Water Supply and Governance Options for Outback Towns in South Australia

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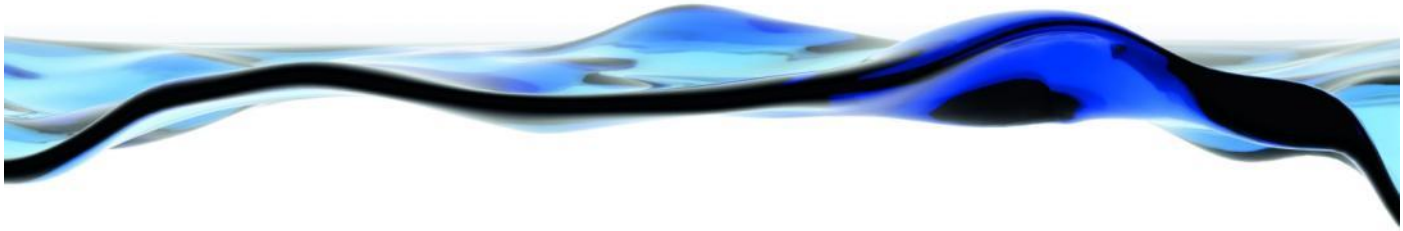

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Abbreviations

AARD	Aboriginal Affairs and Reconciliation Department
ABS	Australian Bureau of Statistics
ADWG	Australian Drinking Water Guidelines
APY	Anangu Pitjantjatjara and Yankunytjatjara
ARCWIS	Australian Research Centre for Water in Society
ATSISJC	Aboriginal and Torres Strait Islander Social Justice Commissioner
BoM	Bureau of Meteorology
CAT	Centre for Appropriate Technology
COAG	Council of Australian Governments
CRC-DK	Collaborative Research Centre-Desert Knowledge
CRC-REP	Collaborative Research Centre- Remote Economic Participation
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSO	Community Services Obligation
CWMS	Community Waste Management Systems
CWP	Community Water Planner
DAARE	Department of Aboriginal Affairs and Reconciliation
DE	Department of Environment
DEWNR	Department for Environment, Water and Natural Resources
DFW	Department for Water
DoE	Department of Environment
DPTI	Department of Planning, Transport and Infrastructure
DSC	Department of State Development
ESCOSA	Essential Services Commission of South Australia
FNPWA	Far North Prescribed Wells Area
FNQRoC	Far North Queensland Regional Organisation of Councils
FRDC	Federal Racial Discrimination Commissioner
FROSAT	Flinders Ranges and Outback SA Tourism
GRB	Great Artesian Basin
GWMWater	Grampians Wimmera Mallee Water
HRSCAFF	House of Representatives Standing Committee on Agriculture, Fisheries and Forestry
IES	Indigenous Essential Services
kL	Kilolitre (=1000L)
kWh	Kilowatts
L	Litre
LGASA	Local Government Association of South Australia
ML	Megalitre (1 ML= 1 000 000 L)
ML/d	Megalitres per day
Mm	Millimetres
MOU	Memorandum of Understanding
MT	Maralinga Tjarutja

NGO	Non-Government Organisation
NHMRC	National Health and Medical Research Council
NSW	New South Wales
NSWDPI	New South Wales Department of Primary Industries
NWC	National Water Commission
NWI	National Water Initiative
OCA	Outback Communities Authority
PA	Progress Association
P&WNT	Power & Water Northern Territory
PIRSA	Primary Industries and Regions South Australia
POE	Point of Entry
POU	Point of Use
PPP	Public, Private Partnerships
QLD	Queensland
QW	Queensland Water
QWRAP	Queensland Water Regional Alliance Program
RAESS	Remote Area Energies Supplies Scheme
RDAFN	Regional Development Australia, Far North
RDIA	Regional Development and Indigenous Advancement
RAPAD	Remote Area Planning and Development Board
SA	South Australia
SAAL NRM	South Australian Arid Lands Natural Resource Management
SAALNRMB	South Australian Arid Land Natural Resources Management Board
SA Health	South Australia's health provider
SCOPUS	Abstract and citation database of peer-reviewed literature
Seqwater	South East Queensland water and sewerage service provider
TDS	Total Dissolved Solids
US/USA	United States/United States of America
WA	Western Australia
WADW	Western Australia Department of Water
WBBROC	Wide Bay Burnett Regional Organisation of Councils
WGOWS	Working Group for Outback Water Supplies

Executive Summary

1 Introduction

Over the last ten years there have been a number of attempts by state and federal governments to determine the most effective mechanism for the delivery of potable water to remote South Australian (SA) outback towns that comply with Australian Drinking Water Guidelines (ADWG), and ensure the development of the townships. The problems faced by these outback townships have been adequately defined, what is lacking is:

- the capacity to identify and fund the agency responsible for rolling out a plan;
- an approach that leads to the identification of the most appropriate water supply solutions and then a consensus on these solutions; and
- the implementation of governance mechanisms and acceptable cost covering arrangements.

This report explores governance options for outback towns in SA.

2 Methodology

The methodology employed for the project included a **systematic literature review** which examined existing water source and supply information and options for five priority outback townships. The second part of the methodology was the establishment of a project **steering group** to guide the research team and respond to options. The third part was a **workshop** involving key stakeholders tasked with responding to the five proposed options (See Appendix C under Stakeholders for a list of participants).

3 The five townships

The townships of Glendambo, Innamincka, Marree, Oodnadatta and Yunta were selected by the Outback Communities Authority (OCA) as they represented the diversity of current water supply provision (management, source, quality, quantity, demand) in outback SA.

4 Key findings from the literature review

The financial cost of water

Water supply for small remote towns is subject to diseconomies of scale due to high delivery costs, low demand, high maintenance costs, uncertain willingness to pay for improved levels of service, and low levels of cost recovery.

Funding for improved water supply will need to occur through a Community Service Obligation (CSO) (Parsons Brinckerhoff, 2008).

Water infrastructure providers

Remote communities differ markedly from large cities in terms of service provider, level of service, level of funding and support, and level of documentation. These differences in the standard of service increase the risk of communities falling through the cracks, not receiving a service at all, or being unsure of where to turn in the event of a failure.

The Working Group for Outback Water Supplies (WGOWS, 2005) recommended licensing the OCA to provide the community water services, with technical support from SA Water, given that OCA has a licence and is already active in this arena.

Health and risk

Most water in remote SA is treated for microbiological contaminants (with chlorine or ultraviolet light) but usually no further water treatment is carried out. The National Health and Medical Research Council (NHMRC, 2004) advocated a risk-based approach to the development and management of small, non-potable water supplies handled by volunteers. However, the use of volunteers does not address issues of risk or volunteer fatigue.

Setting sustainable levels of supply

Providing a water supply service relies on many different factors being in place and working together, namely:

- 'soft' factors such as skills, behaviours, norms and practices;
- 'hard' factors such as suitable technologies;
- availability of finance for capital expenditure; and institutional factors that can provide for long-term support to community system (Lockwood et al., 2010);
- *Motivation* – Consumers have to want to use the scheme. It must satisfy demand.
- *Maintenance* – a viable maintenance and renewal strategy with appropriate training and resourcing;
- *Cost Recovery* – The metering, billing method and its administration and accounting need to be able to generate revenue for ongoing costs. These processes must be transparent;
- *Continuing Support* – Ongoing cooperation between the community, government(s) and the water provider is required. Support is usually necessary for ongoing financial support and maintenance.

Governance options for outback South Australia

There are different options for supply, treatment and governance of outback water and identifying a universal model is difficult to achieve. There has currently been little input from residents of remote towns as to what water supply scheme and level of service they require. A process of including the potential users of improved water supply schemes is a fundamental requirement of good governance.

The only clear description of 'improved' water supplies for any of the study towns appears in the SA Water infrastructure assessment documents (Yelland, 2007), but this focuses solely on technical aspects and does not consider social or economic factors.

5 What is a sustainable service in rural and remote contexts?

A good deal of research on water supply in remote and rural contexts occurs in developing countries. In the developing world meeting the above six requirements is difficult given the high cost of infrastructure and the poverty of the people. The evidence suggests that the cost of water in developing countries is subsidised.

Literature on water supplies to outback towns in developed nations such as the United States, Canada and New Zealand was difficult to obtain. The US Department of Interior, Bureau of Reclamation program in mid-west USA provided some principles for water governance options and decision criteria including provision of grants where projects met development objectives.

A second principle of the US Bureau of Interior program was the need for programs to serve tribal communities and tribal members. Where this principle was met, non-tribal townships were also able to capitalise on infrastructure programs.

In examining water governance and supply in Australia a distinction was made between regional towns with populations between 15,000 and 2,000 and those with less than 2,000. There is a considerable literature on the impact of increasing costs and regulation on local government water utility providers in regional Australia with populations around 15,000. Key findings suggest that the high costs of regulation force amalgamations of water utilities into larger entities in order to achieve full cost recovery and to employ sufficient staff.

For outback towns with populations under 2,000 the primary issue for provision of a water supply is lack of economy of scale, and the scarcity of water. One solution to lack of access to technological and professional expertise is to form mandatory alliances. Mandatory alliances allow for stakeholders to do the major strategic planning and accompanying project management, while local councils or progress associations maintain control of day to day water supplies.

6 An approach to community consultation across the outback

Possible factors that could constitute decision criteria on whether governments service small remote townships are given below. The list, while based on key findings from the literature, is not exhaustive.

Sustainability weightings based on whether:

- The infrastructure and water services are sustainable (e.g. the technology should minimise energy consumption and maximise efficient water use);
- The resource is vulnerable;
- The decision/ technology /structure has been effective in comparable circumstances;
- There is evidence of the sustainability of the town's population (e.g. viable commercial ventures that would be enhanced by improvements in essential services at current population levels);
- The infrastructure complements the sustainability of other services (e.g., dialysis facilities);
- The investment maximises benefits to the broader region, including the environment;
- The population is over 50 people or in excess of 5 houses; or
- The town demonstrates significant increases in population during the tourist season (e.g. 50 overnight visitors between May and September);
- The project meets legislative requirements.

Socio-economic weightings based on:

- Evidence that the infrastructure or up-grades would enhance economic development of the town or region, taking a whole of outback approach;
- The capacity for the project to serve the needs of Indigenous people (the higher the Indigenous population the higher the weighting);
- The density of the overall population;
- Whether communities are working in partnerships;
- Evidence that the customers would be able to pay for the service;
- The towns' track record or ability to access alternative funding (e.g. the state; Indigenous programs);
- A high percentage of householders with incomes in the lowest 2 quintiles, or high rate of unemployment (over the national average);
- Whether the project contributes to identifiable health, sanitary or security outcomes.

Economies of scope and scale weightings based on:

- The capacity to meet regulatory requirements, and managerial control of the service (including clear customer communication, technical and managerial services and clarity in ownership);
- Evidence that the customer base has been consulted;
- Economies of scope (e.g. a single entity managing multiple services);
- Transparent tenders;

- A hierarchy that prioritises projects, but also ensures equal access;
- Projects that connect to an existing service (particularly in non-Indigenous communities).

Criteria for setting costs could also be based on ones similar to those set for outback electricity supplies, covered by a CSO (KPMG, 2011, p. 14).

Parsons Brinckerhoff (2008) identifies a third set of criteria that determines the level of infrastructure and on-going service. This is based on population, remoteness and size of town.

7 Water supply governance options

An analysis of five governance options with case study examples is given in Chapter 7.
The report does not consider a role for private commercial providers given the lack of economies of scale and scope which is a constant refrain in the literature.

Option 1: Retain the status quo: maintain services as they currently are,

Advantages:

- Better information may become available in the future to assist water resources planning in the region beyond the options provided in this report, hence there is value in maintaining existing arrangements

Disadvantages:

- Poor water quality and quantity may limit social and economic development and be a health hazard.

Option 2: SA Water takes on responsibility for water provision and governance for outback water supply

Advantages:

- SA Water has the technological, human resource and infrastructure capacity to take responsibility for water supplies in outback South Australia.
- Ensures sustainable governance of supply.
- Enables the potential to meet Australian Drinking Water Guidelines.
- Provides the potential for achieving efficient economies of scale.
- SA Water has a whole of state approach.

Disadvantages:

- Full cost recovery is unlikely to be achieved.
- Extending SA Water services to remote towns might lead to inefficiencies given the diversity of demand and the complexity of options.

Option 3: SA Water takes on responsibility for water provision and governance as part of its charter including its Remote Indigenous Communities Program

Advantages:

- SA Water already provides water services to remote Indigenous communities through its Remote Communities Team.
- Consolidates the sustainability of outback communities across Indigenous and non-Indigenous towns and settlements.
- Ensures sustainable governance of supply that would eventually lead to full mainstreaming of services for Indigenous people.
- Offers an equitable approach to all citizens living in small communities.
- Has a whole of state approach.

Disadvantages:

- Full cost recovery is unlikely to be achieved.
- May be seen as inequitable if funding intended for Indigenous services is used to provide water services in non-Indigenous towns.
- Increase to SA Water's CSO burden.

Option 4: Outback Communities Authority (OCA)/ Independent Outback Water Corporation takes on responsibility for water supply and governance as the Regional Water Authority

Advantages:

- Consolidates the sustainability of the OCA, especially if it manages a range of essential services such as power and wastewater.
- Makes use of existing governance structure that would likely have the support of local communities.
- Enables the potential to meet Australian Drinking Water Guidelines.
- Takes an equitable approach to all citizens living in outback communities.
- The OCA has a whole of outback approach.

Disadvantages:

- The OCA must negotiate an agreement over water service fees which are supported by all consumers within a town.
- The mandatory enrolment of regional towns may meet with local opposition especially if revenues are seen to support administrative functions of the OCA.
- Economies of scale are unlikely to be achieved even if economies of scope are maximised.

Option 5: The OCA manages an alliance between existing providers of progress associations, councils, SA Water and mining companies

Advantages:

- Consolidates the sustainability of the OCA.
- Local progress associations and councils maintain control over their assets and services.

- Leads to a plan for compliance with Australian Drinking Water Guidelines.
- Takes an equitable approach to all citizens residing in outback settlements.

Disadvantages:

- The alliance between parties must be binding which requires legislation.
- Administrative costs would need to be reflected in pricing which may be unpopular with consumers.
- Full cost recovery is unlikely and a CSO will be required.
- There is considerable variation in water sources (and catchments) across the alliance thereby increasing the complexity in dealing with regulatory arrangements and technological solutions.
- Decisions about major capital works projects are determined by a central board but the progress associations remain responsible for the infrastructure.
- The establishment of a mandatory alliance with a Board of Management that set annual priorities may overshadow existing community development strategies already in place between the OCA and local towns.
- The current Board of the OCA is not representative of all outback stakeholders.

Chapter 1: Introduction to the Study

1.1 Rationale for the study

Over the last ten years there have been a number of attempts by state and federal governments to determine the most effective mechanism for the delivery of the supply of safe, adequate and efficient potable water to remote South Australia that conforms to Australian Drinking Water Guidelines (ADWG) (NHMRC, 2004) and ensures the on-going development of the townships (Outback Communities Authority [OCA], 2013; Government of South Australia, 2014a; Pearce et al., 2010; WGOWS, 2005). The common problems faced by these small remote townships have been adequately defined, along with recommendations for a number of governance and innovative technical solutions (WGOWS 2005).

What is lacking is:

1. the capacity to identify and fund the agency responsible for rolling out a plan. See Chapter 7;
2. an approach that leads to the identification of the most appropriate water supply solutions and then a consensus on the most appropriate water supply solution. See Section 6.2;
3. the implementation of governance mechanisms, and acceptable cost covering arrangements.

The State Government also requires robust and transparent criteria with which to guide consistent decision making in relation to whether to commence a supply, continue to supply or to augment a water supply. This report outlines five options for the governance of outback water supplies along with a literature review that provides the background material informing these options. Water supply arrangements for five outback towns, namely Glendambo, Innamincka, Marree, Oodnadatta and Yunta, are also discussed to contexualise the issues. It is presumed that the options provided would include all towns in outback South Australia (SA) that are designated as unincorporated. An unincorporated town is where residents share a common social identity, but there is no incorporated organisation such as a municipal council, representing the citizens' interests at the broader political level.

Given the above, the aims of this study are to:

- Evaluate stakeholder's insights into the five townships' capacity and willingness to pay for a secure water supply, considering quantity and quality. These are addressed through the literature in Sections 4.2 and 4.7;
- Develop decision criteria as a basis for the Government of South Australia to consider when it should take responsibility for providing a public water supply for small communities in SA. This is addressed in Chapters where relevant data is available and is consolidated in Chapter 6;

- Evaluate governance and service delivery arrangements for water supplies in remote communities, and governance arrangements when faced with management, operational or technical issues that prevent access or use of that water supply. This is addressed in Chapters 4, 5 and 6.

1.2 Why a study on water supply and governance in remote South Australia now?

In South Australia 'outback' towns generally have low populations, sometimes well under 20. Determining a set of criteria for establishing a more regulated water supply or one that meets ADWG requirements is challenging. This is particularly so in remote and arid regions where towns are many kilometres apart and do not share the same catchment area. There was little available research literature, or case studies at national or international level to provide guidelines for action in townships with fewer than 200 customers. Despite this, the stakeholders and steering committee members engaged in this project believed it was imperative that the State government put plans in place to address the above three points This was considered important since the current potable water supply in outback South Australia towns was considered a hazard. While this risk has been present for over 50 years, it has become increasingly urgent in the last five years. This has arisen since residents in outback towns who have traditionally taken responsibility, on a volunteer basis, for managing the water supply, are no longer willing or able to provide this service.

A further motivating factor is the clear regulatory regime now in place that outlines the responsibilities and expectations for water supplies across Australia. In many instances, volunteer residents who have previously been responsible for managing the water supply, may not be aware of these requirements, may not have reported on them, and may not be willing to take on the burden of responsibility.

Three key factors drive the current urgency for the State government to make a decision on the governance of water supplies in outback South Australia. These are:
i) health and safety of residents and tourists,
ii) overall issues of security and risk, and
iii) the negative impact of inadequate water supplies, infrastructure, and governance on economic development of the region and directly on the towns.

i) *Resident and tourist health*: Chapter 3 provides a summary of the water supply management provisions in place in five outback towns, namely Glendambo, Innamincka, Marree, Oodnadatta and Yunta. This summary includes the NHMRC microbial risk rating (NHMRC, 2011) management processes for the towns. In all cases these processes are insufficient as safeguards. The events at Walkerton in Canada in 2000 when the water supply was contaminated with a strain of *E. coli* bacteria are still present in the minds of most water professionals. This contamination resulted in five deaths and 2,500 people

becoming ill. The cost of the tragedy was estimated to be over $100 million. The Walkerton Commission of 2002 (Salavadori et al., 2009) noted that the incident was the result of human and systematic failure. The two water utility employees in the case, who had not had formal training in risk management, both were criminally convicted. Local and provincial governments were seen to be responsible, although no politicians were prosecuted (Salvadori et al., 2009). There are however, differences in scale between the Walkerton population (around 5,000 at the time) and those in outback towns in South Australia, the implications of which are discussed below. In outback South Australia anecdotal estimates of population numbers during the tourist season suggest additional increases of up to 50 visitors per night in many towns but more across any 24 hour period. Measuring the tourist population becomes one criterion for action.

ii) *Overall issues of security and risk*: Given the high tourist numbers that pass through outback South Australia it is imperative that the water supply is safe for human consumption. Unlike local residents tourists they may not be fully aware of the needs to boil water, or ensure it is safe to drink. Current estimates put the numbers of tourists visiting outback South Australia and the Flinders Ranges at 570,000 annually with around 42,000 international visitors (RDAFN, 2013, Section 3.1.3.4). The average length of stay for international visitors is 6.3 days. Questions of risk and security include potable water supplies as a health priority. However, a permanent population is also required in outback towns and roadhouses in sufficient numbers to manage accidents, or when tourists require routine or emergency services. Services include evacuations, emergency healthcare, food, accommodation, fuel, vehicle repairs or other provisions for travel. These services are not simply commercial ventures, they are essential to ensure safety and security for local and visiting populations and the reputation of South Australia as a safe tourist destination. Potable water is one also a requirement.

iii) The negative impact of inadequate water supplies, infrastructure, and governance on economic development of the region and directly on the towns: Tourists and many workers in the mining industry in the region are transitory. Residents are permanent and make a contribution to the region, by establishing businesses and providing infrastructure that contributes to the over-all security of the region. However, residents are hampered in their business endeavours by a lack of infrastructure and the resulting high costs of providing services. Hotel, caravan and motel owners have felt impelled to install equipment that provides safe drinking water to their customers. In the 12 month period prior to the publication of the report there was a 10% decline in business growth. One of the difficulties faced by residents and businesses infrastructure in the unincorporated areas (85% of SA is unincorporated) is water. The Regional Development Areas Far North report notes that 'Small communities have insufficient resources and leverage to improve efficiencies with the private sector. In general, water supplies managed by progress associations have the

poorest service (in both cost and standard). Some small communities do not have a water supply but rely on collecting or purchasing water themselves' (RDAFN, 2013, p. 61).

1.3 A theoretical context to the study

Water governance is key in dealing with an uncertain future and the challenging logistics of supplying small remote townships with water that meets their needs while still allocating enough water to sustain important ecosystems. An early enquiry into the state of water management in outback Australia focused on the social and political issues of providing water services because previous reports had concentrated almost exclusively on engineering and health issues (FRDC, 1994); sentiments shared by Grey-Gardner (2008a, p. 149):

> Water management in small Aboriginal settlements in remote Australia is typified by technology-driven approaches where knowledge, decision-making and responsibility reside with organisations and agencies outside the settlement. This conventional approach has been a disincentive to active involvement by residents in managing the hazards and risks of their own water supply, despite the apparent presence of knowledge and skills at the settlement level.

These observations are also reflected in the international literature (see Chapter 5). A United Nations Development Program report put forward the claim that delivering benefits from water supply over the long-term requires much more than building infrastructure (Sara and Katz, 1997). This notwithstanding, remote communities in Australia may need better water infrastructure, but if the goal of this investment is sustainable communities and environments then the interactions between communities, technologies and institutions (e.g., water providers and government agencies) needs to be understood. Consequently, this report draws on available documents that might provide a basis for informing current planning with respect to water services in outback South Australia.

