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Review of Regional Water Quality & Security

Appendices

Volume 2

Prepared for Infrastructure Australia


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Appendix A Water Framework in Australia

The water industry is complex, with different governance structures and regulatory requirements existing in each state. Understanding the institutional arrangements and regulatory frameworks provides a baseline for the recommendations provided in this report.

The Commonwealth Government also has a strong, but generally a non-regulatory role in the water industry. The criticality of sustainable water supplies for domestic, environmental, industrial and recreational use has meant that the Commonwealth Government has taken a leading role in driving reform across the country. However, the Commonwealth Government does not have enforcement power in water and as such actual reform is generally implemented by the states.

Federal

In Australia, water belongs to the Crown, which means the relevant minister in each state or territory. The management of water in Australia is complex with many laws and agencies. In fact, there are up to as many as 800 agencies that are responsible for the administration and management of water, at the federal, state, regional and local level.

In addition to the regulatory bodies, there are a number of other government and non-government organisations with an interest in water. The organisations provide advice to regulatory authorities, work in research, develop new systems, assist regulators during implementation of new initiatives and campaign government for change.

The major responsibilities for water at a Commonwealth level sit with the Department of Water, Environment, Heritage and the Arts (DEWHA), the Council of Australian Governments (COAG), the National Water Commission (NWC) and the Australian Competition and Consumer Commission (ACCC).

While the states and territories own and manage water resources, the Commonwealth Government provides national leadership and strategic direction on water matters. COAG provides a forum for the states and territories to negotiate with the Commonwealth Government over matters of common concern, including water management.

In 1994, COAG separated the land and water title rights. In 2004 the Intergovernmental Agreement on a National Water Initiative (NWI) was created and as of 2006 all states had signed it. The aim of the NWI is to improve the economic efficiency of Australia's water management, while also protecting our resources and the environment. The NWC was formed to review the progress of the NWI and completes a biennial report on progress. The eight principal reform agendas in the NWI were and as of 2010, still are:

- Water access entitlements and planning framework
- Water markets and trading
- Best practice water pricing and institutional arrangements
- Integrated Management of Environmental Water
- Water Resource Accounting
- Urban Water Reform
- Community Partnerships and Adjustment
- Knowledge and Capacity Building

There are also arrangements in place for a number of catchments traversing state boundaries. These arrangements are in place to improve governance of cross-boundary water supplies. Most of these arrangements are legislated, though some are by agreement only. The catchments are the Murray Darling Basin, Lake Eyre Basin, Snowy River, Great Artesian Basin, Vic-SA Border Groundwater Area and NSW-Qld Border Rivers.

The Water Act 2007 commenced in March 2008. The Water Act established Commonwealth environmental water responsibilities, as well as the new Murray-Darling Basin Authority (MDBA) and required the MDBA to prepare a strategic Basin Plan. The Act also gave the ACCC powers to enforce water charge and market rules

The National Competition Council (NCC) administers the National Competition Policy, in which water is included. The Policy endeavours to address both the economic viability and ecological sustainability of the nation's water supply. Of particular reference to this project is the NCC's pricing reform, which is 'based on principles of consumption-based pricing, full-cost recovery, and removal of cross-subsidies'.

In April 2008, the Commonwealth Government established the Water for the Future program in response to the challenge of securing a sustainable water future for Australia. The program's key priorities are:

- Taking action on climate change
- Using water wisely
- Securing water supplies
- Supporting healthy rivers

The Commonwealth Government is also involved in addressing the water skills shortage and improving the knowledge of water industry members across Australia. Government Skills Australia (GSA) has been contracted by the federal Department of Education, Employment and Workplace Relations (DEEWR) to provide training packages and resources. GSA's Water Industry Advisory Committee (WIAC) is responsible for developing and promoting these programs, which extend beyond operations and into cross-discipline problem solving, such as water resources management.

Other key drinking water related requirements or best practice that are driven by the Commonwealth Government include the Australian Drinking Water Guidelines (ADWG). A 2010 draft revision of the ADWG was publicly available for comment in 2010, with the new ADWG to be issued for release in 2011.

Additionally, the NWC, in association with Water Services Association of Australia (WSAA), publishes the annual National Annual Performance Report. This report provides information on approximately 33 of the 150+ criteria collated on water utilities with greater than or equal to 10,000 connections. The NWC also provides a biennial assessment on the implementation of the NWI, the most recent of which was completed in 2009.

In addition to the above, there are a range of other programs that have been established to improve the management and delivery of water supplies in Australia. These programs are summarised on the DEWHA website[1].

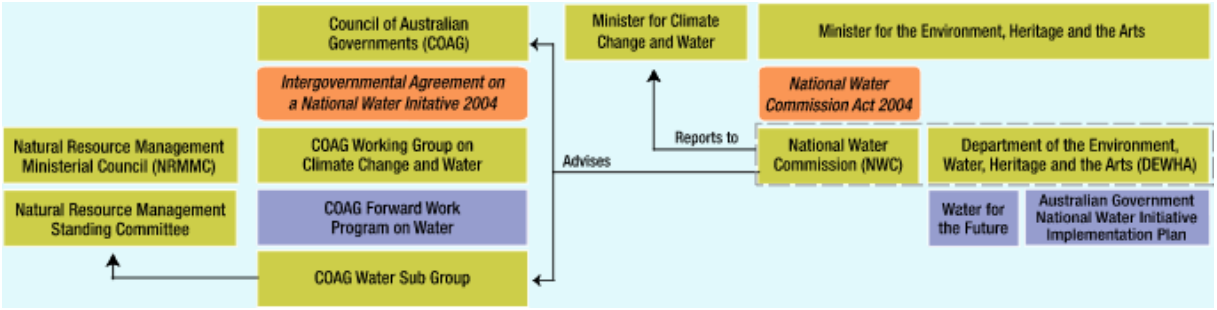

Figure 1: National arrangements for water governance[2]

[1] http://www.environment.gov.au/water/policy-programs/index.html
[2] http://www.nwc.gov.au/www/html/2354-national-arrangements.asp

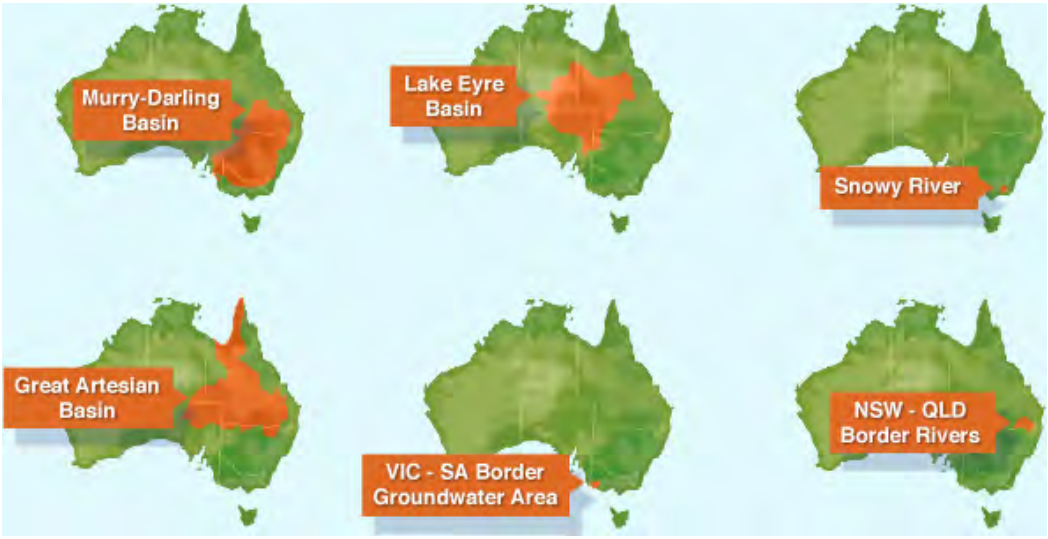

Figure 2: Cross-boundary arrangements [3]

Queensland

In Queensland, water management responsibilities rest with various state organisations. Queensland's water framework has undergone significant change in recent years, including changes to regulatory and institutional arrangements, including the amalgamation of bulk and reticulated water suppliers. The figure and table below describe the various responsibilities in water in Queensland as it related to supply of water to regional towns.

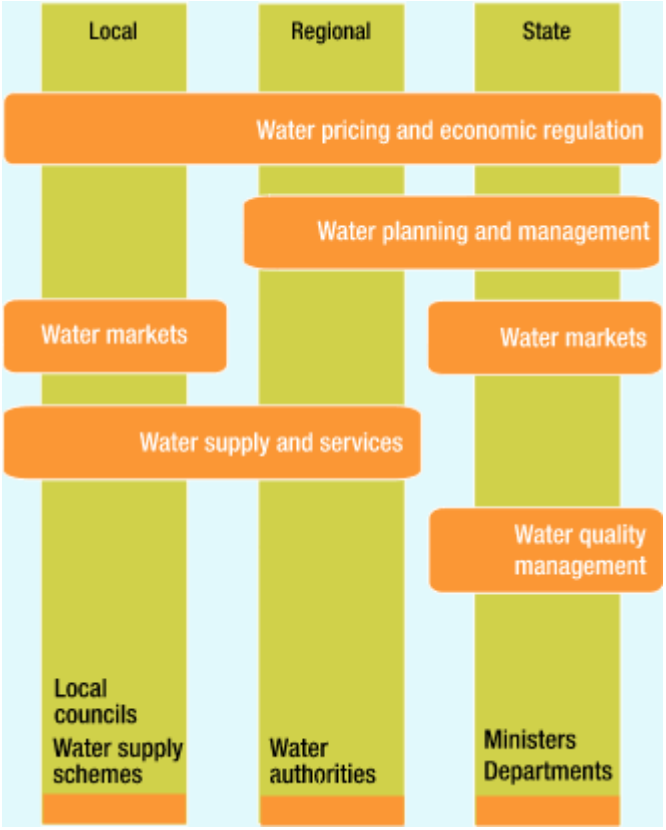

Figure 3: Queensland arrangements for water management [4]

[3] http://www.nwc.gov.au/www/html/1540-cross-boundary-arrangements.asp
[4] http://www.nwc.gov.au/www/html/1787-queensland---introduction.asp

Table 1 Summary of water in Queensland

Governance Area	Responsible Party	Responsibilities
Water Pricing	Queensland Competition Authority (QCA) & Water utilities	QCA provide pricing recommendations, review pricing policies & monitor pricing. Local government councils set their own urban bulk and retail prices. SunWater, Seqwater & rural water boards set their own prices.
Rural & Regional Water Planning & Mgmt	Department of Environment & Resource Management (DERM)	Prepare & implement Water Resource Plans, Resource Operations Plans & Regional Water Supply Strategies; administer water licences, water allocations, resource & distribution operations licences, prepare industry guidelines & approve water service provider plans. The key legislation is the Water Act 2000.
Metropolitan Water Planning & Mgmt	Queensland Water Commission (QWC)	Strategy is to keep water supply & demand in balance for the next 50 years in SE Qld. Have prepared & are implementing the SE Qld Regional Water Supply Strategy, SE Qld Water Security Program & SE Qld Regional Water System Operating Plan. They also administer water licences, water allocations, resource & distribution licences.
Water Markets	The Chief Executive & DERM (Resource Mgmt)	The Chief Executive may prepare resource operations plan, which includes trading rules. DERM administer water licences, water allocations & resources & distribution operations licences. They also manage and approve permanent water trades. Key legislation includes the Water Act 2000 and the Water Regulations 2002.
Water Supply & Services	Local government, SunWater, Seqwater, Brisbane City Council, & a number of other water boards.	Local government supplies urban retail water; SunWater, Seqwater & nine rural water boards supply rural retail; Local Government provide for stormwater & drainage, while rural & urban bulk water is supplied by the organisations listed to the left.
Drinking Water Mgmt	DERM (Office of the Water Supply Regulator) & the Department of Health	DERM regulate water supply activities under the Water Supply (Safety and Reliability) Act 2008. This includes the provision of drinking water quality by drinking water service providers. They administer monitoring and reporting requirement notices & Drinking Water Management Plans. Health encourages water supplied to meet the ADWG & samples & tests for compliance with these Guidelines.
Recycled Water Mgmt	DERM (Office of the Water Supply Regulator)	Oversees and implements the Water Supply (Safety and Reliability) Act 2008. Regulates urban & rural water supply functions carried out by water authorities. They have also prepared the Water Quality Guidelines for Recycled Water Schemes.
Environmental Health Mgmt	DERM (Environment)	Administer the Environmental Protection Act 1994, Environmental Protection Regulation 1998, Environmental Protection (Water) Policy 1997 and the Queensland Water Quality Guidelines 2006.

Drinking water has been regulated in Queensland since the introduction of the Water Supply (Safety and Reliability) Act 2008. Under the Act drinking water providers are required to submit draft water management plans to the Office of the Water Supply Regulator.

The submission of draft water management plans are now a legislated requirement for all water providers in Queensland. Previously the water quality requirements were guidelines only and drinking water providers were not mandated by law to provide a level of service to the Australian Drinking Water Guidelines. The guidelines have now been mandated in the Water Supply (Safety and Reliability) Act 2008; however the reporting requirements are to be phased in over the next 4 years as follows:

- Large supply schemes by July 2011
- Medium supply schemes by July 2012
- Small supply schemes by July 2013

Regional Queensland towns will fall under the medium and small supply schemes.

New South Wales

In New South Wales, water management responsibilities rest with various state, regional and local organisations. The figure and table below describe the various responsibilities in water in NSW as it related to supply of water to regional towns.

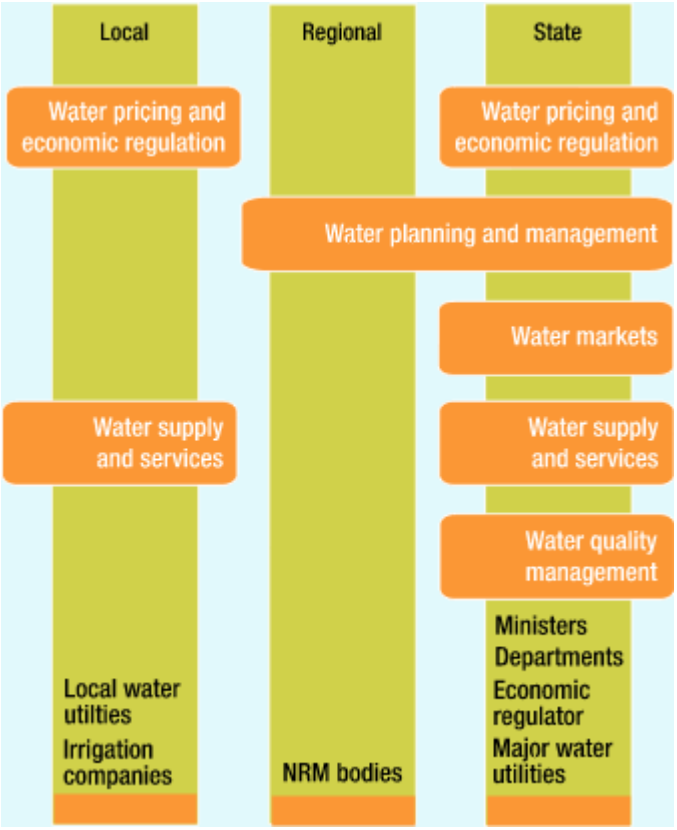

Figure 4: New South Wales arrangements for water management [5]

Table 2 Summary of water in NSW

Governance Area	Responsible Party	Responsibilities
Water Pricing	Independent Pricing and Regulatory Tribunal (IPART) & Local Water utilities (LWUs)	While IPART set prices for metro bulk and retail water and rural bulk water, local utilities set pricing in non-metro retail and irrigation companies set rural retail prices.
Rural & Regional Water Planning & Mgmt	Department of Climate Change & Water (DECCW)	Administer the Water Management Act 2000 & the Water Act 1912. Lead preparation of sharing plans.
Metropolitan Water Planning & Mgmt	DECCW	Provide advice and guidance to local water utilities in rural & regional areas.
Water Markets	DECCW	Administer the Water Management Act 2000 & the Water Act 1912. Assess all water dealing applications in accordance with the Access Licence Dealings Principles Order.
Water Supply & Services	LWUs, StateWater, Private Irrigation Companies & Schemes & Local	LWUs – urban retail, stormwater & drainage State Water – urban & rural bulk & rural retail Private Irrigators & Schemes – rural retail Local Government – stormwater & drainage

[5] http://www.nwc.gov.au/www/html/1204-new-south-wales.asp

Governance Area	Responsible Party	Responsibilities
Drinking Water Mgmt	Governments NSW Health	Develops standards for water quality and drinking water quality mgmt programs. Monitors all water supply schemes against the ADWG.
Recycled Water Mgmt	DECCW & Local Councils	DECCW administer the Protection of the Environment Operations Act 1997 (POEO), including licensing of Sewage Treatment Plants. They issue approvals funder the Local Government Act 1993 to local utilities reusing or supplying reused water. Local councils issues approvals under the LGA to installers and operators of systems of sewage mgmt.
Environmental Health Mgmt	DECCW	Administers the POEO Act. Issues environment protection licences (EPLs) under the POEO Act that set operating and discharge limits for all scheduled activities.

The NSW Office of Water (NOW) administers the two key pieces of legislation for the management of water in NSW. These are the Water Management Act 2000 and the Water Act 1912. In January 2009, new compliance powers were amended into the Water Management Act 2000, providing the government with greater enforcement and penalty capabilities. NOW is also the lead agency for preparation of Water Sharing Plans. Provision of water and wastewater services by local Councils is administered under the Local Government Act 1993.

NOW also administers the NSW Guidelines for Best Practice Management for Water Supply and Sewage (2007). This guideline provides recommendations for the management and operation of water and sewage supplies to promote reasoned planning and cost recovery. For regional NSW, NOW provides managerial, technical and financial support under the Country Towns Water Supply and Sewerage Program. It also administers the Water for Life Education Program.

NSW Health are responsible for the monitoring the performance of water utilities with respect to their drinking water quality. They provide a free of charge drinking water testing service to water supply authorities for indicator bacteria and health-related inorganic chemicals. NSW Health also maintains a Drinking Water Database of water quality information for each utility. NSW health has published two documents to assist water suppliers, namely NSW Health Drinking Water Monitoring Program (2005) and the Guide for Submitting Water Samples to DAL for Analysis (2003). NSW Health support and endorse the Australian Drinking Water Guidelines

While IPART sets and regulates water pricing for metropolitan suppliers, they do not perform this role for non-metropolitan suppliers.

State Water operates the major dams across regional NSW. Supply of drinking water for domestic purposes is the responsibility of local water utilities (usually local Councils) across most of NSW and State-owned Corporations in the major metropolitan centres.

The NSW Government established thirteen Catchment Management Authorities (CMAs) across the State as part of broad natural resource management reforms. The Authorities were established under the Catchment Management Authorities Act 2003. CMAs are statutory authorities, with responsible and accountable Boards that report directly to the Minister for Natural Resources. Each Catchment Management Authority must develop a Catchment Action Plan to ensure effective implementation of natural resource management measures, in compliance with the NSW Natural Resource Management Standard and Targets.

The NSW Water Directorate provides technical information to its members, which comprise of 94 councils and county councils providing water supply and/or sewerage services to local government areas in NSW. They are available as an independent advisor to councils, promote efficiency in operation, provide technical direction and promote sharing of knowledge.

The recent Independent Inquiry into Secure and Sustainable Urban Water Supply and Sewerage Services for Non-Metropolitan NSW proposed a range of amalgamation models to improve the reliable delivery of water and sewage services in NSW. The result of this inquiry will be announced later this year. However, the present framework model in NSW is shown in Figure 4.

Announcement of the result of the Independent Inquiry into Secure and Sustainable Urban Water Supply and Sewerage Services for Non-Metropolitan NSW, which may result in amalgamation of water and wastewater supply authorities in NSW.

The Office of Water is also positioned to improve their compliance enforcement powers through the introduction of compulsory best practice procedures. This will encourage all water suppliers to maintain a consistent level of service and will also improve accountability.

Australian Capital Territory

Due to its localised geography, management of water in the ACT is relatively simple compared to most states, with all water management powers sitting with the ACT government. The figure and table below describe the various responsibilities in water in the ACT as it related to supply of water to regional towns.

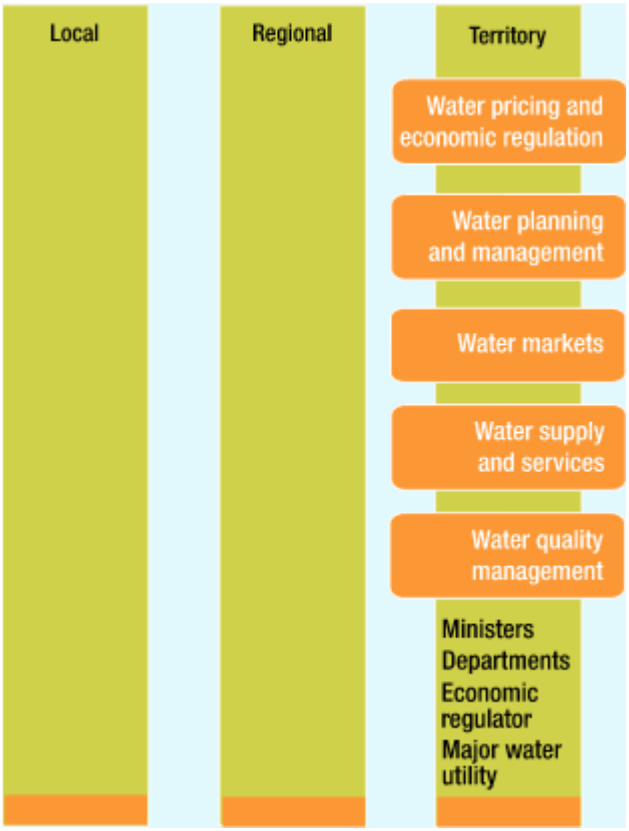

Figure 5: ACT arrangements for water management [6]

Table 3 Summary of water in the ACT

Governance Area	Responsible Party	Responsibilities
Water Pricing	Independent Competition & Regulatory Commission (ICRC)	Sets prices & investigates competitiveness complaints; regulate urban retail water, bulk water, wastewater & water reuse.
Rural & Regional Water Planning & Mgmt	Department of Environment, Climate Change, Energy & Water (DECCEW)	Responsible for water resource mgmt under the Water Resources Act 2007; implement Think water, act water; administer the Water Sharing Plan & Environmental Flow Guidelines 2006.
Metropolitan Water Planning &	DECCEW & ACTEW	DECCEW develop policies related to future demand for water, including integration of stormwater, water supply & wastewater,

[6] http://www.nwc.gov.au/www/html/1118-australian-capital-territory.asp

Governance Area	Responsible Party	Responsibilities
Mgmt Water Markets	 DECCEW	with a target of 20% recycling by 2013. ACTEW examine & recommend future water supply options to government under the Future Water Options Strategy. Approve water trade within & external to the ACT under the Water Resources Act 2007.
Water Supply & Services	ACTEW & Roads ACT	ACTEW supply urban & rural bulk water and urban retail. There is no rural retail water business in the ACT. Roads are responsible for stormwater & drainage.
Drinking Water Mgmt	ACT Health (Chief Health Officer)	Administer the Public Health Act 1997 & issue drinking water utility licences. Drinking water standards are outlined in the Drinking Water Quality Code of Practice 2000, which refers to the ADWG.
Recycled Water Mgmt	ACT Health (Chief Health Officer)	Provide advice on system design & health implications of water reuse; implement Think water, act water, which includes a target of 20% recycling by 2013; administer the Greywater Use: Guidelines for Residential Properties in Canberra 2007
Environmental Health Mgmt	DECCEW	Develop & enforce Environmental Authorisations & Environmental Protection Agreements; administer the Environment Protection Act 1997, Environmental Protection Regulations 1997 & Environmental Protection Agreements.

DECCEW has a number of water management responsibilities in the ACT. It is responsible for a range of water efficiency program, manages the water policy, regulates water resources and monitors and reports on water quality in the ACT.

In the ACT all reticulated water is supplied by ACTEW Corporation.

Victoria

In Victoria, water management responsibilities rest with various state and regional organisations. The figure and table below describe the various responsibilities in water in Victoria as it related to supply of water to regional towns.

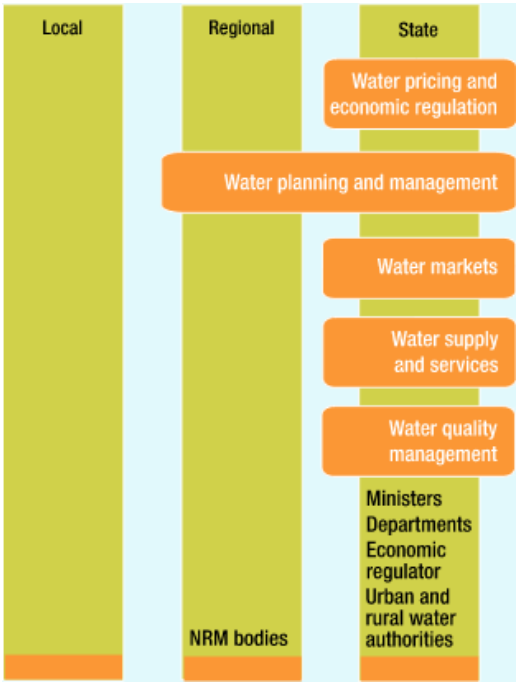

Figure 6: Victorian arrangements for water management [7]

[7] http://www.nwc.gov.au/www/html/1808-victoria---introduction.asp

Table 4 Summary of water in Victoria

Governance Area	Responsible Party	Responsibilities
Water Pricing	Essential Services Commission (ESC).	Price determination & service standards monitoring; regulation of urban bulk water & retail water, sewerage services, metropolitan drainage services, recycled water services, rural bulk water, retail water & irrigation drainage services.
Rural & Regional Water Planning & Mgmt	Department of Sustainability and Environment (DSE)	State-wide water resources policy & strategic planning; prepare regional sustainable water strategies; allocate water rights. Administer key legislation, including Water Act 1989, Our Water Our Future, Bulk Entitlements, groundwater management plans and streamflow management plans
Metropolitan Water Planning & Mgmt	DSE & Metropolitan water authorities (MWAs)	DSE - State-wide water resources policy & strategic planning; prepare the Central Regional Sustainable Water Strategy, which balances the water needs of urban & rural users & the environment; allocate the Melbourne Bulk Entitlement. MWAs - Implement bulk entitlement conditions & the Water Supply-Demand Strategy for Melbourne.
Water Markets	DSE & Rural water authorities	DSE - State-wide water resources policy &strategic planning& allocation of Bulk Entitlements under the Water Act 1989. Rural water authorities - within an irrigation district, trade is subject to the rules & the approval of the relevant Irrigation Authority.
Water Supply & Services	Metro, regional & rural urban retail water businesses & local government	The three metro water businesses supply urban and rural bulk water; urban retail water us supplied by the three metro water businesses and 13 regional businesses; rural retail is supplied by five rural water businesses; stormwater & drainage are managed by Melbourne Water & Local Government.
Drinking Water Mgmt	Department of Human Services (DHS) (Drinking Water Regulatory Unit)	Implement & oversee the Safe Drinking Water Act 2003 and the Safe Drinking Water Regulations 2005, which specifies drinking water quality standards & are based on the ADWG.
Recycled Water Mgmt	Environment Protection Authority (EPA)	Protect water quality & regulation of waste disposal & pollution in Victoria under the Environment Protection Act 1970; administer Our Water Our Future; the Water Recycling Action Plan (2002); Guideline for Environment Management: Use of Reclaimed Water (EPA, 2003); & Reuse options for Household Wastewater
Environmental Health Mgmt	EPA	Administer the Environment Protection Act 1970 & issue works approval to existing industry or new scheduled premises discharging waste to the environment; issue licences that set operating & waste discharge limits.

The key price of drinking water legislation in Victoria is the Safe Drinking Water Act 2003, which came into effect on 1 July 2004. Prior to this, drinking water quality was regulated through the Health Act 1958, the Health (Quality of Drinking Water) Regulations 2002, the Food Act 1984, and contractual and licence deeds between water businesses and the Department of Sustainability and Environment.

The 10 Catchment Management Authorities (CMAs) in Victoria were established under the Catchment and Land Protection Act 1994. Water is Victoria is managed by 19 state-owned businesses that report to the Victorian Government.

Other legislation in place for water management in Victoria includes the Water Industry Act 1994, the Water Industry Regulatory Order 2003 and the Financial Management Act 1994.

Victoria's Our Water, Our Future program was launched in 2004. It was been developed to improve water savings by modernising irrigation systems and encouraging water saving in households and industry; to create new water supplied and improve existing ones; and to expand the existing water grid.

ESC is currently reviewing the Regulatory Accounting Code. The Victorian government is also positioned to improve training to water treatment plant operators through the introduction of a new education and training program with improved requirements for certification of operations staff.

Below is a list of some of the government and non-government organisations with an interest in water in Victoria. The list is not intended to be comprehensive and merely provides a snap-shot of the main stakeholders.

Other: Victorian Water Industry Association (VicWater)

Tasmania

In Tasmania, water management responsibilities rest with various state, regional and local organisation. Tasmania has undergone significant change in the past year, with the amalgamation of water suppliers to just three. The figure and table below describe the various responsibilities in water in Tasmania as it related to supply of water to regional towns.

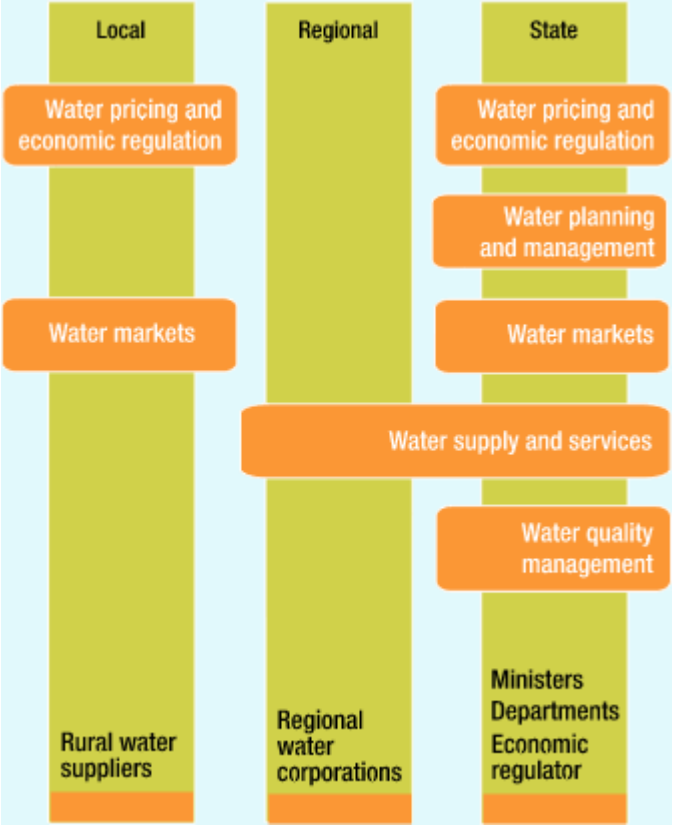

Figure 7: Tasmanian arrangements for water management [8]

Table 5 Summary of water in Tasmania

Governance Area	Responsible Party	Responsibilities
Water Pricing	Economic Regulator of Water & Sewerage, Water Corporations & irrigation entities	Regulate water and sewerage prices and licence industry participants; monitor annual performance; regulate urban bulk water & retail water, sewerage services. The three Water Corporations set urban retail prices, while the five irrigation entities set rural retail prices.
Rural & Regional Water Planning & Mgmt	Department of Primary Industries & Water (DPIW)	Oversee mgmt of Tasmania's freshwater resources under Water Management Act 1999; prepare & implement water management plans, including environmental provisions.
Metropolitan	DPIW	Water infrastructure & development; water management planning;

[8] http://www.nwc.gov.au/www/html/1804-tasmania.asp

Governance Area	Responsible Party	Responsibilities
Water Planning & Mgmt		administer the Water Management Act 1999
Water Markets	Department of Primary Industries, Parks, Water and Environment (DPIPWE),	Oversee mgmt of Tasmania's freshwater resources under Water Management Act 199; grant water licences & allocations & approve of water transfers. Also administer Guiding Principles for Water Trading – Water Resources Policy #2003/2, Water management plans & Irrigation Clauses Act 1973
Water Supply & Services	Southern Regional Corporation, Northern Regional Corporation, North Western Regional Corporation, Rural water entities, Local Government	Urban & rural bulk water & urban retail water is operated by the three water corporations, rural retail is operated by five rural entities, while local government look after stormwater & drainage.
Drinking Water Mgmt	Department of Health and Human Services (DHHS) (Director of Public Health)	Administer Public Health Act 1997; regulate drinking water supplies through administration & enforcement of Drinking Water Quality Guidelines (2005), which are in accordance with the ADWG.
Recycled Water Mgmt	DHHS, DPIPWE, Local councils	DHHS oversee drinking water supplier responsibilities & investigates threats to public health (Public Health Act 1997, Environmental Management and Pollution Control Act 1994) DPIPWE has a key role in ensuring sustainable reuse through permits or environmental protection notices. Local Councils approve & regulate wastewater re-use schemes either through environmental protection notices, permits or user-supplier agreements.
Environmental Health Mgmt	Board of the Environment Protection Authority (EPA), Local councils	EPA enforce provisions of the Environmental Management and Pollution Control Act 1994 & State Policy on Water Quality Management 1997 Local Councils issue permits to Level 1 & 2 activities (under the Environmental Management and Pollution Control Act 1994).

South Australia

In South Australia, water management responsibilities rest with various state, regional and local organisations. The figure and table below describe the various responsibilities in water in South Australia as it related to supply of water to regional towns.

