that there will be some uncertainty in parts of the state.

The Western Australian Treasury has produced a set of guidelines for the financial evaluation of public sector projects (WA Department of Treasury and Finance, 2005).

Table 10.4 – Supporting datasets for water supply planning in Western Australia

Review Element	Comment	Suitability
IS8: Forecast period for State population projections?	WA Planning Commission projections to 2034	✓
IS9: Climate change impacts available?		
a) For rainfall and evaporation	Yes	✓
b) For runoff	For parts of the south-west of WA only	–
c) For groundwater	No	–
IS10: Statewide advice on land use change impacts on water supply?		
a) For logging	No	–
b) For bushfires	No	–
c) For plantations	No	–
IS11: Consumptive pool defined?	Incomplete	–
IS12: Financial analysis parameters available?	Yes	✓

Co-ordinated rebates for demand management initiatives are available in Western Australia, as shown in Table 10.5. The Western Australian Government offers rebates under its Waterwise Rebate Program for purchasing water-saving devices such as swimming pool covers, water efficient shower heads and washing machines. Water Corporation also supports many other demand management initiatives, such as industry training, education and awareness, and research into new water saving technologies.

Table 10.5 – Co-ordinated demand management rebates in Western Australia

Review Element	Comment	Suitability
IS13: State government rebates for demand reduction initiatives?	Yes	✓

10.5 TECHNICAL RIGOUR

An example long-term water supply plan was available for the Integrated Water Supply Scheme, however given that the focus of this review is on areas outside of capital cities, attempts were made to obtain similar water supply plans for other towns within the state. Water Corporation indicated that a number of plans are in development, such as a Source Development Plan for Bridgewater, however all planning undertaken to date outside of the Integrated Water Supply Scheme is conducted internally and plans are not publicly available. Example plans may be available in the future as Water Corporation increases its public consultation for water supply planning. Discussions with planning staff within the Water Corporation indicated that planning is undertaken as part of an annual planning forum, which involves prioritising detailed planning activities based on knowledge of recent growth, proposed developments and resource availability. The outcomes of this planning forum are not formalised into a public document that allows communities to see how town water supplies are being planned for. The content of the Source Development Plan for the Integrated Water Supply Scheme has been referred to in this section of the review as an example of Water Corporation's planning capability and does not necessarily reflect whether this is put into practice in regional areas.

The Busselton Water Board and Aqwest prepared a submission to the Economic Regulation Authority's inquiring into urban water pricing in 2004. Assessment of technical rigour for this review is based upon those submissions. It is recognised that these submissions do not necessarily show the full extent of those utilities' urban water supply planning, however they do represent evidence of many of the elements of such planning. A request was made to Busselton Water Board to obtain a supporting technical report, but that was not forthcoming.

The adequacy of the planning horizon for urban water supply planning in Western Australia is summarised in Table 10.6. Water Corporation and Aqwest have used 45 to 50-year planning horizons, whilst the Busselton Water Board prepared a 25-year planning horizon in 2001. Busselton Water Board also produces a 10-year demand forecast that is updated every 3 years.

Table 10.6 – Planning horizon for example water supply plan

Review Element	Comment	Suitability
TR1: Planning horizon?	20-50 years	✓

Information about the do-nothing demand projections in these plans is summarised in Table 10.7. Evidence of defined level of service objectives is available from all water utilities and current reliability relative to those objectives has been determined. All utilities had projected growth in water demand and assessed if and when augmentation would be required.

Table 10.7 – Current information and do-nothing projections for example water supply plan

Review Element	Comment	Suitability
TR2: Stated level of service objective?	Not stated but implied for BWB and Aqwest. Stated by Water Corporation	✓
TR3: Is level of service objective currently being met?	Yes, BWB and Aqwest very reliable. IWSS objective being met based on post-1975 climate	✓
TR4: Is the current system yield stated?	Yes	✓
TR5: Is the growth in demand over the planning horizon stated?	Yes, all reports have a demand forecast curve or volumes	✓
TR6: Timeframe stated until level of service objectives are no longer met under do-nothing scenario?	Yes, varies for each system	✓

The extent to which demand management and potable substitution are considered by these water utilities is summarised in Table 10.8. All utilities have good knowledge of system losses and benchmark themselves against industry best practice to ensure that they do not have a high rate of leakage. Alternative supply options are not considered as part of the pricing submissions of the two water boards. This would appear to be partly because the ERA's methodology paper does not request information about alternative supply options and partly because of the high groundwater allocation relative to current use. Consideration of alternative supply options may have been considered by Busselton Water Board prior to deciding on an increase in its groundwater allocation as its preferred supply enhancement option, but no documentation could be obtained to confirm this. Water Corporation considers a range of supply options including, but not limited to, all of those listed in Table 10.8.