Where the literature allows, specific attention is paid to the five remote communities which have been selected to serve as case studies having different water infrastructure, geographic locations, and governance arrangements. For the most part, social research focusing on these case studies was limited such that research reports and policy documents dealing with water supply in small rural communities located in other parts of Australia and overseas have formed the basis of discussions. Little is known about the quantity and quality of water within much of the arid lands of South Australia (DEWNR, 2013). This reality becomes sharper in focus given increasing demand for water from industries and townships alike, and the pressures on water resources due to a changing climate (Gibbs et al., 2013; Suppiah et al., 2006). Given the importance of water supply in Australia, and the complexities inherent in its provision, Bailie et al. (2004, p. 409) comment the 'dearth of

published reports and accessible data on this subject is striking'. The work of the Goyder Institute has been significant in filling this gap. However, less is known about the social and cultural aspects of water supply and governance in outback South Australia. This report makes a small contribution to this area.

Chapter 2: Methodology for the Study

2.1 Components of the methodology

The methodology for this research project was determined by the Goyder Institute under its Mining and Outback Water theme, and included the following three activities:

A **systematic literature** review which brought together existing water source and supply information and options for five priority outback townships identified by the OCA, namely Glendambo, Innamincka, Marree, Oodnadatta and Yunta (see Chapter 3); a brief historical overview of water infrastructure supply in regional SA and a summary of current provisions (see Chapter 3); information gleamed from other Australian states and territories and the international arena (see Chapters 4 and 5); and gaps in knowledge, including those of outback community aspirations and water governance issues.

The establishment of a **project steering group** to guide the research team and respond to water supply options (See Appendix B). This group met three times; at the beginning of the project to guide the project (21st November 2014), at the Workshop event, and towards the end of the project on 16th March 2015. The Steering Committee was drawn from key public servants currently employed in relevant South Australian Government or federal departments and familiar with regional outback water issues.

The conduct of a **workshop involving key stakeholders** tasked with responding to the various proposed options (See Appendix C for a list of participants). The original purpose of the workshop was to:

a. Evaluate the five townships' capacity and willingness to pay for a secure water supply, considering quantity and quality;
b. Develop decision criteria as a basis for the South Australian Government to consider when it should take responsibility for providing a public water supply for small communities in SA;
c. Evaluate governance and service delivery arrangements for water supplies in remote communities, such as management of water supplies by individuals, government, non-Government organisations (NGOs) (including the implications of private sector involvement), and
d. Identify governance arrangements when faced with management, operational or technical issues that hinder access or use of a water supply.

The brief extended to all unincorporated townships in South Australia, even though the case studies were limited to five townships, as it was presumed any solution would meet the

needs of the region. It is possible that the proposals outlined in this report might also capture the interest of incorporated townships that already have satisfactory supplies and management systems in place because of potential benefits of economies of scale that particular solutions might offer. The study has not attempted to consult with the Councils that cover these outback towns. However, this has not restricted our reference to reports on water supplies in small, distance-challenged communities that offer valuable insights or synergies.

2.2 Selection of the five outback townships

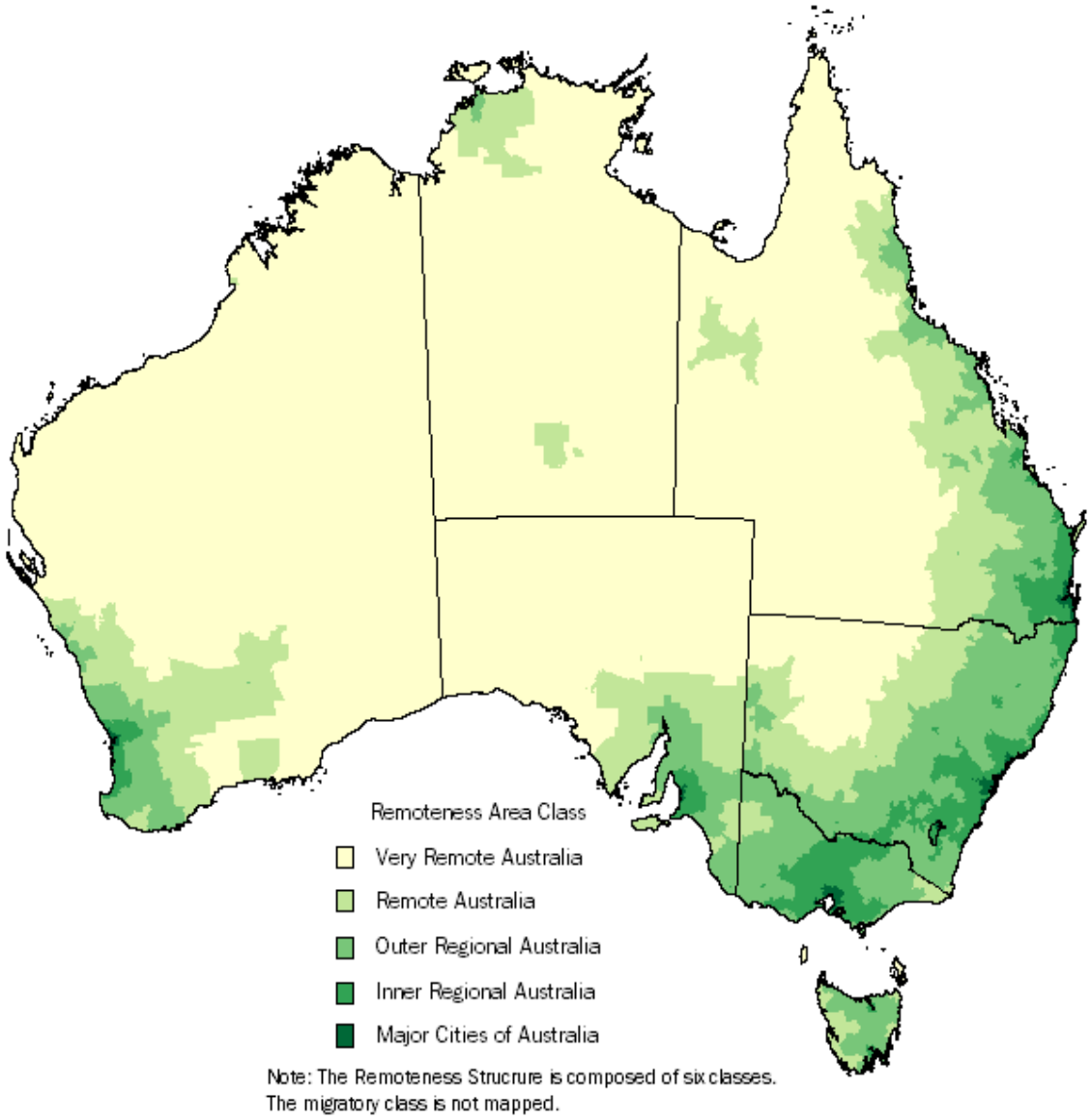
The towns of Glendambo, Innamincka, Marree, Oodnadatta and Yunta (Figure 1) were selected by the OCA as they represent the diversity of water supply provision in regional South Australia. The term 'township' (rather than community) is used throughout the report as it is the preferred term used by the OCA and distinguishes smaller mainstream towns from Indigenous communities and larger regional service centres (such as Port Augusta). In these townships water may be provided by SA Water, but not be potable, it may be surface water managed by SA Water, or it may be sourced from local aquifers and be managed by a local progress association.

Figure 1 shows the location of the study towns relative to groundwater supplies. Marree and Yunta are situated on the Adelaide Geosyncline groundwater resource, while Yunta uses surface water as the main water supply. The remaining three towns (Glendambo, Innamincka and Oodnadatta) have different levels of access to different groundwater resources. For example, the water supply for Oodnadatta is sourced from the Great Artesian Basin, while water for Glendambo comes from shallow groundwater currently sourced from a single emergency bore and Innamincka accesses surface water from the Queerbiddie Waterhole on the Cooper Creek. A number of the study townships have low quality public water supplies with most relying on rainwater tanks for drinking water. The water supply characteristics of each township are described in Chapter 3.

Figure 2 shows the degrees of remoteness defined by the Australian Bureau of Statistics. The five townships can be considered as either 'remote' (Glendambo, Yunta) or 'very remote' (Innamincka, Maree, Oodnadatta). Geographically the townships are well distributed across the South Australian outback. Remoteness in Australia is formally defined by the distance from the nearest service centre. Service Centres themselves can range in population from 200 to 250,000 persons (Australian Population and Migration Research Centre 2015).

Figure1. Location of the Study Townships
(Source http://www.southaustralia.com/media/documents/about-south-australia/map-flinders-ranges.pdf)

Figure 2. Map of Accessibility/Remoteness Index of Australia (ARIA).
(Source: Australian Population and Migration Research Centre 2015)



2.3 Literature search strategy

A literature search was undertaken to bring together existing water source and supply information and options for the five priority outback communities but also included information from other Australian states and territories and the international arena.

Both peer-reviewed and grey literature (non-referred publications such as reports) was retrieved via the usual systematic search methods using standard data bases but also through members of the Project Steering Committee and contacts within the Department of Environment Water and Natural Resources (DEWNR), SA Water, Power and Water NT, OCA, and Primary Industries and Regions SA (PIRSA). Initially searches were conducted via the

webpages of several Universities and CSIRO Land and Water. Literature searches were also conducted on the webpages of relevant government departments, non-government organisations and private sector organisations (detailed in Appendix 1).

One of the difficulties in relying on agency home page interfaces is that many of the pertinent documents were not publicly available. These are part of the internal, and often confidential, repository of material. Consequently, we also conducted a small number of interviews with key individuals within the Steering group or with authors of reports or papers we found as part of the initial literature search. Personal contact was also made with staff from Queensland Water, Melbourne Water, and Grampians Wimmera Mallee Water (GWMWater).The list of agency web pages is found in Appendix A.

2.4 What the study does not include

This report does not deal with issues of climate change, or the scarcity of water in remote South Australia. These are issues that will face any utility provider but do raise questions about how many townships should be supported in outback South Australia and how economic development might be framed.

Although part of the original project brief, the historical context of water supply infrastructure in regional South Australia is not covered in this report. An historical account of water provision in Aboriginal communities in remote South Australia is provided by elsewhere (see Willis et al., 2009). Although the number of townships covered in this report is limited to five, it is presumed that any governance solution would extend to all unincorporated towns in South Australia and thereby meet the needs of the entire outback region. For townships that currently have satisfactory supplies and management systems in place, it is possible that a regional governance model might offer potential benefits of economies of scale.

The study has not attempted to canvass or consult with Indigenous remote communities currently funded under the Federal Government Municipal and Essential Services and National Partnership Agreements on Remote Indigenous Housing (COAG, 2004a), Closing the Gap grants, and the National Water Security Plan for Cities and Towns (Australian Government, 2013) provided through Commonwealth programs. However, this has not restricted our reference to reports that comment on water supply in remote Aboriginal communities where possible synergies with outback townships exist or valuable insights are offered.

The decision not to include some 700 homes in sixty locations in Aboriginal communities was not taken lightly. A clear distinction has been made in this report between Aboriginal communities that are serviced by SA Water's Remote Communities team, and townships

that have a significant Indigenous population such as Oodnadatta and Marree, but are outside the Federal Government Municipal and Essential Services and National Partnership Agreements on Remote Indigenous Housing (COAG, 2004) arrangement. Our rationale was that up to June 2015 funding for Aboriginal communities for essential services, while inadequate, was specifically identified, and according to WGOWS (2005) and others (Morgan et al., 2003; Pearce et al., 2008; Willis et al., 2009) is of a high standard given the harsh desert context. Under the COAG (2004, p. 4) agreement the provision of essential services to these communities needs to be normalised. This is defined within COAG as *service delivery arrangements that are accountable through an agreed framework and reflect a standard of service delivery equal to non-Indigenous communities of a similar size and location.* Not only was this requirement met, but was surpassed (see SA Water, 2005a) with the communities under the agreement gaining access to a potable supply through various treatment processes. For example, in Yalata water is treated through a process of Reverse Osmosis. In Nepabunna a dual reticulation system exists with the potable supply (centrally-harvested rainwater subjected to ultra-violet disinfection) reticulated to a single kitchen tap within each household. This is not to say that residents of these communities are satisfied with their water supply—research suggests they are not (Pearce et al., 2008; Willis et al., 2009). The significant difference is that they all have potable supplies, with infrastructure, monitoring and maintenance under the purview of SA Water and Aboriginal Affairs and Reconciliation Department (AARD). There was some concern that the funding of these Indigenous communities would cease in June 2015 leading to the potential closure of the less populated communities (Government of South Australia, 2014b), which have populations similar to the five townships in this study. However, in April 2015 deal brokered between the Federal Government and the South Australian Government means that essential services (including power, water, wastewater and solid waste disposal) in the remote Indigenous communities will be supported for some time (Scullion and Maher, 2015).

As a final point, the report draws on the literature, and did not involve any discussions or consultations with residents in outback towns. Their views come second hand through the published literature.

Chapter 3: Literature Review of Existing Water Sources in Five Outback Towns

3.1 Introduction

This section provides a brief overview of the water resources and water supply infrastructure for the five townships, namely Glendambo, Innamincka, Marree, Oodnadatta and Yunta (Figure 1). Water supply infrastructure is regarded as all assets or materials used in the delivery of water from the source to an approved water meter outlet (OCA, 2013, p. 6). Following the overview, the details of each townships' water supply is, where applicable or known, outlined according to the following structure:

- Location and population
- Infrastructure and source of supply
- Availability of reticulated and private water supplies, and rates of use
- Health risks associated with the water supply
- Management of the supply and costs

Throughout each section reference is made to supply vulnerabilities such as resource constraints, seasonal fluctuations in demand, and water quality concerns. Also, for each township risk scores are given based on the National Health and Medical Research Council (NHMRC) Community Water Planner (CWP) tool. This tool was developed specifically to provide an indication of the microbiological health risk in water supply systems in communities of less than 1,000 people (NHMRC, 2011). The computer-based tool is aimed at communities or towns where the challenge of distance from major service centres necessitates local involvement in aspects of water provision, and often from semi- or unskilled persons. The tool is designed to guide routine management and prevention of hazards to a water supply rather than focus on corrective actions alone. The tool takes into consideration various characteristics of each component of a supply system from the water source to the consumer. The tool scores each component according to its' potential to add to, or mitigate microbiological health risks (NHMRC, 2011).

Evaluating a system using the CWP tool assists formal or informal managers in their routine management of water supply systems (assessment, prevention of hazards, and prioritisation of amelioration measures). A score of 0 indicates that there are processes or barriers in place to provide a microbiologically-safe water supply, whereas a negative value is an indication that the processes or barriers (for example, stock access to a drinking water catchment area) are insufficient to ensure a microbiologically-safe supply of water. Any process that reduces the risk is given a positive score (for example, regular chlorination of a supply according to best practice guidelines warrants a score of +8). The tool is easy to use,

though not without limitations (such as its failure to consider the impact of extreme fluctuations in water demand on water quality). In 2007, as part of the compilation of drinking water management plans, the OCA compiled risk scores for each water supply system for the 18 townships under its jurisdiction, including the five townships considered in this study. This has enabled the OCA to identify those townships that are in need of priority intervention due to the heightened risk associated with using their water supply. Townships with heightened risk include Innamincka, Glendambo, William Creek, and Mintabie (Yelland, 2007).

For the purpose of focus, excess social and economic data are not presented in this document, nor are details on chemical, microbiological and geological parameters associated with each townships' water supply. Aquifer characteristics throughout the non-prescribed wells area of the southern part of the South Australian Arid Lands Natural Resources Management Region (SAAL NRM Region), and the Far North Prescribed Wells Area (including the Great Artesian Basin) have been compiled in Department for Water (DFW) (2012), and Watt et al. (2012), respectively. Legislation pertaining to the prescribed wells area is given in the *Natural Resources Management Act 2004* (South Australian Government, 2004a) (which was preceded by the *Water Resources Act 1997,* South Australia). Assessments of groundwater trends by DFW (2012) and Watt et al., (2012) show that generally salinity and groundwater levels in the prescribed wells area are stable. However, less data are available for the non-prescribed region. While there is some local variability, Gibbs et al., (2013) highlighted the potential impact of climate change on water resources in the region. A 5-6% decrease in rainfall across the region is likely, but the impact on groundwater availability is expected to be worse in the southern South Australian Arid Land (SAAL NRM) region than on the Great Artesian Basin (Gibbs et al., 2012).

3.2 Glendambo

Glendambo lies approximately 280 km northwest of Port Augusta. The permanent population of the community is around 25 (as of 2007), across 8 dwellings. During the cooler winter months Glendambo receives a steady stream of passing tourists and trades-people using the townships' amenities (service station, motel, roadhouse, caravan park) which peaks at around 30 nightly visitors for at least 2 months of the year (NHMRC, 2007a, p. 5-6). The water supply at Glendambo is shallow groundwater. Previously, a 17 m deep bore was the main source of water, but its' collapse in 2004, means that the township is now reliant on a single shallow emergency bore that is 15 m deep. An attempt at rehabilitating the main bore has ultimately proved unsuccessful. In addition, since 1947 a further 38 bores, all low yielding and less than 20 m in depth, have been drilled (SA Water, 2005a, p. 11). The emergency bore feeds water into two 115 kL steel storage tanks. Three previously used aged concrete storage tanks have been decommissioned due to their state of disrepair and the multiple health risks posed by their use (NHMRC, 2007a, p. 5).

Currently, based on a population of 25 people, the storage tanks have a cumulative capacity equivalent to around five days' supply. The water yield of the emergency bore measured at the time of drilling (in 1986) was 0.83 L/s, while current water use is around 0.5 L/s. Aquifer recharge rates following rainfall and bore yields are not consistently monitored, though Watt et al. (2012) estimated a recharge rate of around 5 mm/year in the Kingoonya-Glendambo area. Further, additional evidence indicated that the rates of extraction and use are not sustainable (SA Water, 2005a, p. 14). Despite concerns about the sustainability of the water supply the township has grown since this date. The townships' previous bore also had an estimated yield of 0.8 L/s, and at an extraction rate of 0.8 L/s the supply was exhausted. Subsequent monitoring of the original bore showed little recovery 18 months after failure (SA Water, 2005a). Given this, SA Water (2005a, p. 14) raised concerns over the fragility of the sole supply and recommended that a further two bores be commissioned and brought online. Currently, if the existing emergency bore were to fail there is no backup bore available to service the community.

In addition to the reticulated supply, which all permanent dwellings have access to; most buildings have rainwater tanks (WGOWS, 2005, p. 22-23). An additional 11 L/person/day (or 98 kL/year) is harvested privately, supplementing the supply (NHMRC, 2007a, p. 6). Residents rely on rainwater for their drinking supply but given the low and variable rainfall in the region, rainwater harvested from building roofs is not a sustainable perennial supply.

As the bore supplying Glendambo taps an unconfined aquifer any surface contaminants that move through the soil profile are able to contaminate the groundwater source which potentially pose a greater health risk than where confined aquifers are accessed. The bore water is unpalatable due, to the high salinity which decreases the likelihood of it being ingested but may result in residents having an inadequate fluid intake. Following rainfall the palatability of the supply may temporarily increase leading to its' consumption with concomitant microbiological health risks (SA Water, 2005a, p. 7). Groundwater from both the abandoned bore (tested in 2001) and the emergency bore (tested in 2005) have been deemed microbiologically and chemically non-potable. High *E.coli* levels have been found in the supply at times creating a serious health risk if the water was ingested indirectly as may occur during teeth cleaning or showering. In addition to a number of parameters (total dissolved solids, sodium, chloride) exceeding aesthetic Australian Drinking Water Guidelines (ADWG), sulphate, arsenic and selenium exceed health guidelines (SA Water, 2005a, p. 13). Water quality testing is not routinely performed on either the bore water or the rainwater collected by households.

Based on the NHMRC Community Water Planner Glendambo is ranked as having a risk score of -2 indicating that there are insufficient barriers in place to render the water potable (from

a microbiological perspective). Furthermore, the ranking of -2 assumes that chlorination is carried out regularly (Yelland, 2007), but in effect disinfection occurs irregularly thereby rendering the supply non-potable (SA Water 2005a, p. 4). This omission (failure to chlorinate regularly) raises the risk factor to -10 to -12 which places Glendambo among the highest priorities (together with Innamincka) requiring intervention in their water supply management (Yelland, 2007).

Currently, the ownership and operational management of the water supply is handled by the Glendambo Progress Association on a voluntary basis (M. Sutton, personal communication, 2014). Previously the infrastructure was owned by the OCA (WGOWS, 2005, p.13). In keeping with the requirements of the National Water Initiative (NWI), the OCA is working towards full cost recovery of water services (OCA, 2013, p. 6). In general, the water supply management model preferred by the OCA for communities within its jurisdiction is the transfer of ownership and responsibility of water supply and associated infrastructure to the OCA (OCA, 2013, p. 6).

3.3 Innamincka

Innamincka is located 1,076 km north of Adelaide, in the Innamincka Regional Reserve. It lies 504 km north of Copley on route to Birdsville on the Strzelecki Track, which is a popular tourist track frequented by many thousands of tourists. The year-round permanent population is 13 people housed in 6 dwellings, with on average a further 10 seasonal workers based in the township along with up to 50 additional overnight visitors in winter (NHMRC, 2007b).

Although Innamincka accesses surface water from the Queerbiddie Waterhole on the Cooper Creek for the townships' supply, it falls within the Far North Prescribed Wells Area (FNPWA) in the northeast corner of the SAAL NRM Region (Gibbs et al., 2013). Water is diverted from the unprotected Queerbiddie Waterhole (reservoir) via polythene pipes into closed holding tanks 3 km away. The water is then reticulated under gravity to dwellings via polythene pipes (NHMRC, 2007b).

Based on a permanent population of 13 persons, NHMRC (2007b, p. 6) estimates that there is sufficient water available to provide residents of Innamincka with 2,592 L/person/day (comprising 2,529 L drawn from the reticulated supply and 63 L from private supplies). While the estimated water availability figures indicated that there are currently sufficient quantities for permanent residents, the variable nature of the rainfall raises the risk of insufficient water availability to meet the demands of the seasonal tourist population as the surface supply is impacted by seasonal changes in rainfall. Rainfall is low, but variable throughout the year, occasionally impacted by rainfall-bearing penetrating low pressure systems. Annual average rainfall is between 206.0 mm/annum (based on 32 years of data

from 1972 to 2005) and 174.3 mm/annum (based on 19 years of data between 1995 and 2014) (BoM, 2014). However, Gibbs et al., (2013) warn of the likely reduction in rainfall in the future as a result of increased global temperatures. In addition to the challenges of meeting the current water needs of residents and tourists, two geothermal energy schemes have been proposed near Innamincka and Moomba that are expected to need around 7.3 GL/year (SAALNRMB, 2009).