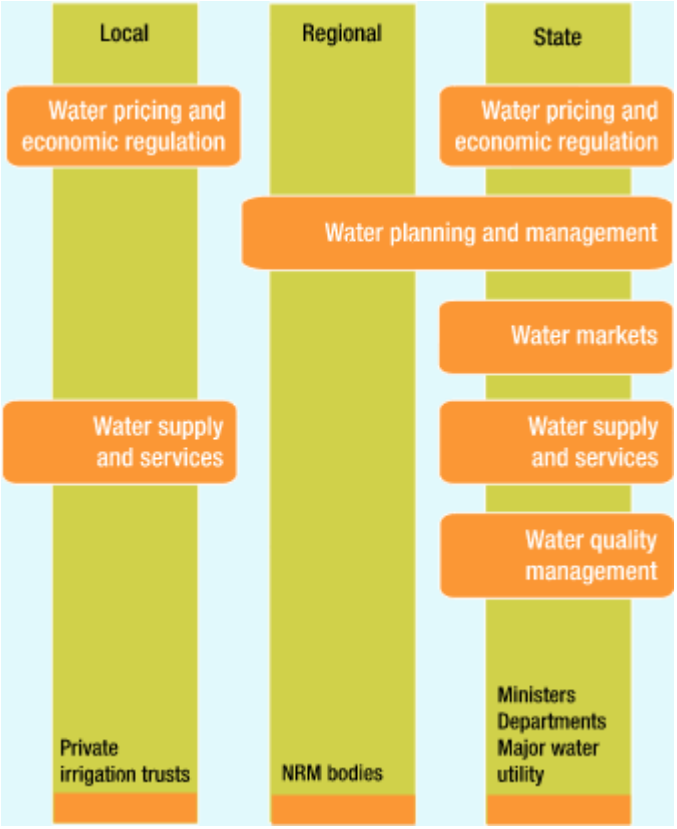

Figure 8: South Australian arrangements for water management [9]

Table 6 Summary of water in South Australia

Governance Area	Responsible Party	Responsibilities
Water Pricing	Essential Services Commission (ESC), SA Cabinet, irrigation trusts	ESC - Review Government price-setting. SA Cabinet – set prices for urban retail water. Private irrigation trusts (27) – set rural retail water prices.
Rural & Regional Water Planning & Mgmt	Department of Land, Water and Biodiversity Conservation (DLWBC), Natural Resource Mgmt (NRM) Boards	DLWBC - Water resource management & administering the Natural Resources Management Act 2004; develop & implement regional natural resource management plans & water allocation plans. Other legislation includes the State Natural Resource Management Plan 2004; Regional Natural Resource Management Plans; Water Allocation Plans; and River Murray Act 2003
Metropolitan Water Planning & Mgmt	SA Water	Plan & develop water & wastewater assets & to secure water supply for South Australia, including the Water-Proofing Adelaide plan.
Water Markets	Department of Land, Water and Biodiversity Conservation (DLWBC)	Approve water trade; record all water licences & transfers; Water Information & Licensing Management Application. Operate Natural Resources Management Act 2004; Natural Resource Management Plans; &Water Allocation Plans.
Water Supply & Services	SA Water, irrigation trusts, Local Government, (NRM) Boards	SA Water supplies urban & rural bulk water & urban retail water. 27 private irrigation trusts supply rural water ; stormwater & drainage is managed by local government & the NRM Boards.
Drinking Water	Department of	Administer & enforce the Food Act 2001 to ensure drinking water

[9] http://www.nwc.gov.au/www/html/1794-south-australia.asp

Governance Area	Responsible Party	Responsibilities
Mgmt	Health	supplies are safe; operates the Drinking Water Quality Management System. Health has adopted the Australian Drinking Water Guidelines (2004).
Recycled Water Mgmt	Department of Health	Issue approvals under Public and Environmental (Waste Control) Regulations 1995 to WTPs; with the EPA, produced the South Australian Reclaimed Water Guidelines (Treated Effluent); administers Public and Environmental Health Act 1987
Environmental Health Mgmt	Environment Protection Authority	Administer the Environment Protection Act 1993; issue environmental authorisations to activities prescribed in Environment Protection Act 1993; administers Environmental Protection (Water Quality) Policy 2003 & Codes of Practice

Western Australia

In Western Australia, water management responsibilities rest with various state and local organisations. The figure and table below describe the various responsibilities in water in Western Australia as it related to supply of water to regional towns.

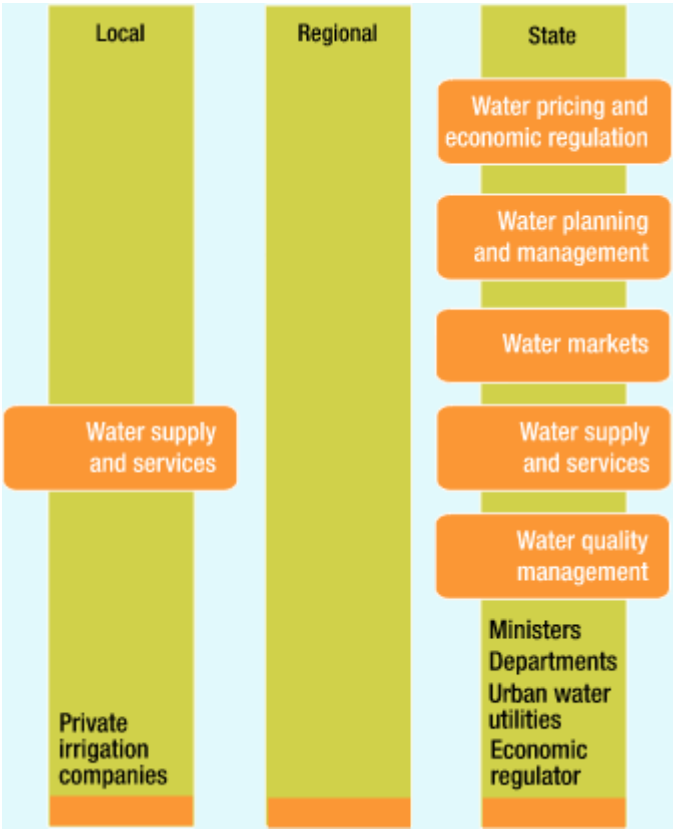

Figure 9: Western Australian arrangements for water management [10]

Table 7 Summary of water in Western Australia

Governance Area	Responsible Party	Responsibilities
Water Pricing	Economic Regulation Authority (ERA)	Price recommendation. Oversight for urban & rural water pricing practices. Western Australia Cabinet set urban bulk & retail prices, while Irrigation Cooperatives set rural retail prices.

[10] http://www.nwc.gov.au/www/html/1812-western-australia.asp

Governance Area	Responsible Party	Responsibilities
Rural & Regional Water Planning & Mgmt	Department of Water (DoW)	Administer the Rights in Water and Irrigation Act 1914; water allocation planning & administration of water entitlements & water rights. Other legislation includes the State Water Plan 2007.
Metropolitan Water Planning & Mgmt	DoW, Water Corporation	DoW - water resources & water industry, planning & policy, management & regulation; supply water & wastewater services to 97% of Western Australia's population. Water Corp - develop Integrated Water Supply Scheme Source Development Plan 2005 - 2050
Water Markets	DoW	Water allocation planning & admin of water entitlements & water rights. Approve trading of water entitlements, in accordance with Rights in Water and Irrigation Act 1914 & State-wide policy No. 6.
Water Supply & Services	Water Corporation, Busselton Water, Aqwest Water, Rottnest Island Authority, Irrigation Corporations, Local Govt	Water Corporation supplues urban & rural bulk water; Water Corporation, Busselton Water, Aqwest Water & Rottnest Island Authority supply urban retail water, private irrigation companies supply rural water; stormwater & drainage are managed by Water Corporation & Local Govt.
Drinking Water Mgmt	Department of Health, ERA, DoW	Health - advise on the appropriate health standards for drinking water; regulate the Water Corporation's drinking water quality. Health has adopted the ADWG (1996). ERA - issue licences that specify drinking water quality standards. Dow - identify & protect Public Drinking Water Source Areas & prepare Drinking Water Source Protection Assessments & Drinking Water Source Protection Plans. Legislation includes Country Areas Water Supply Act 1947, Metropolitan Water Supply, Sewerage and Drainage Act 1909, Public Drinking Water Source Areas (PDWSA) Policy, Statement of Planning Policy 2.7 Public Drinking Water Source Policy, Water Services Licensing Act 2005
Recycled Water Mgmt	Department of Health; Environmental Protection Authority (EPA), DoW, ERA	Health administer & enforce the Health Act 1911; and set min design & installation standards in the Code of Practice for the Reuse of Greywater in Western Australia. EPA provides environmental advice to the Minister; prepare environmental protection policies under the Environmental Protection Act 1986. DoW supports the Minister by developing sewerage service policy. ERA issues licences to sewerage service providers, for the provision of water services, including the supply of recycled water.
Environmental Health Mgmt	Department of Environment & Conservation (DEC), Environment Protection Authority (EPA), Swan River Trust	DEC administers Environmental Protection Act 1986; oversee mgmt of natural resources; license & register water & wastewater related activities; & perform water quality management & monitoring. EPA advises the govt on policy & prepares environmental protection policies. Swan River Trust manage & protect the river system, advises the Minister on development proposals within the Trust's Management Area & controls and prevents pollution of the rivers. Other instruments include Environmental Protection Regulations 1987; Environmental Protection Policies; Environmental Quality Objectives; Swan and Canning Rivers Management Act 2006; and Swan and Canning Rivers Management Regulations 2007.

Northern Territory

In the Northern Territory, water management responsibilities rest with various territory organisations. The figure and table below describe the various responsibilities in water in the Northern Territory as it related to supply of water to regional towns.

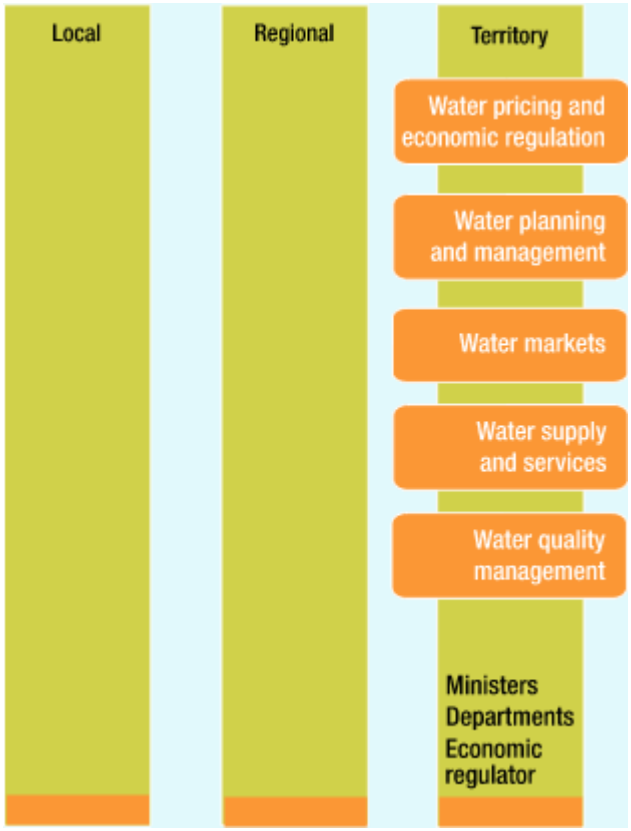

Figure 10: Northern Territory arrangements for water management [11]

Table 8 Summary of water in the Northern Territory

Governance Area	Responsible Party	Responsibilities
Water Pricing	Utilities Commission	Monitor & enforce compliance with pricing determinations; regulates urban water supply & sewerage services. The Treasurer (Regulatory Minister) sets water prices.
Rural & Regional Water Planning & Mgmt	Dept of Natural Resources, Environment, The Arts and Sport (NRETAS) (Controller of Water Resources)	Water resource planning & management under the Water Act 1992; prepare Water Allocation Plans.
Metropolitan Water Planning & Mgmt	NRETAS, Power & Water Corporation	Ensure the achievement of water resource management outcomes; investigate & develop water related infrastructure.
Water Markets	NRETAS	Issue, transfer & amend water licences under the Water Act 1992 & Water Regulations 1992; maintain a register of water licences.
Water Supply & Services	Power and Water Corporation, Local Govt, Dept of Planning &	Power and Water Corporation supply urban & rural bulk water, urban retail water; and rural retail water. Local Govt & DPI manage stormwater & drainage.

[11] http://www.nwc.gov.au/www/html/1735-northern-territory.asp

Governance Area	Responsible Party	Responsibilities
	Infrastructure (DPI)	
Drinking Water Mgmt	Dept of Health and Community Services (DHCS), Utilities Commission	DHCS set standards for drinking water quality under Water Services and Sewerage Supply Act 2001 & monitors compliance with those objectives. The minimum drinking water standards are in accordance with the ADWG (2004). The Utilities Commission regulate water supply services, which include issuing & auditing compliance against Operating Licences that specify drinking water quality standards.
Recycled Water Mgmt	DHCS (Chief Health Officer), Utilities Commission, Power & Water Corporation	DHCS provide direction & safeguards for wastewater quality for reclaimed water schemes; set the standards for the quality of recycled water licensed under the Water Services and Sewerage Supply Act 2001. The Utilities Commission regulate water supply services, which include issuing & auditing compliance against Operating Licences that specify recycled water standards. Power and Water Corp also have a Reclaimed Water Policy
Environmental Health Mgmt	NRETAS	Administer the Water Act 1992 & Water Regulations 2001 including issuing of water discharge licences & intervening in cases of pollution.

Responsibility for Water Delivery

It is unsurprising that water management in Australia is complex with many laws and agencies involved in the process. In fact, there are up to as many as 800 agencies that are responsible for the administration and management of water, at the federal, state, regional and local levels.

Water management and supply by utilities is also highly variable across the country, with some states and territories supplied by one very large utility, while others are served by a large number of smaller, mostly local government based, utilities. Table 9 describes potable water distribution in Australia. In some states a utility might only serve one town, though in most cases, utilities serve a number of towns.

Table 9: Drinking water supply utilities in Australia

State or Territory	Number of Water Utilities[12]	Supplier Description
Queensland	72	Local Councils and Regional water utilities
New South Wales	109	106 Local Councils + 3 Metro
Australian Capital Territory	1	Single State-wide water utility
Victoria	16	Regional water utilities (3 Metro + 13 Regional)
Tasmania	3	Regional water utilities
South Australia	1	Single State-wide water utility
Northern Territory	1	Single State-wide water utility
Western Australia	5	Single State-wide water utility + 4 small Local utilities

[12] As of May 2010

AECOM

Project Methodology

Review of Regional Water Quality & Security

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Project Methodology

Overview of Methodology

A flow chart describing the overall process is provided below in Figure 11.

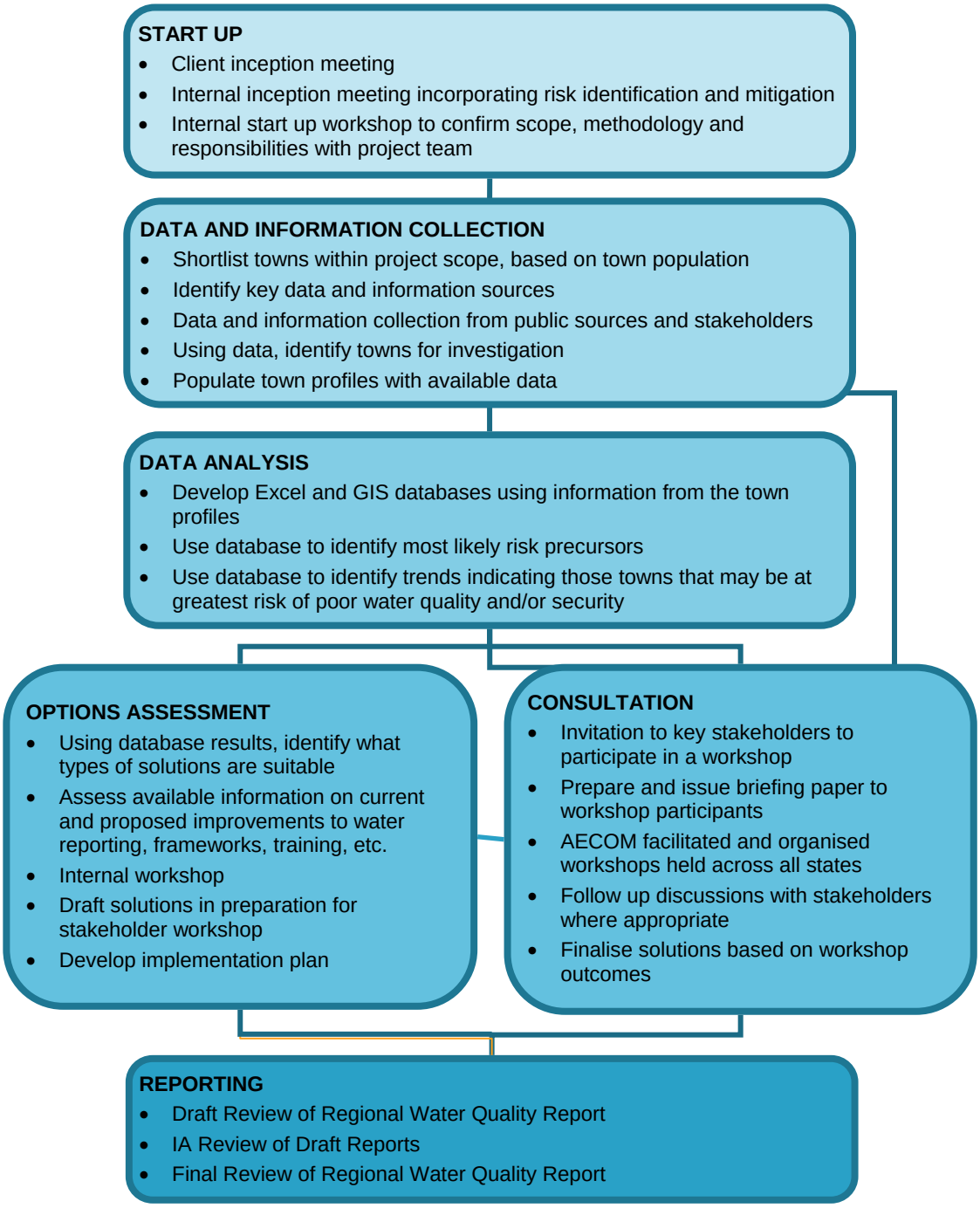


Figure 11: Overall Project Methodology

Identification of Towns for Investigation

Identification of towns to be included in the investigation was a four-step process. This process is described below in Figure 12.

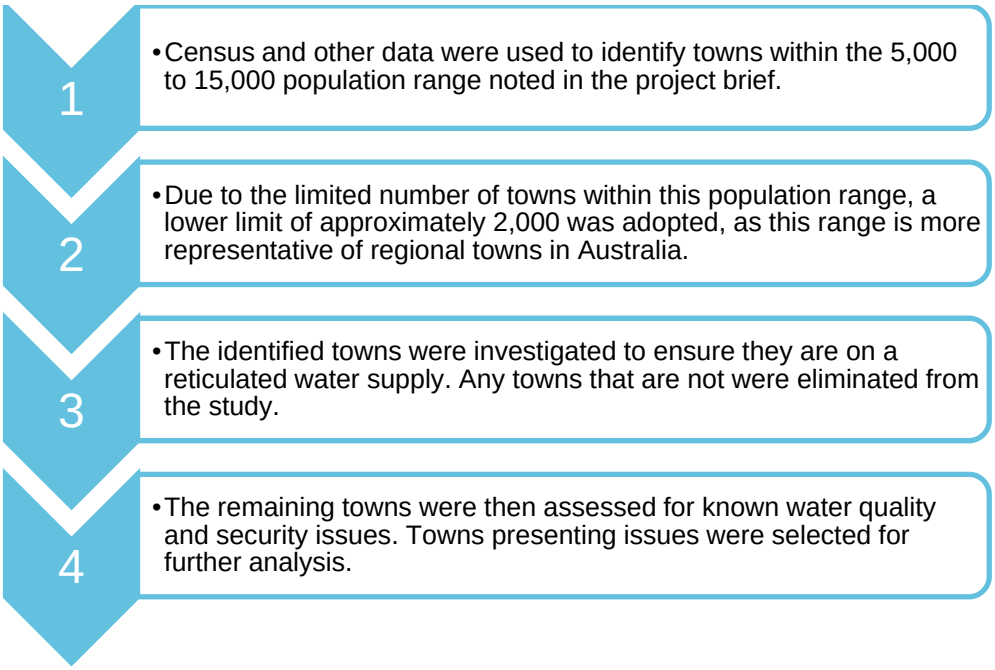


Figure 12: Town Identification Process

It is important to note that it was not the intent of this investigation to study every town in each state and territory that falls within the town scope outlined above. Due to the allocated program and budget for the project, the approach is more strategic and our aim was to investigate a sample of towns in each state or territory.

As there are no towns in the ACT that satisfy the requirements of the scope of this project, no towns in the ACT were selected for further investigation.

Town Profiles

The risks listed in Figure 13 provide a snapshot of some of the physical and organisational risks to water quality and security. Risks such as these were used to identify towns to be included in the study.

AECOM prepared an excel template to capture the major water quality and security risks faced by each town sampled in the investigation. The template used to prepare the town profiles is provided in Appendix C.

Data and Information Collection

Data and information on the selected towns was sourced via public websites, reports and with assistance from federal, state and local stakeholders. This information was used to populate the town profiles. It should be noted that Western Australia were excluded from this part of the investigation Water Corporation were unable to provide the necessary information, and there was very little publically available information on water quality and security in Western Australia.

Further information on water legislation, frameworks, best practice guidelines, reporting, training, reform and institutional arrangements was also compiled. This information is particularly relevant in establishing appropriate solutions. However, it should be understood that given the timeframe and abundance of information potentially available, that there may be gaps in this review, even following stakeholder liaison during the data and information collection phase.

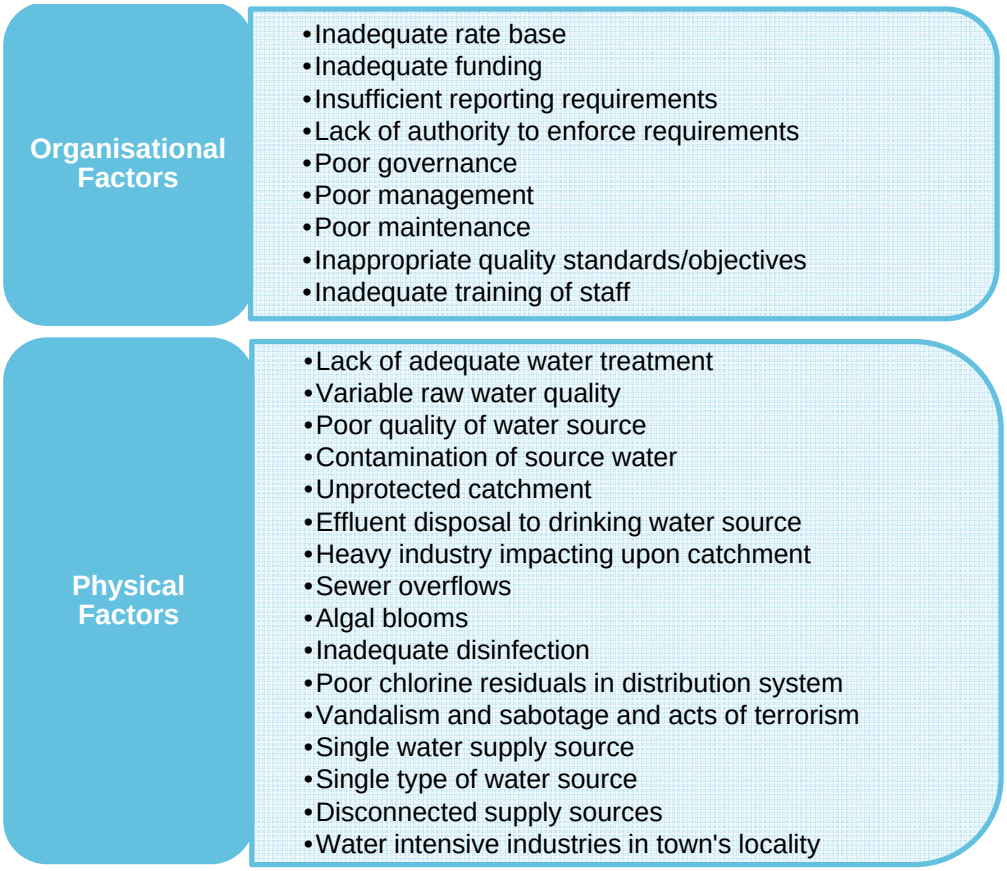


Figure 13: Physical and Organisational Risk Factors that may lead to poor water quality and security

Options Development

The development of solution options occurred in three phases:

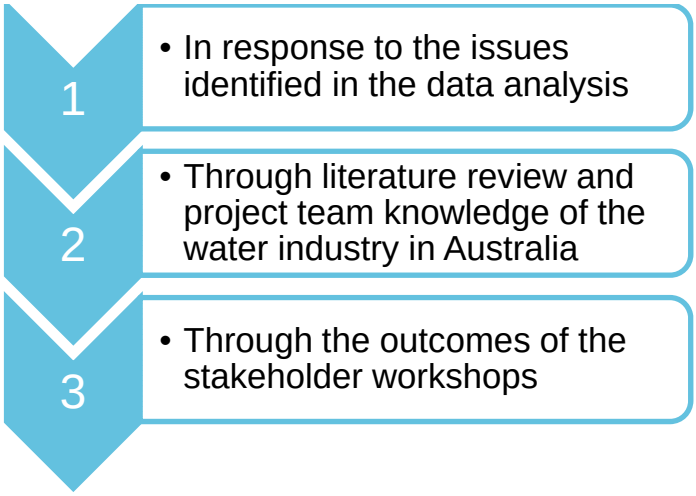


Figure 14: Solution Identification Methodology

Following completion of the town profiles, a nationwide database was established to capture the issues in each town used in the study. This database enabled the project team to determine what the major issues are across the country and within each state. The project team also used the information to attempt to draw cause and effect style conclusions. This allowed us to identify potential trends that may indicate susceptibility to water quality and security risk.

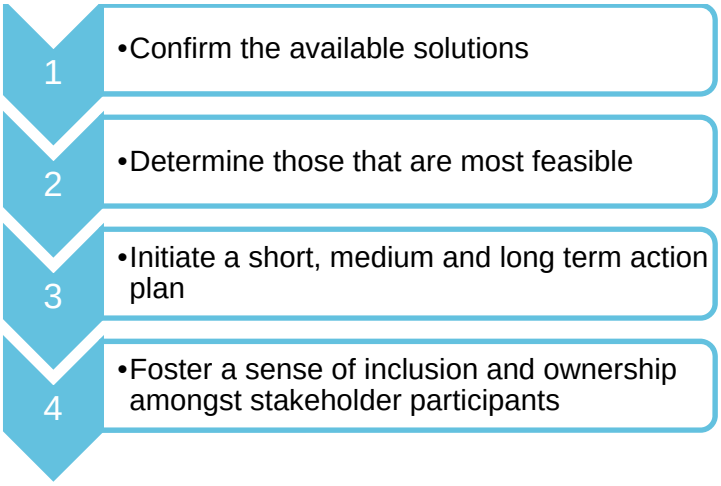
To supplement this process and to close potential information gaps, a literature review was performed to encapsulate other potential issues and solutions confronting the water industry in regional towns. In addition, the knowledge and experience the individual project team members have of the barriers to healthy water quality and reliable water supplies was utilised.

Completion of the two above steps enabled the project team to approach the stakeholder workshops with a broad range of solutions for consideration and discussion. The stakeholders provided information on initiatives and systems currently in place in each state. Additionally, proposed changes and other initiatives under development were also identified and investigated. Stakeholders were asked for alternate and additional solutions to those identified, for their professional opinion on which solutions would be more appropriate, and for their contribution on which solutions would be relatively simple or difficult to implement.

Stakeholder Workshops

Stakeholder workshops formed part of the options development and assessment, ensuring that realistic solutions were identified and recommended. The workshops also assisted in determining barriers to implementation of proposed solutions.

The objectives of the workshops were to:



The workshops considered what solutions may be implemented from a Commonwealth, state and utility level. While the objective of the project was to provide recommendations for improvement, workshop participants were also asked to focus on what is done well at a Commonwealth, state and utility level.

Workshops were held for each state and territory to ensure local issues and solutions were identified and incorporated. A national stakeholder workshop was also held to capture broader issues, as well as those solutions that may be implemented at a Commonwealth level.

A workshop was not held in Western Australia following a decision by Water Corporation not to participate. Water Corporation also requested that the other stakeholders, the Department of Health and the Department of Water, not participate in the workshop.

The discussion points addressed during the workshop were:

- Introduction to the workshop and project
- Introductions by Stakeholder participants
- The current situation in water
- Overview of towns included in the study and how they were chosen
- Some Results from the investigation so far
- Other issues that may not be conclusive via the data analysis
- Solutions already identified and what other solutions might be available
- “Wish list”, i.e. if all options were feasible, what we would do to fix water quality and security
- Barriers to implementation of available options
- Options that may be implemented in the short, medium and long term

- Who should be responsible for implementing these options
- General response to Commonwealth Government's interest in water quality and security in regional Australia

The workshops ran for approximately three hours each. During the workshop, open conversation and debate was encouraged, however, "barrow pushing" was not accepted. An AECOM team member was responsible for recording minutes during the sessions. A workshop summary was circulated to workshop participants for feedback. Submission of additional information was also invited during the week following the workshops.

Invitations to the workshops were issued to a number of key stakeholders. Stakeholders were chosen for their broad knowledge and responsibilities within their study areas. The stakeholders who agreed to participate in the workshops are shown in Table 10.

Table 10: Workshop Participants

Study Area	Organisation	Name	Role
National	Department of Environment, Water, Heritage and the Arts (DEWHA)	Steve Costello	Assistant Secretary, Urban Water Security
		Craig Bradley	Director, Cities and Towns - Urban Water Security
National	Water Services Association Australia (WSAA)	Adam Lovell	Manager, Science and Sustainability
National	Water Industry Operators Association (WIOA)	George Wall	Executive Officer
National	National Health and Medical Research Council Water Quality Advisory Committee (NHMRC WQAC)	Peter Mosse	Member
NSW	Department of Health	Paul Byleveld	Manager, Water Unit
		Sandy Leask	Water Unit
NSW	NSW Office of Water (Department of Environment Climate Change and Water, or DECCW)	Sam Samra	Manager Water Utility Performance
		Bill Ho	Manager of Water and Sewerage
NSW	Water Directorate	Gary Mitchell	Executive Officer
		Stewart McLeod	Chair
VIC	Department of Human Services (DHS)	David Sheehan	Program Manager, Drinking Water Regulation
VIC	Goulburn Valley Water (and also representing VicWater)	Bruce Hammond	General Manager - Technical Services
VIC	Essential Services Commission	Stuart Christie	-
TAS	Department of Health and Human Services (DHHS)	Scott Burton	Senior Environmental Health Officer
		Raquel Esteban	State Water Officer, Public & Environmental Health
TAS	OnStream	Cam Crawford	Executive Manager, Development and Strategy
QLD	Department of Environment and Resource Management (DERM)	Richard Priman	Director of Regional Water Supplies
QLD	Office of Water Supply Regulator (DERM)	Dr. Anne Gardiner	Principal Scientist, Office of the Water Supply Regulator
QLD	Queensland Water Directorate	Dr Rob Fearon	Executive Manager
SA	SA Water	Dennis Steffensen	Principal Scientific Advisor
		Amber Lang	Water Quality Performance Manager
		Paul Doherty	Manager Systems Planning
SA	Department of Health	Nerissa Walton	Senior Scientific Officer – Water Quality

Study Area	Organisation	Name	Role
SA/National	Water Quality Research Australia (WQRA)	Jodieanne Dawe	CEO
		Michelle Akeroyd	Program Manager – Drinking Water
NT	Power and Water	Noel McCarthy	Senior Quality Systems Officer

It should also be noted that the National Water Commission, Australian Water Association, NSW State Water, the Victorian Essential Services Commission, the Victorian Department for Sustainability and the Environment were also invited to the workshops but were unable to attend due to prior commitments.

Assessment of Solutions

Those issues that the project team and stakeholders determined to pose the most risk and greatest uncertainty were identified. Following this, the project team identified the best policy related solutions for the prominent issues. Policy based solutions, rather than specific engineering based solutions, were utilised to ensure the Commonwealth Government would be able to drive implementation of the proposed reform agenda.

Implementation Plan

An implementation plan was prepared for each of the ten recommended solutions. The implementation plan provides a staged approach or alternative options, where applicable. The implementation plan also nominated an indicative timeframe by which the recommendations should be implemented.