Table 10.8 – Demand management and potable substitution for example water supply plan

Review Element	Comment	Suitability
TR7: Consideration of demand management?	Yes	✓
TR8: Knowledge of system losses?	Yes, 10-13% for the two water boards	✓
TR9: Is recycled water considered as a supply option?	For Water Corporation only	–
TR10: Is stormwater considered as a supply option?	For Water Corporation only	–
TR11: Is desalination considered as a supply option?	For Water Corporation only	–
TR12: Is water trading considered as a supply option?	For Water Corporation only	–

The degree to which management of uncertainty has been considered in the example water supply

plans is summarised in Table 10.9. The Water Corporation demonstrates careful consideration of uncertainty and incorporates the potential effects of climate change and land use change in its planning. The Water Corporation has a corporate objective to achieve carbon neutrality which is reflected in its water supply planning. The water boards do not consider climate change or land use change.

Table 10.9 – Management of uncertainty for example water supply plan

Review Element	Comment	Suitability
TR13: Is yield stated as a probability distribution?	Single values for groundwater sources, but appropriate for this type of supply. Range of yields for surface water	✓
TR14: Consideration of climate change?	Incorporated by Water Corporation, but not by the water boards	–
TR15: Consideration of land use change?	Water Corporation considers the potential for catchment thinning to increase yield and effects of other land use changes. Water boards do not consider impacts of land use change	–

The extent to which socio-environmental impacts have been considered is presented in Table 10.10. The majority of Water Corporation's water supply planning outside of the Integrated Water Supply Scheme has been conducted internally with minimal or no community consultation, however consultation has been increasing on recent plans under development and there was extensive consultation on the Integrated Water Supply Scheme Source Development Plan. Aqwest has public board meetings, which indicates that they have a very open policy on community involvement in all projects. There is no specific evidence to demonstrate that community consultation on demand reduction and supply enhancement options are a consistent component of water supply planning by the water boards and Water Corporation.

Impacts of supply enhancement options on other users do not appear to have been explicitly considered in the information available for this review. It is not clear, for example, whether increased use of aquifers will impact on non-urban customers, although this may be available in technical reports held by the water utilities. A triple bottom line assessment has not been presented in the information made available, however this is potentially again because this is not the ERA's area of interest. Water Corporation has undertaken triple bottom line assessments for a number of projects and therefore has the capability to produce these assessments for future non-metropolitan urban planning studies.

Table 10.10 – Socio-environmental considerations for example water supply plan

Review Element	Comment	Suitability
TR16: Energy consumption of options stated?	Yes for Water Corporation, no for water boards	–
TR17: Evidence of community consultation?	No	–
TR18: Have the impacts on other water users been considered?	No	–
TR19: Have impacts on the environment been considered?	No	–
TR20: Is there a triple bottom line assessment of options?	No	–

A summary of the manner in which planning outcomes are specified in the example plans is shown in Table 10.11. Both Water Corporation and the water boards had a plan of action and a timetable for implementation of those actions, including preliminary steps to achieve the desired outcome.

Table 10.11 – Planning outcomes for example water supply plan

Review Element	Comment	Suitability
TR21: Is there a plan of actions to achieve and maintain the desired level of service over the planning horizon?	Yes	✓
TR22: Is there consideration of lead times for actions?	Yes, in Water Resource Strategy	✓

10.6 CONCLUSIONS

The quality of information provided by the Water Corporation, Aqwest and the Busselton Water Board demonstrated a generally high level of long-term water supply planning that resulted in a clear plan of action to ensure reliability of supply will be maintained for each supply system. The process through which the boards and the Water Corporation have come to the final action plan could be improved. Notably:

- There is a lack of public consultation and transparency in the Water Corporation's urban water supply planning. Indications are that this is improving, however outside of the Integrated Water Supply Scheme, planning processes are largely internal and informal. This closed approach inhibits the transfer of skills, knowledge and education to other government departments and to the water boards and prevents public involvement and therefore ownership in plan development. The degree of public consultation on the Integrated Water Supply Scheme was comprehensive and the Water Corporation has good links with industry, indicating that little effort would be required to increase consultation for planning in non-metropolitan areas; and
- There is no external requirement for utilities to undertake water supply planning. The main technical direction provided to water utilities has been from the Economic Regulation Agency (ERA) for collecting background information on price setting. The ERA does not have regular ongoing authority to collect this information and its interest does not span aspects that are important to urban water supply planning, such as whether triple bottom line assessments have been completed. Ideally, the ERA and the newly created Department of Water would liaise with one another to provide a more comprehensive and coherent set of guidelines for use by the utilities, with a regular review period for those plans. The current water resources management legislation reform program taking place in Western Australia provides an opportunity to create appropriate regulatory drivers for urban water supply planning in this state.

11 Conclusions and Recommendations

This report provides a snapshot of the status of long-term urban water supply planning being undertaken by Australia's non-metropolitan urban water utilities. This study postulated that there are two enabling steps that create an environment in which prudent urban water supply planning will generally follow, namely institutional support for water supply planning and knowledge of the essential technical aspects of water supply planning.

This report reviewed long-term urban water supply planning in each state and territory against these two elements. The degree of institutional support was assessed against available State policies, regulations, legislation and guidelines, whilst the degree of technical rigour was assessed with reference to an example plan sourced from each state or territory.

In some parts of Australia significant aspects of one or both of these two elements of institutional support and technical rigour for water supply planning were largely absent. This situation must be remedied if urban water supplies are to be adequately maintained in the face of uncertainties about future water availability and demand.

In states with local water utilities, financial incentives (subsidies) for completion of water supply plans in New South Wales and Queensland were less effective in ensuring completion of plans in accordance with state guidelines than regulation in Victoria. Only 29% of water utilities in New South Wales had commenced their long-term water supply plan by July 2005, which was more than two years after an example plan was made available by the State Government.

An example long-term urban water supply plan in areas outside of capital cities could be readily located in every state or territory except Tasmania, where no formal plan was able to be located. The Tasmanian Government called for tenders for a long-term water supply plan for the town of Bicheno in early 2007, indicating that an example plan is likely to be available in late 2007. In those states or territories where a good support framework had been established for water supply planners, evidence of at least one high quality non-metropolitan urban water supply plan was found.

Most states and territories have a policy, regulatory or legislative framework for managing water resource availability from an individual resource, but there is lack of consideration of how urban water utilities fit into this framework. Assigning resources from a single source for water resource planning, which has been a prime focus of the National Water Initiative, is a separate decision making process from selecting resources from a variety of sources for urban water supply planning. This distinction is not universally acknowledged across Australia and there is no formal requirement for urban water utilities in South Australia, Tasmania, Western Australia and the Northern Territory to undertake long-term urban water supply planning. Current projects to review and reform aspects of water management and regulation in Western Australia and Tasmania present an opportunity to create a regulatory driver in these states. Ideally, water supply planning should also be linked with energy and land use planning decisions in an integrated manner.

Recommendation 1: Consideration should be given to providing greater regulatory drivers for water supply planning for urban water utilities in all states and territories, with the exception of Victoria, where a sound policy framework for urban water supply planning already exists. This will improve the quality, extent and transparency of urban water supply planning in these states and territories. Greater regulatory drivers should replace project subsidies in New South Wales and Queensland and be coupled with other appropriate project funding arrangements.

The extent and quality of water supply planning by local water utilities in Queensland is currently unknown by the Queensland State Government, which is a significant information gap when assessing the adequacy of current planning activities.

Recommendation 2: Consideration should be given to monitoring the progress of water supply planning by local water utilities in Queensland as part of its existing annual water utility benchmarking report, similar to that which occurs in New South Wales.

The Tasmanian Government set up a taskforce in late 2006 to reform its water and sewerage sector, which ATSE believes should strongly consider establishing regulatory drivers for long-term urban water supply planning in that state. The absence of evidence of systematic urban water supply planning in Tasmania highlights the urgent need for urban water reform in that state.