The non-potable water supply at Innamincka poses a health risk, in particular to the tourist population due to their failure to fully understand the extent of the health risk. Based on the NHMRC Community Water Planner risk management plan, Yelland (2007) ranked Innamincka as having a risk score of -12, which made it one of the highest risk supplies in unincorporated outback townships in South Australia.

The management of water and wastewater services at Innamincka involved a range of agencies with varying jurisdictions. The water supply infrastructure is owned and managed by the Innamincka Progress Association. However, current and future developments in wastewater services are managed by the OCA. Similarly, a varied mix of management arrangements and agencies are involved in water and wastewater services in Marla, Oodnadatta, Blinman, Parachilna and William Creek (OCA, 2013, p. 10).

3.4 Marree

Marree is located 677 km north of Adelaide, originally having been settled in 1872 in support of the construction of the Overland Telegraph Line and the Great Northern Railway. As Marree has a low population (< 200) it is classified as a gazetted locality (ABS, 2012), and falls within the Unincorporated Flinders Ranges statistical region (RDAFN, 2011, p. 12). The 2006 census gave the population as 70 persons, while NHMRC (2007c, p. 7) estimated the permanent population to be 120 people housed in 50 dwellings. Although this indicated an increase in residents, the population in the broader region around Marree has declined markedly since 2001 (ABS, 2012). Being roughly central in location in the South Australia Arid Lands, Marree serves as a gateway to the Birdsville and Oodnadatta tracks, both of which see many thousands of visitors in the cooler months. Marree provides refuelling, accommodation and other services to the transient tourist population, as well as those in mining and agriculture (NHMRC, 2007c, p. 7; RDAFN, 2011, p. 7).

The water supply infrastructure in Marree comprises two community bores, and at least one private bore that feed groundwater into a town-based storage tank. From this tank water is gravity-fed to homes and buildings within the town. Based on the average current rates of consumption, the storage tank houses around 4 to 5 days water supply (NHMRC, 2007c, p. 4). As the sub-artesian bores tap into the Great Artesian Basin Marree falls within a Prescribed Wells Area (Watt et al., 2012).

Based on a population of 120 persons, NHMRC (2007c, p. 5) estimated that there is sufficient water available to provide residents with 350 L/person/day (comprising 345 L drawn from the reticulated supply and 5 L from private supplies). The low and variable rainfall averaging 161 mm/annum (based on 29 years of data from 1985 to 2014; BoM, 2014) means that rainfall is an unreliable source, exacerbated by insufficient rainwater tanks (NHMRC, 2007c, p. 6). Water demands at peak time are said to 'strain the system' (NHMRC, 2007c, p. 6). However, according to Watt et al., (2012, p. 55), in and around Marree there are other 'specifically constructed' bores tapping the Great Artesian Basin that have high yields (32 L/s), some of which are used in mining. Another solution for provision of water in Marree might be to access water from the Leigh Creek Reverse Osmosis Plant by extending the supply pipeline a further 120 kms from Lyndhurst to Marree (M. Sutton, personal communication, 2014).

In all outback townships, where water is managed by SA Water, the supply is deemed non-potable. However, SA Water also services a number of the larger Indigenous communities in the arid areas where, although the natural resources and environment constraints are frequently similar, the water is treated to a potable standard. The current 'non-potable' classification in Marree is attributable to the high chance of microbiological contamination and chemical parameters that have the potential to adversely affect the health of consumers (DEWNR, 2010, p. 5). The NHMRC Community Water Planner risk management plan (Yelland, 2007) ranks Marree with a risk score of -2. The non-potable water, along with aridity and distances between communities, are seen as obstacles to economic and tourism development in the township (WGOWS, 2005, p. 5). Currently communities are lobbying the government to address their concerns over water quality. Although not part of the townships' supply, marked increases in the salinity of groundwater from a pastoral bore within the Marree region were noted between 2002 and 2004 by the DFW (2012, p. 28).

Unlike other outback townships the service charges and tiered pricing for water use in Marree and Oodnadatta are the same. The residential supply in Marree and Oodnadatta is provided by SA Water and the charge for 2014-2015 is $282.20/annum. The water pricing is based on a tiered system with the following pricing:

- Tier 1 of the daily consumption allowance set at $0.00 for the first 0.7233 kL,
- Tier 2: $2.32 for use between 0.7233 and 1.0521 kL,
- Tier 3: $3.32 for use between 1.0521 and 2.1479 kL, and
- Tier 4: $3.59 for any use over 2.1479 kL.

Non-residential and commercial properties have two tiers of consumption-based pricing, with the supply charge variable for commercial properties depending on their value (SA Water, 2014a). Although dependent on use, the water rates in Marree and Oodnadatta are

cheaper than 'Country' rates, which are less than those in Marla, which in turn are significantly less than those in Northern Railway Towns such as Yunta (SA Water, 2014a). To put the pricing in Marree and Oodnadatta into perspective, based on a population of 120 persons housed in 50 dwellings (i.e., 2.4 persons/house) a daily household consumption allowance of 0.7233 kL equates to each resident being able to use 301.4 L water on a daily basis at no charge (assuming the set household supply charge of $282.20/annum is paid).

3.5 Oodnadatta

Oodnadatta is located 1,442 km north of Adelaide, via Port Augusta, Marree and Coober Pedy. Oodnadatta is reached via the Oodnadatta track which extends 190 km east of Marla. Like the Strzelecki Track to the east, Oodnadatta is a popular destination or transitional point with tourists travelling the Oodnadatta track, to the Simpson Desert or to Witjira National Park during the cooler winter months (in particular May to August). The township originated in 1889 as it served as a point of culmination of various cattle stock routes from the north and west, and as a township on the Great Northern Railway facilitated interstate movement of travellers and stock (DEWNR, 2014a). The year-round permanent population is between 120 to 140 people housed in 64 dwellings, but is variable on account of the high number of transient Aboriginal residents (NHMRC, 2007d, p. 4).

The water supply infrastructure comprises a bore that feeds groundwater to an elevated 45 kL storage tank that is automatically refilled once it reaches 60% capacity. From the storage tank water is either gravity fed (when the pump is not operating), or pressure-fed (when the bore pump is activated) to homes and buildings in Oodnadatta (NHMRC 2007d, p. 4).

Although Oodnadatta lies on the Neales River it is not a potential water supply option. This is due to the extremely hot summers (up to 50^{o}C), high evaporation rate (3,300 mm to 3,800 mm/annum) (DEWNR, 2014a), and low rainfall (174.6 mm/annum, based on 66 years of data recorded between 1939 and 2014; (BoM, 2014). Occasional summer storms result in short-term flooding of the Neales River, while artesian water feeds a number of waterholes and mound springs within the Neales River system (DEWNR, 2014b). Throughout the region, as with elsewhere in the far north of South Australia, rainfall is highly variable. Rainfall trends between 1956 and 2010 show a cyclic pattern of below average years of rainfall interspersed with occasional above average rainfall years (DFW, 2012, p. 17). Given the unpredictable and unreliable nature of rainfall and river flow in the region, groundwater from the underlying Great Artesian Basin provides the only reliable source of water for the township. Oodnadatta falls within a Prescribed Wells Area (the Far North Prescribed Wells Area) and its use is subject to protective legislation (Gibbs et al., 2013; Watt et al., 2012).

Based on the population of 140 persons, NHMRC (2007d) estimated that there is sufficient water available to provide residents with 1,004 L/person/day (comprising 998 L from the

reticulated supply and 6 L from private supplies). All the permanent dwellings in the community have access to the reticulated water supply. However, given the variable transient population, it is not possible to determine per capita water consumption. SAALNRMB (2009, p. 12) estimates that the total demand for groundwater in the Coober Pedy-Marla-Oodnadatta-Roxby Downs region is around 1.4 GL/annum.

The NHMRC Community Water Planner risk management plan (Yelland, 2007) ranks Oodnadatta as a risk of -4. Residents of Oodnadatta (Amos, 2009, p. 3) have reported that the water supply at Oodnadatta is 'smelly, salty and dark yellow in colour', and are aware that the mains supply is unsuitable for drinking or cleaning their teeth. Rainwater, when available, is used for cooking and drinking, but concerns have been raised by some households where the effluent from evaporative coolers is leaking onto the roof and contaminating the rainwater supply (Amos, 2009). These water quality concerns become heightened for the more vulnerable geriatric and ill members of the community housed in the Aged Care facility and hospital (NHMRC, 2007d, p. 4).

3.6 Yunta

Yunta is located 318 km north of Adelaide in the Unincorporated Pirie statistical region (RDAFN, 2011, p. 12). It is also accessed by those travelling along the Barrier Highway from Broken Hill in New South Wales into South Australia. The population of Yunta is 48 people housed in 29 permanent dwellings (NHMRC, 2007e). In addition, a large number of travellers pass through or overnight in Yunta using the facilities which include a hotel, roadhouse, public toilets, petrol station and related services.

Yunta lies some distance from the Great Artesian Basin in an area with highly saline groundwater (in excess of 5,000 mg/l) (Gibbs et al., 2013, p. 12). Consequently, the community uses surface water for their water supply. Runoff from a catchment of approximately 25 km^2 bounded by part of the Olary Spur ridge flows into Yunta Creek and collects in a detention basin. Following a holding period in the detention basin, to facilitate the settling of sediment picked up during runoff across the easily erodible silty clay surface, water is released via a sluice gate into two open earth-lined reservoirs approximately 100 m from the edge of the township. The storage capacity of the two reservoirs is deemed sufficient to meet demand. Due to historical reasons, related to the construction of the Indian-Pacific railway line, the infrastructure capacity far exceeds the needs of its' current and transient population (SA Water, 2014a). Although there is sufficient reservoir storage capacity, there is less surface water available during the summer months due to the high rate of evaporation (NHMRC, 2007e, p. 7). Water from the reservoirs undergoes rapid sand filtration prior to being pumped into an overhead holding tank (approximately 114 kL) from which water is gravity fed through the reticulation system (NHMRC, 2007e, p. 5; SA Water,

2005b, p. 11). All but 5 dwellings are connected to the reticulated water system (NHMRC, 2007e, p. 6).

Based on the 2005 annual water production rates (of 7,500 kL/annum) the per capita water availability is estimated between 360.5 and 428 litres/person/day for a population of 57 and 48 persons respectively (based on the estimates of SA Water [2005b, p. 18] and NHMRC [2007e], respectively). Given the thousands of travellers that pass through or overnight in Yunta on an annual basis, a per capita water consumption rate is largely meaningless but provides an indication of the overall rate of demand. In addition to the catchment water available a further 400 kL/annum is privately harvested, which for a population of 48 equates to 23 L/person (NHMRC, 2007e). A high proportion of water use (1,000 litres/house/day) has been attributed to the use of evaporative coolers. While past and current rates of consumption are deemed sustainable (SA Water, 2005b, p. 18), an indication of domestic versus non-domestic water use (tourist-related, business use, leaks) would help to inform water demand management and pricing strategies. Given the dependence on rainfall-related surface runoff, periodic fluctuations and changes in rainfall trends will impact on the availability of water supplies in Yunta. Rainfall in Yunta is around 235.5 mm/annum (based on records from 1888-1996, when the Yunta weather station closed). The closest alternative active rainfall station is at Yongala, approximately 90 km to the south, where the rainfall is 366.0 mm/annum (based on records from 1881-2014) (BoM, 2014). When surface water is unavailable in Yunta, or the quality prohibits its' use (as in other railway townships such as Cockburn, Mannahill, Oodla Wirra and Olary), water has to be carted into the community at great expense (DEWNR, 2010, p. 5). Water carted from Broken Hill or Peterborough costs around $15/kL (SA Water, 2005b).

Although the NHMRC Community Water Planner risk management plan (Yelland, 2007) gives an overall risk score of +3 to the water supply (indicating that adequate barriers are in place to render the water microbiologically safe to use), the water supply is deemed non-potable on the basis that microbiological integrity cannot be guaranteed and some physical (e.g., turbidity) and chemical parameters exceed ADWG (SA Water, 2005b, p. 4). The chemical quality of the water varies depending on the amount of rainfall, evaporation, use and level of animal activity in the catchment area (SA Water, 2005b, p. 11). Animals have free access to the catchment area, and besides the non-potable nature of the water, a key risk is the accessibility to the reservoirs: 'It is not uncommon for local children to swim and catch yabbies in the reservoirs' (SA Water, 2005b, p. 11). The reticulated supply is filtered which lowers the health risk, but is not disinfected. The water filtration unit is cleaned on a weekly basis, and the water is tested on a quarterly basis for *E.coli*, faecal coliforms, and other pathogens. A report on conditions in 2005 showed an absence of the latter pathogens, but reported that on prior occasions toxic algal blooms and gastrointestinal pathogens had been present. Given the known risks in the system, and the time lag

between testing of the water and the ability to notify consumers of any health threat, the supply cannot be deemed microbiologically safe for consumption (SA Water, 2005b, p. 4). Notifications are issued to all residents, and at all water outlets warnings visitors not to consume or swallow water even while showering.

In the view of SA Water, the system at Yunta is 'well managed', but does not meet the potable standards that the SA Water Remote Area Team aspires to. Infrastructure improvements would be contingent on the residents' ability to contribute financially to any projects. Water use is metered by SA Water for consumption-based billing. Yunta residents currently pay an annual water supply charge of $565.60 that is a set rate for South Australia's Northern Railway Towns together with two-tiered water charges based on actual daily consumption; the actual $/kL consumption-based rate varies according to property type with Tier 1 set at $2.32 per kL, and Tier 2 at $13.28 per kL (SA Water, 2014a). These rates are higher than previous rates in Yunta, and differ from those charged elsewhere in the state. For example, in 2005 at a rate of $0.88/kL for the first 125 kL and $4.12/kL for consumption above 125 kL the water charges were two to four times higher than metropolitan pricing (SA Water, 2005b, p. 23). By comparison, residents in the outback township of Marla currently pay $4.65/kL for the first 0.3288kL consumed (Tier 1), and $6.64/kL for consumption between 0.3288kL and 1.4247kL (Tier 2) (SA Water, 2005b, p. 23). Complaints about the water in Yunta are primarily about the cost of the supply and its' odour (SA Water, 2005b, p. 11). To alleviate these financial concerns for residents of Yunta SA Water (2005b, p. 4) suggest that eligibility of access to the Community Service Obligation water subsidy be investigated.

3.7 Water supply options

Drinking Water Risk Management Plans for 18 outback townships were drawn up by the OCA in 2007. The plans, which are reviewed annually, do not outline permanent alternative water supply options, but rather provide details of potential hazards to components of the supply systems (both quality and quantity). They also identify preventive measures aimed at amelioration of such hazards, as well as continuous, daily, monthly, annual and event-based operational management targets and guidelines. For example, for Innamincka the Drinking Water Risk Management Plan recommends daily or weekly (according to seasonal demand) monitoring of the water level in the storage systems to ensure that there is sufficient water available to meet the needs of the resident and transient populations. Where it appears that the target may not be met options are suggested, such as increasing pumping and storage, to meet demand, or finding an alternative source of water, or water rationing to address the issue (Yelland, 2007).

Comprehensive Water Supply Needs Assessments for Glendambo, Yunta and Mintabie have, however, been produced by SA Water in their capacity as water service providers to those

townships (SA Water, 2005a, 2005b). The Water Supply Needs Assessments are technical documents drawn up by experts in the field that also provide capital and maintenance costings for each option, including a breakdown to cost per kilolitre of potable water supplied (Table 3.1). The Assessments cover a range of options from simple, low-cost interventions such as providing notifications that warn the public not to drink the water, to high-cost engineering solutions. In some cases water supply options are prioritised. For example, in Glendambo the need to warn the public about the risks associated with drinking the water was regarded as 'extremely urgent', while other options centre on improving the reliability and sustainability of the water supply. Examples of the latter include replacement of equipment in disrepair; installing and equipping backup bores; disinfecting the supply; upgrades to the storage system; desalination; and aquifer protection measures (SA Water, 2005a, p. 5). Table 3.1 provides an example of some of the water supply options for Glendambo proposed over a 4 stage funding round.

Table 3.1. Water supply options for Glendambo (SA Water, 2005a, p. 24)

Description		Capital	Recurrent/year**		Potable Cost/kL	Non-potable Cost/kL*
			Potable	Non-potable		
Declared non-potable	Stage 1a	$1,000	-	$27,750	-	$2.20
	Stage 1b	$240,000	-	$31,500	-	$2.52
	Stage 2	$115,000	-	$32,000	-	$2.56
	Stage 3	$195,000	-	$32,700	-	$2.62
	Total	$550,000	-	$32,700	-	$2.62
Rainwater***		$1,550,000	$38,000	-	$3	-
Water carting		$130,000	$250,000	-	$20	-
Desalination		$870,000	$50,000	-	$4	-

* Excludes recovery of capital costs and interest (grant funding to be sourced).
** For comparative purposes only. Subject to review.
*** There may be periods of low rainfall that require carting of water or the use of bore water.

The Water Supply Needs Assessment for Yunta (SA Water, 2005b) addresses water quality, security, quantity and sustainability issues. As in the case of Glendambo, although the recommendations and costings are now dated by a decade given the paucity of expenditure in the region, many are likely to remain valid. The Yunta Water Supply Needs Assessment draws attention to health risk issues such as the lack of control over animal and human access to the catchment runoff area and open reservoirs; inadequate sealing of the overhead tank; the absence of standby or backup facilities within the supply system; and other risk prevention shortcomings (SA Water 2005b, p. 4-5). To address these issues SA Water (2005b, p. 4-5), and others (NHMRC 2007a, p. 13; WGOWS, 2005, p.22-23) recommend the use of fit-for-purpose water supply options such as a dual reticulation system in which saline groundwater is used for flushing toilets; composting toilets; ground-based rainwater harvesting; community education programs aimed at improving water use efficiencies; and reservoir covers to retard losses to evaporation.

If any of the major recommendations were implemented in Yunta the small number of consumers and low water consumption would result in high water supply charges to residents due to the high capital and recurrent costs associated with the improvements. While it is thought that improvements in the palatability of the water would lead to an increase in consumption (SA Water, 2005b, p. 11), which might reduce the per kL price of water, nonetheless, the relatively low use even considering the transient population may be insufficient to render the price affordable to residents. If funding for the infrastructure upgrades was forthcoming, because of the cost to residents (i.e. water charged at full cost recovery in keeping with the objectives of the National Water Initiative) community consultation is imperative (SA Water, 2005b).

The Assessments (Glendambo, Yunta, Mintabie) do not include commentary pertaining to community consultation on the options, nor do they address the residents' willingness to pay for a potable supply at full cost recovery pricing. The water supply options recommended by SA Water are regarded by some (Stakeholders Appendix C 2015) as 'gold standard' solutions that are not financially feasible for outback residents, though some business operators have implemented high cost water solutions *in situ* (free from regulation constraints that apply to registered service providers). These issues have led to informal discussions on whether an 'outback water standard' (in which the end product is appropriately matched to local resource constraints) should be applied to small, remote townships located in areas with scant and variable water resources. This however raises questions of equity, and implications of substandard water provision (Stakeholders Appendix C, 2015). Above all, supplementary or alternative water supply options need to be chosen in consultation with local residents, and should take into consideration environmental and socio-economic constraints, as well as the regulatory environment.

While groundwater abstraction or gross consumption is known in most of the townships, given the variable transient populations (seasonal tourism and passing trade) what is not known is the per capita water consumption. An analysis of any difference between residents' and tourism-related water consumption would be valuable. For example, in Innamincka volunteers on the Progress Association have kept accurate daily consumption figures over the past 25 years. Such data should be analysed to inform future demand management strategies. In some townships although water use figures may only be known for a selection of properties, they may nonetheless provide an indication of differences in water use between sectors of the population.

In accordance with the 2004 ADWG (COAG 2004) a Drinking Water Risk Management Plan has been drawn up for a number of outback townships. For example, the plan for Glendambo provides an assessment of the supply including water quality. It outlines the

associated risks, preventative measures and barriers in place to protect the supply, recommended operational monitoring and corrective procedures, recommended verification monitoring to ensure that processes in place are effective, and incident and emergency management protocols (NHMRC, 2007a). What is not known, is whether the plan is in operation, that is, which agency (if any) is taking responsibility for the risks or whether any of the recommended risk-averting processes have been put in place, or whether any budget has been allocated for this. Glendambo Progress Association has a water industry act exemption from ESCOSA (allowing a lower standard of service provision) and the OCA policy in relation to community managed and operated water supplies clearly places these concerns as the responsibility of the Progress Association. While they do have insurance, a comprehensive risk profile is thought to be lacking. These gaps in risk management extend to all five towns.

3.8 Gaps in knowledge

This literature search has revealed a significant *absence* of literature or mention of water supplies in mainstream outback townships in South Australia. Much work on regional water supplies, both in South Australia and interstate, has focussed on the Murray Lands and on remote Indigenous communities but largely the outback townships have been neglected.

While groundwater abstraction or gross consumption is known in most of the townships, given the variable transient populations (seasonal tourism and passing trade) there is negligible information on the per capita water consumption. An analysis of any difference between residents' and tourism-related water consumption would be valuable. Such data should be collected and analysed to inform future demand management strategies. In some townships water use figures may only be known for a selection of properties, nonetheless they may provide an indication of differences in water use between sectors of the population.

3.9 Establishing criteria for infrastructure and governance investment

One benchmark that might be employed to guide water entity decision making investment in water infrastructure is the significance of a potable supply to the townships tourist industry. A second principle might be the vulnerability of the supply and as a consequence the need to ensure it is sustainably managed. A further consideration arising from this chapter is the need to standardise prices across the region, as the variety of entities involved in water supply and management have given rise to price differentials.

Chapter 4: Literature Review on Issues Associated With Remote Water Service Provision and, Where Available, Solutions

4.1 Challenges of equity in remote water services

Australian governments recognise that there should be equity across outback communities with respect to water services and infrastructure (WGOWS, 2005). This goal is challenging because communities vary not just on the characteristics of their water supplies, but on a host of other dimensions that affect supply and demand. For example, communities differ in their degree of remoteness, population size, seasonal population dynamics, capacity to pay for water, need for water, and organisations providing supply. All of these factors need to be considered for water governance arrangements necessary to provide reliable water supplies for the range of uses that remote communities have.