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Town Profile Template

Review of Regional Water Quality & Security

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Appendix C Town Profile Template

TOWN	State/Territory		
	Town Name		
	Town Population		
WATER UTILITY	Name of Water Utility		
	Rate ($/kL)		
	Per Capita Water Consumption (L/day)		
	Number of Connections		
CATCHMENT AND WATER SUPPLY	Catchment		
	Sub-Catchment		
	Catchment Protection Status		
	Potable Water Source(s)		
	Supply Capacity		
WATER QUALITY	Treatment Plant(s)		
	Level of Treatment		
	Drinking Water Guidelines		
	Results		
WATER SECURITY	Current Water Restrictions		
	Proportion of Potable Water Supplied to Households (%)		
	Distance from the Coast (km)		
	Climate		
	Average Annual Rainfall		
FACTOR		YES/NO	NOTES/EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought		
		Single drinking water source		
		Poor quality water source		
		Sewage overflow or disposal into water source		
		Flooding		
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		

		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals		
		Irrigation		
		Chemicals / process		
	Population	Seasonal population loadings		
		Rapid population growth		
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		
Notes				

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Town Profiles – QLD

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Town # 1

TOWN		State/Territory	Qld-North	
		Town Name	Napranum Aboriginal Shire Council	
		Town Population	830 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Napranum Aboriginal Shire Council	
		Rate ($/kL)	No rates charged to users - Aboriginal community	
		Per Capita Water Consumption (L/day)	In September 2009, it was approximately 2,000L/person/day.	
		Number of Connections	218	
CATCHMENT AND WATER SUPPLY		Catchment	Groundwater	
		Sub-Catchment	N/A	
		Catchment Protection Status	nil	
		Potable Water Source(s)	Bore water supply 10 to 30m depth.	
		Supply Capacity	100% of supply - allowable extraction unknown.	
WATER QUALITY		Treatment Plant(s)	N/A refer above	
		Level of Treatment	Nil. Bores pump to the reservoir, water is then pumped from the reservoir to the old high level tank.	
		Drinking Water Guidelines	None. Water quality testing is not undertaken.	
		Results	No water quality testing is completed.	
WATER SECURITY		Current Water Restrictions	Yes, due to the high lift pumps failing - the bores were diverted to the high level tank and operated	
		Proportion of Potable Water Supplied to Households (%)	100% - there is a farm, however it is owned by Council and has its separate bore.	
		Distance from the Coast (km)	<100m	
		Climate	Tropical. High rainfall Dec to March, April to November low rainfall periods.	
		Average Annual Rainfall	"over 2 metres" (No information available from BOM, however based on knowledge of area)	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Council is concerned they will run out of water. Water demand management is required to address this issue. Napranum is not listed as being drought declared as at 30 September 2009 on www.longpaddock.qld.gov.au
		Single drinking water source	Yes	
		Poor quality water source	No	
		Sewage overflow or disposal into water source	No	Treated sewage overflows to the ground; may soak into the ground water. Pump station overflows occur perhaps once/year.
		Flooding	No	The area floods, but this doesn't affect the bores - water table rises.
		Fauna defecating in supply	No	
		Fauna destroying water intake structures	No	People do – vandalism.
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Suspected high levels of dissolved CO2 in ground water causing damage to the brass, copper fittings in house plumbing, hydrants, meters etc.
		Un-lined landfills	Yes	Lots of unofficial dump sites - the community dumps dead dogs regularly.
		Extensive agriculture	No	Lots of mining activity in the area - Bauxite, adjacent to Weipa.
		Low vegetation cover (dust, sediment runoff)	Yes	Lots of dust in the dry season.
		Poor access to supply	No	Only ground water, alternate source not available apart from desalinated supply (no current provision).
		Unsustainable water extraction	Possibly	Not sure what the licence is. The mines use a lot of ground water.
		Aquifer turning saline due to high extraction	No	Not that is known.
		Hard water	No	Not that is known.
		Aging or inadequate pipe work and associated infrastructure	Yes	Council is regularly locating and repairing leaks.
		Significant water losses due to leaking pipes	Yes	High water usage.
	Governance	High per capita water consumption	Yes	Approximately 2000L/person/day in the dry season, mixture of high usage and excessive leaks.
		Inappropriate water quality standards / objectives	N/A	No testing is done.
		Lack of infrastructure maintenance	Yes	Common across all aboriginal communities.
		Poor management or governance	Yes	The current manager is good, however, his staff have a low skill and knowledge base. If current manager was to leave then level of service would drop. Poor management of water and sewerage systems is common across all aboriginal communities.
		Vandalism / sabotage / terrorism	Yes	Napranum is not too bad, however, it is common across all aboriginal communities.
		Insufficient trained personnel	Yes	Common across all aboriginal communities.
		Inadequate funding for maintenance or upgrades	Yes	Common across all aboriginal communities.
	Industries	Mining / minerals	Yes	Lots of mining activity in the area - Bauxite.
		Irrigation	No	The Council farm has its own bore.
		Chemicals / process	No	
	Population	Seasonal population loadings	Yes	Population increased during the "Wet Season" but not much when compared with other aboriginal communities.
		Rapid population growth	Yes	Growth is greater than State Average based on Census data, however Council records indicate otherwise.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	No	None known, due to lack of sampling.
		Algal blooms	No	None known.
		Heavy metal contamination	No	None known.
		Poor chlorine residuals	Yes	No chlorination.
		Pesticide contamination	No	None known.
		Boil water notices	No	None known.
		Deaths or illness due to water quality	No	None known.
		Water restrictions (current and historic)	Yes	Only when something fails i.e. pump/switchboard etc.
		Taste and odour issues	No	None known.
		Other contamination that would affect health	Unknown	Suspected high levels of dissolved CO2 in ground water.
Notes			Napranum is an indigenous community located on the edge of Weipa - North Queensland.	

Town # 2

TOWN	State/Territory	Qld-North		
	Town Name	Emerald		
	Town Population	10,990 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Emerald Shire Council		
	Rate ($/kL)	Unknown		
	Per Capita Water Consumption (L/day)	Unknown		
	Number of Connections	Unknown		
CATCHMENT AND WATER SUPPLY	Catchment	Lake Maraboon		
	Sub-Catchment	Unknown		
	Catchment Management Authority (CMA)	Emerald Shire Council		
	CMA Web-Link	www.emerald.qld.gov.au		
	Catchment Protection Status	Unknown		
	Potable Water Source(s)	Lake Maraboon		
	Supply Capacity	Unknown		
WATER QUALITY	Treatment Plant(s)	None		
	Level of Treatment	None		
	Drinking Water Guidelines	ADWG 2008		
	Results	*Typical Results*	Lake Maraboon	ADWG 2004
		Fluoride (mg/L)	Unknown	1.5 mg/L
		pH	Unknown	6.5-8.5
		Chlorine residual (mg/L)	Unknown	5 mg/L
		Alkalinity (mg/L)	Unknown	??
		Hardness (mg/L)	Unknown	200 mg/L as CaCO3
		Turbidity (NTU)	Unknown	5 NTU
WATER SECURITY	Current Water Restrictions	Sprinkler Ban: Monday - 12 am - 12 pm Tuesday-Sunday - 9am - 7 pm Refer to: www.emerald.qld.gov.au/Community/Your_Neighbourhood/Water.htm		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	300km		
	Climate	Dry		
	Average Annual Rainfall	525mm		

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Emerald is not listed as being drought declared as at 30 September 2009 on www.longpaddock.qld.gov.au. It is noted that some areas of Central Highlands Regional Council is drought declared.
		Single drinking water source	Unknown	
		Poor quality water source	Unknown	
		Sewage overflow or disposal into water source	Unknown	
		Flooding	Yes	
		Fauna defecating in supply	Yes	
		Fauna destroying water intake structures	Yes	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture	Yes	
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals		
		Irrigation		
		Chemicals / process		
	Population	Seasonal population loadings		
		Rapid population growth	YES	Growth is greater than State Average based on Census data
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		
Notes				

Town # 3

TOWN	State/Territory	Qld-North		
	Town Name	Longreach		
	Town Population	2,976 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Longreach Regional Council		
	Rate ($/kL)	$0.7/kL		
	Per Capita Water Consumption (L/day)	Unknown. Volume produced by water treatment plant = 5ML/day		
	Number of Connections	1,500		
CATCHMENT AND WATER SUPPLY	Catchment	Thompson River		
	Sub-Catchment	-		
	Catchment Management Authority (CMA)	Longreach Regional Council		
	CMA Web-Link	www.longreach.qld.gov.au		
	Catchment Protection Status	Nil		
	Potable Water Source(s)	Thompson River		
		Bore Water		
	Supply Capacity	5Ml/day and peak day demand at 9ML/day		
WATER QUALITY	Treatment Plant(s)	Longreach Water Treatment Plant		
	Level of Treatment	Coagulation, clarification, DAF, granular media filtration, disinfection		
	Drinking Water Guidelines	ADWG 2008		
	Results (% compliance for 2008 reporting period)	*Typical Results*	Longreach Water Treatment Plant	ADWG 2008
		Fluoride (mg/L)	Unknown	1.5 mg/L
		pH	Unknown	6.5-8.5
		Chlorine residual (mg/L)	Unknown	5 mg/L
		Alkalinity (mg/L)	Unknown	??
		Hardness (mg/L)	Unknown	200 mg/L as CaCO3
		Turbidity (NTU)	Unknown	5 NTU
WATER SECURITY	Current Water Restrictions	Residential Monday to Sunday 6am to 8am 5pm to 8pm Commercial Monday, Wednesday, Friday 6am to 9am 4pm to 7pm Refer to www.longreach.qld.gov.au		
	Proportion of Potable Water Supplied to Households (%)	100%		
	Distance from the Coast (km)	~850km		
	Climate	Dry		
	Average Annual Rainfall	450mm (sourced from www.bom.gov.au)		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Longreach Regional Council is listed as being partially drought declared as at 30 September 2009 on www.longpaddock.qld.gov.au
		Single drinking water source	No	
		Poor quality water source		
		Sewage overflow or disposal into water source	No	
		Flooding	Yes	
		Fauna defecating in supply	Yes	
		Fauna destroying water intake structures	Yes	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture	Yes	
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply	No	
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	No	
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	Yes	
		Irrigation	Yes	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Population decline experienced between 2001 and 2006 Census
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)	Yes	
		Taste and odour issues		
		Other contamination that would affect health		
Notes				

Town # 4

TOWN	State/Territory	Qld-North		
	Town Name	Cloncurry		
	Town Population	2,384 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Cloncurry Shire Council		
	Rate ($/kL)	Unknown		
	Per Capita Water Consumption	Unknown. Water Treatment Plant produces 4 ML/day.		
	Number of Connections	approx. 1,200		
CATCHMENT AND WATER SUPPLY	Catchment	Chinaman Creek and Cloncurry River Catchment		
	Sub-Catchment	Unknown		
	Catchment Management Authority (CMA)	Cloncurry Shire Council		
	CMA Web-Link	www.cloncurry.qld.gov.au		
	Catchment Protection Status	Unknown		
	Potable Water Source(s)	Cloncurry River		
		Chinamen Creek Dam		
	Supply Capacity	4 ML/day		
WATER QUALITY	Treatment Plant(s)	Cloncurry Water Treatment Plant		
	Level of Treatment	Coagulation, clarification, media filtration and disinfection with chlorination (chlorine gas).		
	Drinking Water Guidelines	ADWG 2008		
	Results	*Typical Results*	Cloncurry WTP	ADWG 2004
		Fluoride (mg/L)	0.30	1.5 mg/L
		pH	7.80	6.5-8.5
		Chlorine residual (mg/L)	1.20	5 mg/L
		Alkalinity (mg/L)	194.00	??
		Hardness (mg/L)	199.00	200 mg/L as CaCO3
		Turbidity (NTU)	<1	5 NTU
WATER SECURITY	Current Water Restrictions	Currently on Level 1 Restrictions: Sprinkling only between 6:00am to 9:00am and 6:00pm to 9:00pm "odds & evens" Refer to www.cloncurry.qld.gov.au/community/community_waterrestrictions.shtml.		
	Proportion of Potable Water Supplied to Households (%)	100%		
	Distance from the Coast (km)	~ 400km to the gulf		
	Climate	Arid, long hot Summers		
	Average Annual Rainfall	472mm		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Cloncurry is not listed as being drought declared as at 30 September 2009 on www.longpaddock.qld.gov.au. Cloncurry has faced severe water shortages over the last 15 years when the wet season does not replenish the dam supply. Supplemented by flood harvesting from the Cloncurry river into the dam storage, river wells extracting water stored in the river bed and bores brought on loine around town when the dam supply runs dry.
		Single drinking water source	No	Cloncurry River and Chinamen Creek Dam. Qld State Government is currently constructing pipeline from North West Pipeline to supplement Chinaman Creek Dam.
		Poor quality water source	No	
		Sewage overflow or disposal into water source	No	
		Flooding	Yes	Floods in Cloncurry River caused damage to the Chinaman Creek dam fuse plug in 1997, causing a loss of storage. Flooding in Cloncurry River has caused damage to river well system.
		Fauna defecating in supply	Yes	Cattle in dam storage area.
		Fauna destroying water intake structures	Unknown	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	River water has high levels of iron and manganese in periods of high runoff during wet season. This overloads the WTP for short periods resulting in very dirty water.
		Un-lined landfills	No	
		Extensive agriculture	Yes	Beef cattle in Chinaman Creek and Cloncurry River upstream catchment.
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply	No	
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure	Yes	Water reticulation network consists of asbestos cement (AC) mains in places. Regular leaks require patching. Low pressure in outer areas of town.
		Significant water losses due to leaking pipes	Yes	Believed to be but not proven.
	Governance	High per capita water consumption	Yes	> 500 L/capita/day
		Inappropriate water quality standards / objectives	No	
		Lack of infrastructure maintenance	Yes	Raw water storage inadequate for usage, water treatment plant at capacity. Council is pursuing opportunity to source supplementary supply from Julius Dam pipeline.
		Poor management or governance	Unknown	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades	Yes	
	Industries	Mining / minerals	Yes	Smaller mines upstream. Dewatering activities for Ernest Mine anecdotally lowers groundwater over a large enough area to affect Cloncurry township bore supplies.
		Irrigation	No	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Population decline experienced between 2001 and 2006 Census New mining activity can result in rapid population growth. Current water limitations allegedly impacting on town's ability to attract new mining operations.
ECURITY		Pathogenic contamination	No	
		Algal blooms	No	
		Heavy metal contamination	No	
		Poor chlorine residuals	No	

WATER QUALITY OR S RISK (EFFECT	Pesticide contamination	No	
	Boil water notices	Yes	When required under the Act.
	Deaths or illness due to water quality	Unknown	
	Water restrictions (current and historic)	Yes	
	Taste and odour issues	Yes	Associated with fresh runs in river or when dam levels are getting low.
	Other contamination that would affect health		
Notes			

Town # 5

TOWN		State/Territory	Qld-North		
		Town Name	Charters Towers		
		Town Population	7,979 (Census 2006, Urban Centre/Locality)		
WATER UTILITY		Name of Water Utility	Charters Towers Regional Council		
		Rate ($/kL)	Unknown		
		Per Capita Water Consumption (L/day)	Unknown. Water Treatment Plant produces 14ML/day.		
		Number of Connections	>2,500		
CATCHMENT AND WATER SUPPLY		Catchment	Burdekin River		
		Sub-Catchment	-		
		Catchment Management Authority (CMA)	Charters Towers Regional Council		
		CMA Web-Link	www.charterstowers.qld.gov.au		
		Catchment Protection Status	Restricted access to public.		
		Potable Water Source(s)	Burdekin River Weir		
			Burdekin River		
		Supply Capacity	14ML/day		
WATER QUALITY		Treatment Plant(s)	F E J Butcher Treatment Plant		
		Level of Treatment	Coagulation, clarification, media filtration and disinfection with chlorine (chlorine gas).		
		Drinking Water Guidelines	ADWG 2004		
		Results	*Typical Results*	F E J Butcher Treatment Plant	ADWG 2004
			Fluoride (mg/L)	0.12	1.5 mg/L
			pH	7.30	6.5-8.5
			Chlorine residual (mg/L)	2.80	5 mg/L
			Alkalinity (mg/L)	120.00	??
			Hardness (mg/L)	100.00	200 mg/L as CaCO3
			Turbidity (NTU)	0.22	5 NTU
WATER SECURITY		Current Water Restrictions	Unknown		
		Proportion of Potable Water Supplied to Households (%)	Unknown		
		Distance from the Coast (km)	130km		
		Climate	Dry		
		Average Annual Rainfall	620mm		
FACTOR			YES / NO	NOTES / EXPLANATION	
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Charters Towers is not listed as drought declared as at 30th September 2009 on www.lonpaddock.qld.gov.au	
		Single drinking water source	Yes		
		Poor quality water source	No		
		Sewage overflow or disposal into water source	No		
		Flooding	Yes		
		Fauna defecating in supply	Yes		
		Fauna destroying water intake structures	No		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown		
		Un-lined landfills	No	N/A as water supply source is located some 20 km from town.	
		Extensive agriculture	Yes		
		Low vegetation cover (dust, sediment runoff)	Yes		
		Poor access to supply	No		
		Unsustainable water extraction	Unknown		
		Aquifer turning saline due to high extraction	N/A		
		Hard water	Unknown		
		Aging or inadequate pipe work and associated infrastructure	No	Assets are generally in good condition.	
		Significant water losses due to leaking pipes	No	Council has received funding from Qld government to install pressure reducing valves across network. Council is diligent on water consumption and possible water leaks.	
	Governance	High per capita water consumption	Yes		
		Inappropriate water quality standards / objectives	No		
		Lack of infrastructure maintenance	No		
		Poor management or governance	No		
		Vandalism / sabotage / terrorism	No		
		Insufficient trained personnel	No		
		Inadequate funding for maintenance or upgrades	No		
	Industries	Mining / minerals	No		
		Irrigation	No		
		Chemicals / process	No		
	Population	Seasonal population loadings	Yes	Generally around large events i.e. Goldfield ashes cricket carnival and Country music festival	
		Rapid population growth	No	Population decline experienced between 2001 and 2006 Census	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	Unknown		
		Algal blooms	Yes	Previous outbreak of geosmin blooms	
		Heavy metal contamination	Unknown		
		Poor chlorine residuals	Unknown		
		Pesticide contamination	Unknown		
		Boil water notices	Unknown		
		Deaths or illness due to water quality	Unknown		
		Water restrictions (current and historic)	Yes	Odds and evens watering bans but exact details are unknown.	
		Taste and odour issues	Yes	On rare occasions residents complain of water unsuitable for drinking.	
		Other contamination that would affect health			
Notes					

Town # 6

TOWN		State/Territory	Qld-North	
		Town Name	Innisfail	
		Town Population	8,262 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Cassowary Coast Regional Council	
		Rate ($/kL)	Refer to www.jsc.qld.gov.au/council/Corporate%20Services/Financial%20Management/Financial%20Management.shtml	
		Per Capita Water Consumption (L/day)	Unknown. Volume produced by water treatment plant - 12ML/day.	
		Number of Connections	4,885	
CATCHMENT AND WATER SUPPLY		Catchment	Johnson River Basin, Liverpool Creek	
		Sub-Catchment	-	
		Catchment Management Authority (CMA)	Cassowary Coast Regional Council	
		CMA Web-Link	www.jsc.qld.gov.au	
		Catchment Protection Status	Wet Tropics World Heritage listed	
		Potable Water Source(s)	Surface water	
		Supply Capacity	7ML/d and peak day demand at 12ML/d	
WATER QUALITY		Treatment Plant(s)	Innisfail Water Treatment Plant	
		Level of Treatment	Coagulation, clarification, granular media filtration, disinfection (sodium hypochlorite).	
		Drinking Water Guidelines	ADWG 2008	
		Results	*Typical Results*	Innisfail WTP / ADWG 2004
			Fluoride (mg/L)	- / 1.5 mg/L
			pH	7.20 / 6.5-8.5
			Chlorine residual (mg/L)	1.75 / 5 mg/L
			Alkalinity (mg/L)	20.00 / ??
			Hardness (mg/L)	20.00 / 200 mg/L as CaCO3
			Turbidity (NTU)	0.15 / 5 NTU
WATER SECURITY		Current Water Restrictions	Level 1 Restrictions: - No watering on Mondays - Odds and evens split - Watering only allowed between 5-7 am and 7-9 pm Refer to http://www.cassowarycoast.qld.gov.au/2009/09/water-restrictions/	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	10km	
		Climate	Wet Tropics	
		Average Annual Rainfall	3560mm (sourced from www.bom.gov.au)	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Innisfail is not listed as being drought
		Single drinking water source	No	
		Poor quality water source	Unknown	
		Sewage overflow or disposal into water source	No	
		Flooding	Yes	
		Fauna defecating in supply	Yes	
		Fauna destroying water intake structures	Yes	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	Unknown	
		Extensive agriculture	Yes	
		Low vegetation cover (dust, sediment runoff)	Medium	
		Poor access to supply	Unknown	
		Unsustainable water extraction	Unknown	
		Aquifer turning saline due to high extraction	Unknown	
		Hard water	Unknown	
		Aging or inadequate pipe work and associated infrastructure	Unknown	
		Significant water losses due to leaking pipes	Unknown	
	Governance	High per capita water consumption	Unknown	
		Inappropriate water quality standards / objectives	Unknown	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	Unknown	
		Vandalism / sabotage / terrorism	Unknown	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades	Unknown	
	Industries	Mining / minerals	Unknown	
		Irrigation	Unknown	
		Chemicals / process	Unknown	
	Population	Seasonal population loadings	Unknown	
		Rapid population growth	No	Population decline experienced between 2001 and 2006 Census.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	Unknown	
		Algal blooms	Unknown	
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	Unknown	
		Boil water notices	Unknown	
		Deaths or illness due to water quality	Unknown	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	Unknown	
		Other contamination that would affect health	Unknown	
Notes				

Town # 7

TOWN	State/Territory	Qld-North		
	Town Name	Mareeba		
	Town Population	6806 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Tablelands Regional Council		
	Rate ($/kL)	Unknown		
	Per Capita Water Consumption (L/day)	Unknown		
	Number of Connections	Unknown		
CATCHMENT AND WATER SUPPLY	Catchment	Barron River Catchment		
	Sub-Catchment	-		
	Catchment Management Authority (CMA)	Tablelands Regional Council		
	CMA Web-Link	www.trc.qld.gov.au/contact-us		
	Catchment Protection Status	Nil		
	Potable Water Source(s)	Barron River		
		SunWater irrigation network & bores		
	Supply Capacity	Unknown		
WATER QUALITY	Treatment Plant(s)	Mareeba Water Treatment Plant		
	Level of Treatment	Coagulation, sedimentation, media filtration and liquid chlorine.		
	Drinking Water Guidelines	ADWG 2008		
	Results (% compliance for 2008 reporting period)	*Typical Results*	Mareeba Water Treatment Plant	ADWG 2004
		Fluoride (mg/L)	Unknown	1.5 mg/L
		pH	Unknown	6.5-8.5
		Chlorine residual (mg/L)	Unknown	5 mg/L
		Alkalinity (mg/L)	Unknown	??
		Hardness (mg/L)	Unknown	200 mg/L as CaCO3
		Turbidity (NTU)	Unknown	5 NTU
WATER SECURITY	Current Water Restrictions	None		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	100km		
	Climate	Semi dry		
	Average Annual Rainfall	850mm (sourced from www.bom.gov.au)		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Mareeba is not listed as being drought declared as at 30th September 2009 on www.longpaddock.qld.gov.au.
		Single drinking water source	No	Sunwater Irrigation canal and bore water also available.
		Poor quality water source		
		Sewage overflow or disposal into water source	No	
		Flooding	Yes	
		Fauna defecating in supply	Yes	
		Fauna destroying water intake structures	Yes	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	No	
		Extensive agriculture	Yes	
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	No	
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	No	
		Irrigation	Yes	
		Chemicals / process	No	
	Population	Seasonal population loadings	Yes	Events such as local rodeo raise population.
		Rapid population growth	No	Population decline experienced between 2001 and 2006 Census
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)	Yes	
		Taste and odour issues		
		Other contamination that would affect health		
Notes				

Town # 8

TOWN	State/Territory	Qld-North		
	Town Name	Atherton		
	Town Population	6247 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Tablelands Regional Council		
	Rate ($/kL)	Unknown		
	Per Capita Water Consumption (L/day)	Unknown		
	Number of Connections	Unknown		
CATCHMENT AND WATER SUPPLY	Catchment	Barron River Catchment		
	Sub-Catchment	-		
	Catchment Management Authority (CMA)	Tablelands Regional Council		
	CMA Web-Link	www.trc.qld.gov.au/contact-us		
	Catchment Protection Status	No		
	Potable Water Source(s)	Johnstone & Upper Barron River		
		Scrubby Creek		
		Lake Tinaroo & Bores		
	Supply Capacity	Unknown		
WATER QUALITY	Treatment Plant(s)	Atherton water Treatment Plant		
	Level of Treatment	-		
	Drinking Water Guidelines	ADWG 2008		
	Results (% compliance for 2008 reporting period)	*Typical Results*	Atherton Water Treatment Plant	ADWG 2004
		Fluoride (mg/L)	Unknown	1.5 mg/L
		pH	Unknown	6.5-8.5
		Chlorine residual (mg/L)	Unknown	5 mg/L
		Alkalinity (mg/L)	Unknown	??
		Hardness (mg/L)	Unknown	200 mg/L as CaCO3
		Turbidity (NTU)	Unknown	5 NTU
WATER SECURITY	Current Water Restrictions	Level 1 water restrictions. - Odd property numbers (on odd days of month) and even property numbers (even days of month) watering. - watering using only allowed between 7-9 am Refer to www.trc.qld.gov.au/infrastructure/water.		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	100km		
	Climate	Tropical		
	Average Annual Rainfall	1420mm (sourced from www.bom.gov.au)		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Atherton is not listed as being drought declared as at 30th September 2009 on www.longpaddock.qld.gov.au.
		Single drinking water source	No	
		Poor quality water source		
		Sewage overflow or disposal into water source	No	
		Flooding	Yes	
		Fauna defecating in supply	Yes	
		Fauna destroying water intake structures	Yes	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture	Yes	
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	No	
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	No	
		Irrigation	Yes	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Atherton is growing slower than the Queensland state average based on 2001 and 2006 Census data.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)	Yes	
		Taste and odour issues		
		Other contamination that would affect health		
Notes				

Town # 9

TOWN	State/Territory	Qld-North		
	Town Name	Sarina		
	Town Population	3285 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Mackay Regional Council		
	Rate ($/kL)	Unknown		
	Per Capita Water Consumption (L/day)	Unknown. Average volume produced by the water supply scheme is 1.1ML/d and the peak is 1.4ML/d.		
	Number of Connections	> 500		
CATCHMENT AND WATER SUPPLY	Catchment	None. Bore water, ground water.		
	Sub-Catchment	-		
	Catchment Management Authority (CMA)	Mackay Regional Council		
	CMA Web-Link	www.mackay.qld.gov.au		
	Catchment Protection Status	Unknown		
	Potable Water Source(s)	Bore Water		
	Supply Capacity	Treatment plant design capacity - 2.8ML/d.		
WATER QUALITY	Treatment Plant(s)	Northern Beaches Water Supply Scheme		
	Level of Treatment	Coagulation, clarification, media filtration, pH correction and disinfection with chlorination (sodium hypochlorite).		
	Drinking Water Guidelines	ADWG 2008		
	Results (% compliance for 2008 reporting period)	*Typical Results*	Northern Beaches Water Supply Scheme	ADWG 2004
		Fluoride (mg/L)	0.4	1.5 mg/L
		pH	7.8	6.5-8.5
		Chlorine residual (mg/L)	0.5	5 mg/L
		Alkalinity (mg/L)	140	??
		Hardness (mg/L)	146	200 mg/L as CaCO3
		Turbidity (NTU)	0.60	5 NTU
WATER SECURITY	Current Water Restrictions	Sarina is currently on Level 3 restrictions. - Total sprinkler ban - Hand held hoses only between 6-7 am and 6-7 pm Refer to www.mackay.qld.gov.au/services/water_and_waste/water_restrictions		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	10		
	Climate	Tropical		
	Average Annual Rainfall	1730mm (indicative only no information available from www.bom.gov.au)		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Sarina is not listed as being drought declared as at 30th September 2009 on www.longpaddock.qld.gov.au.
		Single drinking water source	Yes	
		Poor quality water source	Unknown	
		Sewage overflow or disposal into water source	No	
		Flooding	Yes	
		Fauna defecating in supply	No	Bore water.
		Fauna destroying water intake structures	No	Bore water.
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	Unknown	
		Extensive agriculture	Yes	
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply		
		Unsustainable water extraction	Unknown	
		Aquifer turning saline due to high extraction	Unknown	
		Hard water	Unknown	
		Aging or inadequate pipe work and associated infrastructure	Unknown	
		Significant water losses due to leaking pipes	Unknown	
	Governance	High per capita water consumption	Unknown	
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	Unknown	
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades	Unknown	
	Industries	Mining / minerals	No	
		Irrigation	Yes	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	Yes	Growth greater than Queensland State Average based on 2001 and 2006 Census data.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	Unknown	
		Algal blooms	Unknown	
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	Unknown	
		Boil water notices	Unknown	
		Deaths or illness due to water quality	Unknown	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	Unknown	
		Other contamination that would affect health	Unknown	
Notes				

Town # 10

TOWN	State/Territory	Qld-North				
	Town Name	Ayr				
	Town Population	8093 (Census 2006, Urban Centre/Locality)				
WATER UTILITY	Name of Water Utility	Burdekin Shire Council				
	Rate ($/kL)	refer to www.burdekin.qld.gov.au/services/water/billing/				
	Per Capita Water Consumption (L/day)	Unknown				
	Number of Connections	Council Chambers WTP - 500				
		Nelsons Lagoon WTP - 500				
		South Ayr WTP - 500				
CATCHMENT AND WATER SUPPLY	Catchment	Part of the Burdekin River Catchment				
	Sub-Catchment	-				
	Catchment Management Authority (CMA)	Burdekin Shire Council				
	CMA Web-Link	www.burdekin.qld.gov.au				
	Catchment Protection Status	Unknown				
	Potable Water Source(s)	Council Chambers WTP - Bore water				
		Nelsons lagoon WTP - Bore water				
		South Ayr WTP - Bore Water				
	Supply Capacity	Council Chambers WTP - 3ML/d				
		Nelsons lagoon WTP - 10ML/d				
		South Ayr WTP - 11ML/d				
WATER QUALITY	Treatment Plant(s)	Nelsons lagoon, Council Chambers, South Ayr water Treatment Plants				
	Level of Treatment	Council Chambers WTT - semi automated - disinfection with chlorination (sodium hypochlorite).				
		Nelsons lagoon WTP - semi automated - disinfection with chlorination (sodium hypochlorite).				
		South Ayr WTP - semi automated - disinfection with chlorination (sodium hypochlorite).				
	Drinking Water Guidelines	ADWG 2008				
	Results	*Typical Results*	Council Chambers	Nelsons Lagoon	South Ayr	ADWG 2004
		Fluoride (mg/L)	0.10	0.10	0.20	1.5 mg/L
		pH	7.30	8.50	8.60	6.5-8.5
		Chlorine residual (mg/L)	0.30	0.30	0.30	5 mg/L
		Alkalinity (mg/L)	69.00	91.00	108.00	??
		Hardness (mg/L)	71.00	58.00	54.00	200 mg/L as CaCO3
		Turbidity (NTU)	<1	1.40	0.90	5 NTU
WATER SECURITY	Current Water Restrictions	Nil				
	Proportion of Potable Water Supplied to Households (%)	Unknown				
	Distance from the Coast (km)	10km				
	Climate	Tropical				
	Average Annual Rainfall	944mm (sourced from www.bom.gov.au)				

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Ayr is not listed as being drought declared as at 30th September 2009 on www.longpaddock.qld.gov.au.
		Single drinking water source	No	There are multiple sources for bore water.
		Poor quality water source	No	
		Sewage overflow or disposal into water source	No	
		Flooding	Yes	
		Fauna defecating in supply	No	Bore water.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	No	
		Extensive agriculture	Yes	
		Low vegetation cover (dust, sediment runoff)	Yes	Does not pose a problem for bore water.
		Poor access to supply	No	
		Unsustainable water extraction	Unknown	
		Aquifer turning saline due to high extraction	Unknown	
		Hard water	Unknown	
		Aging or inadequate pipe work and associated infrastructure	No	
		Significant water losses due to leaking pipes	Unknown	
	Governance	High per capita water consumption	Unknown	
		Inappropriate water quality standards / objectives	No	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	Unknown	
	Industries	Mining / minerals	No	
		Irrigation	No	Surrounding farmlands have their own supply sources.
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Population decline experienced between 2001 and 2006 Census
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	Unknown	
		Algal blooms	No	
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	Unknown	
		Boil water notices	Unknown	
		Deaths or illness due to water quality	Unknown	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	No	
		Other contamination that would affect health	No	
Notes				

Town # 11

TOWN	State/Territory	Qld-North			
	Town Name	Bowen			
	Town Population	7484 (Census 2006, Urban Centre/Locality)			
WATER UTILITY	Name of Water Utility	Whitsundays Regional Council			
	Rate ($/kL)	Unknown			
	Per Capita Water Consumption (L/day)	Unknown			
	Number of Connections	> 5,000			
CATCHMENT AND WATER SUPPLY	Catchment	Proserpine River Catchment			
	Sub-Catchment	-			
	Catchment Management Authority (CMA)	Whitsunday Regional Council			
	CMA Web-Link	www.whitsunday.qld.gov.au			
	Catchment Protection Status	None			
	Potable Water Source(s)	Bore water			
		Surface water from the Proserpine River			
	Supply Capacity	Bowen Bores Water Treatment Plant - 13.12ML/day; Bowen Proserpine River Water Supply System -			
WATER QUALITY	Treatment Plant(s)	Bowen Bores Water Treatment Plant and Bowen Proserpine River Water Supply System			
	Level of Treatment	Disinfection with chlorination (sodium hypochlorite).			
	Drinking Water Guidelines	ADWG 2008			
	Results (% compliance for 2008 reporting period)	*Typical Results*	Bowen Bores Water	Bowen Proserpine River Water	ADWG 2004
		Fluoride (mg/L)	0.1	0.6	1.5 mg/L
		pH	7.5	7.8	6.5-8.5
		Chlorine residual (mg/L)	0.6	1.2	5 mg/L
		Alkalinity (mg/L)	161	51	??
		Hardness (mg/L)	284	48	200 mg/L as CaCO3
		Turbidity (NTU)	<1	5.00	5 NTU
WATER SECURITY	Current Water Restrictions	Level 1 restrictions: - Watering only between 5-9 am and 5-9 pm on alternative days Refer to www.bowen.qld.gov.au/ServicesFees/whitsundayServices/WaterConservation/tabid/155/Default.aspx			
	Proportion of Potable Water Supplied to Households (%)	Unknown			
	Distance from the Coast (km)	0			
	Climate	Tropical			
	Average Annual Rainfall	830mm (sourced from www.bom.gov.au)			

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Bowen is not listed as being drought declared as at 30th September 2009 on www.longpaddock.qld.gov.au.
		Single drinking water source	No	
		Poor quality water source	Unknown	
		Sewage overflow or disposal into water source	No	
		Flooding	Yes	
		Fauna defecating in supply	Yes	Possible in Proserpine River water source.
		Fauna destroying water intake structures	Yes	Possible in Proserpine River water source.
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	Unknown	
		Extensive agriculture	Moderate	
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply		
		Unsustainable water extraction	Unknown	
		Aquifer turning saline due to high extraction	Unknown	
		Hard water	Unknown	
		Aging or inadequate pipe work and associated infrastructure	Unknown	
		Significant water losses due to leaking pipes	Unknown	
	Governance	High per capita water consumption	Unknown	
		Inappropriate water quality standards / objectives	No	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	Unknown	
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades	Unknown	
	Industries	Mining / minerals	No	
		Irrigation	Yes	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Population decline experienced between 2001 and 2006 Census
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	Unknown	
		Algal blooms	Unknown	
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	Unknown	
		Boil water notices	Unknown	
		Deaths or illness due to water quality	Unknown	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	Unknown	
		Other contamination that would affect health	Unknown	
Notes				

Town # 12

TOWN		State/Territory	Qld-South	
		Town Name	Moranbah	
		Town Population	7113 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Isaac Regional Council	
		Rate ($/kL)	Unknown	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Fitzroy	
		Sub-Catchment	Isaac-Connors	
		Catchment Management Authority (CMA)	Fitzroy Basin Association	
		CMA Web-Link	http://www.fba.org.au/ourregion/ourregion.html	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	Burdekin to Moranbah Pipeline	
		Supply Capacity	Burdekin to Moranbah Pipeline 17000ML/Annum	
WATER QUALITY		Treatment Plant(s)	-	
		Level of Treatment	Sedimentation and Filtration	
		Drinking Water Guidelines	ADWG 2004	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	Yes - external water use, no watering Monday, tues - sun 5am-8am and 5pm-8pm, sprinklers not on Monday, twice weekly 5pm-8pm.	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	156km	
		Climate	Sub-tropical	
		Average Annual Rainfall	589.9mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Water restrictions have been enforced. Not Currently drought declared, however has been previously (Primary Industries and Fisheries)
		Single drinking water source	Yes	Sunwater Pipeline, however this is a fairly reliable source of water.
		Poor quality water source	No	Sunwater supply.
		Sewage overflow or disposal into water	No	
		Flooding		
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction	No	
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	No	Rated as operating well, only requires maintenance.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	Yes	Mines around Moranbah, however no evidence to suggest this has effected water supply.
		Irrigation	No	
		Chemicals / process	Yes	Mineral process industry in surrounding area.
	Population	Seasonal population loadings	No	
		Rapid population growth	Yes	3.3% growth/annum 2001-2005. During mining boom.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect		
Notes			Water supply to the water provider is the responsibility of Sunwater.	