Recommendation 3: Consideration should be given to establishing an urban water supply management and planning unit in the Tasmanian Government to guide and regulate local water utilities, similar to the role currently played by government agencies in Victoria (DSE), New South Wales (DEUS) and Queensland (Queensland Water Commission / DNRW) that have local water utilities.

There are a variety of institutional models for non-metropolitan urban water supply management at a state and territory-wide level, ranging from a single utility across most of a state or territory to a multitude (100+) of local council owned water utilities. The institutional model adopted is considered to have a direct impact on the extent and quality of urban water supply planning undertaken in each state and territory. A comparison of progress against state urban water supply planning guidelines in Victoria and New South Wales, and within New South Wales itself, highlights that smaller utilities are slower to commence their urban water supply planning despite the availability of State Government support.

Managing and planning water supplies is becoming increasingly more complex with more complicated water treatment technologies and a greater diversity of water sources. It is questionable whether institutional models of the past are adequate in the light of this increasing technical complexity that requires the ability to recognise the need for and effectively use highly specialised skills.

Recommendation 4: A study should be undertaken of the efficacy of the non-metropolitan urban water utility institutional models in the various state and territories to determine which models are most appropriate to adopt, as current arrangements are not uniformly producing desirable water supply planning (and potentially many other) outcomes, particularly for utilities managed by local councils.

States and territories typically do not give adequate consideration to uncertainty in their water supply planning. Most notably there was no quantification of the effect of climate change in water supply planning in Queensland, New South Wales, Tasmania and the Northern Territory. Given recent climate conditions and global warming trends, this oversight is of concern. Determining climate change impacts on runoff at a statewide level can significantly reduce the technical burden on water utilities, encourage scenario planning for a range of climate change conditions and promote consistency of information in broader planning forums, as seen in Victoria.

Triple bottom line (social, financial/economic and environmental) assessments of demand reduction and supply enhancement options were not evident in example water supply plans for Victoria, the Northern Territory, Queensland, Western Australia and Tasmania. This indicates that many water supply planning decisions are still being made without taking into account net social and environmental benefits and rely solely on financial cost comparisons. Triple bottom line assessment frameworks are known to exist in most states and territories.

All state and territory resource managers are yet to complete the setting of the size of the consumptive

pool, which hampers the ability of water supply utilities to invest in new water infrastructure with certainty. Most states and territories are nearing completion of this task.

All states and territories lack information on the effect of climate change on groundwater yield and the effect of land use change on groundwater and surface water yields. The expansion of plantation forestry and the prevalence of bushfires in recent years in particular will have significant but currently largely unknown impacts on future urban water supplies. This technical issue has been addressed in some states by site specific studies, but no state or territory resource managers have yet provided uniform advice to water supply utilities on the nature and magnitude of this impact in all of their water supply areas.

Recommendation 5: The shortcomings identified in this review in the area of climate change, vegetation change and the setting of the size of consumptive pools should be immediately addressed and incorporated into future long-term urban water supply planning. This recommendation supports actions identified under the National Water Initiative that are currently being implemented by states and territories.

The above conclusions and recommendations are drawn from this overview of urban water supply planning in Australia. Further investigations and analysis are recommended to ascertain the extent to which sound urban water supply planning is being undertaken in all regional areas, rather than just the examination of readily available example plans.

Recommendation 6: Following on from this review, consideration should be given to undertaking a complete investigation of non-metropolitan urban water supply planning to gain a full picture of the extent to which individual utilities are undertaking long-term urban water supply planning and implementing the actions from those plans.

Almost all urban water utilities and state and territory agencies approached for this study shared information freely and responded to requests in a timely manner. This highlights the willingness of Australia's water supply managers and planners to participate in water industry reform despite the pressures of day to day water supply system management. There will nevertheless be a lag between instituting the above recommendations at a state and territory level, having them taken up by water utilities in their water supply planning and then implementing the actions identified in those plans. This lag means that urgent action is required in order to better prepare the nation's non-metropolitan urban water utilities to adequately balance supply and demand in the near future.

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Review of Water Supply Planning for Australia's Non-metropolitan Urban Water Utilities

The Australian Academy of Technological Sciences and Engineering (ATSE)

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