The factors that affect the long-term sustainability of remote water services are also closely inter-twined. For example, population size influences the type of infrastructure required, its financial cost, the human and social capital that might be available for maintenance, the demand placed upon the system, and the potential revenue that might be collected from consumption charges. Similarly, costs over the medium to long-term can be reduced by managing risk and engineering water which is sourced and treated for a specific purpose. Given these types of inter-dependencies, the following discussion is organised around some major topics identified from the literature that are not completely separate concerns.

4.2 The varying capacity and willingness to pay for water

The provision of sustainable water services to remote communities in South Australia and elsewhere has been constrained by high delivery costs, low levels of cost recovery, inadequate local capacity and/or an unwillingness to pay for 'improved' levels of service (Calow et al., 2013; Moriarty et al., 2009). Household metering does not occur uniformly in outback townships and communities (Hart, 2012). Furthermore, some residents are not in favour of improving their community water supplies on the assumption that infrastructure upgrades will be followed by metering and charges (DEWNR, 2010). The South Australian Government's Water for Good draft plan (DEWNR, 2010) notes the apparent contradiction in remote communities where there exists demand for a higher level of service but not for higher water rates. It notes:

> In many … areas there is considerable community demand for improved water supply services and this has been heightened by the decline of existing supplies. There have been cases in the past, however, where communities have voted against

> an offer of a potable supply, mainly because of concerns about increased water rates (DEWNR, 2010, p. 133).

This issue is not particular to outback townships in South Australia, as it has similarly been said of the GWMWater region in Victoria (P. Atherton, personal communication, April 2015). According to the Working Group for Outback Water Supplies (WGOWS, 2005) this unwillingness to pay for 'better' water services suggests market failure in that the private sector has little incentive to provide services for which they are unlikely to be reimbursed. Consequently, the provision of drinking water and sanitation services in remote SA communities has been undertaken by a range of parties including SA Water, the OCA, mining companies, local Councils, community progress associations, and the consumers themselves (i.e. self-supplied).

While it might be interpreted as remote communities "free-riding" on the contributions of other water consumers (i.e. wanting a higher level of service without having to pay for it), the contradiction can also be interpreted as a preference for improved *and* affordable water supply services in remote communities. Again, the contradiction can be interpreted directly that residents believe that a proposed water supply improvement is not worth the increase in rates. Current knowledge about consumer expectations and preferences for water services in outback South Australia, and what types of water systems might be considered acceptable, is limited at best (Werner, 2009).

The importance of providing water of an 'acceptable' quality and reliability cannot be overstated in establishing levels of water services as users may be unwilling to operate and maintain a system if it fails to meet their needs (Moriarty et al., 2009). Although pertaining to the provision of water and sanitation services in remote Aboriginal and Torres Strait Islander communities this issue was highlighted by the Federal Race Discrimination Commissioner (FRDC, 1994, p. 120):

> To date, the push to use or introduce the latest technical systems and technological advances has been driven by arguments surrounding health, equity and social justice...

In regard to who decides what is an 'adequate' water supply or an 'appropriate' solution for Indigenous communities, the same questions arise when considering water issues in the five study townships. While there are social and physical constraints (e.g. small populations, poor quality water resources, etc.) and limits as to what might be technically and financially possible, community values and preferences need to be taken into account so that the supply scheme contributes to social wellbeing as understood by the residents.

4.2.1 Solutions to the issue

In her discussion of the FRDC (1994) report and other material concerning the implementation of water technology in remote contexts, Werner (2006, 2009) stresses the importance of including the voices of the intended end-user in decisions about preferred technologies and implementation procedures. According to Werner (2006, 2009), these decisions need to draw on broader criteria than simply expected standards of water quality and health outcomes, but also embrace the diversity of value positions of those who will be using the water.

Parsons Brinckerhoff (2008) assert that affordable and safe water services might be possible by adjusting the level provided based on factors such as community size, location, need and other factors that affect provision in remote locations. In this way it may be possible to define a hierarchy of service level that is informed by the difficulties posed by remote communities without trading off community health and safety. However, in any ranking of service levels there must be adequate input from the consumers of the water service in order to define concepts like 'community needs'. Community participation in decision-making is also important in accounting for population size given that population numbers can vary substantially within a year (WGOWS, 2005).

In recognition of the high unit cost of providing water in remote communities, the reports by the WGOWS (2005) and Parsons Brinckerhoff (2008) state that full cost recovery is unlikely. They suggest that governments will need to fund service providers through means such as the community service obligation (CSO) payments to contribute toward capital and operational expenditures. This reliance on financial subsidies is consistent with the Intergovernmental Agreement on a National Water Initiative (COAG, 2004) which recognises that 'there will be some small community services that will never be economically viable' (p. 14)—increasingly this is becoming the norm rather than the exception. However, CSO arrangements were also not intended to represent a permanent solution to funding levels of service in small communities:

> Where full cost recovery is unlikely to be achieved in the long term and a community service obligation (CSO) is deemed necessary, the size of the subsidy is to be reported publicly and, where practicable, jurisdictions consider alternative management arrangements aimed at removing the need for an ongoing CSO (COAG, 2004, p. 14).

The presence of public funding support has not meant that water to remote communities has to be completely subsidised. In the Northern Territory, just across the border from the case study townships in South Australia, Indigenous Essential Services (IES) is a not-for-profit subsidiary of Power and Water Corporation that provides water services to 52 remote

communities (IES, 2012). The Department of Regional Development and Indigenous Advancement (RDIA) oversees funding and strategic planning for the provision of essential services which are delivered by the IES. According to the 'Agreement for Provision of Essential Services to Nominated Indigenous Communities 2013-2016' the services are funded from revenue raised and through a Northern Territory Government grant. Remote residents pay a uniform fee for the essential services they receive. However, most of the funding for the IES is from the Government and not from sales. About one-third of funds are from sales revenue with the remaining funds being met by the Government (IES, 2013; Werner, 2009).

While the arrangements of the IES and the principles of the National Water Initiative reflect an appreciation of the financial load of ongoing shortfalls should governments remain the provider of last resort, there are recurring costs associated with the up-keep of failing existing infrastructure (e.g. leaking tanks) and supply provisions that require carting water to the railway townships along the Barrier Highway. It has been reported that water prices in these locations are among the highest in the State and yet not enough to cover the full cost of services (WGOWS, 2005).

The sustainability of water services in remote rural communities in Australia and overseas has been adversely affected by high delivery costs, low levels of cost recovery and insufficient local capacity for the management and maintenance of water schemes. In Australia and overseas, the reality of these conditions usually mean that some external financial support and technical expertise is required if the water supply service is to be sustainable over the long-term.

4.3 Issues associated with volunteer involvement in water service delivery

Community capacity for maintenance tasks and decision-making cannot be taken for granted (Werner, 2009). Skilled individuals may come and go from remote communities or become dissatisfied with their roles over time. Heylen (2007) reports the results of a limited community engagement process conducted on behalf of the OCA aimed at identifying key issues in outback areas in South Australia. Residents of Glendambo, Innamincka, Yunta and surrounding areas attended a community forum (*n*=52), completed a feedback form (*n*=79) or both as a way of contributing their views on reasonably general planning issues. On the topic of 'essential services' Heylen (2007) stated that residents believed there was an over-reliance on volunteers to manage and maintain services in many communities and that this situation was responsible for experiences of volunteer burnout. This was considered particularly acute in townships experiencing population decline as there was a concomitant decrease in volunteer numbers. In other townships participants believed that volunteers were being asked to take on 'increasingly onerous and complex management and regulatory responsibilities' (p. 3).

4.3.1 Solutions to the issue

In Western Australia there are 155 communities with populations of less than 50 residents whose water services are classified as 'self-supplied' (Western Australian Department of Water (WADW), 2009). In such privately operated communities that are outside agency involvement, residents need to be able to maintain their own water supply systems in order to reduce costs and increase their self-reliance. To this end, Grey-Gardner (2008c) in consultation with remote Australian communities produced clear documentation guiding individuals on, among other things, safe ways to dose a water tank with chlorine, carry out basic maintenance tasks and conduct basic water quality testing. According to Grey-Gardner formal training was not required to develop such capacity and, in some respects, it served to distract from that goal because it sought to deliver an inflexible curricula and specified outcomes that were not relevant to responding to 'local demands and project objectives' (p. 19). Furthermore, this work may be useful in the debate about the criteria for government involvement in water service delivery in townships with small and diminishing populations and a lack of public services.

The significant point to raise here is that Grey-Gardner (2008c) proposed a community solution that in many instances assumes volunteerism. Data from Heylen (2007) and Werner (2009) suggest that dependence on volunteers in towns where populations are aging may be unrealistic. Experience from the Walkerton event (Salvadori et al., 2009) would also suggest the need for well trained staff, or a robust risk management plans.

4.4 The need to rationalise the proliferation of outback water service providers

Currently water is provided to remote communities by a number of organisations including SA Water (e.g., Maree, Oodnadatta and Yunta), local progress associations in cooperation with State agencies such as South Australian (SA) Tourism, National Parks SA, or the OCA (e.g., Glendambo and Innamincka), local Councils (e.g., Coober Pedy), and mining companies (e.g., Leigh Creek) (DEWNR, 2013; WGOWS, 2005). This diversity is associated with varying standards of service delivery with mining companies and Councils more likely to meet water supply standards (WGOWS, 2005). The WGOWS recommended that these providers should continue their services but called for the rationalisation of government water infrastructure providers (e.g. SA Water, SA Tourism, National Parks SA, OCA) and changes to the roles of the OCA and SA Water. Specifically, the account management of all water supplies in the outback should be consolidated within the OCA. In this new arrangement the OCA would procure and manage funds for a program of water capital upgrades. Funds would be allocated for maintenance and monitoring projects managed by SA Water and undertaken by local private contractors. According to this report, water supply and sanitation schemes in outback areas would be developed, maintained and managed (including the collection of revenue) by the OCA. SA Water, on the other hand, would provide technical expertise and

management. The WGOWS (2005) claims that its framework for outback water supply introduces a strong governance model, produces water savings by upgrading existing water assets, and attracts Federal Government funding with the aim of delivering potable water to outback communities. As we note elsewhere, OCA has already moved to taking up many of these recommendations.

The OCA has produced an Outback Infrastructure Policy (OCA, 2013) which espouses goals to own and manage community water infrastructure or, alternatively, to advise communities on the management of water assets. According to its policy, the OCA seeks to:

- encourage relevant communities [within its jurisdiction] to transfer ownership and/or responsibility of water supply and associated infrastructure to the OCA;
- strongly encourage communities electing to maintain and manage their water supply to develop an Asset Management Plan to demonstrate the long term sustainability of the supply, both in terms of financial management and resource availability; and
- develop alternative water supply technologies and source funding options to improve water delivery and management in areas within its jurisdiction. (OCA, 2013, p. 6)

In addition to owning and managing water supply infrastructure, the OCA would attempt to procure funding for the development of water supplies to a potable level. These factors taken together situate the OCA as a key water provider, planner and funder for remote communities in outback South Australia. This option for the outback region is consistent with the model described by the WGOWS (2005), and is discussed further in Chapter 7.

Parsons Brinckerhoff (2008) identified different service providers as one of the institutional arrangements that had hindered service provision in remote communities. They state:

> Remote communities differ markedly in terms of service provider, level of service, level of funding and support and level of documentation. These differences in the standard of service increase the risk of communities falling through the cracks, not receive service at all, or are unsure where to turn in the event of a failure. Additionally under such arrangements access to support at all levels of community water services become difficult (p. 19).

With the recent licensing of the OCA to provide water to outback communities, and some agreement with the need to rationalise state water infrastructure providers, there may be sufficient momentum to rationalise water services under the OCA. However, it is unclear whether such a move would be supported by communities who are currently supplied by a

progress association. Without the consent of the relevant communities, ESCOSA's licensing of the OCA may have been premature.

4.5 Options when water service provision is financially non-viable

Small providers typically start out providing water to consumers because there is an unmet need that is often not commercially viable. This point was expressed by the Local Government Association of South Australia (LGASA, 2011) in its submission to the SA Government on the Water Industry Bill:

> … in regional areas, the provision of CWMS (Community Waste Management Systems) was a public service provided by a Council when the State Government's water utility was unwilling to do so, presumably on the basis of scale and economic considerations (p. 2).

For the LGASA, the notion that local governments act as 'retailers' is incorrect as the service is provided out of necessity rather than choice. Like most small water providers, there is no illusion of profit-making. Rather, small-scale providers take on the task of providing residents and visitors access to a water supply scheme when the State has not provided it. This access is consistent with a 'right to life' obligation as determined by the United Nations (Office of the High Commissioner for Human Rights, 2010) and some states of Australia.

Studies on how third party providers might operate in the existing water supply environment have been a focus of the Essential Services Commission of SA's (ESCOSA) issues paper entitled 'Economic Regulation of the SA Water Industry' (ESCOSA, 2010). This statement of issues defines a water retailer broadly so as to include not just SA Water but also 'the operation of small scale Community Wastewater Management Systems' and 'the provision of small volumes of drinking water to persons in remote areas' (p. 27). In late August 2013, the OCA was issued a water retail licence by ESCOSA to provide water services to residential and non-residential customers (ESCOSA, 2013a). Therefore, in current circumstances OCA is one of a number of small water retailers operating in a sector dominated by one very large provider, SA Water.

While licensing by ESCOSA enables the OCA to operate as a retailer, the risky commercial realities apparent in providing water to remote communities remain. ESCOSA (2012a) plans to adopt a regulatory regime that is informed by both the scale and scope of the retail operations undertaken by licence holders. Here ESCOSA will focus on the services provided rather than look to apply different kinds and levels of regulations depending upon the water provider. As noted:

> … it will be necessary for the Commission, having developed the base set of regulatory arrangements, to modify or tailor their application to suit specific water and wastewater undertakings (ESCOSA, 2012a, p.15).

Without studies examining the potential for third party suppliers, recommendations for rationalisation of water providers seem premature. It may be that the OCA is well positioned to take on a larger role in the outback, or there may be other options worth exploring that involve existing water providers such as the Northern Territory's Power and Water Corporation (providing cross border supplies) and SA Water who have the expertise and capacity to supply water to remote communities, but these options have not been canvassed in the literature.

4.6 Can the remote area energy framework be applied to water services?

Although energy-focussed, the operation of remote power supplies in outback communities in South Australia may provide a framework for water service provision and details are provided below.

Recognising that costs are prohibitive (three times the cost of Adelaide supplies) for residents in many small communities that are off the power grid, the South Australian government has responsibility for electricity through a Remote Area Energies Supplies Scheme. In 2011 the Minister for Mineral Resources and Energy assumed responsibility for the electricity supply to communities across three Aboriginal Land Holding Authorities (South Australian Government, 2015) with many Aboriginal communities now paying for electricity. All residents in towns off the grid pay the standard grid price plus an additional 10% with the Community Service Obligation used to make up the difference between the real costs and what residents are charged. This is paid either to local progress associations, or other providers, including private for-profit providers (South Australian Government, 2015). In effect the government subsidises electricity supplies on a sliding scale so that high end users come closer to full cost recovery. The criteria for financial support are as follows:

- Small to medium domestic customers (up to 8000 kWh per annum) pay 10% or more above the grid price.
- Large domestic customers and commercial entities pay full cost recovery once a minimum rate is consumed—a similar costing approach could be applied to outback water services.
- Government agencies pay a tariff which reflects the average full cost of supply.
- All customers pay a fixed supply charge similar to on-grid customers of $50 per quarter (KPMG, 2011, p. 14).

The local progress associations or private providers manage the day to day operations, including maintenance of assets, call out and emergency visits. ETSA utilities organises meter reading and billing (KPMG, 2011).

In 2011 the State government commissioned KPMG to examine efficiencies given the high cost of diesel. The KPMG report (2011) indicated that there is some capacity for further efficiencies in one or two of the larger towns or where these towns are close to mining companies (e.g. Coober Pedy, BHP and Oz Minerals), but that subsidies will need to remain in place given that the costs are beyond residents in the smaller townships. A range of conservation measures are recommended, as well as support for OCA to take on an extended role in applying for funding for service improvements.

4.7 Issues of water quality and quantity

A number of reports pertaining to water supply in remote South Australia and elsewhere point out that the water quality is designated as non-potable. Not all townships in remote South Australia treat the supply for microbiological contaminants (with chlorine or ultraviolet light). Given the difficulties of regular testing of non-potable supplies, the NHMRC (2004) advocated a risk-based approach to the development and management of small, non-potable water supplies.

This approach has been explored in remote contexts by Grey-Gardner (2008a, 2008b, 2008c) as part of the Desert Knowledge Cooperative Research Centre's Remote Community Water Management Project. According to Grey-Gardner (2008a) the risk management approach is relevant to remote settlements because:

- external responses to poor water quality events is particularly slow due to difficulty in accessing laboratories, contractors, technical advice and parts;
- health facilities are usually difficult to access so there is an increased risk of water borne illness;
- regular inspection of water supply infrastructure is routine in small settlements simply for security of supply, so additional steps to protect water quality are not particularly onerous; and
- the cost of incremental change to water supply systems to progressively target risk factors is more affordable than large-scale installation of 'safe' water treatment and infrastructure (p. 150).

The risk management approach assesses the health risks associated with the water supply and feeds the information into a community decision-making process to set water planning priorities in the context of community needs, aspirations and capability. Subsequently, a management strategy is developed following which participants negotiate the roles and responsibilities necessary to implement the strategy. Grey-Gardner (2008a) found the approach to be promising in the five case studies in which she applied it, and stated that 'with an understanding of risks, residents are able to make hard decisions that utilise their social and human capital to make the [water] management plans work' (p. 153). Where participants had begun the water management process with complaints about poor levels of

service, they quickly moved to exploring what they could do for themselves with external support based on the water management plans they had developed. However, we note this appears to be dependent on volunteers.

The Western Australian Government's Department of Water (WADW) produced a Water Quality Protection Note (WADW, 2009) for improving the quality of drinking water in remote communities where water was self-supplied. The note makes recommendations about where to locate bores, their design and construction, operation and management (including water quality monitoring) and emergency preparation and reporting. These sets of recommendations aim to minimise the risk of contamination rather than to deliver potable water. Moreover, the operation and management recommendations take into consideration the small population sizes of remote communities. For example, the note suggests daily testing of chlorine levels and suggests that this can be achieved using an ordinary swimming pool test kit, but once again the issue of volunteerism emerges.

Rainwater harvesting has been identified as a supplementary source of water that can improve the sustainability of water resources in remote communities (Willis et al., 2009). However, if not properly maintained rainwater tanks can harbour unsafe levels of microbiological activity (Heyworth et al., 2006). In a submission to the House of Representatives Standing Committee on Agriculture, Fisheries and Forestry (HRSCAFF, 2004) Bursill (Chief Executive Officer of the Cooperative Research Centre for Water Quality and Treatment) comments:

> …I have never seen a sample of rainwater come to our laboratories over the years that has come within cooee of meeting the microbiological guidelines that are in place…I always say that it is hard for government to recommend something and even subsidise something that they know full well does not meet health guidelines for drinking water (HRSCAFF, 2004, p.143).

Contaminated rainwater supplies from air conditioning runoff was identified as an issue by a group of Oodnadatta community members in their submission to the Inquiry into Remote Community Stores in Aboriginal and Torres Strait Communities. According to the submission, the water quality is very poor in Oodnadatta such that rain water has been an important supplementary source:

- Township water supply in Oodnadatta is not-drinkable [sic].
- SA Water have provided Oodnadatta businesses with a letter saying that the water is unsuitable for cleaning teeth.
- We rely on rainwater for drinking and cooking.
- During drought times households run out of rainwater.

- In some households air-conditioning water runs onto roof and into rainwater tanks causing rainwater contamination. (Inquiry into Remote Community Stores in Aboriginal and Torres Strait Communities, Submission No. 70, 2009).

According to Bailie et al. (2004) the study of health impacts of water quality and quantity on remote communities in Australia is uncommon. Heyworth et al. (2006) explored the risk of contracting one illness (i.e. gastroenteritis) among children in rural South Australia who drank water from rainwater tanks and children who drank water from a mains supply. While gastroenteritis was found to be a significant cause of morbidity among children, the source of water was not a significant factor. Rather, adequate hygiene practices were found to be important in lowering risk irrespective of where the water was sourced. Therefore, even where the goal is to achieve better health outcomes, water can be fit-for-purpose.

4.8 Fit-for-purpose supplies as an overarching solution

With reference to remote settlements in general, the Centre for Appropriate Technology (undated) laments the lack of consideration of the applicability of water-related technology to local conditions:

> The challenge in remote settlements is to utilise smarter (lower cost, more efficient, user-friendly) and more regionally-appropriate (to climate, geography, local skills) ways of gaining the basic services required to support healthy lifestyles, without the negative consequences of wasting valuable water and economic resources.

However, a good number of studies have demonstrated that water technology does not always deliver the benefits that it was planned to do. Technology breaks down, does not meet its design specifications or proves to be the wrong sort of technology given community values and needs. A report by the Federal Race Discrimination Commissioner (FRDC, 1994) found that many issues associated with water provision in Aboriginal and Torres Strait Islander communities were social and political in nature rather than purely technical, thus, according to Lockwood et al. (2010):

> Providing a service relies on many different factors being in place and working together: 'soft' factors such as skills, behaviours, norms and practices; 'hard' factors such as suitable technologies; availability of finance for capital expenditure; and institutional factors that can provide for long-term support to community systems.

Little is published on the social contexts of the five case study townships in which water is supplied that might guide any discussion around fit-for-purpose. There appears to be more detailed information about the hydrology of the region and the water supply infrastructure that currently exists, than information on resident capacity or aspirations. Setting levels of

service for any community requires an understanding of how technological and human (including institutional) dimensions might interact to result in prescribed social, economic and environmental outcomes.

Werner (2009) also emphasises the notion that the sustainability of water technologies requires community consultation and participation processes by which local knowledge and values can serve as inputs into decisions about appropriate water technology. Part of this assessment must include an understanding of how water is currently used in a community, (and what aspirations are unmet) in order to identify opportunities to provide water that is fit-for-purpose. This appreciation should also serve to clarify what is meant by an 'adequate' water source from a whole-of-community perspective (Grey-Gardner 2008c; Werner, 2009).