Town # 13

TOWN		State/Territory	Qld-South	
		Town Name	Dysart	
		Town Population	3137 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Isaac Regional Council	
		Rate ($/kL)	Unknown	
		Per Capita Water Consumption (L/day)	826 L/day	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Fitzroy	
		Sub-Catchment	Isaac-Connors	
		Catchment Management Authority (CMA)	Fitzroy Basin Association	
		CMA Web-Link	http://www.fba.org.au/ourregion/ourregion.html	
		Catchment Protection Status		
		Potable Water Source(s)	Ground Water	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)		
		Level of Treatment	Sedimentation and Filtration	
		Drinking Water Guidelines	ADWG 2004	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	Yes - external water use 3 times per week, 3 hours each day, between 5pm-8pm.	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	133km	
		Climate	Sub-tropical	
		Average Annual Rainfall	589.9mm (Moranbah is closest recording station).	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Water restrictions. Not Currently drought declared, however has been previously (Primary Industries and Fisheries)
		Single drinking water source		
		Poor quality water source		
		Sewage overflow or disposal into water source		
		Flooding		
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure	No	Infrastructure rated as operating well, only requires maintenance in PB report.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	Yes	Mines around Dysart, however no evidence to suggest this has effected water supply.
		Irrigation	No	
		Chemicals / process	Yes	Mineral process industry in surrounding area.
	Population	Seasonal population loadings	No	
		Rapid population growth	Yes	During mining boom. 5.4% growth/annum 2001-2005.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		
Notes				

Town # 14

TOWN		State/Territory	Qld-South	
		Town Name	Chinchilla	
		Town Population	3681 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Western Downs Regional Council	
		Rate ($/kL)	$251.55/Annum, Six monthly charges $0.99/kL up to 100kL, $1.35/kL from 101 to 400kL, $2.26/kL above 400kL.	
		Per Capita Water Consumption (L/day)	Unknown. 0.4ML/Connection and 0.3ML/Residential Connection in 05/06 financial year.	
		Number of Connections	2004	
CATCHMENT AND WATER SUPPLY		Catchment	Condamine	
		Sub-Catchment	-	
		Catchment Management Authority (CMA)	Condamine Alliance Incorporated	
		CMA Web-Link	http://www.condamine alliance.com.au/	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	Chinchilla Weir on the Condamine River	
			Charley's Creek Weir	
			Water storage facilities in the town	
		Supply Capacity	Chinchilla Weir - 9780ML	
WATER QUALITY		Treatment Plant(s)	Chinchilla Water Treatment Plant, Chinchilla.	
		Level of Treatment	Flocculation, sedimentation, filtration, pH correction and disinfection.	
		Drinking Water Guidelines	ADWG 2004	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	Level 3 - 300L/day/person - hoses and dripper systems 3 days/week from 5pm to 8pm, no watering with sprinklers, buckets anytime excluding Monday.	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	250km	
		Climate	Temperate	
		Average Annual Rainfall	649.4mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Water restrictions currently in place. Currently drought declared (Primary Industries and Fisheries)
		Single drinking water source	Yes	
		Poor quality water source		
		Sewage overflow or disposal into water source		
		Flooding	Yes	
		Fauna defecating in supply	Yes	Open water supply.
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture	Yes	Agriculture is the primary land use around the township.
		Low vegetation cover (dust, sediment runoff)	Yes	Clearing for farm use.
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction	No	
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	Yes	Main breaks/100km of mains: 12.8 in 05/06, 7.6 in 04/05, 14.8 in 03/04, 19.7 in 02/03 and 16.5 in 01/02.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		Total Operations Maintenance and Administration Costs/Connection: 316 05/06, 234 04/05, 212 03/04, 168 02/03, 202 01/02; /100km of water main: 1040000 05/06, 713636 04/05, 668852 03/04, 536589 02/03, 541183 01/02; /ML supplied: 790 05/06
	Industries	Mining / minerals		
		Irrigation	Yes	Surrounding farms.
		Chemicals / process	Yes	Surrounding farms.
	Population	Seasonal population loadings		
		Rapid population growth		1.87% growth/annum 2001-2005.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		Meeting utility's standards/guidelines for E.coli 05/06: 100%
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		Meeting utility's standards/guidelines for Physical Chemical compliance 05/06: 100%, 04/05: 100%, 03/04: 71.43%, 02/03: 88.89%.
Notes			Key natural resource management issues in the region include: - preventing further increase in land affected by salinity - maintaining water quality - controlling exotic weeds and pests - improving soil health and reduce soil erosion - maintaining healthy waterways - maintaining biodiversity including flora, fauna and ecosystems - water reform - protecting and maintaining biodiversity and other NRM assets	

Town # 15

TOWN		State/Territory	Qld-South	
		Town Name	Dalby	
		Town Population	9778 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Western Downs Regional Council	
		Rate ($/kL)	$223.6/annum, six monthly charges $1.24/kL up to 125kL, $2.47/kL from 125kL to 15,000kL, $3.71/kL above 15,000kL.	
		Per Capita Water Consumption (L/day)	Unknown. 0.4ML/connection in 05/06 financial year.	
		Number of Connections	Dalby Town Council 2007: 4,033 Residential, 432 Commercial/Industrial, 0 Rural, 0 Other, 4,465 Total.	
CATCHMENT AND WATER SUPPLY		Catchment	Condamine	
		Sub-Catchment	-	
		Catchment Management Authority (CMA)	Condamine Alliance Incorporated	
		CMA Web-Link	http://www.condamine alliance.com.au/	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	10 Underground Bores	
			Loudoun Weir	
			Desalination Plant	
		Supply Capacity	Loudoun Weir - 588 ML	
			Ground water bore - unknown	
			Desalination Plant - 20L/s	
WATER QUALITY		Treatment Plant(s)	Dalby Water Treatment Plant, Dalby Water Supply Desalination Plant, Dalby.	
		Level of Treatment	Water from Loudoun Weir goes through sedimentation and filtration process, underground bore water is chlorinated only, medium to poor quality irrigation (from bores 10 to 12) water through reverse osmosis plant.	
		Drinking Water Guidelines	ADWG 2004	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	Level 4 -target 240L/person/day. 3 days watering with hoses or dripper systems from 5.30pm to 6.30pm and buckets anytime excluding Mondays.	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	180km	
		Climate	Temperate	
		Average Annual Rainfall	606.8mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Water restrictions. Currently drought declared (Primary Industries and Fisheries)
		Single drinking water source	No	Surface and ground water.
		Poor quality water source	Yes	Desalination plant has been built.
		Sewage overflow or disposal into water source		
		Flooding	Yes	Of the surface water catchments.
		Fauna defecating in supply	Yes	Surface water storages.
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture	Yes	Agriculture is the main land use around the township.
		Low vegetation cover (dust, sediment runoff)	Yes	Clearing for farming use.
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure	Yes	Main breaks/100km of mains: 19.4 in 05/06, 9.2 in 04/05, 11.9 in 03/04.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		Total Operations Maintenance and Administration Costs/Connection: 227 05/06, 247, 04/05, 234 03/04; /100km of water main: 752592 05/06, 740132 04/05, 696689 03/04; /ML supplied: 639 05/06.
	Industries	Mining / minerals		
		Irrigation	Yes	Irrigation of farm land.
		Chemicals / process	Yes	Spraying of farming land.
	Population	Seasonal population loadings	No	
		Rapid population growth	No	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		Meeting Utility's standards/guidelines for E.coli 05/06: 100%.
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		Meeting Utility's standards/guidelines for Physical Chemical compliance 05/06: 100%, 02/03:100%.
Notes			There is discussion of the possibility of water supply from Coal Seam Gas, this however may require expensive treatment etc.	

Town # 16

TOWN		State/Territory	Qld-South	
		Town Name	Goondiwindi	
		Town Population	5,629 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Goondiwindi Regional Council	
		Rate ($/kL)	$138/annum, $0.71/1000L	
		Per Capita Water Consumption (L/day)	Unknown. 0.8ML/connection in 05/06 financial year.	
		Number of Connections	Goondiwindi Town Council 2007: 1,960 Residential, 310 Commercial/Industrial, 9 Rural, 30 Other, 2,309 Total.	
CATCHMENT AND WATER SUPPLY		Catchment	Border Rivers	
		Sub-Catchment	-	
		Catchment Management Authority (CMA)	Queensland Murray Darling Committee	
		CMA Web-Link	http://www.qmdc.org.au/	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	Macintyre River	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Unknown	
		Level of Treatment	Unknown	
		Drinking Water Guidelines	ADWG 2004	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	No	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	320km	
		Climate	Temperate	
		Average Annual Rainfall	594.1mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Dry inland area. Currently drought declared (Primary Industries and Fisheries)
		Single drinking water source	Yes	Water sourced from Macintyre River.
		Poor quality water source		
		Sewage overflow or disposal into water source		
		Flooding	Yes	
		Fauna defecating in supply	Yes	Open water supply.
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture	Yes	Agricultural area outside of township.
		Low vegetation cover (dust, sediment runoff)	Yes	Clearing for farmland.
		Poor access to supply		
		Unsustainable water extraction	No	
		Aquifer turning saline due to high extraction	No	
		Hard water		
		Aging or inadequate pipe work and associated infrastructure	Yes	Main breaks/100km of mains: 144.3 in 05/06, 112.8 in 04/05, 168.7 in 03/04 and 126.0 in 01/02.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		Total Operations Maintenance and Administration Costs/Connection: 330 05/06, 294, 04/05, 258 03/04, 253 02/03, 247 01/02; /100km of water main: 1247098 05/06, 1102819 04/05, 1145296 03/04, 1118596 02/03, 1087874 01/02; /ML supplied: 420 05/06.
	Industries	Mining / minerals	No	
		Irrigation	Yes	Irrigation of crops.
		Chemicals / process	Yes	Spraying of crops.
	Population	Seasonal population loadings	No	
		Rapid population growth	No	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		Meeting utility's standards/guidelines for E.coli 05/06: 100%.
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		Meeting Utility's standards/guidelines for Physical Chemical compliance 05/06: 100%, 04/05:100%, 03/04:100%, 02/03:100%.
Notes				

Town # 17

TOWN		State/Territory	Qld-South	
		Town Name	Roma	
		Town Population	5,983 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Maranoa Regional Council	
		Rate ($/kL)	$11/kL	
		Per Capita Water Consumption (L/day)	1,660L/day	
		Number of Connections	Roma Town Council 2007: 2,280 Residential, 170 Commercial/Industrial, 242 Rural, 0 Other, 2,692 Total.	
CATCHMENT AND WATER SUPPLY		Catchment	Murray Darling	
		Sub-Catchment	-	
		Catchment Management Authority (CMA)	Queensland Murray Darling Committee	
		CMA Web-Link	http://www.qmdc.org.au/	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	Groundwater	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	None	
		Level of Treatment	None	
		Drinking Water Guidelines	ADWG 2004	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	Watering 3 days per week	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	426km	
		Climate	Sub-tropical	
		Average Annual Rainfall	559.9mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Current water restrictions. Currently drought declared (Primary Industries and Fisheries)
		Single drinking water source	Yes	Groundwater.
		Poor quality water source	No	Does not require treatment.
		Sewage overflow or disposal into water source	No	
		Flooding	No	
		Fauna defecating in supply	No	
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	
		Un-lined landfills		
		Extensive agriculture	No	In surrounding area, however uses groundwater so not affected.
		Low vegetation cover (dust, sediment runoff)	No	In surrounding area, however uses groundwater so not affected.
		Poor access to supply	No	
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure	No	Rated as operating well, only requires maintenance (PB report); Main breaks/100km of mains: 109.3 in 05/06, 142.7 in 04/05, 116.4 in 03/04, 124.6 in 02/03 and 85.3 in 01/02.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		Total Operations Maintenance and Administration Costs/Connection: 310 05/06, 272, 04/05, 290 03/04, 237 02/03, 215 01/02; /100km of water main: 638760 05/06, 579032 04/05, 619672 03/04, 502459 02/03, 455590 01/02; /ML supplied: 294 05/06.
	Industries	Mining / minerals	No	
		Irrigation	No	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	No	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		Meeting utility's standards/guidelines for E.coli 05/06: 100%.
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		Meeting Utility's standards/guidelines for Physical Chemical compliance 04/05:100%, 03/04:25%, 02/03:66.67%.
Notes				

Town # 18

TOWN		State/Territory	Qld-South	
		Town Name	Stanthorpe	
		Town Population	4,271 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Stanthorpe Water Supply Scheme	
		Rate ($/kL)	$258.7/annum, $0.87/kL	
		Per Capita Water Consumption (L/day)	Unknown. 0.3ML/Connection and 0.2ML/Rural Connection in 05/06 financial year.	
		Number of Connections	2,353	
CATCHMENT AND WATER SUPPLY		Catchment	Border Rivers	
		Sub-Catchment	-	
		Catchment Management Authority (CMA)	Queensland Murray Darling Committee	
		CMA Web-Link	http://www.qmdc.org.au/	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	Storm King Dam	
			Emu Swamp Dam (future)	
		Supply Capacity	Storm King Dam - 2,180 ML	
			4 Clear water storages - 5.05 ML TMP	
			Emu Swamp Dam (future) - 8,000 to 18,000ML	
WATER QUALITY		Treatment Plant(s)	Mt Marlay Water Treatment Plant - 5ML/day max treatment.	
		Level of Treatment	Unknown	
		Drinking Water Guidelines	ADWG 2004	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	No	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	165km	
		Climate	Temperate	
		Average Annual Rainfall	765.2mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Town has had some form of water restrictions for 46% of 1975-2007 period. Not currently drought declared (Primary Industries and Fisheries)
		Single drinking water source	Yes	Currently water soured from Storm King Dam, however planned construction of Emu Swamp Dam.
		Poor quality water source		
		Sewage overflow or disposal into water source		
		Flooding	Yes	
		Fauna defecating in supply	Yes	Open water supply.
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture	Yes	Agricultural area.
		Low vegetation cover (dust, sediment runoff)	Yes	Clearing for agriculture.
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction	No	
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure		Main breaks per 100km of main: 2.8 in 05/06, 11.3 on 04/05, 11.5 in 03/04, 27.8 in 02/03 and 8.4 in 01/02.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		Total Operations Maintenance and Administration Costs/Connection: 256 05/06, 222 04/05, 190 03/04, 287 02/03, 207 01/02; /100km of water main: 595370 05/06, 519811 04/05, 488008 03/04, 1287494 02/03, 528993 01/02; /ML supplied: 807 05/06.
	Industries	Mining / minerals	No	
		Irrigation	Yes	
		Chemicals / process	Yes	Industrial & wine production area.
	Population	Seasonal population loadings	No	
		Rapid population growth	Yes	Rapidly growing industrial area.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		Meeting Utility's standards/guidelines for E.coli 05/06: 100%.
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		Meeting utility's standards/guidelines for Physical Chemical compliance 05/06:100%, 04/05:100%, 03/04:100%, 02/03:100%.
Notes				

Town # 19

TOWN		State/Territory	Qld-South	
		Town Name	Warwick	
		Town Population	12,562 (Census 2006)	
WATER UTILITY		Name of Water Utility	Southern Downs Regional Council	
		Rate ($/kL)	$390.6/annum, $1.14/kL, restricted flow access charge $269.08/annum.	
		Per Capita Water Consumption (L/day)	Unknown. 0.3ML/Connection in 05/06 financial year.	
		Number of Connections	Warwick Shire Council 2006: 7,693 Residential, 7,693 Total.	
CATCHMENT AND WATER SUPPLY		Catchment	Condamine	
		Sub-Catchment	-	
		Catchment Management Authority (CMA)	Condamine Alliance Incorporated	
		CMA Web-Link	http://www.condaminealliance.com.au/	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	Leslie Dam - Sunwater operated	
			Connolly Dam	
		Supply Capacity	Leslie Dam - storage volume = 108,000ML, allocation = 2,707ML	
			Connolly Dam - storage volume = 2,592ML	
			Total allocation = 5,073ML from both sources	
WATER QUALITY		Treatment Plant(s)	Warwick Water Supply Treatment Plant.	
		Level of Treatment	Unknown	
		Drinking Water Guidelines	Unknown	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	Level 1 - Permitted: Hand-held hosing of gardens at any time, drip irrigation systems, automatic top-up of pools & spas. Not Permitted: Sprinklers or unattended water devices/hoses.	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	151km	
		Climate	Temperate	
		Average Annual Rainfall	689.9mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Current water restrictions. Not currently drought declared however has previously (Primary Industries and Fisheries)
		Single drinking water source	No	Two water supply dams.
		Poor quality water source		
		Sewage overflow or disposal into water source		
		Flooding	Yes	
		Fauna defecating in supply	Yes	Open water supply.
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture	Yes	Agricultural area.
		Low vegetation cover (dust, sediment runoff)	Yes	Clearing for farming.
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction	No	
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	Yes	Main breaks/100km of main: 9.0 in 05/06, 3.2 in 04/05, 10.8 in 03/04, 14.5 in 02/03 and 21.5 in 01/02.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		Total Operations Maintenance and Administration Costs/Connection: 272 05/06, 269 04/05, 253 03/04, 239 02/03, 251 01/02; /100km of water main: 652255 05/06, 642581 04/05, 615541 03/04, 571242 02/03, 568289 01/02; /ML supplied: 940 05/06.
	Industries	Mining / minerals	No	
		Irrigation	Yes	Irrigation of farming land.
		Chemicals / process	Yes	Industrial and wine making area.
	Population	Seasonal population loadings	No	
		Rapid population growth	Yes	Rapidly growing industrial area.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		Meeting utility's standards/guidelines for E.coli 05/06: 100%.
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		Meeting utility's standards/guidelines for Physical Chemical compliance 02/03: 100%.
Notes				

Town # 20

TOWN		State/Territory	Qld-South	
		Town Name	Highfields	
		Town Population	5910 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Toowoomba Regional Council	
		Rate ($/kL)	Unknown	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Moreton	
		Sub-Catchment	Upper Brisbane	
		Catchment Management Authority (CMA)	South East Queensland Catchments	
		CMA Web-Link	http://www.seqcatchments.com.au/	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	Cressbrook Dam	
			Perseverance Dam	
			Council Bores - 20 service Toowoomba and surrounding area	
		Supply Capacity	Cressbrook Dam - 78,847ML	
			Perseverance Dam - 26,668ML	
			Bores 30-35% of the City's needs	
WATER QUALITY		Treatment Plant(s)	Highfields Water Treatment Plant	
		Level of Treatment	Rapid Sand Filtration Plant	
		Drinking Water Guidelines	ADWG 2004	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	Level 5 - No outside watering, topping up pools or washing vehicles using the town supply.	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	125km	
		Climate	Temperate	
		Average Annual Rainfall	944mm (Toowoomba)	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Cressbrook Dam currently at 8.4%, Perseverance Dam at 12.3%, however a pipeline is currently under construction to supply water to the Cressbrook Dam from Wivenhoe Dam. Currently drought declared (Primary Industries and Fisheries)
		Single drinking water source	No	Multiple dams.
		Poor quality water source		
		Sewage overflow or disposal into water source		
		Flooding	Yes	
		Fauna defecating in supply	Yes	Open water supply.
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture	No	
		Low vegetation cover (dust, sediment runoff)	No	
		Poor access to supply		
		Unsustainable water extraction	Yes	Dams have nearly run out of water.
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	No	
		Irrigation	No	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	Yes	Growing area.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		
Notes			Cressbrook Dam will be connected to Wivenhoe Dam within the next year.	

Town # 21

TOWN		State/Territory	Qld-South	
		Town Name	Tin Can Bay - Cooloola Cove	
		Town Population	3857 (Census 2006, Urban Centre/Locality & State Suburb)	
WATER UTILITY		Name of Water Utility	Gympie Regional Council	
		Rate ($/kL)	Unknown	
		Per Capita Water Consumption (L/day)	Unknown. 0.3ML/connection in 05/06 financial year.	
		Number of Connections	Cooloola Shire Council 2007: 9,900 Residential, 750 Commercial/Industrial, 270 Rural, 94 Other, 11,014 Total.	
CATCHMENT AND WATER SUPPLY		Catchment	Mary Basin	
		Sub-Catchment	Noosa River and coastal streams north of the Noosa River	
		Catchment Management Authority (CMA)	Burnett Mary Regional Group	
		CMA Web-Link	http://www.bmrg.org.au/	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	Unknown	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Unknown	
		Level of Treatment	Unknown	
		Drinking Water Guidelines	ADWG 2004	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	Yes - Watering 4-8pm, Non-Residential (Over 10ML/Year users) watering 4-8pm, vehicle washing and Cleaning Paving and Driveways only is water saving devices fitted.	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	9km	
		Climate	Sub-Tropical	
		Average Annual Rainfall	1410.6mm (Rainbow Beach), 1292.2mm (Toolara Forestry)	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Water restrictions however high rainfall area. Not currently drought declared (Primary Industries and Fisheries)
		Single drinking water source		
		Poor quality water source		
		Sewage overflow or disposal into water source		
		Flooding		
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure	Yes	Main breaks/100km of mains: 13.8 in 05/06, 4.9 in 04/05, 6.1 in 03/04, 5.2 in 02/03 and 5.0 in 01/02.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		Total Operations Maintenance and Administration Costs/Connection: 261 05/06, 253, 04/05, 208 03/04, 195 02/03, 213 01/02; /100km of water main: 865204 05/06, 754286 04/05, 677994 03/04, 611869 02/03, 667039 01/02; /ML supplied: 770 05/06.
	Industries	Mining / minerals		
		Irrigation		
		Chemicals / process		
	Population	Seasonal population loadings		
		Rapid population growth		
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		Meeting utility's standards/guidelines for E.coli 05/06: 100%.
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		Meeting utility's standards/guidelines for Physical Chemical compliance 05/06:100%, 04/05:100%, 03/04:100%, 02/03:100%.
Notes				

Town # 22

TOWN		State/Territory	Qld-South	
		Town Name	Kingaroy & Kumbia	
		Town Population	7,811 (Census 2006, Urban Centre/Locality & State Suburb)	
WATER UTILITY		Name of Water Utility	South Burnett Regional Council	
		Rate ($/kL)	Unknown	
		Per Capita Water Consumption (ML/day)	0.3ML/Connection, 0.2ML/Residential Connection in 05/06 financial year.	
		Number of Connections	Kingaroy Shire Council: 3,820 Residential, 335 Commercial/Industrial, 60 Rural, 95 other, 4,310 Total.	
CATCHMENT AND WATER SUPPLY		Catchment	Burnett	
		Sub-Catchment	-	
		Catchment Management Authority (CMA)	Burnett Mary Regional Group	
		CMA Web-Link	http://www.bmrg.org.au/	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	Gordonbrook Dam	
		Supply Capacity	Gordonbrook Dam - 6600ML	
WATER QUALITY		Treatment Plant(s)	Gordonbrook Water Treatment Plant	
		Level of Treatment	Unknown	
		Drinking Water Guidelines	ADWG 2004	
		Results	Unknown	
WATER SECURITY		Current Water Restrictions	Kingaroy Level 4 - 2 hours watering 3 days per week, total ban on all sprinklers. Kumbia Level 7 - No outside watering	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	125km	
		Climate	Subtropical	
		Average Annual Rainfall	776.2mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Water restrictions, nearly ran out of water in 2007.
		Single drinking water source	Yes	Water from one source.
		Poor quality water source	Yes	Algal blooms.
		Sewage overflow or disposal into water		
		Flooding		
		Fauna defecating in supply	Yes	Open water supply.
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture	Yes	Agricultural area.
		Low vegetation cover (dust, sediment	Yes	Clearing for farmland.
		Poor access to supply		
		Unsustainable water extraction	Yes	Nearly ran out of water during 2007.
		Aquifer turning saline due to high	No	
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	Yes	Main breaks/100km of mains: 23.9 in 05/06, 13 in 04/05, 18.1 in 03/04, 27.5 in 02/03 and 26.4 in 01/02.
		Significant water losses due to leaking		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		Total Operations Maintenance and Administration Costs/Connection: 301 05/06, 264 04/05, 245 03/04, 380 02/03, 237 01/02; /100km of water main: 709783 05/06, 575543 04/05, 508791 03/04, 844402 02/03, 766258 01/02; /ML supplied: 965 05/06.
	Industries	Mining / minerals	No	
		Irrigation	Yes	Irrigation of crops.
		Chemicals / process	Yes	Spraying of crops.
	Population	Seasonal population loadings	No	
		Rapid population growth	No	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		Meeting Utility's standards/guidelines for E.coli 05/06: 93.06%.
		Algal blooms	Yes	2.8m average depth in dam, algal blooms have occurred in the past.
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		Meeting utility's standards/guidelines for Physical Chemical compliance 05/06:0%, 04/05:0%, 03/04:33.33%, 02/03:100%.
Notes				

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Town Profiles – NSW

Review of Regional Water Quality & Security

Appendices
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Town # 23

TOWN	State/Territory	NSW	
	Town Name	Lithgow	
	Town Population	14,000 (NSW Health, 2009); 11,298 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Lithgow City Council	
	Council Web-Link	http://www.council.lithgow.com/	
	Rate ($/kL)	Unknown. Water rates = $403/property for the 2001-2002 reporting period.	
	Per Capita Water Consumption (L/day)	Not reported. Estimate = 221 L/day (using NSW Health 2009 population statistics, and domestic water consumption reported in the 2007/2008 Lithgow SoE Report).	
	Number of Connections	7,820 (NSW DWE 07-08 Performance Monitoring Database)	
CATCHMENT AND WATER SUPPLY	Catchment	Hawkesbury Nepean	
	Sub-Catchment	Northern Valleys	
	Catchment Management Authority (CMA)	Hawkesbury Nepean	
	CMA Web-Link	http://www.hn.cma.nsw.gov.au	
	Catchment Protection Status	None. Not a wild river catchment or protected.	
	Potable Water Source(s)	Fish River Water Supply Scheme (State Water): Oberon Dam and Duckmaloi Weir	
		Lithgow City Council System: Farmers Creek Dam and Clarence Colliery Transfer System	
	Supply Capacity	Oberon Dam Storage = 45,400ML	
		Duckmaloi Weir Storage = 20ML	
		Farmers Creek Dam Storage = 450ML	
		Clarence Colliery Transfer System = up to 5 to 6 ML/day	
WATER QUALITY	Treatment Plant(s)	Oakey Water Treatment Plant	
	Level of Treatment	Gravity fed; raw water from Farmers Creek Dam; current design capacity = 15 ML/d; operating capacity is reduced to 12ML/day; treatment includes chemical addition of soda ash, alum and polyelectrolyte, flocculation, clarification, filtration and post dosing of chlorine and soda ash; average daily output during winter = 4ML/d to 8ML per day in the summer months.	
	Drinking Water Guidelines	ADWG 2004	
		NSW Health Monitoring Location: LG01-Lithgow	
	% compliance for water quality parameters achieving < 100%, 2003-2004	Aluminium	86
		E. coli	99
		Nickel	86
		pH	79
		Total Coliforms	66
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (14), Antimony (14), Arsenic (14), Barium (14), Boron (14), Cadmium (14), Calcium (14), Chloride (14), Chromium (14), Copper (14), Cyanide (14), E.Coli (76), Flouride (14), Iron (14), Lead (14), Magnesium (14), Manganese (14), Molybdenum (14), Nickel (14), Nitrate (14), Nitrite (14), pH (14), Selenium (14), Silver (14), Sulfate (14), Total Coliforms (76), Total Dissolved Solids (TDS) (14), Total Hardness as CaCO3 (14), True Colour (6), Turbidity (14), Zinc (14)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	Manganese	97
		Nickel	55
		pH	48
		Total Coliforms	77
		Turbidity	97
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (31), Antimony (31), Arsenic (31), Barium (31), Boron (31), Cadmium (31), Calcium (31), Chloride (31), Chromium (31), Copper (31), Cyanide (1), E.Coli (73), Flouride (31), Iron (31), Lead (31), Magnesium (31), Manganese (31), Molybdenum (31), Nickel (31), Nitrate (31), Nitrite (31), pH (31), Selenium (31), Silver (31), Sulfate (31), Total Coliforms (73), Total Dissolved Solids (TDS) (31), Total Hardness as CaCO3 (31), True Colour (31), Turbidity (31), Zinc (31)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Aluminium	92
		Iron	92
		Nickel	69
		pH	71
		Total Coliforms	90
		Turbidity	92
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (13), Antimony (13), Arsenic (13), Barium (13), Boron (13), Cadmium (13), Calcium (13), Chloride (13), Chromium (13), Copper (13), Cyanide (13), E.Coli (67), Flouride (13), Free Chlorine (1), Iodine (13), Iron (13), Lead (13), Magnesium (13), Manganese (13), Molybdenum (13), Nickel (13), Nitrate (13), Nitrite (13), pH (14), Selenium (13), Silver (13), Sodium (13), Sulfate (13), Total Coliforms (67), Total Dissolved Solids (TDS) (13), Total Hardness as CaCO3 (13), True Colour (13), Turbidity (13), Zinc (13)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Iron	92
		Nickel	92
		Total Coliforms	79
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (71), Flouride (12), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (71), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	Aluminium	70
		pH	81
		Total Coliforms	73
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (23), Antimony (23), Arsenic (23), Barium (23), Boron (23), Cadmium (23), Calcium (23), Chloride (23), Chromium (23), Copper (23), E.Coli (152), Flouride (23), Flouride (field result WSA) (1), Free Chlorine (17), Iodine (23), Iron (23), Lead (23), Magnesium (23), Manganese (23), Molybdenum (23), Nickel (23), Nitrate (23), Nitrite (23), pH (26), Selenium (23), Silver (23), Sodium (23), Sulfate (23), Total Chlorine (1), Total Coliforms (152), Total Dissolved Solids (TDS) (23), Total Hardness as CaCO3 (23), True Colour (23), Turbidity (23), Zinc (23)	