Fit-for-purpose water technology has not been widely discussed where remote communities have been concerned. This notwithstanding, the provision of water to a level adequate for specific purposes (e.g. toilet flushing) would seem appropriate in towns where water is both scarce and difficult to treat to a potable level. The WGOWS (2005) makes note of examples in Coober Pedy and Leigh Creek South where fit-for-purpose options have been implemented, and SA Water's Water Supply Needs Assessment for Yunta (SA Water, 2005b) discusses the potential for re-using septic tank effluent for subsurface irrigation. However, there does not appear to be literature that describes how water from a variety of catchment areas might be integrated to deliver the required water for the purposes desired by specific communities.

Where potable water is required (e.g. for drinking and food preparation) point-of-use (POU) and point-of-entry (POE) systems have been put forward as promising technologies for small remote and rural communities in Australia (Grey-Gardner, 2002; HRSCAFF, 2004) and settlements in the developing world (Sobsey et al., 2008). These technologies have begun to be trialled in Australia by Victorian water corporations. Evaluations of the technology have been mixed and show that some designs are superior to others. However, for the POE/POU technologies that do perform well, the preliminary evaluations indicate that they are capable of offering an alternative to larger scale water treatment systems (Atherton, 2011; Gray et al., 2007).

Other sources of water supply (e.g. wastewater recycling and stormwater reuse) may also add to the sustainability of groundwater systems in remote areas (WGOWS, 2005). Moreover, on the demand side, water conservation measures (e.g. metering, outdoor water use restrictions) have been recommended for settlements in remote outback communities especially if water infrastructure is to be upgraded using public funds (WGOWS, 2005; Wright, 2002), although this can be a contentious issue. Demand management is important

as the provision of potable water and fit-for-purpose water in general is likely to promote higher levels of water consumption.

In setting levels of service, the main objective is usually to deliver a standard of service consistent with consumer expectations at a reasonable cost. Achieving this objective requires establishing consumer expectations and what costs might be regarded as reasonable. The standard of service applies to the quality of the water and the quality of the means of delivering the water. Reasonable costs on the other hand may refer to financial costs or other kinds of costs such as environmental degradation or inequities in accessing the service (ARCWIS, 1999). This relatively broad approach to setting levels of service requires an understanding of not just factors such as hydrological characteristics and financial mechanisms but also factors describing the social context of the settlements where the service is to be delivered. For this reason, rationalisation of service providers seems solid advice, given the requirements to meet regulatory obligations and customer expectations.

4.9 Establishing criteria for infrastructure and governance investment

Criteria identified in this chapter for establishing a service include:

- Evidence the town's customer base have been consulted;
- The availability of appropriate technology for the town;

Criteria identified for electricity charges/fees, and access to CSO include:

- Small to medium domestic customers (up to 8000 kWh per annum), pay 10% or more above the price set for urban customers;
- Large domestic customers and commercial entities pay full cost recovery once a minimum rate is consumed;
- Government agencies pay a tariff which reflects the average full cost of supply;

All customers pay a fixed supply charge similar to on-grid customers of $50 per quarter (KPMG, 2011, p. 14).

Parsons Brinckerhoff (2008) suggests a hierarchy of decision making based on some of the criteria outlined. This hierarchy would determine the technological level of service and infrastructure engagement. We address this in Chapter 6.

Chapter 5: Literature Review on International and Interstate Regional Water Supplies and, Where Available, Application to Outback South Australia

5.1 What is a sustainable service in remote and rural contexts?

There is a large body of international literature on sustainable water services, with different authors promoting different criteria to define sustainability (Abrams et al., 1998; Giné and Pérez-Foguet, 2008; Harvey and Reed 2007; Hodgkin, 1994). Nonetheless, sustainable water supplies are generally regarded to be largely self-sufficient over the long-term, financed by users of the system, and provide benefits to consumers over a long period of time. Despite the lack of precision in these criteria, in developing countries there is an expectation that a water supply system should require little external support from government and donor organisations and to operate over a time frame that warrants the investment.

Based on earlier work by Mukherjee and van Wijk (2003), Gine and Perez-Foguet (2008) have identified six factors that influence the sustainability of water and sanitation services: institutional, managerial, social, financial, technical and environmental. In essence, these dimensions describe a sustainable service as one that does not degrade the natural environment, operates reliably with minimal external assistance, delivers social benefits and improves health outcomes, is paid for by those who benefit from using it, and can be effectively managed to provide benefits over the long-term.

Carter et al. (1999) take a more dynamic approach to describing a sustainable water service. They present four components of a process, with the absence of any one component resulting in the potential breakdown of the system (see Figure 3). The 'sustainability chain' developed by Carter et al., (1999) begins with community motivation to use the water service based on the realisation that the new system is superior in key ways to the old system. Community involvement in planning and managing the service and a sense of community ownership are regarded as important aspects of community motivation, although this should not put an undue burden on a small number of volunteers.

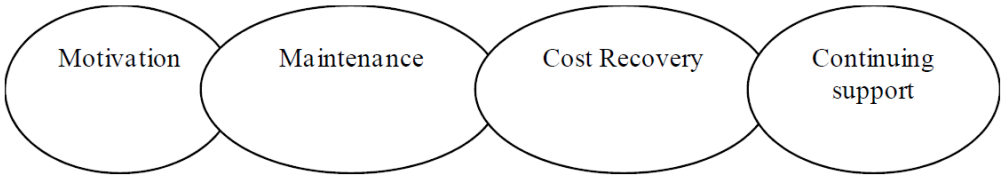


Figure 3. The sustainability chain (Carter et al., 1999)

Maintenance refers to the need to have a maintenance strategy in place that can be implemented by a trained and appropriately resourced organisation. In many cases, and particularly in developing countries, system maintenance requires the cooperation of community members and some well-resourced government agency. Clear communication between the relevant parties is essential to achieving system reliability, although it is not clear if local communities volunteer their services or are paid.

The financial sustainability of the service depends upon cost recovery mechanisms that are transparent and accountable. Metering, billing methods administration and accounting need to be able to generate revenue that meets the ongoing cost of providing the services (including training, staffing, maintenance, etc.).

The international literature, which mainly describes case studies in developing world contexts, involves international donor organisations and government aid programs that are absent from the South Australian context. Moreover, the remoteness characteristic of the South Australian study towns does not appear to be a large concern in the international literature. In addition, very small populations and related issues such as insufficient economies of scale are mostly missing from international discussions. Rather, concerns such as revenue collection, maintenance and the relationship between village leadership, government and aid organisations for the management of small scale technologies (e.g. hand pumps) appear with some regularity.

The description of water supply issues faced by remote South Australian communities and discussed earlier suggest that there are only general insights that might be gleaned from international experiences. Technological solutions implemented in remote communities in Australia have sometimes heightened levels of expectation among the community which are not always met in practice. Furthermore, communities can experience frustration when the technology delivered was not their preferred option (ATSISJC, 2001). The international literature mirrors these themes, particularly in developing countries where significant

investments in water supply has resulted in increased numbers of poorly functioning and under-utilised water infrastructure (Briscoe and de Ferranti, 1988; Kleemeier, 2000).

While there are differences between perspectives on sustainable water supply, as well as areas of agreement, models from the international literature illustrate that various facets of sustainability need to be deliberated upon by the relevant stakeholders, including the users, the infrastructure providers, regulatory institutions, technical experts, etc. Participatory methodologies for setting levels of service in the water industry have been identified and evaluated for use in Australian urban contexts (Jorgensen and Syme 1994; Syme and Jorgensen, 1995; Syme and Jorgensen, 1999; Speers et al., 2002) but rarely in remote communities. Setting levels in urban environments have typically sought quantitative data regarding consumers' perceptions of the existing level of water services and their preferred level of service (which may be higher or lower than the existing level of service). In addition, measuring consumers' willingness-to-pay for a higher level of service has been proposed in order to conduct an analysis against its expected cost. However, these quantitative survey approaches are probably not suitable for use in small communities, where significant cultural and social imperatives for water exist, and where much of the existing infrastructure may need to be abandoned or significantly embellished.

If community motivation, maintenance and cost recovery are present, then it is likely that the community will continue to utilise the systems into the future. However, according to Carter et al. (1999), given the high cost of providing water services in many remote communities, on-going cooperation between the community, government and the water provider is necessary. External support of some kind, and to some degree, is crucial to the sustainability of water supply systems in the developing world largely because the resources required for management and maintenance and the poor economies-of-scale present significant challenges to small and impoverished rural villages.

5.2 What is a sustainable service in the developed world: Rural Water Supply Program Western United States

As noted above there was some difficulty in finding specific examples from the international published academic or grey literature that provided comparable examples to outback South Australia. One area with some similarities to outback South Australia was rural central and south west North America. Under section 104 of the *Public Law 109-451*, the *Rural Water Supply Act of 2006* requires the US Department of Interior, Bureau of Reclamation (henceforth referred to as Reclamation) to provide a systematic program for potable water to rural towns and Native American communities. Its brief requires Reclamation to 'i) investigate and identify opportunities to ensure safe and adequate rural water supply projects for domestic, municipal, and industrial use in small communities,… ii) plan the design and construction …and conduct feasibility studies; and iii) oversee the construction'

(US Department of Interior, Bureau of Reclamation, 2014, p. 8-10). In attending to the brief Reclamation establishes four criteria directed towards efficiency in decision making. These are:

- Do the criteria reflect the goals and objectives of the rural Water projects as …authorised by Congress?
- Is the data required for the proposal readily available?
- Is the cost of collecting the data relatively low?
- Is the selection process transparent?

A further six criteria focused on sustainability:

- Is there an urgent and compelling need for potable water supplies?
- How close is the project to being completed?
- What is the financial need of the communities and what is the relative economic effect of the project?
- Does it meet Reclamation's goals?
- Does the project minimize water and energy consumption?
- Does the project serve the needs of tribal communities and tribal members? (US Department of Interior, Bureau of Reclamation, 2014, p 8-20)

The final dot point above is of particular relevance to outback South Australia. There are a considerable number of Native American communities that come under the Reclamation programs. As a result funding from the Director of the Indian Health Service is available along with all other responsible agencies. The Act allows for funding from the Indian Health Service to be allocated towards potable water supply infrastructure on Indian reservations as well as for those towns where there is a significant Indian population. The program also allows for this funding to be directed to towns where there is a very low Indian population or none at all as part of its non-core provisions. In such cases these towns benefit from the Native American-based funding.

Projects are funded by Reclamation, a Federal entity, to support state and local community water suppliers up to 75% of the full cost where specific criteria are met. The criteria are weighted and are summarised as:

- The town has a population of less than 10,000 - or where the Native Americans population is below 5,500. The higher the population the higher the weighting, the higher the density of population the higher the weighting, the higher the number of communities in partnership the higher the weighting.
- The town can access consumer payments to support the service and in the case of loans, repay the loan.

- For small communities a state-based loan must be provided equal to 15% and 30% for disadvantaged communities. Areas with the highest rate of poverty get higher weighted scores. Communities with state and other grants higher than 25% get a higher weighting.
- Any residual loan taken out by the community must be set at a rate that allows repayment costs to be met by the population.
- The town has access to funding from alternative sources, e.g., the state.
- The median household income of consumers/customers must be below the national poverty level or other relevant criteria (e.g., Native Americans incomes below $15,110 and/or unemployment rates of 5.5%). The higher the poverty rate, the higher the weighting.
- The project must contribute to health, sanitary or security issues. The higher the number of violations the higher the weighting.
- Communities that can connect their supply to an existing service get a higher weighting. This is especially pertinent to non-Indian towns.
- The higher the impact of the new supply on economic development for the region the higher the weighting. (US Department of Interior, Bureau of Reclamation, 2014 p. 8-20)

An example of a regional water system collaboration between Native Americans and non-Native American residents is the Rocky Boys-North Central Montana Rural Water System. The Native Americans access potable water via a core pipeline, while non-core pipelines service 21 surrounding towns (with populations as low as 150 and where the number of Native American residents is less than 50%), as well as the broader rural area. The US$4.6 million funding amassed through the collaborative scheme enabled the end-users to have access to infrastructure that met with *Federal Safe Drinking Water Act* regulations. Brady County is one such example of an unincorporated town benefitting from this collaboration. The town (population 140) is located close to Blackfoot reservation, but comprises less than 2% Native Americans (US Department of Interior, Bureau of Reclamation, 2015). The other similarity to outback South Australia was its reliance on groundwater.

While it is clear there is a proliferation of water utilities operating under this US scheme, it also points to a *whole of outback* approach where funding is pooled. Federal funding designated for Native Americans is able to be pooled to service the needs of Indians off reservations, living in small remote towns. Added to this, small towns that can meet the designated criteria of proximity to the infrastructure, but have low Native American population, or none at all, are able to tap into this infrastructure to meet their own specific needs.

5.3 What is happening elsewhere in regional Australia and how it applies to the Outback

Retrieving literature on how water supplies in small outback towns in other states is managed was difficult, although there are a small number of reports on water supplies in regional towns with larger populations than in outback South Australia (Miles et al., 2010a). While these reports do not fully address the issues of small remote towns where populations are under 1,000 and in some cases less than 20 people, they do illustrate some common problems and possible solutions. The examples below are divided by population numbers into those above 2,000 and up to 15,000, and those a low as 1,500 to 500.

5.3.1 Regional towns with populations 2,000 to 15,000

One of the most comprehensive reports on water supply, security and governance issues in regional Australia was prepared by AECON for Infrastructure Australia in 2010 (Miles et al., 2010a, p. v-vi). This report provides an overview and reform strategy for safe and secure water supplies that comply with the ADWG for all six states and the Australian Capital Territory and Northern Territory. The study focused on regional towns with populations between 2,000 and 15,000 noting that under the current national regulatory framework all utility providers with over 50,000 connections are required to report annually on performance to the NWC and the Water Service Association of Australia. A number of the key findings are relevant to smaller remote towns, utility providers and progress associations that are the subject of this report. For example, the report identified that regional Australia is noted for the variability, rather than standardisation in water management. Some States and Territories, such as South Australia and the Northern Territory, are serviced by a small number or single providers, while others are awash with utility providers. This variability also occurs in water resource planning.

A significant number of the utility providers do not achieve full cost recovery. The authors argue that for the majority of providers this was not possible, given the low and variable population numbers and the high cost of infrastructure. Despite this there were a number of anomalies such as gross differences in the price of water (ranging from $0.70c to $11/kL), independent of population numbers, cost of infrastructure or water use, and in some instances water prices were lower than that provided in urban areas. Differences were also evident in water restrictions, even where the catchment area was shared between providers (Miles et al., 2010a).

In commenting on the capacity of these suppliers to meet the ADWG guidelines the authors argued that in many instances this was further hampered by declining rural and regional populations with limited availability or access to professional and technical staff with the required skills, willingness to live in the region, or access to continuing training. They also highlighted inadequate infrastructure to comply with water regulations, and poor

management processes at the local and state level to ensure compliance. Examples included differences in approaches to data collection across utility providers within regions and states, and differences in water restrictions even between suppliers accessing the same water source (Miles et al., 2010a).

Miles et al., (2010a) made a number of recommendations including:

- Working towards amalgamations of water providers to achieve economies of scale to assist in the provision of infrastructure and maintenance. Larger utility providers with a more secure economic base are in a better position to instigate infrastructure up-grades and purchases, but also to employ the necessary technical and professional staff;
- Standardising reporting and monitoring processes between utility providers across the nation;
- Proposing that the cost of water should reflect the cost of supply. In addressing the inevitable impact of these costs on low income groups they argued for compensation payments. These could be via a regional or zone allowance, a welfare benefit or subsidy for eligible consumers. In the discussion on pricing reform they suggested the need for either a CSO or Zone pricing scheme (also referred to as postage stamp pricing) which they believed most Australians accept;
- Identifying the state-based model that was developed in Victoria in the 1990s as part of the Kennett Government (1992-1999) reforms as the ideal model. Under these reforms 370 local government water service providers were amalgamated into 12. Under the Victorian model regional water corporations are owned by the Government of Victoria. An alternate model proposes mandatory alliances between various regional providers similar to that operating with the Lower Macquarie Water Utilities Alliance.

The AECOM reports (Miles et al., 2010a, 2010b) examined water utility supplies in 20 South Australian regional towns with populations above 2,000. Not all were serviced by SA Water. Volume 2 of the report attempted to unravel the complexity of water supply governance in Australia arguing for a simplified system similar to Victoria. With over 800 agencies tasked with managing supplies in Australia this was a reasonable aspiration. In illustrating best practice the report compared each state in terms of where responsibility for water management lies. The ideal model presented was Victoria where all agencies vested with the provision of regional supplies sat at either state or regional level, with the Regional Water Boards reporting to the government. By comparison South Australia has a model with responsibility at state, regional and local level with multiple providers, including 27 private irrigation trusts, along with private urban/regional and remote providers. The assumption within the report was that this has led to differences and inadequate pricing and funding of

water and infrastructure, lack of compliance with reporting, poor governance and management and insufficient funds or technical competence to ensure ongoing maintenance in comparison to Victoria.

5.3.2 A solution

The Case Study: from small to regional to state wide: TASWater

The formation of three regional water utility companies from the amalgamation of 29 council services in Tasmania in 2009 represents a case study that captures a number of the issues highlighted in the AECOM reports (Miles et al., 2010a, 2010b). The decision to form three regional providers was based on a desire to keep the service close to the people, a belief that the technical services would be efficient and the desire that this solution deepened democracy (Aulick et al., 2011). There was also a strong view within local councils that they were ideally placed to provide specific services such as water and wastewater.

It was these three sometimes competing ideas that motivated the formation of three water and wastewater utility providers for Tasmania. In 2006 the Tasmanian Premier, Paul Lennon, created a Water and Sewerage Taskforce explicitly to examine the inefficiencies in water and wastewater supplies operated by the 29 councils across the state (Legislative Council Tasmania, 2014). The Taskforce found that fewer than 30% had an adequate asset management plan, only 2% had sufficient funds to manage debt or further investment in infrastructure, and over 50% were not compliant with their licencing conditions with 23 of them on permanent boil water alerts many of which were in high tourist destinations (Aulick et al., 2011).

The Taskforce made a recommendation that there should be either one single entity or that a regional model be developed. The key principles governing both models included the need for a business focus, an independent board made up of technical, business and professional experts, and it should operate as a government owned company subject to appropriate reporting mechanisms (Aulick et al., 2011). Further, principles stipulated that it would need to be able to manage the transfer from small local government suppliers to larger entities and be of sufficient size to attract and maintain a skilled workforce.

The response from the Local Government Association of Tasmania was to propose a regional model with ownership retained by local councils. The argument being that this approach ensured proximity to the community, provided detailed knowledge of the assets and ensured an efficient transition process (Aulick et al., 2011, p. 71). As a result of this submission three new water utilities were established, namely Ben Lomond Water, Cradle Mountain Water and Southern Water, with Onstream (a 4th entity) providing the corporate services to all three. Boards were established for all three, but only two of the six members of all three boards came from the local councils. Hence the concept of representative

democracy was not fully achieved. Other problematic issues appear to have arisen from a rushed implementation (Aulick et al., 2011, p. 73).

By July 2013 all four corporations had merged to form TASWater an entity representing all 29 councils as owners (TASWater, 2014). Motivation for the merger into a state wide service arose from the issues identified by the 2006 Taskforce. The four existing entities (Ben Lomond Water, Cradle Mountain Water, Southern Water and Onstream) could not adequately address the deficits. Ownership of TASWater still rests with the 29 councils who receive annual dividends, but have little say in the day-to-day operations. Management of the regulatory obligations still eludes TASWater given the high cost of compliance (Legislative Council Tasmania, 2014). While economies of scale do allow for cost shifting to support poorer communities, and for water to be delivered to remote sites and low population density towns, the high level of regulation and the impact compliance has on expensive infrastructure means that water charges have increased. A report on the cost of living in Tasmania makes the point that water and sewerage charges have increased annually since 2005 despite two amalgamations. One of the reasons for this is that the original charges levied by councils did not cover costs or allow for investment in future infrastructure (Eccleston et al., 2014). Furthermore, water supplies have been extended to towns with populations under 200, examples being Tunbridge and Wayatinah.

5.3.3 Regional areas with populations less than 2,000

Management of water supplies in low population, remote, drought-affected outback areas is an issue covering the majority of the Australian land mass and extends across Queensland, the Northern Territory and Western Australia. Despite this, there was a lack of access to information on how states, local governments or outback associations manage such issues. In its response to the National Water Initiative Review (Cameron and Fearon, 2013) QldWater took a scathing approach to the idea of full cost recovery or Public, Private Partnerships (PPPs) for remote and very remote towns noting that:

> … the notion of private investment in capital infrastructure in small communities is absurd… the suggestion that such issues can be overcome through aggregation, collaboration or 'scale' is only slightly less preposterous …. (p. 4)

Similarly, Cameron and Fearon (2013, p. 5) note that 'secure water and sewerage services to small and remote Queensland communities requires more courageous solutions than the tired, high-level recommendations to regionalise and explore PPPs'. In making these comments they opt for alternative supply options including self-supply and fit for purpose rather than high technical solutions, but also note that the state and territory governments need to subsidise these services via CSO provisions. In taking up this position they propose state-based regional infrastructure advisory panels to provide independent advice to

regional suppliers, but clearly without the same regulatory constraints given the supply is fit-for-purpose, rather than the high-end technology required to meet all regulatory requirements (Cameron and Fearon, 2013, p. 6).

In Western Australia water supplies for town-based Indigenous communities in rural regions are usually provided by the WA Water Corporation to the gate, but not to individual houses. In remote communities with a population over 50 people or in excess of five houses water supply is managed through the Department of Housing Remote Aboriginal Essential Services Program (WADW, 2013). The situation for non-Indigenous communities is similar to that of remote Queensland with economies of scale remaining difficult to achieve. A commissioned study by the WA Economic Regulator in 2007 (The Allen Consulting Group, 2008), tasked with examining competition within the water industry in the South-West of Western Australia, could make few recommendations for increased efficiencies. In this study the range of householders and customers was 200-15,000 across the 12 existing water and/or wastewater providers.

The consultants put forward nine proposals for amalgamations but admitted that only one was financially efficient, given the high cost of mergers and the impact this might have on staffing and consumer satisfaction. Significantly, very small towns with populations under 100 were excluded from their analysis. Much of the diseconomies of scale arose from the fact that tariffs differed across the 12 providers, and amalgamations would have led to standardisation and consequent customer dissatisfaction. Some economies of scale existed prior to this consultancy, with some of the larger schemes already sharing technical and professional services so that loose networks already existed between the larger Water Corporation and smaller entities (The Allen Consulting Group, 2008). This loose network, whereby smaller services draw on the expertise of larger providers has been explored in Queensland through the process of mandatory and voluntary alliances. An interesting example of what happens with alliances is the case of that proposed by the National Water Commission (NWC) for south-east Queensland. The case study illustrates the political vulnerability of alliances, as well as the potential for safeguarding customer/utility sovereignty while ensuring increased access to technical expertise.

5.3.4 Case study: Regional alliances: Queensland Water Regional Alliance Program (QWRAP)

Projections for significant population growth in south-east Queensland led the NWC to contract consultants, SMEC, to examine an integrated water supply option for north-east New South Wales and south-east Queensland that would have resulted in something akin to a cross-border mandatory alliance. The motivation was the capacity of the north-east New South Wales river system to capture water, and the less reliable supplies in south-east Queensland which is the fastest population growth area in Australia. The report is

interesting for noting that the New South Wales government refused to provide sufficient data, and for the fact that all the options, other than business as usual, would require some resolution between New South Wales and Queensland legislation (SMEC, 2007). As recently as 2010 various water utility providers in Queensland (Seqwater, Unitywater, Queensland Urban Utilities and the water businesses of the Redland, Logan and Gold Coast city councils) formed a partnership to ensure water security, with the deal brokered by the Queensland Water Commission (Queensland Water Commission, 2010; Seqwater, 2013). No New South Wales provider joined the alliance, highlighting the difficulties of alliances, particularly across states. During the period that Premier Newman was in government in Queensland these alliances started to unravel highlighting the vulnerability of non-legislative agreements within states (Queensland Water Directorate, 2014).

In the light of the rejection by the Newman Queensland government (2012-2015) of further state water reform, Qldwater moved to increase its support for the various regional and rural communities who had formed collaborative alliances, rather than mandatory alliances. This led to the formation of the Queensland Water Regional Alliance Program. One of the key focuses of the Alliance is the exploration of full water cycle management, although it is readily recognised that the initial establishment costs are high and, for the most part, beyond the capacity of services with low populations. The Queensland experience also demonstrated that total Water Cycle Management Plans are dependent on strict regulation, and once this is removed, they risk being abandoned (Cameron and Fearon, 2013, p. 14).

The Queensland Water Regional Alliance Program has been operational since 2010 with a focus on identifying the most appropriate institutional arrangements for the provision of drinking water and sewerage services in remote and regional communities (Fearon, 2014). To date four regions have self-selected as pilot study sites. All four pilots have engaged in reviews of their current services and the benefits and costs to moving to alternative regional models including full amalgamations. The four groups are the Remote Area Planning and Development Board (RAPAD), the Far North Queensland Regional Organisation of Councils (FNQRoC), Whitsunday Regional Councils and the Wide Bay Burnett Regional Organisation of Councils (WBBROC). The most pertinent to the South Australian situation is RAPAD representing 0.3% of the total Queensland population, covering a land mass larger than the state of Victoria, and with a number of small towns with populations under 400. The RAPAD Board (2014) Annual Report notes that water supply and governance issues are handled through the Outback Regional Water Group and the Outback Regional Water Technical Group. These two groups act as the major decision making bodies across the regions in priority setting, generation of funding for major capital works, training, and the handling of economies of scale for technical and professional support. They operate within the RAPAD structure under a single constitution, with MOUs between the various shires, with members either elected from the various towns or professional and technical experts. This model is

not an amalgamation of the various shires, but an alliance. This decision followed an independent review of capacity which argued against full amalgamation as a result of low population and resource base. However, it is possible that one of the other three pilot regions may opt for full amalgamation given their larger populations and resources. This recommendation is based on well-off councils not wishing to subsidise less economically viable services with low populations, beyond extending or sharing technical and strategic resources.

Despite the limitations of the RAPAD alliance, leadership of the two water groups within RAPAD alternates between the mayors of the various towns. A number of smaller communities and towns within the alliance have been able to access resources and technical support/training and infrastructure as a result of the broader collaboration, cross subsidies, and the financial benefits that come with having alliances with larger populations (Fearon, 2014; RAPAD, 2014). According to Fearon (2014) the most significant factor in the success of the RAPAD is its voluntary status.

Significantly, the examples provided here from within regional and remote Australia illustrate the impossibility of full cost recovery if the service is to meet regulatory requirements. Collaborative arrangements point to amalgamations or alliances depending on the financial gains to be made. Amalgamations are pursued where there are obvious financial gains to be made, but alliances are formed where some partners are so small they would be a burden on the larger services if full cost subsidies were required.

5.4 Establishing a criteria for infrastructure and governance investment

Several criteria are evident from the various programs outlined in this chapter. These can be divided into three categories, namely sustainability, socio-economic, and economies of scale and scope.

Sustainability:

- The proposed water supply infrastructure and service should be one that is sustainable over a long period of time (e.g., the technology should be sustainable and aimed at the sustainable population level).
- The supply should maximise environmental protection and not degrade the natural environment.
- The supply should maximise the benefits to the **whole of outback** where possible.
- Funding is extended to those towns where the population is over 50 people or in excess of five houses.
- The project must minimise water and energy consumption.

Socio-economic:

- Decisions to provide water infrastructure are based on the financial need of the communities and the relative economic effect of the project in terms of enhancing business across the region taking a whole of outback approach.
- The project serves the needs of Aboriginal groups.
- Where the town's population is less than 50, are there Aboriginal residents who would benefit?
- The higher the Indigenous population the higher the weighting.
- The higher the density of the overall population the higher the weighting.
- The higher the number of communities in partnership the higher the weighting.
- Can the customers or local progress association access payments to support the service and in the case of loans, repay the loan?
- Areas with the highest rate of poverty get higher weighted scores.
- Does the town have access to funding from alternative sources (e.g., the state; Indigenous programs)?
- Is there a high percentage of householders with incomes in the lower quintiles?
- Unemployment rates are over the national average.
- The project must contribute to identifiable health, sanitary or security issues.

Economies of scope and scale:

- The managerial control of the service needs to be well established, to be a formalised water utility entity with clear lines of customer communication, technical and managerial services and clarity in ownership. The entity must have the capacity to meet regulatory requirements.
- Preference is given to those entities that have economies of scope.
- Selection process for infrastructure projects is transparent.
- Communities that can connect their supply to an existing service get a higher weighting. This is especially pertinent to non-Indigenous communities.
- The higher the impact of the new supply on economic development for the region the higher the weighting.

Chapter 6: Consolidation of Key Themes from the Literature Review and Stakeholder Consultation

This chapter seeks to consolidate the key themes from discussions and consultation with stakeholders that are key players in water service provision in South Australia. Where findings from the literature review support and add substance to those of the stakeholder discussions these are referred to. Chapters 4 and 5 addressed additional aims that were outlined in Section 1.1 and 1.2 and Chapter 2 from a review of literature, and those findings are not repeated here.

6.1 Identification of the aspirations of outback township members

There is a need for an agency to manage both water and wastewater services in unincorporated outback townships in a cost-acceptable manner (to both provider and recipient). The WGOWS (2005) outlined some of the aspirations of outback residents. For example, during earlier consultation in Innamincka residents suggested that basic water needs of around 100kL/annum should be provided at a discounted rate with every additional kL of water consumed charged at a capped rate of $2/kL to alleviate some of the burden of water costs (WGOWS, 2005, p. 22). While dated, the data may provide an indication of what residents are willing or *capable* of paying for water. As part of the engagement process undertaken by Heylen (2007) and discussed in previous sections, participants were asked which of three possible options for the provision of essential services (defined as water, power, effluent disposal, waste disposal, aerodromes and television) would result in 'essential services that are reliable, affordable and meet and accepted standard' (Heylen, 2007, p. 5). The three options involving the OCA and presented to participants were:

1. Community constructs and owns the infrastructure. The Trust [i.e. Outback Areas Community Development Trust but now the Outback Community Authority] manages it on behalf of the community through a service agreement.
2. The community, with support and advice of the Trust, constructs, owns and manages the service and infrastructure.
3. The Trust constructs, owns and manages the infrastructure that provides the service.

Participants could opt for all three options or none of the options. The results showed that no single option stood out as most preferred by participants. Rather, 49% were supportive of their community constructing and owning essential services infrastructure (i.e. Option 1). About 46% of participants supported Option 2 in which the community not only owned and constructed the infrastructure but also managed the delivery of services. The third option,

which attributed construction, ownership and management to the OCA, was supported by 38% of participants. According to Heylen (2007), participants expressed support for essential services that were 'tailored to individual community aspirations and service needs, and [to] respond to changing community development cycles' (p. 5).

Participants were also asked to consider a range of options to ensure that 'essential services and community projects are adequately funded through a mix of government grants and community or direct beneficiary contributions' (Heylen, 2007, p. 6). The options presented to participants were:

1. Community contributions are collected on a voluntary or community fund raising basis.
2. The Trust has powers to collect compulsory community contributions, but powers only applied upon formal request from the community of potential contributors/beneficiaries.
3. The Trust has the power to apply [an] enforceable cost share scheme where standards of service, public health or safety are at risk.
4. The Trust has powers to collect a general regional levy based on principles of fairness and equity.

Here, more than half of residents (54%) supported Option 2, with Options 1, 3 and 4 attracting 43%, 36%, and 40% support, respectively. The findings of Heylen (2007) highlighted the issue of a lack of consensus or majority vote on matters pertaining to water services.

Where communities prefer infrastructure ownership, the OCA will respect that desire but within that option would prefer to have responsibility for water delivery. The least attractive option to the OCA is where communities, within their jurisdiction, want self-management of their water supply. SA Water is reluctant to service communities, such as Glendambo, where infrastructure fails to meet their criteria (SA Water, 2005a), and funding is not available to bring the system up to a standard they would be willing to maintain.

6.1.1 Gaps in our knowledge

This study gained insights into gaps in our knowledge. Firstly, where community consultation has occurred data are dated (for example, WGOWS, 2005; Heylen, 2007). Secondly, in the Heylen study residents were asked to vote on four or five defined options and could choose more than one option, resulting in views on alternative options not being captured. Thirdly, while prior studies (Willis et al., 2007) showed the willingness of local residents to be involved in township water service provision and maintenance, this report has found that with the passage of time residents feel they are too old to continue their

volunteer roles or feel exploited, though this finding is anecdotal. Apart from the above reports, there is little focused published discussion about how water supply and sanitation infrastructure might be provided and operated in the outback region. Therefore little can be concluded about the potential economies of scale (or scope) that might be obtained through a rationalisation of current water providers and greater consistency across the region in terms of water infrastructure and equipment, maintenance services, revenue collection and accounting, and risk management procedures.

6.2 Approaches that lead to the identification of the most appropriate water supply solutions and then a consensus on the most appropriate water supply solution

In identifying an approach that leads to the most appropriate water supply solutions two tiers of intervention can be identified, that is an approach to community consultation that identifies the residents' desires, and management or governance-level decisions on outback expenditure and technological solutions. However, before the two tiers are outlined, a review of literature that highlights the importance of a 'bottom-up social learning approach' as opposed to the traditional 'top-down approach' is presented.

6.2.1 A literature review on a 'bottom-up social learning approach' to governance as opposed to the traditional 'top-down approach'—the importance of community consultation

It has been suggested that a 'bottom-up' social learning approach is more suitable for use in small remote communities than the traditional 'top-down approach' (Gleitsmannet al., 2007; Jorgensen, 2009; Martinet al., 2009; Pahl-Wostl, 2007). If trade-offs are to be made between relevant dimensions of a planned water supply scheme, then the parties involved need a process which enables the various value positions to be articulated with respect to its key elements (e.g. health concerns, price per kilo litre, maintenance requirements, cultural considerations for the use of water, revenue collection method, current and future water needs, etc.). In an urban context many of these issues are taken for granted and higher levels of service may involve one or more aspects of how the scheme performs (e.g. frequency of interruptions to regular service) rather than the wider set of elements noted above. Clearly much more needs to be considered in planning for capital upgrades in small remote communities. The literature reviewed in this document emphasises the need to go beyond a focus on the technological options to an appreciation of social priorities and institutional support and management. At a minimum, the long-term sustainability of water supply requires a decision-making process that includes the users of the water services and the facilitation of cooperative behaviour between parties who have agreed to undertake required functions and have the resources and motivation to achieve them.

In her report on water supply in remote indigenous communities the Federal Race Discrimination Commissioner referred to a history of water planning that privileged

questions of technology over social and political issues (FRDC, 1994). The same observation has been noted in the international literature and is sometimes referred to as the 'traditional approach':

> … the results of water supply interventions in rural communities have been mixed so far. Some analysts have suggested that this is in part due to the engineering and technological determinism that has accompanied design considerations. In planning for water supply in poor communities in the developing world, technological design specifications have been dominated by the donor and implementing agencies, while communities have been typically left out of this critical design and planning phase (Gleitsmann et al., 2007, p. 142).

Sustainable water supplies, according to Gleitsmann et al. (2007), require a management approach that enables local communities to negotiate with and learn from external agencies to arrive at decisions that reflect community choices as much as they are informed by the preferences of collaborators outside the community. Sara and Katz (1997) have argued that discussions about water supply in rural communities need to be broad-based because the various roles (i.e. project planning, implementation, cost recovery, operation and maintenance, and asset ownership) need to be well-defined and understood. For example, if communities are to share the costs they need to see how the level of their contribution has been determined and how it relates to consumption. Therefore, all of the issues concerning remote water supply systems in Chapter 4 of this review (i.e. the financial cost to the water user, who provides the water and maintains and manages the scheme, and how risks might be managed) are appropriate points of discussion in a participative decision-making process.

Within a social learning approach, communities, water providers, and government agencies come together to discuss what might be regarded as 'appropriate' water supply solutions for a town, what governance mechanisms are required and possible, how much risk is acceptable, how best to manage risks associated with preferred water supply systems, and what cost-covering arrangements are sufficient. There are likely to be a range of viewpoints on these issues and technical expertise may be required to address points of uncertainty and debate as they arise in deliberations. To the extent that the decision-making process is structured in a way consistent with principles of procedural justice, conflict can be managed and democratic decision-making rules can be applied.

6.2.2 An approach to community consultation across the vast outback region

Despite the difficulties on reaching community consensus or a majority during consultation, the study by Heylen (2007) does provide evidence of an approach that is appropriate in garnering the views of remote-dwelling residents across the vast outback region. Although a

consensus may not be reached the approach used by Heylen (2007) provides residents with the opportunity to respond in either a community discussion forum or via a postal response. Thus, it could be argued that if outback residents choose not to engage in community consultation voting on water service preferences they nonetheless understand that they may have to live with the consequences of decisions that are made. While there was no consensus on governance options in Heylen's study, there was a broad consensus among participants that a user pays service model was 'inevitable'. Opinions tended to divide over concerns that user pays would entail greater administration costs rather than paying for the water consumed. This factor has hindered some townships from relinquishing control over their water supplies. Clearly 'Any future arrangement is more likely to be accepted if communities understand what they are paying for, how much the services cost to supply, and how the amount of the contribution is calculated' (Heylen, 2007, p. 6).

One criticism of Heylen's approach is that residents were only asked to consider three options in which the OCA might exert a role (see Section 6.1). Further, residents were able to opt for more than one of the three options which meant that there was no clearly favoured choice. It is possible that other options, not explored in the consultation, might be favoured. In any future survey on the type of services sought by township there will be a tension between providing residents with limited options (as outlined in Chapter 7) or a range of clearly identifiable ones. In either case residents should be provided with sufficient details on the accessibility, reliability, and price of the various options to enable them to make informed decisions.

6.2.3 A 'whole of outback' approach to decision-making in the outback region

The Water for Good Progress Report Card (DEWNR, 2012, p. 21) states that it is 'on track' in delivering on item 66 which aims to 'Develop and implement a strategy to improve the quality of water provided to remote communities', in that 'The Department for Water (now DEWNR) is currently developing a discussion paper to define possible approaches and methodologies for ensuring the appropriate supply of water to remote communities'. While the reference to 'remote communities' tends to focus on Indigenous communities rather than the whole outback region, in the meanwhile an ad hoc arrangement which extends to volunteers in progress associations handling water supplies continues. This begs the question: will it take a tragedy akin to what occurred in Walkerton, Canada that resulted in a number of deaths due to the consumption of water that was not of a potable standard, before any agency is given the authority and jurisdiction to handle water supplies in outback towns in South Australia? In the case of electricity services the electrocution of a young Indigenous boy in the Anangu Pitjantjatjara and Yankunytjatjara (APY) Lands sparked a similar debate. While there was originally some dislike among residents having to pay for the electricity they used, they eventually came to accept the program and as noted above, the cost is only 10% higher than metropolitan prices. Similarly, the Walkerton event was one

of the motivating factors that resulted in water supply on Indigenous communities being transferred in 2004 from the Department of Aboriginal Affair's and Reconciliation (DAARE) to SA Water. This was done to capitalise on the expertise that SA Water was able to supply (Willis et al., 2009).

While Heylen (2007) shows a generally accepted view that revenue raised in a community should be spent on its local priorities rather than to support regional priorities, the OCA Board offers a co-ordinated 'whole of outback' approach to progressing water supply needs in the outback region. The 'whole of outback' approach aims to 'pool' outback water service funding to address large scale priority needs in one township at a time. In this way over a five to ten year period expensive infrastructure capital or maintenance needs could be met, and on a five to ten year plan all townships would be catered for rather than an ad hoc small-scale patchwork approaches that fails to address the big issues (Stakeholders Appendix C, 2015).

6.2.4 A key question

Non-potable water and the associated health risk is such a serious issue that begs the question: 'Are water-related health risks too serious an issue for outback residents simply to opt out of paying for improved supplies (at a cost)?', that is, 'Should an agency take control of water services and ensure the water is potable, with concomitant appropriate pricing (as in the case of electricity)?'. Given the economic importance of the tourist industry in the outback region, clearly options for an entity to take up this challenge should be investigated for the region.

6.3 Developing a decision criteria as a basis for the Government of South Australia to consider when it should take responsibility for providing water infrastructure

The *Safe Drinking Water Act* (SA Health, 2011) does not mandate the provision of water supplies, thus the Government of South Australia is under no obligation to provide water services to outback townships. This raises the question: 'What are the decision criteria for the government to consider when faced with non-viable services to outback townships with low populations?'

Several criteria are evident from the various programs outlined throughout this report. Two are presented here. The first one explored is divided into three categories; sustainability, socio-economic, and economies of scale and scope. A weighting approach could be implemented similar to that used by the US Bureau of the Interior (see Chapter 5).

6.3.1 Sustainability, socio-economic and economies of scale weightings

Sustainability weightings based on:

- Does the proposed water supply infrastructure and service provide for sustainability over a long period of time, e.g., the technology should be sustainable and minimise energy and water consumption;
- Is the water supply vulnerable and as a consequence there is a need to ensure it is well managed.
- Has this decision/ technology /structure/been tried elsewhere and succeeded?
- Is there sufficient evidence to indicate the sustainability of the town's population, e.g., evidence of viable commercial ventures that would be enhanced by improvements in essential services such as water and maintain current population levels;
- Would the infrastructure ensure other services such as banks, health care facilities were maintained?;
- Would the investment maximise the benefits to the whole of outback, including the natural environment, where possible;
- Has the town a population is over 50 people or 5+ houses;
- Can the town demonstrate significant increases in population during the tourist season., e.g., 50 overnight visitors, or 30 visitors calling in for tourist advice, and or supplies;

Socio-economic weightings based on:

- Is there evidence that the infrastructure or up-grades would enhance economic development of the town, such as reducing business costs, or enhancing business opportunities across the region taking a whole of outback approach;
- Does the project serve the needs of Aboriginal groups?;
- Where the population of a town is less than 50, Would the Aboriginal residents benefit'?;
- The higher the Indigenous population the higher the weighting;
- The higher the density of the overall population the higher the weighting;
- The higher the number of communities in partnership the higher the weighting
- Is there evidence that the customers would be able to pay for the service;
- Is there evidence of higher rates of poverty?
- Does the town have access to funding from alternative sources, e.g. the state; Indigenous programs;
- Is there a high percentage of householders with incomes in the lowest 2 quintiles;
- Is the unemployment rate over the national average;
- Would the project contribute to identifiable health, sanitary or security issues;

Economies of scope and scale weightings for the supplier based on:

- Is there a well-managed agency to administer the service, providing clear lines of customer communication, technical and managerial services and clarity in ownership.
- Is there an entity with the capacity to meet regulatory requirements?;
- Is there evidence the town's customer base have been consulted;
- Higher weightings would be given to those entities that have economies of scope (e.g., included management of waste or electricity supply in the town;
- Is there evidence that the selection process for projects was transparent?
- Is there a hierarchy that prioritises projects, but also ensures equal access?;
- Projects that are able to connect the supply to an existing service would get a higher weighting. This is especially pertinent to non-Indigenous communities;

6.3.2 Population number weightings: Incorporating tourist numbers into town populations

The above criteria do take account of low populations. The difficulty with the five towns discussed in this report is that the permanent populations are very low with little capacity to meet the costs of expensive infrastructure. However, the tourist populations are high. Tourist numbers could be used to calculate populations, and in deciding on infrastructure. A tiered system could be set that separated out domestic from commercial (tourist) water consumers similar to that employed for regulating electricity prices.

If tourist numbers were incorporated into population estimates it would be possible to develop a specific hierarchy based on township size. Here two criteria might be i) the size of the town (including tourist numbers) determines the level of service infrastructure provided and ii), and the size of the town determines the level of on-going service to ensure there is minimum disruption to the service. This second criteria could include support such as emergency contacts, drinking water quality and pressure and flow. While we were unable to find published material that outlined the details of any such model, the Parsons Brinckerhoff report (2008) provides a set of guidelines. Table 3 below is adapted from the Parson Brinckerhoff model also incorporates remoteness in recognition of the impact of services on tourists. Significantly, towns with very low populations, but high tourist numbers might gain access to higher quality infrastructure and services, than towns with higher permanent populations, but lower tourist numbers.

Table 2: Hierarchies for considering provision of infrastructure and services in remote towns

Town	Supply Quality and level of testing provided	Accessibility/ Remoteness Index of Australia	Number of service connections/ populations + number of commercial outlets servicing tourists		Determines level of service
Very small towns	Water supplies non-potable	Very remote Australia	1.Population/ connections 10 through to 50 2.Tourist estimates per annum	→	Type of infrastructure provided Level of response time to service disruption? Level of water quality monitoring provided
Small towns	Water supplies potable	Remote Australia	1.Population/ connections 50+ through to 500 2.Tourist estimates per annum	→	

(Based on Parsons Brinckerhoff, 2008, p 22-23)

6.3.3. Private Providers

We have not explored private provider provision of services in this project. The evidence suggests that the economies of scale and scope are limited and the best option is for a single provider. This would be a government instrumentality. As a consequence a measure that asks whether or not consumers are willing to pay while relevant has a number of caveats that assume a CSO subsidy.