WATER SECURITY		Current Water Restrictions	Yes. Level 4 restrictions: Summer Months - sprinklers, hand held hoses and micro systems, hours = 4 hrs a day between 6am -8am & 5pm - 7pm on an odds and even system, Sprinklers, Winter Months - hand held hoses and micro systems, hours = 4 hrs a day between 6am -8am & 5pm - 7pm on an odds and even system.	
		Proportion of Potable Water Supplied to Households (%)	71% Domestic, 29% Commercial (07-08 Lithgow SoE Report)	
		Distance from the Coast (km)	~ 120km	
		Climate	Temperate (BoM, 2005)	
		Average Annual Rainfall	715 mm (Source: BoM gauge number 63164, period 2004-2008)	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Experienced drought for 4 months of the period 07/08 (Lithgow SoE report 07/08). Classified as 'Marginal or Satisfactory' according to NSW DPI Drought Map October 2009.
		Single drinking water source	No	
		Poor quality water source	No	No indication that source water is poor quality.
		Sewage overflow or disposal into water source	Yes	Two sewer overflow incidents at pump stations. Reported in the 07-08 Lithgow City Council Annual Report.
		Flooding	No	
		Fauna defecating in supply	No	No reports of this being a cause of contamination.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, flouride)	Yes	Coal mining operations cause leeching of natural minerals through exposure of rock to air and moisture, and creation of cracks in river beds. Unsure of what minerals.
		Un-lined landfills	No	No indication of leaking landfills.
		Extensive agriculture	No	Farming exists nearby, but the area is not based on extensive and intensive agriculture. Large portions of land nearby are forested.
		Low vegetation cover (dust, sediment runoff)	No	Surrounds are grassed or tree covered areas.
		Poor access to supply	No	
		Unsustainable water extraction	Yes	Residents have historically been on water restrictions. Currently on Level 4 restrictions.
		Aquifer turning saline due to high extraction	No	
		Hard water	No	No reports that the source water is 'hard' water.
		Aging or inadequate pipework and associated infrastructure	Yes	Oakey Water Treatment Plant requires upgrade. Works are currently in progress. Age of infrastructure not reported to DECCW (07-08 Water Treatment Performance Report).
		Significant water losses due to leaking pipes	No	Unknown. No reports of water losses in the system.
	Governance	High per capita water consumption	No	Per capita water consumption is below the national average reported by the National Water Commission, 04-05 reporting period.
		Inappropriate water quality standards / objectives	No	Council report to NSW Health, who use the ADWG.
		Lack of infrastructure maintenance	Yes	Oakey Water Treatment Plant required maintenance and upgrade. Council prosecuted in the Land and Environment Court for not undertaking pollution prevention works at the plant in the timeframe specified by DECCW (previously DECC).
		Poor management or governance	Yes	Water treatment plant not maintained adequately. Council prosecuted in Land and Environment Court. Many concerned community members regarding adequacy and quality of supply.
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	No indication of training issues.
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	Yes	
		Irrigation	No	No extensive irrigation industry nearby.
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Average Annual Population growth = 0.5% (from 2001 to 2006 Census), which is less than the NSW average (1.6%) reported by ABS, March 2009.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Only 73% compliance for Faecal Coliforms in 07-08 reporting period (NSW Health, 2009).
		Algal blooms		
		Heavy metal contamination	Yes	
		Poor chlorine residuals	No	Free Chlorine met ADWG guidelines for 07-08 reporting period (NSW Health, 2009).
		Pesticide contamination	No	
		High suspended solids	No	
		Boil water notices	No	No reports of boil water notices according to NSW Health summary spreadsheet.
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	No	
		Other contamination that would affect health	Yes	Levels of aluminium compliant with ADWG only 70% of the time for the 07-08 reporting period (NSW Health, 2009).
Notes				

Town # 24

TOWN	State/Territory	NSW	
	Town Name	Bourke	
	Town Population	3,780 (NSW Health, 2009); 2,145 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Bourke Shire Council	
	Council Web-Link	http://www.bourke.local-e.nsw.gov.au/	
	Rate ($/kL)	Unknown. $627/property for the 2001-2002 reporting period.	
	Per Capita Water Consumption (L/day)	Unknown. 285 kL/household per year (according to graph presented in the Central West Regional SoE Report, 07-08)	
	Number of Connections	1180	
CATCHMENT AND WATER SUPPLY	Catchment	Western	
	Sub-Catchment	-	
	Catchment Management Authority (CMA)	Western	
	CMA Web-Link	http://www.western.cma.nsw.gov.au/	
	Catchment Protection Status	None.	
	Potable Water Source(s)	Darling River (Watercourse)	
	Supply Capacity	Unknown. Source is a controlled river with reduced flow (DECCW, 2009).	
WATER QUALITY	Treatment Plant(s)	Yes	
	Level of Treatment	Filtration, Flocculation, Sedimentation, Chlorination (NSW Health, 2009)	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
		NSW Health Monitoring Location: BK01-Bourke	
	% compliance for water quality parameters achieving < 100%, 2003-2004	Chloride	67
		E. coli	98
		Sodium	89
		Total Coliforms	66
		Total Dissolved Solids (TDS)	67
		Total Hardness as CaCO3	44
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (9), Antimony (9), Arsenic (9), Barium (9), Boron (9), Cadmium (9), Calcium (9), Chloride (9), Chromium (9), Copper (9), Cyanide (9), E.Coli (44), Flouride (9), Free Chlorine (8), Iodine (9), Iron (9), Lead (9), Magnesium (9), Manganese (9), Mercury (9), Molybdenum (9), Nickel (9), Nitrate (9), Nitrite (9), pH (9), Selenium (9), Silver (9), Sodium (9), Sulfate (9), Total Coliforms (44), Total Dissolved Solids (TDS) (9), Total Hardness as CaCO3 (9), True Colour (6), Turbidity (9), Zinc (9)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	Aluminium	27
		Copper	67
		E. coli	96
		Iron	73
		Lead	53
		Nickel	87
		pH	73
		Total Coliforms	75
		Turbidity	47
		Zinc	93
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (15), Antimony (15), Arsenic (15), Barium (15), Boron (15), Cadmium (15), Calcium (15), Chloride (15), Chromium (15), Copper (15), Cyanide (2), E.Coli (51), Flouride (15), Free Chlorine (15), Iodine (15), Iron (15), Lead (15), Magnesium (15), Manganese (15), Mercury (15), Molybdenum (15), Nickel (15), Nitrate (15), Nitrite (15), pH (15), Selenium (15), Silver (15), Sodium (15), Sulfate (15), Total Coliforms (51), Total Dissolved Solids (TDS) (15), Total Hardness as CaCO3 (15), True Colour (15), Turbidity (15), Zinc (15)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Aluminium	58
		Copper	75
		E. coli	96
		Iron	67
		Lead	83
		Nickel	92
		Total Coliforms	75
		Turbidity	58
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (53), Flouride (12), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (53), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Aluminium	83
		Copper	92
		E. coli	88
		Iron	92
		Lead	92
		Total Coliforms	75
		Turbidity	92
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (52), Flouride (12), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (52), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	Chloride	78
		E. coli	94
		Total Coliforms	67
		Total Dissolved Solids (TDS)	78
		Total Hardness as CaCO3	78
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (9), Antimony (9), Arsenic (9), Barium (9), Boron (9), Cadmium (9), Calcium (9), Chloride (9), Chromium (9), Copper (9), E.Coli (51), Flouride (9), Iodine (9), Iron (9), Lead (9), Magnesium (9), Manganese (9), Mercury (9), Molybdenum (9), Nickel (9), Nitrate (9), Nitrite (9), pH (9), Selenium (9), Silver (9), Sodium (9), Sulfate (9), Total Coliforms (51), Total Dissolved Solids (TDS) (9), Total Hardness as CaCO3 (9), True Colour (9), Turbidity (9), Zinc (9)	

WATER SECURITY		Current Water Restrictions	Level 1. Maximum of two sprinkler taps per household, for maximum of two hours per day between 6pm in the evening and 8am in the morning; no filling of private swimming pools; wash paved areas and roofs with pressure cleaner and/or buckets only; two hours maximum sprinklers on bowling greens, nurseries, public garden, sporting fields, ovals and War Memorial Swimming Pool grounds.	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Reuse	None (Central West Regional SoE Report, 07-08)	
		Distance from the Coast (km)	~ 700 km	
		Climate	Grassland (BoM, 2005)	
		Average Annual Rainfall	219mm (Source: BoM station number 48245, period 2004-2008)	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Classified as 'Marginal' according to NSW DPI Drought Map October 2009.
		Single drinking water source	Yes	According to the Bourke Shire Council Annual Report (07-08), Council is planning on drilling an artesian bore to supplement supply.
		Poor quality water source	No	
		Sewage overflow or disposal into water source	Yes	Central West Regional SoE Report states that water quality in the catchment is affected by wastewater discharges and overflows.
		Flooding	No	
		Fauna defecating in supply	Yes	
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, flouride)	No	
		Un-lined landfills	No	It is stated in the 05-06 Bourke Shire Council SoE Report that the management of illegal dumping is a priority for Council.
		Extensive agriculture	Yes	Cotton farming, sheep and cattle production (Bourke Shire Council SoE Report, 05-06)
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply	No	
		Unsustainable water extraction	Yes	Drinking water source is the Darling River, which is a controlled river with reduced flow.
		Aquifer turning saline due to high extraction	Yes	Salinity is monitored at various points along the river. Historically, salinity levels have exceeded drinking water guidelines.
		Hard water	Yes	22% of water quality results were non-compliant for water hardness for the 07-08 reporting period.
		Aging or inadequate pipework and associated infrastructure	Yes	Facility built or refurbished in 1988 (DECCW 07-08 Water Treatment Performance Report). Recent minor refurbishments to water filtration plant. New pumps and control buildings installed (Bourke Shire Council Annual Report, 07-08).
		Significant water losses due to leaking pipes	No	No report of water losses.
	Governance	High per capita water consumption	No	Water consumption is essentially the state average.
		Inappropriate water quality standards / objectives	No	Council report to NSW Health, who use the ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	No indication of training issues.
		Inadequate funding for maintenance or upgrades	No	No indication of funding issues.
	Industries	Mining / minerals	Yes	Stated to be an industry in the Bourke region (mineral/mining, chemical wholesaling), in the Central West Regional SoE Report, 07-08.
		Irrigation	Yes	Agriculture such as cotton in the LGA.
		Chemicals / process	No	
	Population	Seasonal population loadings	Yes	Approximately 20,000 tourists visited the Bourke Tourist Information Centre in 05-06 (Bourke Shire Council SoE Report, 05-06); however there is no information on the number of tourists staying in the township during peak season.
		Rapid population growth	Yes	Average Annual Population growth = 3.8% (from 2001-2006 Census), which is greater than the NSW average of 1.6%.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	The levels of E.Coli and Total Coliforms were not 100% compliant for the 07-08 reporting period.
		Algal blooms	No	
		Heavy metal contamination	Yes	Some heavy metals have been repeatedly non-compliant up to the 07-08 reporting period.
		Poor chlorine residuals	Yes	Free chlorine is not tested.
		Pesticide contamination	Yes	The Central West Regional SoE Report 07-08 identifies pesticide runoff as a risk factor in the region. Pesticides are not tested for in the drinking water supply according to the NSW Health database.
		High suspended solids	Yes	Levels of Total Dissolved Solids were not 100% compliant for the 07-08 reporting period.
		Boil water notices	No	
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	No	
		Other contamination that would affect health	No	
Notes				

Town # 25

TOWN	State/Territory	NSW		
	Town Name	Narromine		
	Town Population	3,500 (NSW Health, 2009); 3,599 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Narromine Shire Council		
	Council Web-Link	http://www.narromine.nsw.gov.au/		
	Rate ($/kL)	$0.80/kL		
	Per Capita Water Consumption (L/day)	550L/day based on the NSW Health 2009 population statistics, and 703ML of potable water was supplied to customers in the 07-08 period (DWE, 2009)		
	Number of Connections	2090		
CATCHMENT AND WATER SUPPLY	Catchment	Central West		
	Sub-Catchment	Macquarie-Bogan		
	Catchment Management Authority (CMA)	Central West		
	CMA Web-Link	http://cw.cma.nsw.gov.au/cwcma_ourcatchment.htm		
	Catchment Protection Status	None.		
	Potable Water Source(s)	Narromine Bore (groundwater)		
	Supply Capacity	Unknown		
WATER QUALITY	Treatment Plant(s)	None		
	Level of Treatment	Aeration (NSW Health, 2009)		
	Drinking Water Guidelines	ADWG 2004 (NSW Health)		
	NSW Health Monitoring Location: NM01-Narrowmine			
	% compliance for water quality parameters achieving < 100%, 2003-2004	Total Coliforms	84	
	Parameter(s) tested and number of samples ( ) 2003-2004	E.Coli (50), Total Coliforms (50)		
	% compliance for water quality parameters achieving < 100%, 2004-2005	Total Coliforms	92	
	Parameter(s) tested and number of samples ( ) 2004-2005	E.Coli (13), Total Coliforms (13)		
	% compliance for water quality parameters achieving < 100%, 2005-2006	Total Coliforms	70	
	Parameter(s) tested and number of samples ( ) 2005-2006	E.Coli (20), Total Coliforms (20)		
	% compliance for water quality parameters achieving < 100%, 2006-2007	Total Coliforms	96	
	Parameter(s) tested and number of samples ( ) 2006-2007	E.Coli (25), Total Coliforms (25)		
	% compliance for water quality parameters achieving < 100%, 2007-2008	Total Coliforms	90	
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (51), Fluoride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (51), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)		
WATER SECURITY	Current Water Restrictions	No water restrictions advertised on the Narromine Council website.		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	~ 400km		
	Climate	Temperate (nearing 'Grassland') (BoM, 2005)		
	Average Annual Rainfall	488mm (Source: BoM station number 51037, period 2004-2008)		
FACTOR		YES / NO	NOTES / EXPLANATION	
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October 2009.
		Single drinking water source	Yes	Groundwater bore.
		Poor quality water source	No	
		Sewage overflow or disposal into water source	No	Groundwater source. Contamination via sewage overflows is unlikely.
		Flooding	No	
		Fauna defecating in supply	No	Repeated non-compliances reported for Total Coliforms, however due to their widespread occurrence in most soil and water environments, they are no longer regarded as the most reliable indicator of human or animal contamination.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	
		Un-lined landfills	Yes	The Central West Regional SoE Report 07-08 reports that there are 50 potentially contaminated sites in the Narromine area.
		Extensive agriculture	Yes	Livestock, grains, citrus and cotton industries (Council website).
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply	No	
		Unsustainable water extraction	No	
		Aquifer turning saline due to high extraction	Yes	Narromine has a 'moderate' water salinity hazard rating according to the Central West Regional SoE Report, 07-08.
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	No	No reports on the condition of existing infrastructure. Age of infrastructure not report to DECCW (07-08 Water Treatment Performance Report).
		Significant water losses due to leaking pipes	No	No indication of the age of the existing reticulation system.
	Governance	High per capita water consumption	Yes	
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health who use ADWG.
		Lack of infrastructure maintenance	No	No reports of infrastructure maintenance issues.
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	

		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	No	
		Irrigation	Yes	Cropping/pasture stated to be a major industry in the region in the Central West Regional SoE Report, 07-08.
		Chemicals / process	No	
	Population	Seasonal population loadings	Unknown	
		Rapid population growth	No	Negative population growth between 2001 and 2006 census.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	No	E.Coli samples have historically been compliant.
		Algal blooms	No	
		Heavy metal contamination	No	No detection of heavy metals for the 07-08 reporting period when metals were tested (in previous years metals were not tested).
		Poor chlorine residuals	Yes	No chlorine is added to the water supply.
		Pesticide contamination	No	
		High suspended solids	No	
		Boil water notices	No	
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	No	No water restrictions advertised on the Council website.
		Taste and odour issues	No	
		Other contamination that would affect health	Yes	Narromine has a 'moderate' water salinity hazard rating according to the Central West Regional SoE Report, 07-08.
Notes			Council refunded water rates to one community member due to dissatisfaction with water supply services (Central West Regional SoE Report, 07-08).	

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Town # 26

TOWN	State/Territory	NSW		
	Town Name	Coonabarabran		
	Town Population	3,000 (NSW Health, 2009); 2,609 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Warrumbungle Shire Council		
	Council Web-Link	http://www.warrumbungle.nsw.gov.au/		
	Rate ($/kL)	Unknown		
	Per Capita Water Consumption (L/day)	1000L/day. Based on statistic of average annual resident use = 365kL (04-05 reporting period, Warrumbungle Shire Council SoE Report, 07-08).		
	Number of Connections	3280 (Warrumbungle system)		
CATCHMENT AND WATER SUPPLY	Catchment	Central West		
	Sub-Catchment	Castlereagh		
	Catchment Management Authority (CMA)	Central West		
	CMA Web-Link	http://cw.cma.nsw.gov.au/cwcma_ourcatchment.htm		
	Catchment Protection Status	None.		
	Potable Water Source(s)	Castlereagh River (watercourse) (NSW Health, 2009)		
		Timor Dam (surface storage) (NSW Health, 2009)		
	Supply Capacity	Castlereagh River = unknown		
		Timor Dam = unknown		
WATER QUALITY	Treatment Plant(s)	No		
	Level of Treatment	Flocculation, filtration, chlorination.		
	Drinking Water Guidelines	ADWG 2004 (NSW Health)		
	NSW Health Monitoring Location: Coonabarabran (01)			
	% compliance for water quality parameters achieving < 100%, 2003-2004	No information.		
	% compliance for water quality parameters achieving < 100%, 2004-2005	No information.		
	% compliance for water quality parameters achieving < 100%, 2005-2006	Total Coliforms	59	
	Parameter(s) tested and number of samples ( ) 2005-2006	E.Coli (49), Free Chlorine (2), Total Coliforms (49)		
	% compliance for water quality parameters achieving < 100%, 2006-2007	Aluminium	0	
		E. coli	98	
		Iron	0	
		Total Coliforms	73	
		Turbidity	0	
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (1), Antimony (1), Arsenic (1), Barium (1), Boron (1), Cadmium (1), Calcium (1), Chloride (1), Chromium (1), Copper (1), E.Coli (45), Fluoride (1), Iodine (1), Iron (1), Lead (1), Magnesium (1), Manganese (1), Mercury (1), Molybdenum (1), Nickel (1), Nitrate (1), Nitrite (1), pH (1), Selenium (1), Silver (1), Sodium (1), Sulfate (1), Total Coliforms (45), Total Dissolved Solids (TDS) (1), Total Hardness as CaCO3 (1), True Colour (1), Turbidity (1), Zinc (1)		
	% compliance for water quality parameters achieving < 100%, 2007-2008	E. coli	98	
	Parameter(s) tested and number of samples ( ) 2007-2008	E.Coli (48), Free Chlorine (4), pH (4)		
WATER SECURITY	Current Water Restrictions	No record of water restrictions on Council's website.		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	~ 340km		
	Climate	Subtropical (border of Subtropical, Grassland and Temperate) (BoM, 2005)		
	Average Annual Rainfall	784mm (Source: BoM station number 64008, period 2004-2008)		

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October 2009.
		Single drinking water source	No	
		Poor quality water source	Yes	Castlereagh River quality stated as 'Fair' based on the Warrumbungle Shire Council SoE Report, 07-08.
		Sewage overflow or disposal into water source	Yes	Coonabarabran STP discharges to the Castlereagh River.
		Flooding	No	
		Fauna defecating in supply	Yes	River and dam water sources.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Iron and aluminium samples were non-compliant in the 06-07 sampling period.
		Un-lined landfills	Yes	Illegal dumping reported in the Warrumbungle Shire Council SoE Report, 07-08.
		Extensive agriculture	Yes	Wool and beef cattle production, cereal cropping and vine growing and horticulture (Council website).
		Low vegetation cover (dust, sediment runoff)	No	
		Poor access to supply	No	
		Unsustainable water extraction	No	No record of water restrictions on Council's website.
		Aquifer turning saline due to high extraction	Unknown	
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	No	Infrastructure was built or upgraded in 1993 according to the DECCW 07-08 Water Treatment Performance Report.
		Significant water losses due to leaking pipes	No	No record of losses.
	overnance	High per capita water consumption	Yes	1000L/day.
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health who use ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supp	Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	
		Un-lined landfills	Yes	The Central West Regional SoE Report 07-08 states that there are 24 potentially contaminated sites in the Wellington area, including the gasworks remediation site.
		Extensive agriculture	Yes	Cropping, wool, beef and prime lamb are major industries (Wellington Annual Report, 07-08).
		Low vegetation cover (dust, sediment runoff)	Yes	Extensive agricultural areas, low forested cover.
		Poor access to supply	No	Town is immediately adjacent to the Macquarie River.
		Unsustainable water extraction	Yes	
		Aquifer turning saline due to high extraction	Yes	Wellington has a water salinity hazard rating of 'high' (Central West Regional SoE Report, 07-08).
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	No	Infrastructure built or augmented in 1993 according to DECCW 07-08 Water Treatment Performance Report.
		Significant water losses due to leaking pipes	No	
	Governance	High per capita water consumption	No	Per capita water consumption is not reported.
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health, who use ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	No	
		Irrigation	Yes	Council parks and other areas consume a significant amount of water (Central West Regional SoE Report, 07-08).
		Chemicals / process	No	
	Populatio n	Seasonal population loadings	No	
		Rapid population growth	No	Wellington experienced a negative average annual population growth (approximately 2%) between the 2001 and 2006 Census.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Some samples of E.Coli were non-compliant for the 07-08 reporting period.
		Algal blooms	No	
		Heavy metal contamination	Yes	Historical issues with Aluminium.
		Poor chlorine residuals	No	
		Pesticide contamination	No	
		High suspended solids	No	
		Boil water notices	No	No boil water notices according to NSW Health summary spreadsheet.
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	No	No record of water restrictions on the Council website.
		Taste and odour issues	No	
		Other contamination that would affect health	Yes	Wellington has a water salinity hazard rating of 'high' (Central West Regional SoE Report, 07-08).
Notes			Wellington Council had 187 dirty water complaints from the community in the 07-08 reporting period (Central West Regional SoE Report, 07-08). Groundwater in Wellington is being studied by a university research group (led by Flinders University) as part of $60 Million of funding to secure Australia's water supply.	

Town # **27**

TOWN	State/Territory	NSW	
	Town Name	Wellington	
	Town Population	4,947 (NSW Health, 2009); 4,118 (Census 2006, State Suburb)	
WATER UTILITY	Name of Water Utility	Wellington Council	
	Council Web-Link	http://www.wellington.nsw.gov.au	
	Rate ($/kL)	$1.64 - $2.02/kL (Council website, 'Fees and Charges 2009/2010')	
	Per Capita Water Consumption (L/day)	Unknown. Annual household use = 230kL (Central West Regional SoE Report, 07-08).	
	Number of Connections	2860	
CATCHMENT AND WATER SUPPLY	Catchment	Central West	
	Sub-Catchment	Macquarie-Bogan	
	Catchment Management Authority (CMA)	Central West	
	CMA Web-Link	http://www.western.cma.nsw.gov.au/	
	Catchment Protection Status	None.	
	Potable Water Source(s)	Macquarie River (watercourse)	
	Supply Capacity	Unknown	
WATER QUALITY	Treatment Plant(s)	Yes	
	Level of Treatment	Filtration, flocculation, sedimentation, chlorination, fluoridation (NSW Health, 2009).	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
	NSW Health Monitoring Location: WL01-Wellington		
	% compliance for water quality parameters achieving < 100%, 2003-2004	Aluminium	91
		Fluoride (daily WSA)	82
		Fluoride (weekly WSA)	61
		Fluoride Ratio	70
		Total Coliforms	70
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), Cyanide (11), E.Coli (64), Fluoride (11), Fluoride (daily WSA) (332), Fluoride (field result WSA) (10), Fluoride (weekly WSA) (88), Fluoride Ratio (10), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (11), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (6), Turbidity (11), Zinc (11)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	Fluoride (daily WSA)	82
		Fluoride (weekly WSA)	70
		Fluoride Ratio	91
		Total Coliforms	78
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), Cyanide (2), E.Coli (58), Fluoride (12), Fluoride (daily WSA) (336), Fluoride (field result WSA) (11), Fluoride (weekly WSA) (96), Fluoride Ratio (11), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (58), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Fluoride	91
		Fluoride (daily WSA)	63
		Fluoride (field result WSA)	91
		Fluoride (weekly WSA)	40
		Fluoride Ratio	55
		Total Coliforms	95
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), E.Coli (57), Fluoride (11), Fluoride (daily WSA) (105), Fluoride (field result WSA) (1), Fluoride (weekly WSA) (80), Fluoride Ratio (11), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (11), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Total Coliforms (57), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (11), Turbidity (11), Zinc (11)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Aluminium	86
		Fluoride (daily WSA)	79
		Fluoride (weekly WSA)	75
		Fluoride Ratio	50
		Total Coliforms	88
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (7), Antimony (7), Arsenic (7), Barium (7), Boron (7), Cadmium (7), Calcium (7), Chloride (7), Chromium (7), Copper (7), E.Coli (43), Fluoride (7), Fluoride (daily WSA) (257), Fluoride (field result WSA) (4), Fluoride (weekly WSA) (72), Fluoride Ratio (4), Iodine (7), Iron (7), Lead (7), Magnesium (7), Manganese (7), Mercury (7), Molybdenum (7), Nickel (7), Nitrate (7), Nitrite (7), pH (7), Selenium (7), Silver (7), Sodium (7), Sulfate (7), Total Coliforms (43), Total Dissolved Solids (TDS) (7), Total Hardness as CaCO3 (7), True Colour (7), Turbidity (7), Zinc (7)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	E. coli	98
		Fluoride (daily WSA)	68
		Fluoride (weekly WSA)	42
		Total Coliforms	88
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (1), Antimony (1), Arsenic (1), Barium (1), Boron (1), Cadmium (1), Calcium (1), Chloride (1), Chromium (1), Copper (1), E.Coli (41), Fluoride (1), Fluoride (daily WSA) (200), Fluoride (field result WSA) (1), Fluoride (weekly WSA) (60), Fluoride Ratio (1), Free Chlorine (6), Iodine (1), Iron (1), Lead (1), Magnesium (1), Manganese (1), Mercury (1), Molybdenum (1), Nickel (1), Nitrate (1), Nitrite (1), pH (1), Selenium (1), Silver (1), Sodium (1), Sulfate (1), Total Coliforms (41), Total Dissolved Solids (TDS) (1), Total Hardness as CaCO3 (1), True Colour (1), Turbidity (1), Zinc (1)	
WATER SECURITY	Current Water Restrictions	No restrictions on Council website.	
	Proportion of Potable Water Supplied to Households (%)	Unknown.	
	Distance from the Coast (km)	~ 310km	
	Climate	Temperate (BoM, 2005)	
	Average Annual Rainfall	564.3mm (Source: BoM station number 65034, period 2004-2008)	
FACTOR		YES / NO	NOTES / EXPLANATION
	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October 2009.
	Single drinking water source	Yes	No reuse.
	Poor quality water source	No	
	Sewage overflow or disposal into water source	No	No reports of sewer overflows.
	Flooding	No	
	Fauna defecating in supply	Yes	This would be likely, as drinking water source is the Macquarie River.

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	
		Un-lined landfills	Yes	The Central West Regional SoE Report 07-08 states that there are 24 potentially contaminated sites in the Wellington area, including the gasworks remediation site.
		Extensive agriculture	Yes	Cropping, wool, beef and prime lamb are major industries (Wellington Annual Report, 07-08).
		Low vegetation cover (dust, sediment runoff)	Yes	Extensive agricultural areas, low forested cover.
		Poor access to supply	No	Town is immediately adjacent to the Macquarie River.
		Unsustainable water extraction	Yes	
		Aquifer turning saline due to high extraction	Yes	Wellington has a water salinity hazard rating of 'high' (Central West Regional SoE Report, 07-08).
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	No	Infrastructure built or augmented in 1993 according to DECCW 07-08 Water Treatment Performance Report.
		Significant water losses due to leaking pipes	No	
	Governance	High per capita water consumption	No	Per capita water consumption is not reported.
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health, who use ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	No	
		Irrigation	Yes	Council parks and other areas consume a significant amount of water (Central West Regional SoE Report, 07-08).
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Wellington experienced a negative average annual population growth (approximately 2%) between the 2001 and 2006 Census.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Some samples of E.Coli were non-compliant for the 07-08 reporting period.
		Algal blooms	No	
		Heavy metal contamination	Yes	Historical issues with Aluminium.
		Poor chlorine residuals	No	
		Pesticide contamination	No	
		High suspended solids	No	
		Boil water notices	No	No boil water notices according to NSW Health summary spreadsheet.
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	No	No record of water restrictions on the Council website.
		Taste and odour issues	No	
		Other contamination that would affect health	Yes	Wellington has a water salinity hazard rating of 'high' (Central West Regional SoE Report, 07-08).
Notes			Wellington Council had 187 dirty water complaints from the community in the 07-08 reporting period (Central West Regional SoE Report, 07-08). Groundwater in Wellington is being studied by a university research group (led by Flinders University) as part of $60 Million of funding to secure Australia's water supply.	

Town # 28

TOWN	State/Territory	NSW		
	Town Name	Gloucester		
	Town Population	2,800 (NSW Health, 2009); 2,445 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Gloucester Shire Council		
	Council Web-Link	http://www.gloucester.nsw.gov.au/		
	Rate ($/kL)	$1.55/kL up to 50kL (per annum), $1.96/kL over 50kL (per annum) (Gloucester Shire Council fees and charges, 09/10 period)		
	Per Capita Water Consumption (L/day)	System capacity is 5ML/day, 390ML produced during the 07-08 reporting period.		
	Number of Connections	1,700		
CATCHMENT AND WATER SUPPLY	Catchment	Hunter/Central Rivers		
	Sub-Catchment	Manning River		
	Catchment Management Authority (CMA)	Hunter/Central Rivers		
	CMA Web-Link	http://www.hcr.cma.nsw.gov.au/our_catchment.php3		
	Catchment Protection Status	None		
	Potable Water Source(s)	Barrington River (watercourse)		
	Supply Capacity	Unknown		
WATER QUALITY	Treatment Plant(s)	Unknown		
	Level of Treatment	Conventional Water Treatment (DECCW inventory on NSW water utilities). Chlorination, coagulation, filtration, flocculation, fluoridation, sedimentation, softening (NSW Health database)		
	Drinking Water Guidelines	ADWG 2004 (NSW Health)		
	NSW Health Monitoring Location: Gloucester			
	% compliance for water quality parameters achieving < 100%, 2003-2004	Fluoride (daily WSA)	24	
		Fluoride (weekly WSA)	11	
		Fluoride Ratio	71	
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), Cyanide (2), E.Coli (51), Fluoride (8), Fluoride (daily WSA) (230), Fluoride (field result WSA) (7), Fluoride (weekly WSA) (70), Fluoride Ratio (7), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (51), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (1), Turbidity (2), Zinc (2)		
	% compliance for water quality parameters achieving < 100%, 2004-2005	E. coli	98	
		Fluoride (daily WSA)	62	
		Fluoride (weekly WSA)	16	
		Fluoride Ratio	0	
		pH	50	
		Total Coliforms	88	
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (50), Fluoride (7), Fluoride (daily WSA) (122), Fluoride (field result WSA) (5), Fluoride (weekly WSA) (31), Fluoride Ratio (5), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (50), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)		
	% compliance for water quality parameters achieving < 100%, 2005-2006	E. coli	96	
		Total Coliforms	94	
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (49), Fluoride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (49), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)		
	% compliance for water quality parameters achieving < 100%, 2006-2007	Total Coliforms	92	
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (51), Fluoride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (51), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)		
	% compliance for water quality parameters achieving < 100%, 2007-2008	Aluminium	50	
		Total Coliforms	71	
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (52), Fluoride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (52), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)		
WATER SECURITY	Current Water Restrictions	No. Restrictions not advertised on the Council website or in the Gloucester Advocate.		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	~ 55km		
	Climate	Temperate (BoM, 2005)		
	Average Annual Rainfall	1028mm (Source: BoM station number 60015, period 2004-2008) or 985mm per annum according to Council website.		

	FACTOR	YES / NO	NOTES / EXPLANATION
Water Supply	Drought	No	Classified as 'Marginal' according to NSW DPI Drought Map October 2009.
	Single drinking water source	Yes	
	Poor quality water source	Yes	Faecal contamination and high aluminium levels.
	Sewage overflow or disposal into water source		
	Flooding	Yes	Significant flooding in 2001.
	Fauna defecating in supply	Yes	Open water source.
	Fauna destroying water intake structures	No	
	Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Aluminium
	Un-lined landfills		

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Wat	Extensive agriculture	Yes	Reportedly a 'major' industry according to the Council website. Traditionally in beef and dairying, with more "boutique" industries such as aqua-culture, olive groves, escargot, vineyards and wineries, table rabbits, specialist nuts and alpacas now established.
		Low vegetation cover (dust, sediment runoff)	Yes	Extensive clearing for agriculture. The area does have grass cover though.
		Poor access to supply	No	
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water	Yes	NSW Health report that the Gloucester treatment system incorporates water softening.
		Aging or inadequate pipe work and associated infrastructure	Yes	Plant built in 1981.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption	Unknown	Domestic consumption (and per capita consumption) is not isolated from total water production, so this statistic is unknown.
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health, who use ADWG
		Lack of infrastructure maintenance	Yes	
		Poor management or governance	Yes	Council measured some basic water quality parameters from the major river systems in the Gloucester catchment area during 07-08. Due to faulty equipment all measurements taken during the reporting period could not be used for reporting purposes (Gloucester SoE Report, 07-08).
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	Yes	Council measured some basic water quality parameters from the major river systems in the Gloucester catchment area during 07-08. Due to faulty equipment all measurements taken during the reporting period could not be used for reporting purposes (Gloucester SoE Report, 07-08). This may have been avoided if adequately trained personnel had identified the issue.
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	Yes	There is a Coal Mine at Stratford (Gloucester Shire Council website).
		Irrigation	Yes	Agriculture is a major local industry.
		Chemicals / process	Yes	Timber mill nearby (Council website).
	Population	Seasonal population loadings		
		Rapid population growth		
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Several samples during April and May from Barrington failed to meet the NSW Health Departments Drinking Water Guidelines. In response to the failures council notified all residents to boil their water before use. Council also flushed the water mains through the affected area to assist in improving the quality (Gloucester SoE Report, 07-08).
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals	Yes	Free chlorine is not tested.
		Pesticide contamination	Unknown	Pesticides not tested.
		High suspended solids		
		Boil water notices	Yes	Several samples during April and May from Barrington failed to meet the NSW Health Departments Drinking Water Guidelines. In response to the failures council notified all residents to boil their water before use. Council also flushed the water mains through the affected area to assist in improving the quality (Gloucester SoE Report, 07-08).
		Deaths or illness due to water quality		
		Water restrictions (current and historic)	No	No current water restrictions based on Council website.
		Taste and odour issues		
		Other contamination that would affect health		
Notes				

Town # 29

TOWN	State/Territory	NSW	
	Town Name	Dungog	
	Town Population	2,600 (NSW Health, 2009); 2,102 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Hunter Water Corporation	
	Council Web-Link	http://www.dungog.nsw.gov.au/	
	Rate ($/kL)	$1.22/kL (Hunter Water Corporation website)	
	Per Capita Water Consumption (L/day)	Unknown. 674,337kL purchased from Hunter Water in the 03-04 reporting period. This is not restricted to domestic consumption. Dungog WTP produces 150ML/day.	
	Number of Connections	205,000 (entire Hunter Water network) (07-08 reporting period, National Performance Report to the	
CATCHMENT AND WATER SUPPLY	Catchment	Hunter/Central Rivers	
	Sub-Catchment	Hunter River	
	Catchment Management Authority (CMA)	Hunter/Central Rivers	
	CMA Web-Link	http://www.hcr.cma.nsw.gov.au/our_catchment.php3	
	Catchment Protection Status	None	
	Potable Water Source(s)	Chichester Dam (surface water storage)	
	Supply Capacity	Average daily supply = 90ML, capacity = 21,500ML.	
WATER QUALITY	Treatment Plant(s)	Dungog Water Treatment Plant	
	Level of Treatment	Chlorine dosing (at Chichester Dam), then flows under gravity to Dungog Water Treatment Plant. At the WTP, coagulation and flocculation using alum and polyelectrolyte, contact filtration (sand, anthracite and gravel), chlorination, fluoridation and lime and carbon dioxide dosing for pH correction and buffering, before being returned to the Chichester Main (Hunter Water Corporation website).	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
		NSW Health Monitoring Location:	
	% compliance for water quality parameters achieving < 100%, 2003-2004	E. coli	98
		Fluoride (daily WSA)	94
		Iron	90
		pH	94
		Total Coliforms	85
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (10), Antimony (10), Arsenic (10), Barium (10), Boron (10), Cadmium (10), Calcium (10), Chloride (10), Chromium (10), Copper (10), Cyanide (10), E.Coli (82), Fluoride (10), Fluoride (daily WSA) (62), Fluoride (weekly WSA) (4), Free Chlorine (8), Iodine (10), Iron (10), Lead (10), Magnesium (10), Manganese (10), Mercury (10), Molybdenum (10), Nickel (10), Nitrate (10), Nitrite (10), pH (17), Selenium (10), Silver (10), Sodium (10), Sulfate (10), Total Coliforms (82), Total Dissolved Solids (TDS) (10), Total Hardness as CaCO3 (10), True Colour (5), Turbidity (10), Zinc (10)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	pH	96
		Total Coliforms	92
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), Cyanide (1), E.Coli (77), Fluoride (11), Free Chlorine (19), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (28), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Total Coliforms (77), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (11), Turbidity (11), Zinc (11)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	pH	92
		Total Coliforms	85
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (10), Antimony (10), Arsenic (10), Barium (10), Boron (10), Cadmium (10), Calcium (10), Chloride (10), Chromium (10), Copper (10), E.Coli (75), Fluoride (10), Free Chlorine (3), Iodine (10), Iron (10), Lead (10), Magnesium (10), Manganese (10), Mercury (10), Molybdenum (10), Nickel (10), Nitrate (10), Nitrite (10), pH (13), Selenium (10), Silver (10), Sodium (10), Sulfate (10), Total Coliforms (75), Total Dissolved Solids (TDS) (10), Total Hardness as CaCO3 (10), True Colour (10), Turbidity (10), Zinc (10)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Total Coliforms	91
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (77), Fluoride (12), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (77), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	Total Coliforms	95
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (78), Fluoride (12), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (78), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
WATER SECURITY	Current Water Restrictions	No report of water restrictions on the Council website.	
	Proportion of Potable Water Supplied to Households (%)	55% Residential, 30% non-residential, 15% non-metered (statistics are for the entire Hunter Water supply system).	
	Distance from the Coast (km)	~ 70km	
	Climate	Temperate (BoM, 2005)	
	Average Annual Rainfall	982mm (Source: BoM station number 61017, period 2004-2008)	
FACTOR		YES / NO	NOTES / EXPLANATION
	Drought	No	Classified as 'Marginal' according to NSW DPI Drought Map October 2009.
	Single drinking water source	Yes	Tillegra Dam is currently being constructed by Hunter Water to supplement supply.
	Poor quality water source	No	
	Sewage overflow or disposal into water source	No	Closed system from Chichester

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Flooding	Yes	Hunter Water website mentions challenges associated with providing drinking water during flood.
		Fauna defecating in supply	Yes	Open water source, but treatment should eliminate this.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	These are not an issue due to the WTP.
		Un-lined landfills		
		Extensive agriculture	Yes	Extensive cleared farmland.
		Low vegetation cover (dust, sediment runoff)	Yes	Widespread clearing for farming, however there is grass cover.
		Poor access to supply	No	Water flows under gravity from Chichester Dam to the Dungog WTP.
		Unsustainable water extraction	Yes	Tillegra Dam is currently being constructed by Hunter Water to supplement supply.
		Aquifer turning saline due to high extraction		
		Hard water	No	This is not an issue due to the Dungog WTP.
		Aging or inadequate pipe work and associated infrastructure	Yes	Dungog WTP was completed in 1987.
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption	Unknown	Per capita consumption is not well reported.
		Inappropriate water quality standards / objectives	No	
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	No	
		Irrigation	Yes	Farming nearby.
		Chemicals / process		
	Population	Seasonal population loadings	Unknown	
		Rapid population growth	No	Negative population growth between the 2001 and 2006 Census.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Total coliforms.
		Algal blooms	No	
		Heavy metal contamination	No	However there was iron in the water supply in 03-04.
		Poor chlorine residuals	Yes	Free chlorine not tested.
		Pesticide contamination		Pesticides not tested.
		High suspended solids	No	
		Boil water notices	No	
		Deaths or illness due to water quality		
		Water restrictions (current and historic)	No	
		Taste and odour issues		
		Other contamination that would affect health		
Notes			Construction of Tillegra Dam is underway.	

Town # 30

TOWN	State/Territory	NSW	
	Town Name	Cowra	
	Town Population	9,100 (NSW Health, 2009); 8,430 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Cowra Shire Council	
	Council Web-Link	http://www.cowraregion.com.au/home/	
	Rate ($/kL)	Unknown.	
	Per Capita Water Consumption (L/day)	Unknown.	
	Number of Connections	5240	
CATCHMENT AND WATER SUPPLY	Catchment	Lachlan	
	Sub-Catchment	-	
	Catchment Management Authority (CMA)	Lachlan	
	CMA Web-Link	http://www.lachlan.cma.nsw.gov.au/	
	Catchment Protection Status	None.	
	Potable Water Source(s)	Lachlan River (watercourse) (Cowra supply source according to NSW Health)	
		Wyangala Dam (Cowra supply source according to Council website)	
	Supply Capacity	Unknown.	
WATER QUALITY	Treatment Plant(s)	None	
	Level of Treatment	Filtration, chlorination, fluoridation.	
	NSW Health Monitoring Location: CO01-Cowra		
	% compliance for water quality parameters achieving < 100%, 2003-2004	Aluminium	27
		E. coli	99
		Fluoride (daily WSA)	93
		Fluoride (weekly WSA)	91
		Fluoride Ratio	91
		pH	91
		Thermotolerant Coliforms	83
		Total Coliforms	78
		Total Dissolved Solids (TDS)	91
		Total Hardness as CaCO3	73
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), Cyanide (11), E.Coli (139), Fluoride (13), Fluoride (daily WSA) (279), Fluoride (field result WSA) (9), Fluoride (weekly WSA) (82), Fluoride Ratio (11), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (11), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Thermotolerant Coliforms (6), Total Coliforms (139), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (5), Turbidity (11), Zinc (11)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	Aluminium	8
		E. coli	99
		Fluoride (daily WSA)	95
		Fluoride (weekly WSA)	98
		pH	92
		Total Coliforms	79
		Total Hardness as CaCO3	83
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), Cyanide (2), E.Coli (124), Fluoride (12), Fluoride (daily WSA) (286), Fluoride (field result WSA) (12), Fluoride (weekly WSA) (88), Fluoride Ratio (12), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Thermotolerant Coliforms (124), Total Coliforms (124), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Aluminium	44
		E. coli	98
		Fluoride (daily WSA)	96
		Fluoride (weekly WSA)	99
		Iron	94
		Total Coliforms	85
		Total Hardness as CaCO3	94
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (16), Antimony (16), Arsenic (16), Barium (16), Boron (16), Cadmium (16), Calcium (16), Chloride (16), Chromium (16), Copper (16), E.Coli (142), Fluoride (16), Fluoride (daily WSA) (294), Fluoride (field result WSA) (13), Fluoride (weekly WSA) (84), Fluoride Ratio (13), Iodine (16), Iron (16), Lead (16), Magnesium (16), Manganese (16), Mercury (16), Molybdenum (16), Nickel (16), Nitrate (16), Nitrite (16), pH (16), Selenium (16), Silver (16), Sodium (16), Sulfate (16), Total Coliforms (142), Total Dissolved Solids (TDS) (16), Total Hardness as CaCO3 (16), True Colour (16), Turbidity (16), Zinc (16)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Aluminium	50
		E. coli	96
		Fluoride (daily WSA)	98
		Fluoride (weekly WSA)	97
		Total Coliforms	71
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (119), Fluoride (12), Fluoride (daily WSA) (363), Fluoride (field result WSA) (9), Fluoride (weekly WSA) (102), Fluoride Ratio (9), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (119), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	Aluminium	36
		E. coli	98
		Fluoride (daily WSA)	97
		Iodine	82
		Total Coliforms	72
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), Cyanide (11), E.Coli (125), Fluoride (11), Fluoride (daily WSA) (180), Fluoride (field result WSA) (7), Fluoride (weekly WSA) (50), Fluoride Ratio (7), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (11), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Total Coliforms (125), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (5), Turbidity (11), Zinc (11)	
WATER SECURITY	Current Water Restrictions	Yes. Level 2 water restrictions.	
	Proportion of Potable Water Supplied to Households (%)	Unknown.	
	Distance from the Coast (km)	~ 240km	

W SE		Climate	Temperate (BoM, 2005)	
		Average Annual Rainfall	640mm per annum. Cowra Shire Council website.	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October 2009.
		Single drinking water source	Yes	
		Poor quality water source	No	
		Sewage overflow or disposal into water source	No	
		Flooding	No	
		Fauna defecating in supply	Yes	Source is river water and large reservoir (dam); contamination due to wildlife is likely.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Iron and aluminium.
		Un-lined landfills	No	No reports of unlined landfills.
		Extensive agriculture	Yes	Agriculture is stated as a major industry in the Cowra Shire Council Annual Report, 07-08, including irrigation cropping and fodder production, mixed farming enterprises, and other intensive agriculture.
		Low vegetation cover (dust, sediment runoff)	No	
		Poor access to supply	No	
		Unsustainable water extraction	No	
		Aquifer turning saline due to high extraction	No	No reports of aquifer turning saline. Salinity levels monitored and reported in the Cowra Shire Council Annual Report, 07-08.
		Hard water	No	No reports of overly hard water. Total hardness 100% compliant for 07-08 reporting period.
		Aging or inadequate pipe work and associated infrastructure	No	
		Significant water losses due to leaking pipes	No	No reports of water system losses.
	Governance	High per capita water consumption	No	Water consumption per capita unknown.
		Inappropriate water quality standards / objectives	No	Reports to NSW Health, who use ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	Yes	Stated as a major industry in the region in the Cowra Shire Council Annual Report, 07-08.
		Irrigation	Yes	
		Chemicals / process	No	
	Population	Seasonal population loadings	Yes	Tourism is stated to be one of the major industries in the shire (Cowra Annual Report, 07-08).
		Rapid population growth	No	Population growth = 0.84% between 2001 and 2006 Census, which is less than the NSW average of 1.6% (ABS, 2009).
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Historical non-compliance for E.Coli.
		Algal blooms	No	No report of algal blooms.
		Heavy metal contamination	Yes	Aluminium and iron in supply.
		Poor chlorine residuals	Yes	Free chlorine not tested.
		Pesticide contamination	No	No reports of pesticide issues.
		High suspended solids	Yes	Reports of colour issues on the Cowra Shire Council website.
		Boil water notices	No	No boil water notices according to NSW Health summary spreadsheet.
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	Yes	Level 2 water restrictions currently in place.
		Taste and odour issues	No	
		Other contamination that would affect health	No	
Notes				

Town # 31

TOWN	State/Territory	NSW	
	Town Name	Wentworth	
	Town Population	1,200 (NSW Health, 2009); 1,303 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Wellington Shire Council	
	Council Web-Link	http://www.wentworth.nsw.gov.au/	
	Rate ($/kL)	$1.15/kL up to 250kL, $2.70 over 250kL.	
	Per Capita Water Consumption (L/day)	Unknown. WTP supply capacity is 1ML/day (NSW DECCW inventory of NSW water utilities 07-08), 226ML treated to potable in 07-08 reporting period. Average annual household consumption is 450kL (Riverina and Murray Regional Organisation of Councils SoE Report, 07-08).	
	Number of Connections	2,230	
CATCHMENT AND WATER SUPPLY	Catchment	Lower Murray Darling	
	Sub-Catchment	-	
	Catchment Management Authority (CMA)	Lower Murray Darling	
	CMA Web-Link	http://www.lmd.cma.nsw.gov.au/	
	Catchment Protection Status	None.	
	Potable Water Source(s)	Murray River (watercourse)	
	Supply Capacity	Unknown	
WATER QUALITY	Treatment Plant(s)	Wentworth Water Treatment Plant	
	Level of Treatment	Conventional treatment (DECCW), filtration, flocculation, coagulation, sand filter, activated carbon, chlorination (NSW Health).	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
		NSW Health Monitoring Location: WW01-Wentworth	
	% compliance for water quality parameters achieving < 100%, 2003-2004	Aluminium	75
		E. coli	77
		pH	60
		Total Coliforms	63
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (4), Antimony (4), Arsenic (4), Barium (4), Boron (4), Cadmium (4), Calcium (4), Chloride (4), Chromium (4), Copper (4), Cyanide (4), E.Coli (57), Fluoride (4), Free Chlorine (3), Iodine (4), Iron (4), Lead (4), Magnesium (4), Manganese (4), Mercury (4), Molybdenum (4), Nickel (4), Nitrate (4), Nitrite (4), pH (5), Selenium (4), Silver (4), Sodium (4), Sulfate (4), Total Coliforms (57), Total Dissolved Solids (TDS) (4), Total Hardness as CaCO3 (4), True Colour (1), Turbidity (4), Zinc (4)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	E. coli	88
		Total Coliforms	76
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), Cyanide (2), E.Coli (51), Fluoride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (51), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Total Coliforms	94
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), Cyanide (2), E.Coli (52), Fluoride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (52), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Total Coliforms	98
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (1), Antimony (1), Arsenic (1), Barium (1), Boron (1), Cadmium (1), Calcium (1), Chloride (1), Chromium (1), Copper (1), E.Coli (48), Fluoride (1), Iodine (1), Iron (1), Lead (1), Magnesium (1), Manganese (1), Mercury (1), Molybdenum (1), Nickel (1), Nitrate (1), Nitrite (1), pH (1), Selenium (1), Silver (1), Sodium (1), Sulfate (1), Total Coliforms (48), Total Dissolved Solids (TDS) (1), Total Hardness as CaCO3 (1), True Colour (1), Turbidity (1), Zinc (1)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	Aluminium	50
		Total Coliforms	92
		Total Dissolved So	50
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (52), Fluoride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (52), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
WATER SECURITY	Current Water Restrictions	Yes. Level 2 water restrictions. Hours of watering = 12 hours per week on any day between the hours of 6pm and 10am.	
	Proportion of Potable Water Supplied to Households (%)	Unknown	
	Distance from the Coast (km)	~ 475km	
	Climate	Grassland (BoM, 2005)	
	Average Annual Rainfall	195.67mm (Source: BoM station number 47041)	
FACTOR		YES / NO	NOTES / EXPLANATION
	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October 2009.
	Single drinking water source	Yes	Murray River.
	Poor quality water source	Yes	Council's submission to the NSW Inquiry into Secure and Sustainable Water Supply and Sewerage Services for Non Metropolitan NSW states that that there are, by necessity, three water treatment plants for a small population due to the local water quality.

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Sewage overflow or disposal into water		
		Flooding		
		Fauna defecating in supply	Yes	Open water source. Should not be an issue due to the water treatment plant.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Aluminium
		Un-lined landfills		
		Extensive agriculture	Yes	
		Low vegetation cover (dust, sediment	Yes	
		Poor access to supply	No	
		Unsustainable water extraction	Yes	Water source is a regulated river subject to interstate processes.
		Aquifer turning saline due to high extraction	No	SoE Report suggests that the Murray is not overly saline in this location.
		Hard water	No	Results indicate good compliance for hardness.
		Aging or inadequate pipe work and associated infrastructure	No	Infrastructure was built or augmented in 1991 (NSW DECCW inventory of water utilities 07-08).
		Significant water losses due to leaking pipes	Unknown	
	Governance	High per capita water consumption	Unknown	
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health who use ADWG.
		Lack of infrastructure maintenance	Yes	Infrastructure upgrade and maintenance required, but capital expenditure cannot be raised (according to Council submission to the NSW Inquiry).
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	Yes	Council's submission to the NSW Inquiry into Secure and Sustainable Water Supply and Sewerage Services for Non Metropolitan NSW states that that there are, by necessity, three water treatment plants for a small population due to the local water quality, making the financial viability of the water services very doubtful without funding grants for capital works.
	Industries	Mining / minerals	Yes	Snapper and Ginko mineral mines.
		Irrigation	Yes	Agriculture.
		Chemicals / process		
	Population	Seasonal population loadings	Yes	High tourism as the town is located near the junction of the Murray and Darling Rivers.
		Rapid population growth	No	Negative population growth between 2001 and 2006 Census.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	No	
		Algal blooms	No	One major outbreak (lasting 6 months) in 06-07 reporting period.
		Heavy metal contamination	Yes	Aluminium
		Poor chlorine residuals	Yes	Free chlorine is not measured.
		Pesticide contamination		Unknown. Pesticides not measured.
		High suspended solids	Yes	
		Boil water notices	No	
		Deaths or illness due to water quality	No	None reported.
		Water restrictions (current and historic)	Yes	The town has been on repeated water restrictions of various levels. Recently downgraded from Level 3 to Level 2.
		Taste and odour issues		
		Other contamination that would affect	No	
Notes				

Town # 32

TOWN	State/Territory	NSW	
	Town Name	Tumbarumba	
	Town Population	1,800 (NSW Health, 2009); 1,487 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Tumbarumba Shire Council	
	Council Web-Link	http://www.tumbashire.nsw.gov.au/	
	Rate ($/kL)	$1.04/kL up to 200kL, $1.74/kL over 200kL	
	Per Capita Water Consumption (L/day)	Unknown. GHD completed a water balance in the Drought Mitigation Strategy but daily demand did not include distinction of domestic consumption.	
	Number of Connections	1,140	
CATCHMENT AND WATER SUPPLY	Catchment	Murray River	
	Sub-Catchment	-	
	Catchment Management Authority (CMA)	Murray River	
	CMA Web-Link	http://www.murray.cma.nsw.gov.au/	
	Catchment Protection Status	None.	
	Potable Water Source(s)	Tumbarumba Creek	
	Supply Capacity	0.5ML/day for past 3 years (supply restricted in conjunction with water restrictions)	
WATER QUALITY	Treatment Plant(s)	None	
	Level of Treatment	Chlorination	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
	NSW Health Monitoring Location: TM01-Tumbarumba		
	% compliance for water quality parameters achieving < 100%, 2003-2004	E. coli	98
		Total Coliforms	37
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), Cyanide (2), E.Coli (51), Flouride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (51), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	E. coli	96
		Iron	50
		Total Coliforms	49
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (53), Flouride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (53), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Total Coliforms	54
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (52), Flouride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (52), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Aluminium	33
		Iron	67
		Lead	67
		Total Coliforms	39
		Turbidity	33
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (3), Antimony (3), Arsenic (3), Barium (3), Boron (3), Cadmium (3), Calcium (3), Chloride (3), Chromium (3), Copper (3), E.Coli (51), Flouride (3), Iodine (3), Iron (3), Lead (3), Magnesium (3), Manganese (3), Mercury (3), Molybdenum (3), Nickel (3), Nitrate (3), Nitrite (3), pH (3), Selenium (3), Silver (3), Sodium (3), Sulfate (3), Total Coliforms (51), Total Dissolved Solids (TDS) (3), Total Hardness as CaCO3 (3), True Colour (3), Turbidity (3), Zinc (3)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	Iron	0
		Total Coliforms	48
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (50), Flouride (2), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (50), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
WATER SECURITY	Current Water Restrictions	Yes. Level 2. The use of sprinklers & watering systems is permitted seven (7) days a week between the hours of 3pm and 6pm; garden watering is permitted seven (7) days a week between 3pm and 6pm daily, with trigger nozzle hand held hoses only; no pool filling, top ups only; washing of vehicles is permitted on lawn areas, with trigger nozzle hand held hoses only; hosing of pavements is NOT permitted unless for health reasons as approved by Council; the Mayor and General Manager are to approve volumes for industrial and commercial users.	
	Proportion of Potable Water Supplied to Households (%)	Unknown	
	Distance from the Coast (km)	~ 200km	
	Climate	Temperate (BoM, 2005)	
	Average Annual Rainfall	791mm (Source: BoM station number 72043)	

		FACTOR	YES / NO	NOTES / EXPLANATION
(SE)	and Water Supply	Drought	No	Classified as 'Marginal' according to NSW DPI Drought Map October 2009.
		Single drinking water source	No	Council alse use Burra Creek for supply. The GHD Draft Drought Mitigation Strategy also states that Council have recently commissioned a new groundwater bore. Further work is currently being commissioned to enlarge the Tumbarumba Reservoir.
		Poor quality water source	Yes	GHD report suggests poor quality in Tumbarumba Creek.
		Sewage overflow or disposal into water source		
		Flooding		
		Fauna defecating in supply	Yes	Open water source, and very low compliance with Total Coliforms.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, flouride)	Yes	Historical non-compliances with metals.
		Un-lined landfills		

WATER QUALITY OR SECURITY RISK (CAU	Catchment a	Extensive agriculture	Yes	Grazing, timber, grapes, horticulture, fishing and other agriculture industries.
		Low vegetation cover (dust, sediment runoff)	No	Local clearing, but township is close to the Bago State Forsest, which is an extensive tract of vegetated forest.
		Poor access to supply	No	
		Unsustainable water extraction	Yes	The town draws water from a major regulated river with reduced flow.
		Aquifer turning saline due to high extraction	No	
		Hard water	No	Compliant with guidelines for hardness.
		Aging or inadequate pipework and associated infrastructure	Yes	Inadequate supply. Council is undertaking works to improve the situation.
		Significant water losses due to leaking pipes	Unknown	The GHD Drought Mitigation Strategy did not include water losses in the water balance - these were considered negligible.
	Governance	High per capita water consumption	Unknown	No confident description of per capita consumption.
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health who use ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	Currently commissioning and undertaking upgrades.
	Industrie s	Mining / minerals	No	
		Irrigation	Yes	Some.
		Chemicals / process	Yes	Grapes/wine industry.
	Population	Seasonal population loadings	No	Tourism industry, but doesn't appear to be highly seasonal.
		Rapid population growth	No	Negative population growth between the 2001 and 2006 Census.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Total coliforms non-compliant.
		Algal blooms		
		Heavy metal contamination	Yes	
		Poor chlorine residuals	Unknown	Free chlorine is not tested.
		Pesticide contamination	Unknown	Not tested.
		High suspended solids	Yes	33% compliance for turbidity in 06-07 reporting period.
		Boil water notices	No	
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	No	
		Other contamination that would affect health		
Notes			2 water service complaints per 1000 customers in the 07-08 reporting period.	

Town # 33

TOWN	State/Territory	NSW	
	Town Name	Berrigan	
	Town Population	1,000 (NSW Health, 2009); 899 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Berrigan Shire Council	
	Council Web-Link	http://www.berriganshire.nsw.gov.au/	
	Rate ($/kL)	$0.90/kL (treated supply), $0.45/kL unfiltered supply (dual supply).	
	Per Capita Water Consumption (L/day)	220L/day. 114ML treated to potable in 07-08 period (DECCW inventory of NSW water utilities).	
	Number of Connections	3,490	
CATCHMENT AND WATER SUPPLY	Catchment	Murray River	
	Sub-Catchment	-	
	Catchment Management Authority (CMA)	Murray River	
	CMA Web-Link	http://www.murray.cma.nsw.gov.au/	
	Catchment Protection Status	None.	
	Potable Water Source(s)	Berrigan Channel (watercourse)	
		Murray River (watercourse)	
	Supply Capacity	Unknown. Capacity of the treatment plant is 1ML/day.	
WATER QUALITY	Treatment Plant(s)	Yes	
	Level of Treatment	Filtration, flocculation, coagulation, sedimentation, chlorination, fluoridation.	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
	NSW Health Monitoring Location: BR02-Berrigan		
	% compliance for water quality parameters achieving < 100%, 2003-2004	Fluoride (daily WSA)	97
		Fluoride (weekly WSA)	99
		Fluoride Ratio	91
		Total Coliforms	98
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), Cyanide (2), E.Coli (49), Fluoride (11), Fluoride (daily WSA) (366), Fluoride (field result WSA) (11), Fluoride (weekly WSA) (104), Fluoride Ratio (11), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (49), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (1), Turbidity (2), Zinc (2)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	Fluoride (daily WSA)	93
		Fluoride (weekly WSA)	93
		Fluoride Ratio	75
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), Cyanide (2), E.Coli (45), Fluoride (12), Fluoride (daily WSA) (367), Fluoride (field result WSA) (12), Fluoride (weekly WSA) (104), Fluoride Ratio (12), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (45), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Fluoride (daily WSA)	90
		Fluoride (weekly WSA)	97
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (1), Antimony (1), Arsenic (1), Barium (1), Boron (1), Cadmium (1), Calcium (1), Chloride (1), Chromium (1), Copper (1), E.Coli (47), Fluoride (11), Fluoride (daily WSA) (366), Fluoride (field result WSA) (11), Fluoride (weekly WSA) (100), Fluoride Ratio (11), Iodine (1), Iron (1), Lead (1), Magnesium (1), Manganese (1), Mercury (1), Molybdenum (1), Nickel (1), Nitrate (1), Nitrite (1), pH (1), Selenium (1), Silver (1), Sodium (1), Sulfate (1), Total Coliforms (47), Total Dissolved Solids (TDS) (1), Total Hardness	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Fluoride (daily WSA)	82
		Fluoride (weekly WSA)	94
		Iron	50
		Total Coliforms	98
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (44), Fluoride (12), Fluoride (daily WSA) (366), Fluoride (field result WSA) (12), Fluoride (weekly WSA) (96), Fluoride Ratio (12), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Chlorine (29), Total Coliforms (44), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	Fluoride (daily WSA)	97
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (42), Fluoride (10), Fluoride (daily WSA) (366), Fluoride (field result WSA) (10), Fluoride (weekly WSA) (102), Fluoride Ratio (10), Free Chlorine (1), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Chlorine (35), Total Coliforms (42), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
WATER SECURITY	Current Water Restrictions	Yes. Stage 2. Gardens and lawns can be watered on specified watering days from 7 am to 9 am and 6 pm to 8 pm on allocation days (odds and evens system), with a hand-held hose fitted with trigger nozzle or with a watering can or bucket or by a manual dripper system and/or movable sprinklers operating through a tap timer or by an automatic watering system from Midnight to 4am on allocated days.	
	Proportion of Potable Water Supplied to Households (%)	Unknown. Annual household consumption = 250kL in 07-08.	
	Distance from the Coast (km)	~ 410km	
	Climate	Temperate/Grassland (on the border of both climatic regions) (BoM, 2005)	
	Average Annual Rainfall	294mm (Source: BoM station number 74009, period 2006-2008)	
FACTOR		YES / NO	NOTES / EXPLANATION
Risk to Water Supply	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October
	Single drinking water source	No	
	Poor quality water source	No	Compliance is pretty good, except for iron results in 06-07 period. Water treatment plant appears effective.
	Sewage overflow or disposal into water	No	No reports of sewer overflows in Regional SoE Report 07-08.
	Flooding	No	No report of recent flooding in the Regional SoE Report 07-08.
	Fauna defecating in supply	Yes	Open water sources. Should not be an issue due to water treatment plant.
	Fauna destroying water intake structures	No	
	Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Iron.
	Un-lined landfills	Yes	Berrigan annual report states that Council is required by law to restore the present tip sites. Assume this may include some form of leachate/lining issue.

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment an	Extensive agriculture	Yes	
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply	No	
		Unsustainable water extraction	Yes	Water restrictions, plus the town draws from the Murray, which is a river subject to interstate processes.
		Aquifer turning saline due to high extraction	No	Murray River showed reasonable results for the 07-08 reporting period (Regional SoE Report, 07-08).
		Hard water	No	Hardness was compliant for the reporting period.
		Aging or inadequate pipe work and associated infrastructure	Yes	Last upgrade or retrofit was completed in 1990.
		Significant water losses due to leaking pipes	Yes	In 2006, 100ML were lost from the raw water supply, and 64ML was lost from the treated water supply.
	Governance	High per capita water consumption	No	Per capita consumption is ok for this region, although it is still higher than Melbourne, who have an average per capita consumption of 170L/day (Berrigan Demand Management Plan, 2006).
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health who use ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	Yes	Pine Lodge Gravel Pit for the supply of road making materials, sand and
		Irrigation	Yes	Stated on the Council website to be their major industry.
		Chemicals / process		
	Population	Seasonal population loadings	No	No reports of high seasonal loadings for the area on Council website or in Regional SoE Report.
		Rapid population growth	No	Negative population growth between the 2001 and 2006 Census.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	No	
		Algal blooms	No	One outbreak in the previous year (07) that lasted 8 weeks.
		Heavy metal contamination	Yes	Poor historical compliance regarding Iron.
		Poor chlorine residuals	Unknown	Free chlorine is not tested.
		Pesticide contamination	Unknown	Pesticides are not tested.
		High suspended solids	No	
		Boil water notices	No	
		Deaths or illness due to water quality		
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	No	No water quality complaints recorded in the DECCW inventory of NSW Water Utilities.
		Other contamination that would affect	No	None reported.
Notes			RAMROC are facilitating the Water4Food program, which is a community-based program aimed at maintaining a dialogue between the community and government bodies regarding the provision of water for food production.	

Town # 34

TOWN	State/Territory	NSW	
	Town Name	Narrandera	
	Town Population	5,000 (NSW Health, 2009); 3,961 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Narrandera Shire Council	
	Council Web-Link	http://www.narrandera.nsw.gov.au/cmst/n/nova.asp	
	Rate ($/kL)	$0.595 per kL plus $200 access charge per annum	
	Per Capita Water Consumption (L/day)	Unknown (not reported in the Murray Regional Organisation of Councils SoE Report, 07-08).	
	Number of Connections	2010	
CATCHMENT AND WATER SUPPLY	Catchment	Murrumbidgee	
	Sub-Catchment	-	
	Catchment Management Authority (CMA)	Murrumbidgee	
	CMA Web-Link	http://www.murrumbidgee.cma.nsw.gov.au/	
	Catchment Protection Status	None	
	Potable Water Source(s)	Narrandera Bore (groundwater)	
	Supply Capacity	Unknown	
WATER QUALITY	Treatment Plant(s)	None	
	Level of Treatment	Aeration and chlorination	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
	NSW Health Monitoring Location: ND01-Narrandera		
	% compliance for water quality parameters achieving < 100%, 2003-2004	Aluminium	91
		Iodide	67
		Iodine	45
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), Cyanide (11), E.Coli (70), Fluoride (11), Iodide (3), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (11), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Total Coliforms (70), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (5), Turbidity (11), Zinc (11)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	Aluminium	86
		Iodine	0
		Lead	86
		Total Coliforms	93
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (7), Antimony (7), Arsenic (7), Barium (7), Boron (7), Cadmium (7), Calcium (7), Chloride (7), Chromium (7), Copper (7), E.Coli (61), Fluoride (7), Iodide (7), Iodine (7), Iron (7), Lead (7), Magnesium (7), Manganese (7), Mercury (7), Molybdenum (7), Nickel (7), Nitrate (7), Nitrite (7), pH (7), Selenium (7), Silver (7), Sodium (7), Sulfate (7), Total Coliforms (61), Total Dissolved Solids (TDS) (7), Total Hardness as CaCO3 (7), True Colour (7), Turbidity (7), Zinc (7)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Iodine	0
		Iron	70
		Turbidity	90
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (10), Antimony (10), Arsenic (10), Barium (10), Boron (10), Cadmium (10), Calcium (10), Chloride (10), Chromium (10), Copper (10), E.Coli (65), Fluoride (10), Iodide (8), Iodine (10), Iron (10), Lead (10), Magnesium (10), Manganese (10), Mercury (10), Molybdenum (10), Nickel (10), Nitrate (10), Nitrite (10), pH (17), Selenium (10), Silver (10), Sodium (10), Sulfate (10), Total Coliforms (65), Total Dissolved Solids (TDS) (10), Total Hardness as CaCO3 (10), True Colour (10), Turbidity (10), Zinc (10)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Iodine	73
		Iron	91
		Total Coliforms	99
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), E.Coli (72), Fluoride (11), Iodide (3), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (11), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Total Coliforms (72), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (11), Turbidity (11), Zinc (11)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	E. coli	95
		Iodine	67
		Iron	75
		Lead	83
		Total Coliforms	90
		Turbidity	92
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (78), Fluoride (12), Iodide (5), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (78), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
WATER SECURITY	Current Water Restrictions	Yes. No fixed sprinkler, no washing cars (Narrandera Shire Council SoE Report, 07-08).	
	Proportion of Potable Water Supplied to Households (%)	Unknown	
	Distance from the Coast (km)	~ 380km	
	Climate	Grassland (BoM, 2005)	
	Average Annual Rainfall	450mm (according to Council website)	
FACTOR		YES / NO	NOTES / EXPLANATION
	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October 2009).