6.4 SA Government stakeholders' views.

The Flinders research team invited key State Government officials including OCA directors and staff (see Appendix C) to a one-day workshop on 27 February to discuss the findings from the literature search, identify strategic issues facing policy and governance of water management in the outback communities of South Australia and to consider options for more effective governance. Specifically they were asked to identify key outcomes and why it was important to achieve these outcomes. We provide a largely un-edited summary of these strategic issues at Appendix C.

These issues cover:

- The sustainability of outback communities,
- Their local institutional structure and governance
- Leading to safe and reliable potable water supply
- Equity in its provision
- Strategic investment (for resources and tourism development)
- Supported by a whole of government approach.

Chapter 7: Conclusion and Recommendations for Governance and Management of Water in Outback Communities of South Australia

7.1 Introduction

In discussing options we assume that the State Government supports the continuation of small towns in the remote regions of the north of the state. We make this assumption based on the many state and federal government reports, plans, and strategies that call for increased economic development in outback South Australia, and also on the arguments provided in Chapter 1. We also assume that the principle of subsidiarity: the idea that a central authority should have a subsidiary (that is, a supporting, rather than a subordinate) function, performing only those tasks which cannot be performed effectively at a more immediate or local level' (Oxford English Dictionary 2010) would be applied by the State Government and its agencies. Getting the balance right here is the contemporary policy challenge.

This section focuses on possible options for the management and governance of water supplies in outback towns in South Australia. Management and governance are defined firstly **as identifying an agency or agencies that will take responsibility for these supplies**; and secondly, **how this agency interacts with citizens in outback towns and communities** in the provision of water supply. This section only deals with identifying the organisational structure that might be tasked with responsibility for outback water. It does not provide strategies for what political actions will be needed to ensure such an entity is tasked by government. The report also does not deal with the work schedule for such as agency. This is adequately outlined in the Water for Good report Action 66 (DEWNR, 2010).

The five governance options identifying a responsible entity outlined below draw on ideas taken from the literature review and discussion with members of the Steering Committee and Workshop group and other contacts. They are:

1. Retain the status quo
2. SA Water takes on responsibility for water provision and governance for outback water supply
3. SA Water takes on responsibility for water provision and governance as part of its charter including its Remote Indigenous Communities Program
4. Outback Communities Authority / Independent Outback Water Corporation takes on responsibility for water supply and governance as the Regional Water Authority

5 The OCA manages an alliance between existing providers of progress associations, councils, SA Water, and mining companies.

As noted above we have not provided any recommendations for outsourcing or privatisation.

7.2 Option one: Retain the status quo

Introduction

Given the difficulties that will be encountered in establishing a new entity, or extending the brief of SA Water or the OCA there is an argument for retaining the status quo.

The proposal

It could be argued that politically and economically, the time is not right to pressure state or federal governments to invest in water supply infrastructure or to alter existing governance arrangements. While there is considerable potential for mining activity in the Far North, the population distribution is variable, and the towns within the study scope are small. International and national evidence suggests that elsewhere towns as small as the five identified in this study often do not have potable water supplies if they are remote and dependent on groundwater (e.g., Cameron and Fearon 2013; WADW, 2009; Yukon Community Services, 2009).

The argument

It is possible that some of these towns could be further de-populated over the next ten years leading to underutilisation of a water infrastructure resource. Evidence from the ABS suggests that while the population for Greater Adelaide is 3 to 4 times larger than the rest of the state, the population of younger people in the 20-24 year cohort is almost 5 times as high, indicating that the age profile is older in regional and remote towns. The exception to this is the APY Lands (ABS, 2012), although some other remote Aboriginal communities are also experiencing population declines. There has been an overall decline in population in outback SA since 1996 of 14.17% across the total Upper Spencer Gulf and outback regions (South Australian Government, 2014). Similarly tourism has declined in the region over the last 10 years at a rate of 4.5% in line with other remote and regional parts of Australia (South Australian Tourism Commission et al., 2012). In the independent inquiry into secure and sustainable urban water supply and sewerage services for non-metropolitan New South Wales (Armstrong and Gellatly, 2009) the majority (49) of the 96 councils consulted wished to maintain the status quo.

Relevant government policy or strategic plan

South Australian Tourism Commission and Outback Tourism Working Party/Flinders Ranges and Outback SA Tourism (FROSAT) and RDA (2012)

This report notes the decline in population and recognises that infrastructure needs to go well beyond water supply, to include airstrips, accommodation, roads, telecommunications, and transport. Water has not been established as the major priority.

Regional Development Plan 2013-2016 (2013)

The RDA Far North community consultation conducted as part of the development plan 2013-2016 asked residents their views on investment priorities. Residents did not list water as a major priority, even when details on required infrastructure were solicited. Residents may be unaware of the shifts in regulatory requirements.

PIRSA Annual Report 2011-2012 (2013)

PIRSA (2013) notes the need for the management of water resources given climate change, but does not identify water supplies for domestic or commercial consumption as a priority.

Guiding principles

- The sustainability of outback communities—There is no evidence that a decision not to act would impact negatively on outback communities.
- Their local institutional structure and governance—These would remain as they currently exist.
- Leading to safe and reliable potable water supply—There is no evidence to date of negative impact on health of either tourists or local residents.
- Equity in its provision—Residents currently in some instances pay less for water than metropolitan residents.
- Strategic investment (for resources and tourism development)—The reality is that water is but one of a myriad of infrastructure requirements for boosting tourism, although there is little published evidence that residents think water is an inhibitor to commercial development.
- Supported by a whole of government approach.

Risks

Environmental: There is a serious need to ask whether it is advisable to commence development of water infrastructure for community, social or tourist enterprises before the full impact of the FLOWs research is published and it is clear what increases in population the existing supplies are able to sustain (see Munday et al., 2013).

Social and economic: Given the overall decline in tourism, and the extensive infrastructure required to enhance the tourist experience (such as roads and hotels), to the point that numbers would increase in years when Lake Eyre is not in flood, costs would outweigh the benefits. Hence it is highly unlikely that there will ever be full cost recovery.

Risks to development: This does not appear to be a major issue. For example, mining companies make provision for mining related and domestic water supplies and will continue to fund these as required.

Health: While services are not ideal, water supplies are available to outback communities and to date there is no evidence that existing water supplies have resulted in any adverse public health related events. As we note above Heyworth et al. (2006) explored the risk of contracting gastroenteritis among children in rural South Australia who drank water from rainwater tanks and those who did not. While gastroenteritis was found to be a significant cause of morbidity among children, the source of water was not a significant factor. The major factor was hygiene.

However, the risk of serious contamination to outback water supplies in the future must be afforded appropriate consideration given that the absence of proper treatment has rendered the water unsafe for drinking.

Case study

The Remote Area Energies Supplies Scheme (RAESS) described in Section 4.6 provides a way forward in support of this proposal. As outlined in the RAESS, there are multiple suppliers, but state funded CSO ensures equity.

7.3 Option two: SA Water takes on responsibility for water provision and governance in outback South Australia other than mining

Introduction

SA Water is the only utility provider operating in the region with the economies of scale to take responsibility for water supplies in outback SA. This would work towards a whole of state approach.

The argument

- SA Water is the only utility provider with the financial capacity to take responsibility for outback water supplies.
- SA Water has the capacity to organise resource sharing.
- SA Water could manage the infrastructure in an efficient and effective manner.
- It has comprehensive administrative services, and has the technical and operational staff, systems and skills, strategic planning and risk management systems.
- It has robust research and development expertise.
- SA Water would be able to sustain service standards—water supply quality, quantity, and reliability.
- SA Water has capacity to minimise environmental harm.
- SA Water already operates 9 water schemes in outback areas that could provide some economies of scale (Hart, 2012). For example, it operates a water testing laboratory at Marla.

Relevant government policy or strategic plan

CSO and SA Water' dividend requirements

SA Water is required to pay 95% of its after tax profits to the State Government. A State government CSO is paid to SA Water for non-commercial operations that ensures the price of water in some country areas is equivalent to metropolitan prices. According to the SA Water data on Dividends and CSO, between 2008 and 2011 the CSO outstripped the dividends. By 2013 the dividend had increased to $235 million with the CSO at $106 million (SA Water, 2014c). It would be possible under the policy for some of the infrastructure to be funded through the CSO (South Australian Government, 2004b). However, under existing policy most outback towns are not SA Water customers so are outside the existing legislation (SA Water, 2014a).

Water for Good (DEWNR, 2010, Action 66) recommends that the number of Government agencies engaged in the provision of water to outback communities be rationalised in the

interests of efficiency (DFW, 2010, p. 20). Action 66 suggests that knowledge of who owns the infrastructure is required before it can be determined who should fund any supply water. SA Water has been managing water supplies on the APY Lands for over 10 years while agreements were worked out between SA Water and the owners of the infrastructure (the three Land Trusts).

Regional Development Plan 2013-2016 (2013)

Section 5.2.2 (p. 12) of the Regional Road Map notes that the RDA Far North continues to work with OCA and SA Water to support options for upgrades and new systems where appropriate. Water supply is listed as one of the key issues for sustainability in the region. DEWNR has a sub-program to support economic development in the region through the provision of water in alignment with their G-FLOWS project (p. 16).

The RDA plan (2013) notes that the region (Flinders Ranges and Outback SA) is 80% of the state's land mass, with a population of 28,212. Along with the Flinders Ranges it is a major tourist region, second only to the Fleurieu Peninsula in activity. Tourism is a major economic driver for this region with up to 570,000 people visiting the area, with around 42,000 international visitors (see Section 3.1.3.4 of the Plan). In the last 10 years the number of visitors has declined by 16% with lack of organisation capacity identified as a critical factor.

South Australian Planning Strategy Far North Regional Plan (2010)

One of the key aims of the regional plan is to improve liveability and to achieve this partly through equitable access to services and cost of living that is affordable. Under the section on sustainability the objective is to improve water access (Government of South Australia, 2010, p. 4).

South Australian Tourism Commission Corporate Plan 2020

The SA Tourism Plan identifies investment in public infrastructure as an area that requires political will (South Australian Tourism Commission, 2014a, p. 11). This proposal supports this investment across a number of portfolios.

South Australian Tourism Commission Corporate Plan 2015-2017

A key strategy is to partner with regional tourism organisations over the next three years to support tourism as part of building capacity of regional towns (South Australian Tourism Commission, 2014b).

Urban and Regional Planning Solutions (2008) SA Tourism: Destination Action Plans (Flinders Ranges and Outback SA Regional Integrated Strategic Tourism Plan) 2008-2014

(Urban and Regional Planning Solutions, 2008)

- This plan notes tourism is a vital part of the region's economy. In *2006 tourism contributed 1,380 jobs and $145 million in gross regional products* (Executive Summary).
- Those employed in tourism in remote SA live in the area leading to sustainable communities with sustainable infrastructure, this is unlike mining which is fly-in-fly-out.
- Identifies the need for water supply, specifically quality and quantity to support industry development including tourism and mining (Section Infrastructure and Services that Support Positive Visitor Experiences).
- Notes that volunteers in remote towns maintain infrastructure and need support.
- Points to the need for sustainable use of water.
- Action 36: identifies and supports opportunities to introduce alternative technologies for energy and water supply.
- Recommendation 7 notes 'given the remoteness of much of the region, introduce policies to ensure that development is readily accessible by road and/or air and, is as self-contained as is practical with regard to energy, water and infrastructure'.

Guiding principles

- The sustainability of outback communities—This proposal will consolidate sustainability of outback communities.
- Their local institutional structure and governance—This proposal ensures sustainable governance of supply.
- Leading to safe and reliable potable water supply—This proposal is the most reliable for achieving compliance with ADWG.
- Equity in its provision—There is capacity to access CSO funding for initial infrastructure required.
- Strategic investment (for resources and tourism development)—This proposal ensures the most efficient economies of scale.
- Supported by a whole of government approach—This proposal nominated an agency that has a whole of state approach.

Risks

Diseconomies of scale work against remote water suppliers meeting the NWI aim of full cost recovery. This option is not based on economies of scale, but social justice and a serious commitment to Action 66 of Water for Good.

Possible challenges to economies of scale: There is some literature that suggests diseconomies of scale occur once a service provider's customer population exceeds 1.6

million, or the breadth of services expands to the point that the organisation cannot respond with nimbleness to customer requirements (ACIL Tasman, 2007, p. 2). This might suggest that extending SA Water services to remote towns would lead to inefficiencies (ACIL Tasman, 2007, p. v). There is no doubt that diseconomies will arise as the water required, the high cost of supply across vast geographical distances, and the low population density except during the tourist season, will not cover costs (ACIL Tasman, 2007). However, there will be significant economies of staff skill mix, expertise, research capacity and related services in comparison to any other option presented in this report (ACIL Tasman, 2007).

Legislative limitations to this proposal

The SA Water Charter

The primary function of SA Water is to provide services- (a) for the supply of water by means of reticulated systems; and (b) for the storage, treatment and supply of bulk water (SA Water, 2014b, Part 2 Section 5.1 a and b).

Under Part 2.5 sub-section 9.2, the Corporation is charged with encouraging and facilitating private or public sector investment and participation, whether from within or outside the state (Part 2 Section 5.2.2e). All operations conducted by SA Water are commercial, except where specified (Part 3 Section 8.1). All operations must be competitive, take account of operational costs, be compliant with competitive neutrality principles and the NWI (Section 3 8.6). The 2014 version of the Charter, restricts non-commercial operations to those that come under the community service obligation agreement between SA Water and the relevant Minister, identified Aboriginal communities and those agreed by the Minister and the Treasurer to be non-commercial (Section 3 9.1). Any non-commercial activity must minimise impact on the state, needs to be costed and funded in line with government policy. (Section 3 9.2 and 9. 3). The CSO only extends to existing customers, not new customers.

Under Clause 5 of the Water Industry Retail Licence, if a Community Service Obligation is in place for the continuation of existing services, SA Water must provide retail services that meet the customer's requirements unless the Minister approves a discontinuance of existing services. If a Community Service Obligation is not already established, SA Water must make an offer to provide retail services that are suitable for the customer's requirements.

Under Clause 5 of the Water Industry Retail Licence SA Water has an obligation to supply according to a set of criteria that honour the commercial goals of the entity. If it is in an existing supply area, then SA Water is obligated to continue the service. If it falls outside

one of these areas SA Water has an obligation to provide an 'offer' for a service. As a result any up-grades in infrastructure of an existing service is funded through SA Water revenue allowances set by ESCOSA and will be recovered via water and sewerage charges. In the case of new customers residing in a town or region that is not an existing customer of SA Water, the full cost recovery of the infrastructure must be met by the new customers. This may be individual householders or a developer (ESCOSA, 2012b; Government of SA, 2014c). It should also be noted that the revenue SA Water's receives from customer prices is set for regulatory periods of 4 years and SA Water cannot recover additional revenue above this cap (R. Cawley, personal communication, SA Water, 2015).

Case Study

The case study on the eventual formation of TASWater outlined in Chapter 5 Section 5.3.2 provides support for this option.

7.4 Option three: SA Water takes on responsibility for water provision and governance including its Remote Indigenous Communities Program

Introduction

This option is similar to No 2, but incorporates all Indigenous communities. SA Water already provides comprehensive services to remote Indigenous communities through the SA Water Remote Communities Team. Extending this to other small communities and towns would provide added economies of scale, although would not be economically sustainable without some form of CSO.

Funding for current 18 Indigenous communities is managed through Aboriginal Affairs and Reconciliation (AARD) and the three Land Councils although the provision is not standardised across the three entities. The three land trusts are Anangu Pitjantjatjara Yankunytjatjara (APY), Maralinga Tjarutja (MT) and Aboriginal Lands Trusts. SA Water's own data notes that it '*…manages water and wastewater systems including scheduled services and water quality monitoring, emergency response to related incidents and new consumer connections. The program has addressed the requirement to formalise and systematically implement a verifiable management framework for these communities to work towards the requirements of the Australian Drinking Water Guidelines (ADWG). Water quality testing is conducted regularly for all major Aboriginal communities in SA, with water samples collected every three months. These samples are tested at laboratories in Adelaide and Marla ….. SA Water has also been engaged as the project manager for a number of capital works improvement projects funded by the federal government. Many projects have been successfully completed to date, with others planned or underway'* (SA Water, 2015).

The above quote suggests that a comprehensive organisational framework for water supplies already exists in outback South Australia and this could be extended to the rest the state.

The proposal

This proposal would take a whole of outback South Australian approach and include Indigenous communities currently serviced by SA Water, those not designated under the SA Water Remote Indigenous Outback program along with **all** remote towns - incorporated and unincorporated. Criteria for inclusion could be where the population was over 50 and there were multiple householders/customers, or based on the US Reclamation model (US Department of Interior, Bureau of Reclamation, 2014).

Funding sources could be diverse given the *whole of outback* approach. It includes the use

of funding ear-marked for Aboriginal Affairs, along with remote and regional funding sources available through local government, and state and federal programs.

The proposal requires a mechanism for SA Water along with a number of government and Indigenous agencies to form an entity within government that would develop criteria and champion funding of projects.

The argument

SA Water Remote Indigenous Communities Team represents one of the state's most experienced and innovative resources (Willis et al., 2007). The team have over 40 years of experience in the provision of water supplies to outback communities, and a breadth of knowledge of appropriate technology. Economies of scale could be achieved by taking a whole of state approach, particularly around infrastructure, testing, and contracting out of maintenance services. The proposal acknowledges that full cost recovery would be difficult to achieve.

A whole of outback approach does not mean a standardised approach within the region. It is possible to have fit-for-purpose technologies and arrangements according to a set of criteria to be determined. Services in remote towns could differ from what is currently offered to Indigenous communities in the early stages, but with a program of alignment put in place. The important principle is transparency.

This proposal is consistent with the COAG national framework that aims *to harness the mainstream, streamline service delivery and avoid duplication in the delivery of services* to Indigenous Australians (COAG, 2004). Previous investigations have argued that there should be equity of services across remote locations between Indigenous and non-indigenous communities of similar sizes (Pattison et al., 2014).

Relevant government policy or strategic plan

This proposal resonates with recommendations put forward in the early drafts of Water for Good. **The Water for Good Action 66** section 1.4 targets, recommend that '*a Cabinet submission on institutional arrangements for remote service providers be lodged. The initial proposal is for this to be limited to the APY Lands but the target suggests that it be extended to all remote communities'* (DFW, 2010, Action 66, p. 20).

Action 66 recommended that the number of Government agencies engaged in the provision of water to outback communities be rationalised in the interests of efficiency (DFW, 2010, Action 66, p. 20). Services provided to each small town would be fit for purpose.

Guiding principles

- The sustainability of outback communities—This proposal will consolidate sustainability of outback communities across Indigenous and Non-Indigenous towns, communities and settlements of over 50 consumers.
- Their local institutional structure and governance—This proposal ensure sustainable governance of supply that would eventually lead to full mainstreaming of services for Indigenous peoples.
- Leading to safe and reliable potable water supply—This proposal is the most reliable for achieving compliance with ADWG.
- Equity in its provision—This proposal takes an equitable approach to all citizens living in communities of over 50 consumers.
- Strategic investment (for resources and tourism development)—This proposal ensures the most efficient economies of scale for any commercial venture.
- Supported by a whole of government approach—This proposal nominates an agency that has a whole of state approach that incorporates services for Indigenous peoples into mainstream services.

Risks

The vexed issue of mainstreaming Indigenous resources: This proposal is effectively mainstreaming Indigenous access and financial support for essential services. It also capitalises on funding marked for Indigenous services to be used to provide a whole of outback approach. There is a strong risk that this will be seen as inequitable by some sections of the community, or as using Indigenous targeted funds for non-Indigenous purposes.

Issues of cost and service standard: While the arguments that SA Water could not offer a variety of services across outback South Australia (e.g., some towns metered, others provided with free water) are not sustained, this proposal would increase their CSO burden. While service standards do differ across the current SA Water provisions, it is not the ideal.

In a similar vein to option 2, the proposal requires changes to SA Water charter.

Case study

The case study in Chapter 5, Section 5.2 on the US Reclamation program provides support for this proposal.

7.5 Option four: Outback Communities Authority (OCA) establish itself as a regional water authority

Introduction

The OCA establish itself as a utility (all essential services) provider. This option is a modification of the proposal put forward by the WGOWS in 2005. See Section 4.4. and Section 6.1 for background literature on this option.

The proposal

The OCA covers an area of 625,000 square kilometres and in 2011 had a population of 4,500 (OCA, 2015). It is the ideal agency to extend essential services to outback communities. This model proposes that OCA become the designated provider of all essential services across the whole of the outback. This model is similar to council-owned regional water corporations. Progress associations transfer the ownership of the assets and responsibility for operations over to the Authority (Armstrong and Gellatly, 2009, p. 3). This model has extensive support in rural New South Wales with over half the councils in the Armstrong and Gellatly (2009) report opting for this option. Local councils and progress associations are shareholders in the Water Authority with their interests managed through a board.

The OCA would have the power to build, supply, maintain, and bill consumers for all water supplies in unincorporated areas in outback SA. It would develop a sustainable program of up-grades moving all unincorporated towns to potable or secure water supplies across a designated time period, e.g., 10 years. Funding from government in the form of a CSO would be required to provide a service that consumers could afford and was equitable. This could be similar to the model operating for electricity to residents in outback towns with the CSO paid directly to OCA (KPMG, 2011; South Australian Government, 2015) in order to assist in moving towards economies of scale.

The Scheme would need to be mandatory to achieve any economies of scale with no opt out provisions. Communities wishing to access OCA services would need to sign up to the OCA utility provider. Ideally the OCA would also seek economies of scope and include all essential services. OCA would be accountable to the State Government and its Board and subject to ESCOSA determination. OCA could outsource various services to SA Water. It is possible that some incorporated towns in outback South Australia might wish to sign up to OCA Water Authority given that the OCA will develop expertise and have a critical mass of technical and professional services.