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Single drinking water source	Yes	Council have attempted to provide multiple groundwater sources for drinking, but have had issues with bores collapsing and the water being high in iron and manganese.
		Poor quality water source	Yes	Iron content in one groundwater bore means it is now inoperable.
		Sewage overflow or disposal into water	No	No reports of sewer overflows.
		Flooding	No	
		Fauna defecating in supply	No	Drinking water source is groundwater bore.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Bore water is high in iron and manganese and is slightly corrosive (Council website and Narrandera Shire Council SoE Report, 07-08).
		Un-lined landfills	No	No reports of unlined landfills in the area.
		Extensive agriculture	Yes	Pig farming, flour mill and aquaculture identified in the Murray Regional Organisation of Councils SoE Report (07-08).
		Low vegetation cover (dust, sediment	Yes	
		Poor access to supply	Yes	
		Unsustainable water extraction	Yes	Current supply is not adequate. Council have attempted to access more groundwater but have not been successful.
		Aquifer turning saline due to high extraction	Yes	Reports of salinity issues in Narrandera. Water table only 3 metres under surface in some locations.
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	Yes	One of Council's operating bores collapsed.
		Significant water losses due to leaking	No	No report of water losses.
	Governance	High per capita water consumption	Unknown	Water consumption per capita unknown.
		Inappropriate water quality standards / objectives	No	Reports to NSW Health, who use ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	Yes	Groundwater bores have been installed and abandoned due to high levels of iron and manganese in supply.
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	Yes	Groundwater bores have been installed and abandoned due to high levels of iron and manganese in supply.
		Inadequate funding for maintenance or upgrades	Yes	Issues with groundwater bore have not yet been resolved.
	Industries	Mining / minerals	No	
		Irrigation	Yes	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	No report of seasonal population loadings.
		Rapid population growth	Yes	Average annual population growth between 2001 and 2006 = 4%, which is greater than the NSW average of 1.6% (ABS, 2009).
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	5% of samples were non-compliant for the 07-08 reporting period (NSW Health, 2009).
		Algal blooms	No	According to the Murray Regional Organisation of Councils SoE Report,
		Heavy metal contamination	Yes	See 07-08 water quality results (NSW Health, 2009).
		Poor chlorine residuals	Yes	Free chlorine not sampled.
		Pesticide contamination	No	Pesticides were not sampled for the reporting period.
		High suspended solids	No	
		Boil water notices	Yes	Boil water alert issued on the 27 March 2007.
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	Yes	High iron content in bore water.
		Other contamination that would affect health	Yes	Salinity issues in the area (Murray Regional Organisation of Councils SoE Report, 07-08).
Notes			According to the Council website, options are currently being investigated to improve water quality.	

Town # 35

TOWN	State/Territory	NSW	
	Town Name	Yamba	
	Town Population	4,700 (NSW Health, 2009); 5,514 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Clarence Valley Council	
	Council Web-Link	http://www.clarence.nsw.gov.au/cmst/cvc009/nova.asp	
	Rate ($/kL)	$2.30/kL	
	Per Capita Water Consumption (L/day)	Unknown.	
	Number of Connections	20560	
CATCHMENT AND WATER SUPPLY	Catchment	Northern Rivers	
	Sub-Catchment	Lower Clarence	
	Catchment Management Authority (CMA)	Northern Rivers	
	CMA Web-Link	http://www.northern.cma.nsw.gov.au/map_nrcma.php	
	Catchment Protection Status	Appears to be in or near a Wild Rivers Catchment.	
	Potable Water Source(s)	Nymboida River (watercourse)	
		Rushforth Reservoir (surface storage)	
	Supply Capacity	Rushforth Rd Reservoir	100ML
		Additional reservoir	32ML
		On 19th October 2009, Clarence Valley Council were supplying 341 ML/day, and consumption was 20.48ML (Clarence Valley Council website).	
WATER QUALITY	Treatment Plant(s)	None	
	Level of Treatment	Chloramination, Fluoridation: Raw water from Nymboida River is initially held in the 100 ML reservoir at Rushforth Rd, South Grafton, where algae are destroyed by electronic pulse emissions. Sediment is allowed to settle to the bottom, and water is taken from mid level of the 100ML reservoir to the 32 ML reservoir. Before the water enters the 32 ML reservoir it is disinfected with a mixture of chlorine and ammonia (chloramination). Fluoride is also added at this stage, at the rate of 1ppm. From the 32 ML reservoir the water is transferred into the trunk (pipe) system.	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
		NSW Health Monitoring Location: CV08-Lower Clarence	
	% compliance for water quality parameters achieving < 100%, 2003-2004	Aluminium	86
		E. coli	96
		Fluoride (daily WSA)	93
		Fluoride (weekly WSA)	90
		Fluoride Ratio	90
		Molybdenum	93
		pH	93
		Thermotolerant Coliforms	95
		Total Coliforms	5
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (14), Antimony (14), Arsenic (14), Barium (14), Boron (14), Cadmium (14), Calcium (14), Chloride (14), Chromium (14), Copper (14), Cyanide (14), E.Coli (303), Fluoride (14), Fluoride (daily WSA) (334), Fluoride (field result WSA) (10), Fluoride (weekly WSA) (92), Fluoride Ratio (10), Iodine (14), Iron (14), Lead (14), Magnesium (14), Manganese (14), Mercury (14), Molybdenum (14), Nickel (14), Nitrate (14), Nitrite (14), pH (14), Selenium (14), Silver (14), Sodium (14), Sulfate (14),Thermotolerant Coliforms (303), Total Coliforms (303), Total Dissolved Solids (TDS) (14), Total Hardness as CaCO3 (14), True Colour (6), Turbidity (14), Zinc (14)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	Aluminium	83
		E. coli	98
		Fluoride (daily WSA)	95
		Iron	92
		Thermotolerant Coliforms	98
		Total Coliforms	7
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), Cyanide (2), E.Coli (298), Fluoride (12), Fluoride (daily WSA) (361), Fluoride (field result WSA) (8), Fluoride (weekly WSA) (100), Fluoride Ratio (8), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Thermotolerant Coliforms (298), Total Coliforms (298), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	E. coli	98
		Fluoride (daily WSA)	92
		Fluoride (weekly WSA)	96
		Iron	92
		pH	85
		Thermotolerant Coliforms	99
		Total Coliforms	6
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (13), Antimony (13), Arsenic (13), Barium (13), Boron (13), Cadmium (13), Calcium (13), Chloride (13), Chromium (13), Copper (13), E.Coli (67), Fluoride (13), Fluoride (daily WSA) (361), Fluoride (field result WSA) (11), Fluoride (weekly WSA) (90), Fluoride Ratio (11), Iodine (13), Iron (13), Lead (13), Magnesium (13), Manganese (13), Mercury (13), Molybdenum (13), Nickel (13), Nitrate (13), Nitrite (13), pH (13), Selenium (13), Silver (13), Sodium (13), Sulfate (13), Thermotolerant Coliforms (284), Total Coliforms (298), Total Dissolved Solids (TDS) (13), Total Hardness as CaCO3 (13), True Colour (13), Turbidity (13), Zinc (13)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	E. coli	99
		Fluoride (daily WSA)	98
		Iron	64
		pH	91
		Thermotolerant Coliforms	99
		Total Coliforms	14
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), E.Coli (297), Fluoride (11), Fluoride (daily WSA) (296), Fluoride (field result WSA) (9), Fluoride (weekly WSA) (78), Fluoride Ratio (9), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (11), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Thermotolerant Coliforms (257), Total Coliforms (297), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (11), Turbidity (11), Zinc (11)	
	% compliance for water quality parameters	Fluoride (daily WSA)	98

		% compliance for water quality parameters achieving < 100%, 2007-2008	Iron	70
			Total Coliforms	11
		Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (10), Antimony (10), Arsenic (10), Barium (10), Boron (10), Cadmium (10), Calcium (10), Chloride (10), Chromium (10), Copper (10), E.Coli (295), Fluoride (10), Fluoride (daily WSA) (298), Fluoride (field result WSA) (8), Fluoride (weekly WSA) (78), Fluoride Ratio (8), Iodine (10), Iron (10), Lead (10), Magnesium (10), Manganese (10), Mercury (10), Molybdenum (10), Nickel (10), Nitrate (10), Nitrite (10), pH (10), Selenium (10), Silver (10), Sodium (10), Sulfate (10), Thermotolerant Coliforms (249), Total Coliforms (295), Total Dissolved Solids (TDS) (10), Total Hardness as CaCO3 (10), True Colour (10), Turbidity (10), Zinc (10)	
WATER SECURITY		Current Water Restrictions	Yes. The use of sprinklers and fixed hoses are banned permanently between 9.00am and 4.00pm every day.	
		Proportion of Potable Water Supplied to Households (%)	Unknown.	
		Distance from the Coast (km)	0km	
		Climate	Subtropical (BoM, 2005)	
		Average Annual Rainfall	1340mm (Source: BoM station number 58012, period 2004-2008)	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Classified as 'Satisfactory' according to NSW DPI Drought Map October
		Single drinking water source	Yes	
		Poor quality water source	Yes	Very high levels of faecal contamination.
		Sewage overflow or disposal into water source	Yes	High faecal contamination. Potentially due to sewer overflows.
		Flooding	Yes	History of flooding in this region.
		Fauna defecating in supply	Yes	
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Iron.
		Un-lined landfills	No	
		Extensive agriculture	Yes	
		Low vegetation cover (dust, sediment runoff)	No	
		Poor access to supply	No	
		Unsustainable water extraction	Yes	Environmental flows affected (Clarence Valley Council website).
		Aquifer turning saline due to high extraction	No	Not reported as an issue.
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	No	
		Significant water losses due to leaking	No	
	Governance	High per capita water consumption	No	
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health, who use ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	Unknown	
		Irrigation	Yes	
		Chemicals / process	Unknown	
	Population	Seasonal population loadings	Yes	Peak season occurs in Summer.
		Rapid population growth	No	Negative population growth between the 2001 and 2006 Census.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Total Coliform levels are very high, and some non-compliances for E.Coli.
		Algal blooms	No	None reported.
		Heavy metal contamination	No	
		Poor chlorine residuals	Yes	Free Chlorine not sampled.
		Pesticide contamination	No	
		High suspended solids	No	
		Boil water notices	No	No record of boil water notices in NSW Health summary spreadsheet.
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	Yes	Iron non-compliances.
		Other contamination that would affect	Yes	Very high contamination by faecal coliforms.
Notes			Council is currently undertaking major sewage augmentation, that will incorporate a major reuse component. Have constructed a Regional Water Supply Strategy with Coffs Harbour Council (see http://cvchrws.gov.com.au/).	

Town # 36

TOWN	State/Territory	NSW	
	Town Name	Bega	
	Town Population	4,250 (NSW Health, 2009); 4,537 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Bega Valley Shire Council	
	Council Web-Link	www.begavalley.nsw.gov.au	
	Rate ($/kL)	$2.10/kL	
	Per Capita Water Consumption (L/day)	Unknown. Residential water use = 1800ML/Yr for 07-08 reporting period.	
	Number of Connections	13,800	
CATCHMENT AND WATER SUPPLY	Catchment	Southern Rivers	
	Sub-Catchment	Bega River	
	Catchment Management Authority (CMA)	Southern Rivers	
	CMA Web-Link	http://www.southern.cma.nsw.gov.au/	
	Catchment Protection Status	None	
	Potable Water Source(s)	Bega Bores (groundwater)	
	Supply Capacity	Unknown. ~ 3300ML of reticulated water was consumed in the shire for the 07-08 reporting period.	
WATER QUALITY	Treatment Plant(s)	None	
	Level of Treatment	Chlorination, fluoridation.	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
	NSW Health Monitoring Location:		
	% compliance for water quality parameters achieving < 100%, 2003-2004	Fluoride (daily WSA)	57
		Fluoride Ratio	71
		Total Coliforms	98
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), Cyanide (12), E.Coli (91), Fluoride (12), Fluoride (daily WSA) (327), Fluoride (field result WSA) (7), Fluoride Ratio (7), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (91), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (5), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	Fluoride (daily WSA)	80
		Fluoride Ratio	82
		Total Coliforms	99
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), Cyanide (2), E.Coli (89), Fluoride (12), Fluoride (daily WSA) (339), Fluoride (field result WSA) (11), Fluoride Ratio (11), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (89), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Fluoride (daily WSA)	76
		Fluoride Ratio	89
		Total Coliforms	99
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), E.Coli (88), Fluoride (11), Fluoride (daily WSA) (339), Fluoride (field result WSA) (9), Fluoride Ratio (9), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (11), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Total Coliforms (72), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (11), Turbidity (11), Zinc (11)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Fluoride (daily WSA)	79
		Fluoride (weekly WSA)	80
		Total Coliforms	97
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (10), Antimony (10), Arsenic (10), Barium (10), Boron (10), Cadmium (10), Calcium (10), Chloride (10), Chromium (10), Copper (10), E.Coli (98), Fluoride (10), Fluoride (daily WSA) (343), Fluoride (field result WSA) (7), Fluoride (weekly WSA) (109), Fluoride Ratio (7), Iodine (10), Iron (10), Lead (10), Magnesium (10), Manganese (10), Mercury (10), Molybdenum (10), Nickel (10), Nitrate (10), Nitrite (10), pH (17), Selenium (10), Silver (10), Sodium (10), Sulfate (10), Total Coliforms (98), Total Dissolved Solids (TDS) (10), Total Hardness as CaCO3 (10), True Colour (10), Turbidity (10), Zinc (10)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	Fluoride (daily WSA)	62
		Fluoride (weekly WSA)	52
		Fluoride Ratio	89
		Iron	92
		Total Coliforms	99
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (114), Fluoride (12), Fluoride (daily WSA) (333), Fluoride (field result WSA) (9), Fluoride (weekly WSA) (85), Fluoride Ratio (9), Free Chlorine (1), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (114), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
WATER SECURITY	Current Water Restrictions	No domestic water restrictions advertised on the Council website, but irrigation water allocation was zero from July - September 2009.	
	Proportion of Potable Water Supplied to Households (%)	60%	
	Distance from the Coast (km)	~ 29km	
	Climate	Temperate	
	Average Annual Rainfall	608mm (Source: BoM station number 69139, period 2004-2008)	

FACTOR		YES / NO	NOTES / EXPLANATION
SE) and Water Supply	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October
	Single drinking water source	Yes	
	Poor quality water source	No	Good compliance even though only using disinfection and fluoridation.
	Sewage overflow or disposal into water	Yes	Estimated volume accidentally discharged in the 07-08 reporting period =
	Flooding	Yes	Occasional flooding in the region.
	Fauna defecating in supply	No	Groundwater source.
	Fauna destroying water intake structures	No	
	Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Iron.
	Un-lined landfills		
	Extensive agriculture	Yes	Strong dairy and beef cattle industry.

WATER QUALITY OR SECURITY RISK (CAUS	Catchment a	Low vegetation cover (dust, sediment runoff)	No	Extensive clearing for agriculture in the local Bega area, but good ground cover with grasses and crops.
		Poor access to supply	No	
		Unsustainable water extraction	No	No water restrictions.
		Aquifer turning saline due to high extraction	No	No issues with salt detected in the water quality testing.
		Hard water	No	Compliant with hardness.
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking	Unknown	
	Governance	High per capita water consumption	Unknown	
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health who use ADWG.
		Lack of infrastructure maintenance	No	Council are active in maintenance and gaining funding for upgrades.
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals		
		Irrigation	Yes	
		Chemicals / process	No	
	Population	Seasonal population loadings	Yes	Large tourism industry.
		Rapid population growth	No	Average yearly population growth = 0.50% in comparison to the state average of 1.6% for the same period (2001-2006) (ABS, 2009).
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	No	
		Algal blooms	No	
		Heavy metal contamination	No	
		Poor chlorine residuals	No	Only one test completed.
		Pesticide contamination	Unknown	
		High suspended solids	No	Compliant for this parameter.
		Boil water notices	No	
		Deaths or illness due to water quality		
		Water restrictions (current and historic)	Yes	Historic water restrictions. Recent restrictions on irrigation allocations.
		Taste and odour issues	Yes	Taste issues.
		Other contamination that would affect health		
Notes				

Town # 37

TOWN	State/Territory	NSW	
	Town Name	Bundanoon	
	Town Population	2,228 (NSW Health, 2009); 2,035 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Wingecarribee Shire Council	
	Council Web-Link	http://www.wsc.nsw.gov.au	
	Rate ($/kL)	$2.05/kL	
	Per Capita Water Consumption (L/day)	Unknown. 5,273ML used for residential consumption, Wingecarribee Shire Council SoE Report, 07-08.	
	Number of Connections	17,870	
CATCHMENT AND WATER SUPPLY	Catchment	Southern Rivers	
	Sub-Catchment	Shoalhaven	
	Catchment Management Authority (CMA)	Southern Rivers	
	CMA Web-Link	http://www.southern.cma.nsw.gov.au/	
	Catchment Protection Status	None	
	Potable Water Source(s)	Bundanoon Creek Dam (surface storage)	
	Supply Capacity	Unknown	
WATER QUALITY	Treatment Plant(s)	Yes	
	Level of Treatment	Flocculation, coagulation, filtration, dissolved air flotation,	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
	NSW Health Monitoring Location: WI03-Bundanoon		
	% compliance for water quality parameters achieving < 100%, 2003-2004	E. coli	99
		Fluoride (daily WSA)	81
		Fluoride (weekly WSA)	69
		Fluoride Ratio	60
		Total Coliforms	86
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), Cyanide (4), E.Coli (276), Fluoride (12), Fluoride (daily WSA) (367), Fluoride (field result WSA) (10), Fluoride (weekly WSA) (48), Fluoride Ratio (10), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (276), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	Aluminium	92
		E. coli	99
		Fluoride (daily WSA)	77
		Fluoride (weekly WSA)	61
		Fluoride Ratio	67
		Total Coliforms	86
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), Cyanide (2), E.Coli (271), Fluoride (12), Fluoride (daily WSA) (367), Fluoride (field result WSA) (12), Fluoride (weekly WSA) (46), Fluoride Ratio (12), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (271), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Aluminium	92
		Fluoride (daily WSA)	73
		Fluoride (weekly WSA)	73
		Fluoride Ratio	82
		pH	77
		Total Coliforms	87
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (13), Antimony (13), Arsenic (13), Barium (13), Boron (13), Cadmium (13), Calcium (13), Chloride (13), Chromium (13), Copper (13), E.Coli (267), Fluoride (13), Fluoride (daily WSA) (364), Fluoride (field result WSA) (11), Fluoride (weekly WSA) (66), Fluoride Ratio (11), Iodine (13), Iron (13), Lead (13), Magnesium (13), Manganese (13), Mercury (13), Molybdenum (13), Nickel (13), Nitrate (13), Nitrite (13), pH (13), Selenium (13), Silver (13), Sodium (13), Sulfate (13), Total Coliforms (267), Total Dissolved Solids (TDS) (13), Total Hardness as CaCO3 (13), True Colour (13), Turbidity (13), Zinc (13)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	Fluoride (daily WSA)	74
		Fluoride (weekly WSA)	76
		Fluoride Ratio	91
		pH	91
		Total Coliforms	91
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), E.Coli (280), Fluoride (11), Fluoride (daily WSA) (365), Fluoride (field result WSA) (11), Fluoride (weekly WSA) (75), Fluoride Ratio (11), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (11), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Total Coliforms (280), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (11), Turbidity (11),	
	% compliance for water quality parameters achieving < 100%, 2007-2008	Fluoride (daily WSA)	78
		Fluoride (weekly WSA)	50
		Fluoride Ratio	71
		pH	83
		Total Coliforms	93
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (281), Fluoride (12), Fluoride (daily WSA) (230), Fluoride (field result WSA) (10), Fluoride (weekly WSA) (54), Fluoride Ratio (7), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (281), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
R SECURITY	Current Water Restrictions	Yes. Level 1. Hand held hoses on the garden at any time of the day or night. Hosing of hard surfaces like paths, driveways, paved areas and houses is banned. Cars can be washed anytime with a bucket, then hosed off with a hand held hose fitted with a trigger nozzle. Fixed hoses and sprinklers may be used at any time during the months of April to October inclusive. Fixed hoses and sprinklers can be used in the morning from 7am to 10am and at night from 6pm to 9pm on any day during the months of November to March inclusive. Drip irrigation systems can be used at any time.	

WATER		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	~ 50km	
		Climate	Temperate	
		Average Annual Rainfall	972mm (Source: BoM station number 68100, period 2004-2008)	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October 2009.
		Single drinking water source	Yes	
		Poor quality water source		
		Sewage overflow or disposal into water		
		Flooding		
		Fauna defecating in supply	Yes	Open water source. Faecal coliform bacteria levels are high, and increase dramatically with rain events. Dry weather sources are probably direct faecal contamination by unfenced stock (Wingecarribee Shire Council SoE Report 07-08).
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	Yes	Incidences of illegal dumping are high in the shire.
		Extensive agriculture		
		Low vegetation cover (dust, sediment		
		Poor access to supply	No	
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water	No	Compliant for hardness.
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health, who use ADWG.
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades	No	Council has ~$100,000 water fund surplus for the 07-08 period.
	Industries	Mining / minerals	Yes	26 quarries and 2 coal mines operate in the Wingecarribee Shire.
		Irrigation	Yes	
		Chemicals / process		
	Population	Seasonal population loadings		
		Rapid population growth		
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Faecal coliform bacteria levels are high, and increase dramatically with rain events. Dry weather sources are probably direct faecal contamination by unfenced stock (Wingecarribee Shire Council SoE Report 07-08).
		Algal blooms		Nutrient levels (P&N) routinely exceed guideline values in many locations (Wingecarribee Shire Council SoE Report, 07-08).
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		High suspended solids	Yes	Turbidity levels are high, and correlate with soil and bank erosion, level of development and impervious surfaces (Wingecarribee Shire Council SoE Report, 07-08).
		Boil water notices		
		Deaths or illness due to water quality		
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect		
Notes				

Town # 38

TOWN	State/Territory	NSW		
	Town Name	Tenterfield		
	Town Population	3300 (NSW Health, 2009); 2,035 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Tenterfield Shire Council		
	Council Web-Link	http://www.tenterfield.nsw.gov.au/		
	Rate ($/kL)	$1.45/kL (domestic supply for 08/09 period, Tenterfield Shire Council Annual Report, 07-08) and $3.30/kL for bulk water purchases (Tenterfield Revenue Policy, 07-08)		
	Per Capita Water Consumption (L/day)	148L/day. Based on 54.08kL/person/yr (Tenterfield SoE Report, 07-08) and 2006 Census population statistics. Water use in the Tenterfield Shire = 369,563kL for the 07-08 reporting period (Tenterfield SoE Report, 07-08).		
	Number of Connections	1780		
CATCHMENT AND WATER SUPPLY	Catchment	Border Rivers - Gwydir		
	Sub-Catchment	Border Rivers		
	Catchment Management Authority (CMA)	Border Rivers - Gwydir		
	CMA Web-Link	http://brg.cma.nsw.gov.au/index.php?page=home_page		
	Catchment Protection Status	None.		
	Potable Water Source(s)	Tenterfield Creek Dam (dam on watercourse) (NSW Health)		
		Shirley Park Bore (Tenterfield Shire Council Annual Report, 07-08)		
	Supply Capacity	Tenterfield Creek Dam total storage = 1300ML (Tenterfield Shire Council Annual Report, 07-		
		Shirley Park Bore = licensed annual yield 160ML (Tenterfield Shire Council Annual Report, 07-		
WATER QUALITY	Treatment Plant(s)	Yes. Water Treatment Plant. Average weekly production 6.6ML.		
	Level of Treatment	Tertiary		
	Treatment Process	Filtration, coagulation, sedimentation, powdered activated carbon, soda ash, chlorination (NSW Health, 2009).		
	Drinking Water Guidelines	ADWG 2004 (NSW Health)		
		NSW Health Monitoring Location: TF01-Tenterfield		
	% compliance for water quality parameters achieving < 100%, 2003-2004	Total Coliforms	43	
	Parameter(s) tested and number of samples ( ) 2003-2004	E.Coli (30), Thermotolerant Coliforms (30), Total Coliforms (30)		
	% compliance for water quality parameters achieving < 100%, 2004-2005	Total Coliforms	53	
	Parameter(s) tested and number of samples ( ) 2004-2005	E.Coli (36), Thermotolerant Colifrms (36), Total Coliforms (36)		
	% compliance for water quality parameters achieving < 100%, 2005-2006	Total Coliforms	82	
	Parameter(s) tested and number of samples ( ) 2005-2006	E.Coli (33), Thermotolerant Colifrms (33), Total Coliforms (33)		
	% compliance for water quality parameters achieving < 100%, 2006-2007	Lead	50	
		Total Coliforms	98	
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (1), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (1), Chloride (1), Chromium (2), Copper (2), Cyanide (1), E.Coli (42), Fluoride (2), Iodide (1), Iodine (1), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Thermotolerant Coliforms (42), Total Coliforms (42), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (1), Turbidity (2), Zinc (1)		
	% compliance for water quality parameters achieving < 100%, 2007-2008	Total Coliforms	86	
	Parameter(s) tested and number of samples ( ) 2007-2008	E.Coli (36), Thermotolerant Coliforms (27), Total Coliforms (36)		
WATER SECURITY	Current Water Restrictions	Yes. Level 1 water restrictions. Fixed hoses/sprinklers 2 hrs/day between 530 and 730pm daily. Micro-sprays/garden watering systems 2 hrs/day between 530 and 730pm daily.		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	~ 130km		
	Climate	Temperate		
	Average Annual Rainfall	850mm (Tenterfield SoE Report, 07-08)		
FACTOR		YES / NO	NOTES / EXPLANATION	
RITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Classified as 'Satisfactory/Marginal' according to NSW DPI Drought Map October 2009.
		Single drinking water source	Yes	
		Poor quality water source	Yes	
		Sewage overflow or disposal into water source	Yes	Tenterfield STP was constructed for 2000EP and was processing approximately 3500EP until recently (~2008). The STP was found to be non-compliant with its environment protection license, as the effluent had non-compliant pH and Total Suspended Solids levels. Effluent is discharged to Tenterfield Creek. A new STP is currently being constructed (IDAL technology is being used).
		Flooding	Yes	Severe flooding in January 2008 (Tenterfield Shire Council Annual Report, 07-08).
		Fauna defecating in supply	Yes	Drinking water source is river water.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unlikely that lead is naturally occurring in the drinking water.
		Un-lined landfills	Yes	No reports of unlined landfills but illegal dumping is an ongoing issue in the Shire (Tenterfield Shire Council Annual Report, 07-08).
		Extensive agriculture	Yes	Vegetable production. Sheep and cattle grazing. Rapid expansion of timber plantations on private land since 2002. (Tenterfield Shire Council Annual Report, 07-08).
		Low vegetation cover (dust, sediment runoff)	Yes	Council receives complaints regarding dust (from unsealed roads and cleared land) however no complaints were received for the 07-08 reporting period.
		Poor access to supply	No	
		Unsustainable water extraction	Yes	Water restrictions in place.
		Aquifer turning saline due to high extraction	No	No reports of salinity issues for the area.

WATER QUALITY OR SECU		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	Yes	Dam built in 1930 and upgraded in 1974. Water treatment plant built in 1930 and upgraded in 1958 and 1985.
		Significant water losses due to leaking pipes	Yes	Council is one of 34 Water Supply Authorities in NSW that has secured funding from the Federal Government for the investigation and implementation of a Water Loss Reduction Program. Stage 1 of the works, involving the investigation of the Tenterfield Water reticulation system and reservoirs for water losses due to leaks, etc has been completed by a consultant. The results indicate that further investigation is required to ascertain the extent and location of the water loss within Tenterfield . This work will be undertaken in 2008/09 by a contractor. (Tenterfield Annual Report, 07-08).
	Governance	High per capita water consumption	No	Lower than Aus average of 285L/day.
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health who use ADWG.
		Lack of infrastructure maintenance	No	Council have undertaken infrastructure upgrades as required and are currently awaiting the completion of a new sewage treatment plant (Tenterfield Shire Council Annual Report, 07-08).
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	Yes	Council's planned upgrades were delayed (installation of fluoridation unit and sewage treatment plant upgrades) due to inadequate funding.
	Industries	Mining / minerals	No	
		Irrigation	Yes	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	Negative population growth between the 2001 and 2006 Census.
		Rapid population growth	No	Population growth was negative (approximately 7% change) for the period between the 2001 and 2006 Census.
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Some issues with Total Coliforms.
		Algal blooms	No	None reported.
		Heavy metal contamination	Yes	Non-compliance issues for lead (see above).
		Poor chlorine residuals	Yes	Free Chlorine is not measured.
		Pesticide contamination	No	
		High suspended solids	No	
		Boil water notices	No	
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	No	
		Other contamination that would affect	No	
Notes			Council received higher than normal dirty water complaints between January and March 2008. Council has planned a program of scour to rectify the issue (Tenterfield Shire Council Annual Report, 07-08).	

Town # 39

TOWN	State/Territory	NSW	
	Town Name	Corowa	
	Town Population	5,500 (NSW Health, 2009); 5,628 (Census 2006, (Corowa Part) Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Corowa Shire Council	
	Council Web-Link	http://www.corowa.nsw.gov.au/	
	Rate ($/kL)	Unknown.	
	Per Capita Water Consumption (L/day)	Unknown. Average annual water use per household = 220kL.	
	Number of Connections	4800	
CATCHMENT AND WATER SUPPLY	Catchment	Murray River	
	Sub-Catchment	-	
	Catchment Management Authority (CMA)	Murray River	
	CMA Web-Link	http://www.murray.cma.nsw.gov.au/	
	Catchment Protection Status	None.	
	Potable Water Source(s)	Murray River (watercourse)	
	Supply Capacity	Unknown	
WATER QUALITY	Treatment Plant(s)	Yes. Mulwala Filtration Plant, Gulai Road, Mulwala	
	Level of Treatment	Dissolved Air Flotation, Coagulation, Chlorination	
	Drinking Water Guidelines	ADWG 2004 (NSW Health)	
	NSW Health Monitoring Location: CW01-Corowa		
	% compliance for water quality parameters achieving < 100%, 2003-2004	pH	75
		Total Coliforms	98
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), Cyanide (12), E.Coli (47), Fluoride (12), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (47), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (5), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2004-2005	pH	83
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), Cyanide (2), E.Coli (51), Fluoride (12), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (51), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2005-2006	Fluoride (daily WSA)	86
		Fluoride (weekly WSA)	67
		pH	75
		Total Coliforms	96
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (49), Fluoride (12), Fluoride (daily WSA) (22), Fluoride (field result WSA) (1), Fluoride (weekly WSA) (6), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (49), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	pH	64
		Total Coliforms	96
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (11), Antimony (11), Arsenic (11), Barium (11), Boron (11), Cadmium (11), Calcium (11), Chloride (11), Chromium (11), Copper (11), E.Coli (45), Fluoride (11), Iodine (11), Iron (11), Lead (11), Magnesium (11), Manganese (11), Mercury (11), Molybdenum (11), Nickel (11), Nitrate (11), Nitrite (11), pH (11), Selenium (11), Silver (11), Sodium (11), Sulfate (11), Total Coliforms (45), Total Dissolved Solids (TDS) (11), Total Hardness as CaCO3 (11), True Colour (11), Turbidity (11), Zinc (11)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	Aluminium	92
		pH	67
		Total Coliforms	98
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (12), Antimony (12), Arsenic (12), Barium (12), Boron (12), Cadmium (12), Calcium (12), Chloride (12), Chromium (12), Copper (12), E.Coli (50), Fluoride (12), Iodine (12), Iron (12), Lead (12), Magnesium (12), Manganese (12), Mercury (12), Molybdenum (12), Nickel (12), Nitrate (12), Nitrite (12), pH (12), Selenium (12), Silver (12), Sodium (12), Sulfate (12), Total Coliforms (50), Total Dissolved Solids (TDS) (12), Total Hardness as CaCO3 (12), True Colour (12), Turbidity (12), Zinc (12)	
WATER SECURITY	Current Water Restrictions	Yes. Stage 3A water restrictions. 4 hours of garden watering per week (7.00am – 8.00am and 6.00pm – 7.00pm, 2 days per week); odd numbered houses Tuesday and Saturday; even numbered houses Wednesday and Sunday; no lawn watering allowed; car washing with hand held hose with trigger nozzle allowed on lawn any time.	
	Proportion of Potable Water Supplied to Households (%)	Unknown.	
	Distance from the Coast (km)	~ 340km	
	Climate	Temperate	
	Average Annual Rainfall	455mm (Source: BoM station number 69139, period 2004-2008)	
FACTOR		YES / NO	NOTES / EXPLANATION
Water Supply	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October 2009.
	Single drinking water source	Yes	
	Poor quality water source	Yes	Aluminium in supply, (NSW Health, 07-08 reporting period).
	Sewage overflow or disposal into water source	Yes	Effluent discharges from the Mulwala Sewage Treatment Works that exceeded the environment protection license standards (Murray Regional Organisation of Councils Annual Report, 07-08).
	Flooding	No	
	Fauna defecating in supply	Yes	Water supply is Murray River, which is likely to experience high wildlife activity.
	Fauna destroying water intake structures	No	
	Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Aluminium (07-08).
	Un-lined landfills	No	No reports of unlined landfills.