The argument

OCA is already a government enterprise, with its assets owned by the State Government (but not the assets of various progress associations). OCA already provides a range of essential services to remote towns and already has a licence from ESCOSA. It already handles water supplies, billing services, and infrastructure repairs. OCA already has an internal organisational structure, a board structure that ensures transparent management and allocation of funds, a strategic approach to development across the region and a whole of outback philosophy. OCA would provide technical services across the region. Economies of scale for the employment of skilled professional and technical staff would be improved under this model. Funding would be required to employ technical staff to cover all towns. This proposal does not support volunteer labour maintaining services.

ESCOSA has already noted that small scale services mean that regulatory compliance costs may be prohibitive and has suggested a 'light handed regulatory regime' (ESCOSA, 2013b). This would provide OCA with a longer time frame for compliance and facilitate an incremental approach to the scheme.

According to the *Outback Communities (Administration and Management) Act 2009* (OCA, 2009, p. 3), the OCA has within its' remit to 'manage the provision of public services', 'promote improvements in the provision of public services', and 'to raise revenue for public services' in outback communities within their jurisdiction, the OCA thus aims to access funding to improve the quality of the reticulated water (OCA, 2013, p. 6).

Relevant government policy or strategic plan

The draft report for **Action 66** notes that there are around '500 independent suppliers of water in remote outback SA' (DFW, 2010, p. 20). This is hardly efficient given the costs of appropriate and compliant infrastructure and supply. OCA already has a licence to provide water through ESCOSA.

OCA legislation

OCA can impose levies and rates under the 2009 Act. Legislation may be required to allow it to negotiate the established price for water in the various towns. The price could be set using a similar formula to that used for remote electricity supplies. Legislation may be required to ensure an efficient mechanism for OCA to function as a commercially responsible Utility provider.

Working Group for Outback Water Supplies (WGOWS, 2005). Outback Water Supplies Discussion Paper. Government of South Australia, Adelaide, South Australia

The original Working Group supported this proposal for communities currently serviced by government utility providers such as SA Water, and the DFW.

Guiding principles

- The sustainability of outback communities—This proposal would consolidate sustainability of the OCA, particularly if it took up economies of scope and managed power and wastewater services as well and extended its brief to a range of other essential services.
- Their local institutional structure and governance—This proposal ensure transparent governance structures that would most likely meet with local community approval as the OCA would operate with a governing board and councils and progress associations as shareholders.
- Leading to safe and reliable potable water supply—This proposal has the potential to comply with ADWG given the capacity of the OCA to work closely with all government departments, the communities and towns involved, and to take an incremental and strategic approach.
- Equity in its provision—This proposal takes an equitable approach to all citizens living in outback communities.
- Strategic investment (for resources and tourism development)—This proposal ensures economies of scale if economies of scope are included.
- Supported by a whole of government approach—This proposal nominates an agency that has a whole of state approach that incorporates a wide array of services.

Risks

Current limitations of OCA: The requirement that OCA must have the explicit agreement of all consumers within a town before it can charge a fee, is an impediment to this proposal as it limits its capacity to achieve efficiencies. Hence the proposal cannot be mandatory. The proposal may meet with opposition from townspeople who prize their independence.

Challenges to the authority of the OCA: There is anecdotal evidence that some outback citizens believe that any fees or charges should not go towards the administrative side of OCA. This view is misdirected as it is not possible to provide services without administrative infrastructure. A significant factor in the failure of other regional services is the high cost of meeting the regulatory requirements and the fact that some councils did not manage services adequately (Armstrong and Gellatly, 2009).

Costs of becoming a regulator: There are considerable costs associated with this proposal. The report by Yelland (2007) on 18 outback towns notes the need for investment in order to ensure community water supply of all drinking water is microbiologically safe. In a

similar vein the Water for Good draft report, Action 66 notes (DEWNR, 2010) that *SA Water supplies to unincorporated towns is non-potable based on the fact there is a high chance of bacterial and/or chemical contamination* (p. 5). This is seen to inhibit services for tourists, industry and citizens (p 6). However, these costs are no different from options 2, and 3.

Limits of information and resources: The Water for Good Action 66 draft report (DEWNR, 2010) notes that there is limited information on other remote towns and that this is an impediment to any agency taking up the responsibility. We would argue that there is copious information, it needs to be compiled into one resource and an incremental approach is one way forward.

It is not clear if all the actions described in Action 66 have been achieved for this proposal to be successful. For example the Department for Water (now DEWNR) was required to prepare a definition of '*remote and homelands and make available a registry of all remote community assets, population and the conditions of their supplies* by March 2011. An additional target was to examine *how supplies are managed* by 2012. This data may be required before any Authority could begin to operate (DFW, 2010). However, this data would also be required for options 2 and 3.

Economies of scale will not be achieved: Research suggests that the minimum size for economic efficiency for a Water utility is a 125,000 to 1 million customers (ACIL Tasman, 2007, p. x). This is not the case with this proposal. Further, the recommendation is hampered by the vast distances suggesting that there is no economic benefit to this proposal. Some economies arise from extending the scope of services beyond water supply to other services such as wastewater, retail, environmental services, and water quality treatment. The evidence supports a larger regional operation, rather than small providers (ACIL Tasman, 2007, p. xii).

Case study

The creation of the regional water supply utilities in Tasmania—Section 5.3.2 provides some support for this proposal but also highlights the limitations.

7.6 Option five: Outback Communities Authority (OCA) establish a Regional Alliance

Introduction

The OCA could be charged with managing an Outback Water Regional Alliance. As an alliance it would function as a central organisational board and operational structure for the management of all water supplies in unincorporated towns in outback South Australia. As a regional alliance it would also operate as a binding alliance.

The proposal

A mandatory regional or binding alliance brings together councils and progress associations who establish a corporation owned by the group as shareholders. The alliance has as its charter to provide high level strategic planning, and coordination of services. The infrastructure such as water or sewerage remains with the local group or council, but the high level services, including preparation of funding applications and decision making about priorities is with the alliance (Armstrong and Gellatly, 2009, p. 185).

A binding alliance requires legislation to enact. It is a legal arrangement whereby the Board of the Alliance performs the high level strategic asset management, and human resource functions. Councils and progress associations continue to take responsibility for the day to day delivery of the service. A service level agreement is facilitated between the progress association and the Board of the Alliance (Armstrong and Gellatly, 2009, p. 3).

Each progress association or council continues to own its own infrastructure and manage the day to day operations, but the OCA controlled alliance would take full responsibility for establishing the Board of Management, and for employing the necessary staff to maintain alliance services which would deal with high order regulatory and maintenance issues. OCA already has a Community Affairs Resourcing and Management Agreement with each progress association for the resourcing of parks, some water supplies, wastewater services, community hall up-grades and other facilities (OCA, 2012). This proposal would extend these arrangements.

The OCA, through the Board would be responsible for obtaining funding. OCA would need to comply with the ESCOSA price determination which currently sets pricing principles which they must adhere to. The OCA would then, collect fees, bill and attend to maintenance issues across the region and all staff issues.

The benefit of the alliance model is that it provides economies of scale for high level services and ensures there is an agency to take on responsibility during times of crisis.

Alliances usually make annual reports to the relevant minister on compliance with the relevant legislation. However, it is responsible to its shareholders who are the local progress associations. Legislation is required to make alliances binding. A binding alliance provides support for current progress associations with the aim of moving to full regulatory compliance with minimal disruption to current arrangements. The increased capacity of the Alliance, its access to technical and professional services results in improved services.

One of the first functions of the Alliance might be to establish standardisation in pricing, equity principles for hardship and access to some form of CSO. Some alliances function as corporations (Armstrong and Gellatly, 2009, p. 52). The organisational framework usually involves two Boards- one made up of council or progress association members who own the assets and the other of technical and professional members as well as representation from councils who determine the strategic plan (p. 114). Local progress associations would pay an annual fee for services conducted by the Alliance It would be possible for the OCA Alliance to then contract a third party supplier. An alliance provides for long term planning.

The argument

Many councils and progress associations wish to maintain direct control and responsibility for the services they provide (Armstrong and Gellatly, 2009). OCA already has a strong community development process in its negotiations with local communities. OCA already has a Board of Management representative of a range of outback towns.

Relevant government policy or strategic plan

As noted in Option 4, the *Outback Communities (Administration and Management) Act 2009* (OCA, 2009, p. 3), provides OCA with the remit to 'manage the provision of public services', 'promote improvements in the provision of public services', and 'to raise revenue for public services' in outback communities within their jurisdiction, the OCA thus aims to access funding to improve the quality of the reticulated water (OCA, 2013, p. 6).

Guiding principles

- The sustainability of Outback communities—This proposal would consolidate sustainability of the OCA, particularly if it extended the alliance to a range of services and was binding.
- Their local institutional structure and governance—An Alliance allows local progress associations and councils to maintain control over their assets and services.

- Leading to safe and reliable potable water supply—This proposal would lead to a plan for eventual compliance with ADWG given the capacity of the OCA to work closely with all government departments and towns.
- Equity in its provision—This proposal takes an equitable approach to all citizens living in outback communities.
- Strategic investment (for resources and tourism development)—This proposal ensures there is a strategic and long term approach to development that is coordinated.
- Supported by a whole of government approach—This proposal nominates an agency that has a whole of state approach that incorporates an array of services.

Risks

Alliances must be binding to function otherwise the work of the Board cannot be assured (Armstrong and Gellatly, 2009, p. 50).

The cost of staffing and running an Alliance is met by the members. This adds to the annual water bill and may be resisted by consumers.

Pricing of water is not necessarily standardised across the alliance leading to problems in revenue, unless the Alliance commits all members to a regulatory pricing regime.

In the examples from the literature with similar profiles to Outback SA, e.g., Far Western New South Wales, a CSO was required to make the alliance viable (Armstrong and Gellatly, 2009, p. 111).

The various towns in an OCA binding alliance do not share the same catchment regions or water sources. This means there is increased complexity for the central board as a result of the need for multiple solutions, regulatory arrangements, or technological solutions.

If councils or progress associations do not comply with the Alliances program, there may be little that it can do. Legal responsibility for regulatory compliance continues to reside with the progress associations.

The literature is inconsistent on what are the designated responsibilities for Alliances. While binding, there is a suggestion councils or progress associations can determine the Alliance scope of authority (Armstrong and Gellatly, 2009, p. 37), or leave when their needs are not met. If towns abandoned the Alliance it would eventually become non-viable.

The difficulties with the alliance model is that decisions of major capital works, and upgrades are determined by a central board, but local progress associations remain responsible for the infrastructure and are subject to board decisions and timelines for up-grades.

The establishment of a mandatory alliance with a Board of Management that determined yearly priorities would overshadow some of the existing community development strategies currently operating between OCA and local towns.

The current Board of OCA does not mirror other examples of Alliances which tend to have representation from all outback stakeholders. OCA is only required to have 4 members from outback communities.

Case study
The Case study on the RAPAD alliance in Queensland is an example of a binding alliance (See Section 5.3.4).

7.7 Commentary on the options

In summary the 5 options are:

Option 1:	Retain the status quo
Option 2:	SA Water takes on responsibility for water provision and governance in outback SA other than mining
Option 3:	SA Water takes on responsibility for water provision and governance including its Remote Indigenous Communities Program
Option 4:	Outback Communities Authority (OCA) establish itself as a regional water authority
Option 5:	Outback Communities Authority (OCA) establish a Regional Alliance

While Option 4 is not the most economically efficient, no option presented in this report will achieve economies of scale as recommended by the NWI (COAG 2004). However, there is a hierarchy in terms of efficiencies and preferences. Options 2 and 3 that recommend SA Water take on full responsibility are the most financially efficient proposals, but they would require significant political will and changes to existing legislation and financial subsidies to implement. Option 4 that proposes that OCA take on the role of a utility provider for the whole of the outback was favoured by the Steering Committee. It mirrors previous studies and proposals and there is evidence of political will at this level (WGOWS, 2005). For this reason Option 4 is considered to be the most viable option.

7.8 Recommendations for further research and work

For water supplies to be regularised within outback South Australia requires a proposal to be drawn up and presented to the relevant minister/s. Before this can be reliably reported there is a need for an up-dated consultation of the views of outback customers/residents. We would recommend a consultation similar to that conducted by Werner (2009) and Heylen (2007) be commissioned.

Engaging in a community consultation is not a straight forward affair. While we recommend a process similar to that conducted by Werner (2009) and Helylen (2007), we argue that there is no longer room for a variety of views since the evidence suggests that this results in no action. A process needs to be in place that allows for firm decisions, even if they are a set of processes that are long term. The options provided here are guidelines that could be used in any consultation. We further recommend that any consultation should include a thorough briefing for residents on the shifts and changes in the regulation of water that has occurred in the last two decades. These policy and legislative changes highlight the risks now associated with a status quo approach. Clearly this approach is risky in itself. Highlighting the risks so that residents make informed decisions requires a political will and action that makes the decisions possible. This requires a clear partnership between residents and government.

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Appendix A: List of Web Addresses

Aboriginal Affairs and Reconciliation Division	http://dpc.sa.gov.au/
Arid Lands DEWNR	http://www.naturalresources.sa.gov.au/aridlands/water
ARUP	www.arup.com.au
Bureau of Interior USA	http://www.doi.gov/index.cfm
Centre for Appropriate Technology	http://www.icat.org.au/
CRC Remote Economic participation	http://crc-rep.com/
CSIRO	http://www.csiro.au/
CRC in Desert Knowledge	http://www.desertknowledge.com.au/Home
DEWNR	http://www.environment.sa.gov.au/Home
Department of State Development	http://www.statedevelopment.sa.gov.au/
Department of Planning, Transport and Infrastructure	http://www.dpti.sa.gov.au/
Department of Environment	http://www.environment.gov.au/topics/water/water-cities-and-towns/national-water-security-plan
Energy and Water Supply Ombudsman NSW	http://www.ewon.com.au/index.cfm/suppliers/suppliers-in-nsw/water-suppliers/
Environmental Protection Authority SA	http://www.epa.sa.gov.au
Goyder Institute	http://goyderinstitute.org/
Independent Pricing and Regulatory Tribunal	http://www.ipart.nsw.gov.au/Home
International Water Centre	http://www.watercentre.org
National Water Commission	http://www.nwc.gov.au/
NSW Department of Primary Industries Office of Water	http://www.water.nsw.gov.au/
Ninti One	http://www.nintione.com.au/
Outback Communities Authority (OCA)	http://www.oca.sa.gov.au/
PIRSA	http://www.pir.sa.gov.au/
Power and Water NT	https://www.powerwater.com.au/
Power and Water	https://www.powerwater.com.au

Corporation, Indigenous Essential Services	
Productivity Commission	http://www.pc.gov.au
Queensland Water	http://www.qldwater.com.au/about-us
Queensland Water Commission	https://www.dews.qld.gov.au/policies-initiatives/water-sector-reform/queensland-water-commission
Regional Development Far North South Australia	http://www.rdafn.com.au/
Remote Area Planning Board QLD	http://www.rapad.com.au/
SA Government Lists: Ministers	http://www.sa.gov.au/directories/government
SA Health	www.sahealth.sa.gov.au
South Australian Strategic Plan	http://saplan.org.au/
State Water Corporation NSW	http://statewater.com.au/
South East Queensland Water (Seqwater)	http://www.seqwater.com.au/
TASWater	http://www.taswater.com.au/
United Nations Development Program	http://www.undp.org
Western Australia Department of Water (WADW)	http://www.water.wa.gov.au/
WA Government	http://www.water.wa.gov.au/Business+with+water/Rural+water/Community+Water+Supply+Program/default.aspx
Water Corporation WA	http://www.watercorporation.com.au/
Water Directorate NSW	http://www.waterdirectorate.asn.au/MemberRegions.aspx
Water Industry	http://www.waterindustry.com.au/
World Bank Water and Sanitation Program	http://www.wsp.org

Appendix B: Steering Committee

Goyder Institute	Neil Power
Department of the Environment, Water and National Resources	Steve Morton
Outback Communities Authority	Mark Sutton
Regional Development Far North South Australia	Troy Grover
SAAL NRM Arid Lands	David Leek
SA Health	David Cunliffe
SA Water	Sam Banzi and Glyn Ashman

Appendix C: Stakeholders and Workshop Attendees

Name	
SA Health	Renay Cooke Mark Nash Nick Baker
SA Arid Lands	David Leek
Regional Development Australia Far North SA	Troy Grover
Outback Communities Authority	Mark Sutton
PIRSA	Andrew Johnson
SA Water	Jeremy Lucas and Glyn Ashman
DEWNR	Steve Morton
Department of State Development	Scott Howell
Director, State Research Coordination Goyder Institute for Water Research	Neil Power
Power and Water NT	Lee Morgan
Essential Services Commission of SA	Stuart Peevor
Chair: Outback Communities Authority	Cecilia Woolford
CEO Flinders Ranges Council	Colin Davies
Housing SA	Chris Kennett
Resources and Energy Group Department of State Development	Benjamin Zammit

Appendix D: Workshop Outcome: Identification of Strategic Issues facing Policy and Governance of Water Management in the Outback

The Flinders research team invited key State Government officials including OCA directors and staff (see Appendix B) to a one day workshop on 27 February to discuss the findings from our literature search, identify strategic issues facing policy and governance of water management in the outback communities of South Australia and to consider options for more effective governance. Specifically they were asked to identify key outcomes and why it was important to achieve these outcomes. We provide a largely un-edited summary of these strategic issues below.

1. How does the South Australian Government achieve *improved governance and structure of water management in outback towns* given the need for funding accountability, service standards, achieving economies of scale where possible while meeting regulatory requirements? Achieving these outcomes will improve employment, water quality, water sustainability, provide local responsibility, help meet contractual requirements, allow for affective asset management while meeting regulatory requirements (ESCOSA, EPA etc).

2. How does the South Australian Government achieve *sustainable communities in the outback providing opportunities for economic development* while meeting health and well-being requirements given these communities are essential to the success of South Australia?

3. How does the South Australian Government achieve *a sustainable level of water use* given other towns are located remote from suppliers that cannot support continued extraction, let alone an increase in supply?

4. How can DSD ensure *ongoing sustainable resource development* through the identification and supply of fit-for-purpose water supply in regional South Australia?

5. How does South Australia *more effectively adopt the use of tried innovation and technology in the production and quality of outback water* given developments in solar and desalination as well as policy, governance/ownership, economies of scale, pricing/subsidies, building capacity and ownership in communities?

6. How does South Australian Health (and other areas of government) *quantify the negative outcomes of non-potable water in remote communities* given the hidden costs such as increasing disease, replacement and cleaning costs (eg evaporative cooler pads)?

7. How does South Australian Health *achieve equitable health outcomes* given a diversity of living conditions?

8. How does Housing South Australia *influence the provision of safe, reliable and affordable water* given a lack of capacity to pay in vulnerable households?

9. How do we ensure *equitable service delivery* given small permanent populations and large transient populations in the outback communities of South Australia?

10. How does the State Government ensure that *the right level of investment is made into these schemes to ensure ongoing sustainabilit*y (ESCOSA)?

11. How can *the petroleum industry provide a benefit to outback towns' ability to access a fit-for- purpose and sustainable water supply*?

13. How does South Australian Health *resolve individual needs for potable water solutions with collective needs for collective solutions*?

14. How does the South Australian Government *determine the appropriate provision of services* given the government requirement for scattered small communities in outback South Australia? What is the organisation that would be responsible for services? What organisations would need to be accountable for water and other services? Which communities would be eligible and what are the appropriate management systems?

15. How does South Australian health *promote/achieve the provision of adequate supplies of water to remote communities* given:
    - Adequate supplies of safe water required for healthy communities plus prevention of disease
    - Water must be fit for purpose drinking versus nondrinking water quality
    - Alternative water supplies (for example, rainwater, groundwater) not always reliably available
    - Cost constraints of water supplies, particularly carted water as a drinking water source
    - Safe Drinking Water Act does not require provision water supplies (addresses water quality not quantity, Nondrinking water supplies not captured)
    - Drinking water supplies required for broader health benefits
    - Healthy choices, obesity prevention, oral health, healthy safe food etc.

16. How does the South Australian Department of Health *achieve/ensure continued reliable potable water in remote area communities* given this depends on infrastructure in the towns, minimum rainfall, rainwater tanks are reliable, making all water supplies potable and can promote the drinking water (rather than soft drink) knowing it is safe. Better health hardware for example plumbing caps massive cost and repairs and maintenance, Monitor regulate supplies under State drinking water?

17. How does DEWNR/ Government *ensure supply of water to remote communities that is acceptable to the community and is provided at least cost* given the limited information on community preferences and willingness to pay?

18. How does South Australian Water *achieve potable standard* given legislative and regulatory requirements, RBP funding (income cap, CSO cap, costs, non-regulated water and standards relating to health, environment and the water resource) Community expectation, water source issues (demand oversupply and the climate is getting hotter and dry)?

19. How does the SA Government *get a consistent policy approach to water supply in communities* given the need to respond to emergency events, adverse health situations, social justice responsibilities and commitments given reactive policy processes and no overall consistent approach?

20. How do we *identify criteria for when governments invest in a community water supply which are based on a consistent approach to service standards*?

21. How can we *work across government to provide the ongoing maintenance/ support required to support a reticulated potable water supply to remote communities*?

22. How does OCA *ensure a coordinated approach across agencies and players to affect agreed prioritized outcomes* given tyrannies of different agencies imperatives, different mandated outcomes, often trying to attack whole region problems instead of agreed rolling priorities?

23. How does *an outback water management structure operate that achieves consistency in service delivery across the region that caters for all stakeholders*?

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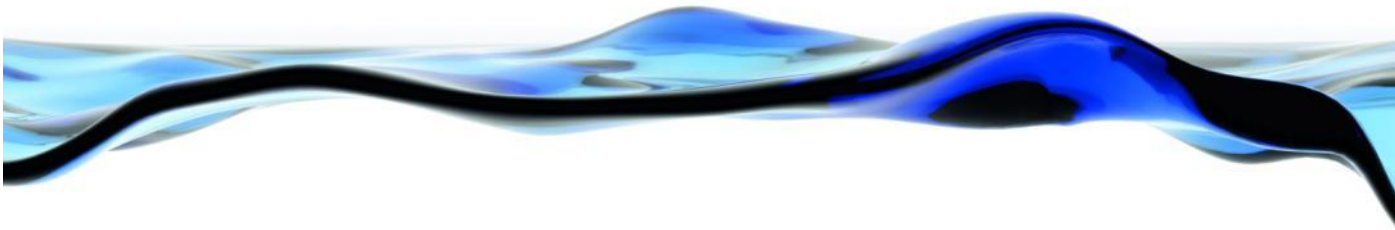

Government of South Australia
Department of Environment, Water and Natural Resources

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