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment ar	Extensive agriculture	Yes	Sheep, cattle and pig meat industries. Piggery feedlot and abattoir in the area.
		Low vegetation cover (dust, sediment runoff)	Yes	
		Poor access to supply	No	
		Unsustainable water extraction	Yes	Stage 3A water restrictions.
		Aquifer turning saline due to high extraction	Yes	Salinity is a reported issue.
		Hard water	No	Hardness levels are historically compliant.
		Aging or inadequate pipe work and associated infrastructure	No	Water filtration plant in use.
		Significant water losses due to leaking pipes	No	No indication of water losses.
	Governance	High per capita water consumption	No	Unknown per capita water consumption.
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health, who use ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	Yes	Sand and gravel extraction. Concrete production.
		Irrigation	Yes	Irrigation for meat industries.
		Chemicals / process	Yes	Munitions production - dangerous goods, explosives, general chemicals storage, non-thermal treatment of hazardous and other waste, thermal treatment of hazardous waste (Thales Australia Limited). Thales Australia issued with a cleanup notice under their environment protection license.
	Populatio n	Seasonal population loadings	No	Tourism is a growing industry.
		Rapid population growth	No	Population growth = 1.1% between 2001 and 2006 Census, which is less than NSW population growth of 1.6% (ABS, 2009).
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Total coliforms.
		Algal blooms	Yes	Incidence of blue-green algae outbreak (lasting 6 months) reported for Corowa in the Murray Regional Organisation of Councils SoE Report, 07-08.
		Heavy metal contamination	Yes	
		Poor chlorine residuals	Yes	Free chlorine is not measured.
		Pesticide contamination	No	No reports of pesticide contamination.
		High suspended solids	No	
		Boil water notices	No	No reported boil water notices.
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	Yes	Stage 3A water restrictions.
		Taste and odour issues	No	
		Other contamination that would affect health	Yes	Salinity and acid sulfate soils reported to affect the Corowa Shire as reported in the Murray Regional Organisation of Councils SoE Report, 07-08.
Notes				

Town # 40

TOWN	State/Territory	NSW	
	Town Name	Jindabyne East	
	Town Population	2095 (NSW Health)	
WATER UTILITY	Name of Water Utility	Snowy River Shire Council	
	Council Web-Link	http://www.snowyriver.nsw.gov.au/content/Public/Homepage.aspx	
	Rate ($/kL)	$1.61/kL	
	Per Capita Water Consumption (L/day)	Unknown	
	Number of Connections	3,900 (for Snowy River Shire Council system), DWE Annual Performance Report 07-08.	
CATCHMENT AND WATER SUPPLY	Catchment	Southern Rivers	
	Sub-Catchment	-	
	Catchment Management Authority (CMA)	Southern Rivers	
	CMA Web-Link	www.southern.cma.nsw.gov.au	
	Catchment Protection Status	None. Some of the upstream area is the Snowy Mountains National Park.	
	Potable Water Source(s)	Lake Jindabyne (surface storage)	
	Supply Capacity	9ML/day; 217ML treated to potable in 07-08.	
WATER QUALITY	Treatment Plant(s)	No	
	Level of Treatment	Chlorination, fluoridation.	
	Drinking Water Guidelines	ADWG (Council reports to NSW Health)	
	NSW Health Monitoring Location: Supply System SR02		
	% compliance for water quality parameters achieving < 100%, 2003-2004	E. coli	96
		pH	50
		Total Coliforms	61
	Parameter(s) tested and number of samples ( ) 2003-2004	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), Cyanide (2), E.Coli (49), Fluoride (12), Fluoride (daily WSA) (365), Fluoride (weekly WSA) (108), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (49), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (1),	
	% compliance for water quality parameters achieving < 100%, 2004-2005	E. coli	98
		Fluoride (daily WSA)	92
		Fluoride (weekly WS	84
		Total Coliforms	84
	Parameter(s) tested and number of samples ( ) 2004-2005	Aluminium (1), Antimony (1), Arsenic (1), Barium (1), Boron (1), Cadmium (1), Calcium (1), Chloride (1), Chromium (1), Copper (1), E.Coli (50), Fluoride (0), Fluoride (daily WSA) (365), Fluoride (weekly WSA) (108), Iodine (1), Iron (1), Lead (1), Magnesium (1), Manganese (1), Mercury (1), Molybdenum (1), Nickel (1), Nitrate (1), Nitrite (1), pH (1), Selenium (1), Silver (1), Sodium (1), Sulfate (1), Total Coliforms (50), Total Dissolved Solids (TDS) (1), Total Hardness as CaCO3 (1), True Colour (1), Turbidity	
	% compliance for water quality parameters achieving < 100%, 2005-2006	E. coli	98
		Fluoride (daily WSA)	62
		Fluoride (weekly WS	59
		Fluoride Ratio	25
		pH	50
		Total Coliforms	92
		Turbidity	50
	Parameter(s) tested and number of samples ( ) 2005-2006	Aluminium (2), Antimony (2), Arsenic (2), Barium (2), Boron (2), Cadmium (2), Calcium (2), Chloride (2), Chromium (2), Copper (2), E.Coli (51), Fluoride (12), Fluoride (daily WSA) (223), Fluoride (field result WSA) (5), Fluoride (weekly WSA) (39), Fluoride Ratio (4), Iodine (2), Iron (2), Lead (2), Magnesium (2), Manganese (2), Mercury (2), Molybdenum (2), Nickel (2), Nitrate (2), Nitrite (2), pH (2), Selenium (2), Silver (2), Sodium (2), Sulfate (2), Total Coliforms (51), Total Dissolved Solids (TDS) (2), Total Hardness as CaCO3 (2), True Colour (2), Turbidity (2), Zinc (2)	
	% compliance for water quality parameters achieving < 100%, 2006-2007	E. coli	96
		Fluoride (daily WSA)	69
		Fluoride (weekly WS	64
		Fluoride Ratio	73
		pH	67
		Total Coliforms	79
	Parameter(s) tested and number of samples ( ) 2006-2007	Aluminium (3), Antimony (3), Arsenic (3), Barium (3), Boron (3), Cadmium (3), Calcium (3), Chloride (3), Chromium (3), Copper (3), E.Coli (53), Fluoride (11), Fluoride (daily WSA) (359), Fluoride (field result WSA) (11), Fluoride (weekly WSA) (47), Fluoride Ratio (11), Iodine (3), Iron (3), Lead (3), Magnesium (3), Manganese (3), Mercury (3), Molybdenum (3), Nickel (3), Nitrate (3), Nitrite (3), pH (3), Selenium (3), Silver (3), Sodium (3), Sulfate (3), Total Coliforms (53), Total Dissolved Solids (TDS) (3), Total Hardness as CaCO3 (3), True Colour (3), Turbidity (3), Zinc (3)	
	% compliance for water quality parameters achieving < 100%, 2007-2008	E. coli	96
		Fluoride (daily WSA)	75
		Fluoride (field result '	91
		Fluoride (weekly WS	63
		Fluoride Ratio	60
		pH	67
		Total Coliforms	90
	Parameter(s) tested and number of samples ( ) 2007-2008	Aluminium (3), Antimony (3), Arsenic (3), Barium (3), Boron (3), Cadmium (3), Calcium (3), Chloride (3), Chromium (3), Copper (3), E.Coli (52), Fluoride (12), Fluoride (daily WSA) (283), Fluoride (field result WSA) (11), Fluoride (weekly WSA) (43), Fluoride Ratio (10), Iodine (3), Iron (3), Lead (3), Magnesium (3), Manganese (3), Mercury (3), Molybdenum (3), Nickel (3), Nitrate (3), Nitrite (3), pH (3), Selenium (3), Silver (3), Sodium (3), Sulfate (3), Total Coliforms (52), Total Dissolved Solids (TDS) (3), Total Hardness as CaCO3 (3), True Colour (3), Turbidity (3), Zinc (3)	
	Current Water Restrictions	No	

WATER SECURITY		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	130km	
		Climate	Sub-alpine (Southern Rivers CMA, 2009)	
		Average Annual Rainfall	534mm (Source: BoM station number 071021 Jindabyne (Lynwood), period 2004-2008)	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Classified as 'In Drought' according to NSW DPI Drought Map October 2009.
		Single drinking water source	Yes	
		Poor quality water source	No	Alpine region, lake/surface water supply.
		Sewage overflow or disposal into water	Yes	Media reports to suggest sewer overflow into supply.
		Flooding	No	
		Fauna defecating in supply	Yes	Surface water storage.
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Compliance with natural mineral pollutants is good.
		Un-lined landfills		
		Extensive agriculture	No	
		Low vegetation cover (dust, sediment	No	
		Poor access to supply	No	
		Unsustainable water extraction	Yes	Visible draw down in the lake.
		Aquifer turning saline due to high		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure	No	Last augmented/upgraded in 2007 (DWE, 07-08)
		Significant water losses due to leaking		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	No	Council reports to NSW Health who use ADWG.
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	No	
		Irrigation	No	
		Chemicals / process	No	
	Population	Seasonal population loadings	Yes	Alpine region. Highly seasonal- winter peak.
		Rapid population growth	No	1.1% (Regional SoE Report)
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	Yes	Ecoli non-compliances.
		Algal blooms	No	None recorded on the DWE website as of 16th November 2009.
		Heavy metal contamination	No	No record of heavy metals in water quality results.
		Poor chlorine residuals		Free chlorine not tested.
		Pesticide contamination		Pesticides not tested.
		High suspended solids	No	Compliant for these parameters.
		Boil water notices	Yes	2009 alert recorded on NSW Health database.
		Deaths or illness due to water quality	Yes	Illnesses reported in the media due to contaminated drinking water.
		Water restrictions (current and historic)	No	No current water restrictions.
		Taste and odour issues		
		Other contamination that would affect health	No	
Notes				

AECOM

Town Profiles – VIC

Review of Regional Water Quality & Security

Appendices
Volume 2

Town # 41

TOWN		State/Territory	VIC	
		Town Name	Daylesford	
		Town Population	3,073 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Central Highlands Water	
		Rate ($/kL)	Tier 1 $1.30/kL, Tier 2 $1.57/kL, Tier 3 $1.96/kL	
		Per Capita Water Consumption (L/day)	435L/capita/day - under Stage 2 restrictions, 598L/capita/day - current unrestricted demand	
		Number of Connections	2,589	
CATCHMENT AND WATER SUPPLY		Catchment	Cairn Curran - Proclaimed Water Supply Catchment	
		Sub-Catchment	River Basin - Upper Loddon	
		Catchment Management Authority (CMA)	North Central Catchment Management Authority	
		CMA Web-Link	www.nccma.vic.gov.au/	
		Catchment Protection Status	Proclaimed Water Supply Catchment, good condition	
		Potable Water Source(s)	Wombat Reservoir - 568ML	
			Bullarto Reservoir - 219ML	
			Hepburn Reservoir - 35ML	
			Wallaby Creek (drought relief only)	
		Supply Capacity	Combined Annual Entitlement - up to 916 ML in any year	
			Wombat Reservoir Entitlement - < 5 ML per day	
			Bullarto Reservoir Entitlement - < 2 ML per day	
			Hepburn Reservoir Entitlement - < 0.5ML per day	
			Wallaby Creek Entitlement - < 0.4ML per day	
WATER QUALITY		Treatment Plant(s)	Daylesford WTP	
		Level of Treatment	Dissolved Air Flotation and Filtration (DAFF) plant with disinfection by chlorine	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for the 07-08 reporting period)	E. Coli	Complied (100%)
			Heavy Metals	100%
			pH	Complied (based on overall average)
WATER SECURITY		Current Water Restrictions	Yes Stage 2 - Started 17/12/06 For details refer to: http://www.ourwater.vic.gov.au/saving/restrictions	
		Proportion of Potable Water Supplied to Households (%)	Residential - 51% Industrial - 22% Concessional - 6% Non Revenue - 21%	
		Distance from the Coast (km)	Approx 100km South	
		Climate	Temperate	
		Average Annual Rainfall	579.5mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	NO	
		Poor quality water source	NO	
		Sewage overflow or disposal into water	NO	
		Flooding		
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption	NO	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel	?	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings		
		Rapid population growth	NO	Decline in Population between 2001 and 2006
OR SECURITY RISK FFECT)		Bacteriological and / or viral contamination	YES	Detection of E. coli in basin
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	NO	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 2 - Started 17/12/06
		Taste and odour issues	NO	

WATER QUALITY (EF	Other contamination that would affect health	YES	Sodium bisulfite entered water supply due to mislabelled chemical. Central Highlands Water advised that, in relation to the sodium bisulfite incident at the Daylesford treatment plant, the issue was due to mislabelled water treatment chemical being delivered to the treatment plant. The product was relabelled from the chemical manufacturer to the chemical distributor. Although a small amount of the product was dosed into the drinking water, no health risk was evident. The incident had prompted corrective action by the chemical distributor, to no longer rename and relabel the product.
Notes		Using long term historical inflow averages, the current likelihood of water restrictions in the Daylesford system is approximately 1 in 7 years (86% reliability of supply). While using a continued low inflow scenario water restrictions are likely to occur approximately 1 in every 4 years (74% reliability of supply).	

Town # 42

TOWN		State/Territory	VIC	
		Town Name	Maryborough	
		Town Population	7,692 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Central Highlands Water	
		Rate ($/kL)	Tier 1 $1.30/kL, Tier 2 $1.57/kL, Tier 3 $1.96/kL	
		Per Capita Water Consumption (L/day)	398L/day - under stage 2 restrictions, 586L/day - current unrestricted demand	
		Number of Connections	5,400	
CATCHMENT AND WATER SUPPLY		Catchment	Loddon River (Laanecoorie) - Proclaimed Water Supply Catchment	
		Sub-Catchment	River Basin - Upper Loddon	
		Catchment Management Authority (CMA)	North Central Catchment Management Authority	
		CMA Web-Link	www.nccma.vic.gov.au/	
		Catchment Protection Status	Proclaimed Water Supply Catchment, Poor to Moderate condition.	
		Potable Water Source(s)	Evansford - 1351ML	
			Talbot Reservoir - 846ML	
			Tullaroop Reservoir - 1200ML	
			Centenary Reservoir - 180ML	
		Supply Capacity	Combined Annual Entitlement - Up to 300 ML in any year	
			Evansford - < 6 ML per day	
			Talbot Reservoir - <2 ML per day	
			Tullaroop Reservoir - 600 - 1200 ML/annum	
			Centenary Reservoir - Holding basin only	
WATER QUALITY		Treatment Plant(s)	Maryborough WTP	
		Level of Treatment	Conventional sedimentation and filtration plant with disinfection by chlorine	
		Drinking Water Guidelines	ADWG, 2004 and SDWG, 2005	
		Results (% compliance for the 07-08 reporting period)	Suspended Solids	Did not comply
			Faecal Coliforms	100%
			THM's, TDS, Hardness and Iron	Did not comply
WATER SECURITY		Current Water Restrictions	Yes, Stage 4 - started 30/04/09	
		Proportion of Potable Water Supplied to Households (%)	Residential - 60% Industrial - 16% Concessional - 4% Non Revenue - 20%	
		Distance from the Coast (km)	Approx 150km south-east	
		Climate	Temperate	
		Average Annual Rainfall	524 mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Severe drought conditions continued across Central Highland Water's area of operation during 2007–08. This created challenges to maintaining water quality with low reservoir levels, emergency supplies and limited resource for mains cleaning programs.
		Single drinking water source	NO	
		Poor quality water source	YES	
		Sewage overflow or disposal into water	NO	
		Flooding		
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	YES	Iron levels did not comply with standards.
		Un-lined landfills	NO	
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water	YES	Hardness testing did not meet standards.
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption	NO	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	Issues associated with not having sufficient water for flushing mains
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings		
		Rapid population growth	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	YES	Detection of E. coli at Talbot break tank, Tank dosed with sodium hypochlorite and then re-
		Algal blooms	YES	Centenary reservoir taken offline for a total of 13 days during the reporting period due to blue green algae break-outs. In each instance algaecide dosing used to correct problem.
		Heavy metal contamination	NO	
		Poor chlorine residuals		
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 4 - started 30/04/09.
		Taste and odour issues	NO	Unknown
		Other contamination that would affect health	YES	Elevated trihalomethanes - Issue lasted 112 days. Chloramination plant commissioned after reporting period (November 2008).
Notes			During the past year, temporary aerators have been used at Tullaroop Reservoir to help improve water quality and prevent algal blooms. Plans are in place to install a permanent aeration system to help improve source water quality.	

Town # 43

TOWN		State/Territory	VIC	
		Town Name	Warracknabeal	
		Town Population	2,490 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Grampians Wimmera Mallee Water	
		Rate ($/kL)	$1.30/kL - fully treated water	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Wimmera	
		Sub-Catchment	Not within a designated catchment	
		Catchment Management Authority (CMA)	Wimmera Catchment Management Authority	
		CMA Web-Link	http://wcma.vic.gov.au	
		Catchment Protection Status	None.	
		Potable Water Source(s)	Previously the Wimmera-Mallee channel system - now supplied by the Wimmera Mallee Pipeline (this should result in WQ improvements).	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Warracknabeal WTP	
		Level of Treatment	Coagulation, flocculation, dissolved air flotation, filtration, disinfection, pH correction.	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for the 07-08 reporting period)	E.Coli	100%
			Aluminium and THM's	Did not comply with standards
WATER SECURITY		Current Water Restrictions	Yes Stage 4 - Started 10/02/09	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	Approx 230km South	
		Climate	Temperate	
		Average Annual Rainfall	445.6 mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	YES	Based on available information
		Poor quality water source	YES	Issues with previous open channel system
		source	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	NO	
		Extensive agriculture		
		runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high		
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	??	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	?	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Populati	Seasonal population loadings		
		Rapid population growth	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	?	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 4 - Started 10/02/09
		Taste and odour issues	YES	High Salinity. As of November 2008 improvement in salinity 3,500 EC units to less than 500 EC due to change in water supply
		Other contamination that would affect health	YES	Aluminium - caused by changes in the raw water pH as part of operational changes made to the raw water storages. Elevated Trihalomethanes.
Notes			Air scouring of mains took place in May 2008 to improve water quality. Town now connected to GWM pipeline which should improve quality along with the proposed construction of new raw water storages. Town also not complaint with THM's during last reporting period.	

Town # 44

TOWN		State/Territory	VIC	
		Town Name	Seymour	
		Town Population	6,063 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Goulburn Valley Water	
		Rate ($/kL)	Treated Water - $0.75/kL Raw Water - $0.38/kL	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Goulburn Broken	
		Sub-Catchment	Not within a designated Catchment	
		Catchment Management Authority (CMA)	Goulburn Broken Catchment Management Authority	
		CMA Web-Link	http://www.gbcma.vic.gov.au/	
		Catchment Protection Status	None. Catchment condition is Good to Excellent.	
		Potable Water Source(s)	Heywoods Hill Raw Water Storage - sourced from Goulburn River	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Seymour WTP	
		Level of Treatment	Coagulation, flocculation, up flow clarification, filtration, chlorination.	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	Aluminium	Exceeded guidelines
			pH	Exceeded guidelines
			E. Coli	100%
WATER SECURITY		Current Water Restrictions	Yes Stage 1 - Started 20/10/07	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	Approx 170km South	
		Climate	Temperate	
		Average Annual Rainfall	593.4mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	YES	Based on available information
		Poor quality water source		
		Sewage overflow or disposal into water	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	NO	
		Extensive agriculture		
		Low vegetation cover (dust, sediment		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high		
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings		
		Rapid population growth	NO	Decline in Population between 2001 and 2006
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	YES	Algal Bloom in May 2008
		Heavy metal contamination	NO	
		Poor chlorine residuals	?	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 1 - Started 20/10/07
		Taste and odour issues	YES	Complaints received after algae outbreak in May 2008
		Other contamination that would affect health	YES	Aluminium - the non-compliance was due to a short term process control issue at the water treatment plants. pH exceeded ADWG.
Notes				

Town # 45

TOWN		State/Territory	VIC	
		Town Name	Castlemaine	
		Town Population	7,248 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Coliban Water	
		Rate ($/kL)	Step 1 - $1.34/kL, Step 2 - $1.62/kL, Step 3 - $2.66/kL	
		Per Capita Water Consumption (L/day)	338 L/capita/day	
		Number of Connections	6,924 (2004/2005 period)	
CATCHMENT AND WATER SUPPLY		Catchment	Cairn Curran - Proclaimed	
		Sub-Catchment	River Basin - Loddon River South	
		Catchment Management Authority (CMA)	North Central Catchment Management Authority	
		CMA Web-Link	http://www.nccma.vic.gov.au/	
		Catchment Protection Status	Proclaimed, Poor to Moderate condition	
		Potable Water Source(s)	Malmsbury Reservoir - (via Coliban Main Channel) into McCay Reservoir, via the Poverty Gully Channel	
			McCay Reservoir (primarily used as a service reservoir)	
		Supply Capacity	Bulk Entitlement of 50,260ML/annum for the Coliban Supply System (includes several other towns and supply areas)	
WATER QUALITY		Treatment Plant(s)	Castlemaine WTP	
		Level of Treatment	Filtration, Taste / odour / algae toxin removal, pH Correction, Disinfection, Alum / alum chlorhydrate, Activated Carbon.	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	E.Coli	Complied
			Aluminium	Complied
			Turbidity	Complied
WATER SECURITY		Current Water Restrictions	Yes Stage 4 - Started 01/09/06 For details refer to: http://www.ourwater.vic.gov.au/saving/restrictions	
		Proportion of Potable Water Supplied to Households (%)	39% to Residential, 25% Rural Consumption , 17.5% Non Residential	
		Distance from the Coast (km)	Approx 150km South	
		Climate	Temperate	
		Average Annual Rainfall	592.7mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	NO	
		Poor quality water source	YES	Due to low reservoir levels
		Sewage overflow or disposal into water	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	NO	
		Extensive agriculture		
		Low vegetation cover (dust, sediment		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking		
	Governance	High per capita water consumption	NO	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings		
		Rapid population growth	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	E.coli detected in November 2007, although re-sample was clear.
		Algal blooms	YES	Tullaroop Reservoir had blue green algae problem - although it is unclear whether or not this impacted upon the Castlemaine water supply.
		Heavy metal contamination	NO	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 4 - Started 01/09/06
		Taste and odour issues	YES	Refer below re: Coliban notice of change in aesthetic quality.
		Other contamination that would affect health	NO	

Notes	June 2008 - Fluoride dosing of Castlemaine's water supply started after a directive from the Department of Human Services. Castlemaine also has a water reclamation plant with water provided to the golf club. May 2009 - Media release from Coliban about change in water quality due to low reservoir levels (advised that there may be changes to taste/odour that customers are used to.

Town # 46

TOWN		State/Territory	VIC	
		Town Name	Hamilton	
		Town Population	9,379 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Wannon Water	
		Rate ($/kL)	Step 1 - $1.60/kL, Step 2 - $1.92/kL, Step 3 - $2.88/kL	
		Per Capita Water Consumption (L/day)	298 L/capita/day	
		Number of Connections	4,898	
CATCHMENT AND WATER SUPPLY		Catchment	Grampians	
		Sub-Catchment	River Basin - Glenelg	
		Catchment Management Authority (CMA)	Glenelg Hopkins Catchment Management Authority	
		CMA Web-Link	http://www.ghcma.vic.gov.au/	
		Catchment Protection Status	None. Poor to Moderate condition.	
		Potable Water Source(s)	Hayes Reservoir, Cruckoor Reservoir, Hartwichs Reservoir	
			Hamilton Service Basins 1 & 2	
			Surface Water from the Victoria Ranges catchment (extracted from numerous small streams)	
			Groundwater flow- numerous bores	
		Supply Capacity	Surface Water Bulk Entitlement of 3,435 ML	
			The maximum capacity of the supply system is approximately 12.8 ML/d	
			Hamilton Aquifer - 120 ML/annum	
WATER QUALITY		Treatment Plant(s)	Hamilton WTP	
		Level of Treatment	Disinfection, Coagulation, Flocculation, Clarification, Filtration	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	E Coli	100%
			Aluminium	Did not comply
			pH	Did not comply
			Iron	Did not comply
			Ammonia	Did not comply
WATER SECURITY		Current Water Restrictions	Yes Stage 3 - Started 03/11/07 For details refer to: http://www.ourwater.vic.gov.au/saving/restrictions	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	Approx 60km South-West	
		Climate	Temperate	
		Average Annual Rainfall	613.3mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	NO	
		Poor quality water source	YES	Groundwater quality issues, treatment plant unable to cope.
		Sewage overflow or disposal into water	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	YES	Iron exceeded guidelines.
		Un-lined landfills	NO	
		Extensive agriculture		
		Low vegetation cover (dust, sediment		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high	Unknown	
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure	YES	Treatment plant is inadequate for current feed water. Action to redesign and reconstruct existing stream off take structures in the southern Grampians to ensure compliance with passing flows from 2010 (Reference: Wannon Water - Water Supply Demand Strategy)
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption	NO	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	??	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings		
		Rapid population growth	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 3 - Started 03/11/07
		Taste and odour issues	YES	70 Complaints received relating to aesthetics (0.75 complaints per 100 customers).
		Other contamination that would affect health	YES	High Aluminium levels.
Notes			The quality of the raw water entering the water treatment plant has deteriorated to the point where it is outside the design specifications of the water treatment plant. Changes have since been made to improve quality.	

Town # 47

TOWN		State/Territory	VIC	
		Town Name	Thornton	
		Town Population	164 (Census 2006, State Suburb)	
WATER UTILITY		Name of Water Utility	Goulburn Valley Water	
		Rate ($/kL)	$0.75/kL (Treated Water)	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Goulburn Broken	
		Sub-Catchment	Not within a designated Catchment	
		Catchment Management Authority (CMA)	Goulburn Broken Catchment Management Authority	
		CMA Web-Link	http://www.gbcma.vic.gov.au/	
		Catchment Protection Status	Good to Excellent	
		Potable Water Source(s)	Rubicon River	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Thornton WTP	
		Level of Treatment	Chlorination	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	E Coli	100%
			pH	Aesthetic limits exceeded
			Other	Dichloroacetic acid and Trichloroacetic acid exceeded ADWG - Attributed to high organic content of raw water Benzo(a)pyrene detected in raw water supply
WATER SECURITY		Current Water Restrictions	Yes Stage 1 - 01/10/07 For details refer to: http://www.ourwater.vic.gov.au/saving/restrictions	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	Approx 160km South	
		Climate	Temperate	
		Average Annual Rainfall	703.9mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	YES	Rubicon River
		Poor quality water source	YES	From 1 July to 5 July 2007 and 24 to 27 December 2007 drinking water was tankered from Alexandra to Thornton due to high turbidity in the Rubicon River.
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	NO	
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction	N/A	
		Aquifer turning saline due to high extraction	N/A	
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	Unknown	Census data unavailable for 2001
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 1 - 01/10/07
		Taste and odour issues	NO	
		Other contamination that would affect health	YES	Benzo(a)pyrene detected in raw water during one sampling event, subsequent sample clear.
Notes			Planning and design for a pipeline to provide fully treated water to Thornton and Eildon from Alexandra recently undertaken. Due for completion 2009/10.	

Town # 48

TOWN		State/Territory	VIC	
		Town Name	Riddells Creek	
		Town Population	2,625 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Western Water	
		Rate ($/kL)	$1.49/kL	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Upper Yarra Thomson catchments and Yarra Valley tributaries and Jacksons Creek Catchment	
		Sub-Catchment	Weribee River Basin	
		Catchment Management Authority (CMA)	Port Phillip and Westernport Catchment Management Authority	
		CMA Web-Link	http://www.ppwcma.vic.gov.au/	
		Catchment Protection Status	Varies from tributary to tributary	
		Potable Water Source(s)	Surface water from above subcatchments	
			Rosslynne Reservoir	
			Wright Reservoir and Forster Reservoir used as back up	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Rosslynne Water Filtration Plant (chloramination)	
		Level of Treatment	Fluoridation and primary chlorination by Melbourne Water Secondary disinfection (Chloramination) at Loemans Rd Pump Station Additional chlorination by booster chlorinators along reticulation system as required	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	E Coli	100%
WATER SECURITY		Current Water Restrictions	Yes Stage 3a - Started 01/04/07 For details refer to: http://www.ourwater.vic.gov.au/saving/restrictions	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	Approx 95km South-West	
		Climate	Temperate	
		Average Annual Rainfall	838.7mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	NO	
		Poor quality water source	NO	
		Sewage overflow or disposal into water	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	NO	
		Extensive agriculture		
		Low vegetation cover (dust, sediment		
		Poor access to supply		
		Unsustainable water extraction	N/A	
		Aquifer turning saline due to high	N/A	
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	YES	Growth rate of 3.18% P.A between 2001 and 2006
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	YES	Blue Green Algae Bloom - Alert Level 3 (August 2007 - October 2007)
		Heavy metal contamination	NO	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 3a - Started 01/04/07
		Taste and odour issues	NO	
		Other contamination that would affect health	NO	
Notes			Water for the most part is sourced from Melbourne. At times this can vary between Melbourne water and a Rosslynne Reservoir/ Melbourne water blend to ensure that the Rosslynne Water Filtration Plant and associated infrastructure are maintained.	

Town # 49

TOWN		State/Territory	VIC	
		Town Name	Beulah	
		Town Population	219 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Grampians Wimmera Mallee Water	
		Rate ($/kL)	$1.19/kL - partially treated water	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Wimmera River Basin	
		Sub-Catchment	Not within a designated Catchment	
		Catchment Management Authority (CMA)	Mallee Catchment Management Authority	
		CMA Web-Link	http://www.malleecma.vic.gov.au/	
		Catchment Protection Status	None. Very Poor to Moderate condition.	
		Potable Water Source(s)	Unknown	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Beulah WTP ?	
		Level of Treatment	Disinfection	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	E Coli	100%
			Turbidity	Did not comply with standards
			THM's	Did not comply with standards
WATER SECURITY		Current Water Restrictions	Yes Stage 4 - Started 10/02/09	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	Approx 260km West	
		Climate	Temperate	
		Average Annual Rainfall	374.3 mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	YES?	
		Poor quality water source	YES	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	NO	
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption	NO	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings		
		Rapid population growth	YES	Growth rate of 1.58% P.A between 2001 and 2006.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 4 - Started 10/02/09
		Taste and odour issues	NO	
		Other contamination that would affect health	YES	Elevated Trihalomethanes.
Notes			Proposed to Connect to the Wimmera Mallee Pipeline and construct new raw water storages for Beulah. Three other towns (Jung, Nullawil and Quambatook) within the GWM region are experiencing the same water quality and security issues	

Town # 50

TOWN	State/Territory	VIC		
	Town Name	Avoca		
	Town Population	951 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Central Highlands Water		
	Rate ($/kL)	Tier 1 $1.30/kL, Tier 2 $1.57/kL, Tier 3 $1.96/kL		
	Per Capita Water Consumption (L/day)	292 L/capita/day - Current unrestricted demand		
	Number of Connections	608		
CATCHMENT AND WATER SUPPLY	Catchment	Avoca River		
	Sub-Catchment	River Basin - Avoca		
	Catchment Management Authority (CMA)	North Central Catchment Management Authority		
	CMA Web-Link	www.nccma.vic.gov.au/		
	Catchment Protection Status	None. Very Poor condition.		
	Potable Water Source(s)	Sugarloaf Reservoir - 363 ML		
		Lead Dam - 118 ML		
		Bung Bong Bore		
	Supply Capacity	Surface Water Combined Annual Entitlement - up to 233 ML in any year		
		Sugarloaf Reservoir - at a rate not exceeding 0.84ML/day		
		Lead Dam - no extraction limit		
		Groundwater Licence - 200ML/year		
WATER QUALITY	Treatment Plant(s)	Avoca WTP		
	Level of Treatment	Conventional sedimentation and filtration plant with disinfection by chlorine.		
	Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)		
	Results (% compliance for 2008 reporting period)	Suspended Solids	Did not comply with standards	
		E Coli	100%	
		THM's, TDS, Hardness and Iron	Did not comply with standards	
WATER SECURITY	Current Water Restrictions	Yes Stage 2 - Started 12/11/07 For details refer to: http://www.ourwater.vic.gov.au/saving/restrictions		
	Proportion of Potable Water Supplied to Households (%)	Residential - 60% Industrial - 14% Concessional - 6% Non Revenue - 20%		
	Distance from the Coast (km)	Approx 160km South-East		
	Climate	Temperate		
	Average Annual Rainfall	536.2 mm		
FACTOR		YES / NO	NOTES / EXPLANATION	
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Severe drought conditions continued across Central Highland Water's area of operation during 2007–08. This created challenges to maintaining water quality with low reservoir levels, emergency supplies and limited resource for mains cleaning programs.
		Single drinking water source	NO	
		Poor quality water source	YES	Groundwater with high salinity was being blended with surface water to supplement supplies - this has caused a number of quality issues.
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	YES	Iron levels did not comply with standards.
		Un-lined landfills	NO	
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water	YES	Hardness testing did not meet standards.
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption	NO	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings		
		Rapid population growth	NO	Decline in Population between 2001 and 2006
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	NO	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 2 - Started 12/11/07
		Taste and odour issues	NO	Salinity Issues associated with the use of groundwater.

VIC SEC	Other contamination that would affect health	YES	Elevated trihalomethanes - Issue lasted 119 days. Chloramination plant commissioned after reporting period (November 2008).
Notes		The Avoca water supply systems consists of Sugarloaf Reservoir, Bung Bong Bore groundwater supply and Lead Dam. The Avoca system has predominantly relied on water from Sugarloaf Reservoir. However since rainfall in the region has been less reliable this has resulted in a greater reliance on Bung Bong Bore. Whilst the groundwater supply is reliable, it is characterised by relatively high natural salinity and hardness levels.	

Town # 51

TOWN		State/Territory	VIC	
		Town Name	Woori Yallock	
		Town Population	2,000 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Yarra Valley Water	
		Rate ($/kL)	Block 1 - $1.25/kL, Block 2 - $1.47/kL, Block 3 - $ 2.17/kL	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Thompson and Upper Yarra Catchments	
		Sub-Catchment	Not within a designated water supply catchment - River Basin is Yarra	
		Catchment Management Authority (CMA)	Port Phillip and Westernport Catchment Management Authority	
		CMA Web-Link	http://www.ppwcma.vic.gov.au/	
		Catchment Protection Status	Varies from tributary to tributary (generally Poor to Moderate)	
		Potable Water Source(s)	Unknown	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Lusatia Park WTP	
		Level of Treatment	Unknown	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	E Coli	100%
			Other	High Iron and Turbidity Levels recorded although overall standards were
WATER SECURITY		Current Water Restrictions	No	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	Approx 85km South-West	
		Climate	Temperate	
		Average Annual Rainfall	693.6mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	Unknown	
		Poor quality water source	NO	
		Sewage overflow or disposal into water	NO	
		Flooding	YES	Caused a number of issues in June/July 2007
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	NO	
		Extensive agriculture		
		Low vegetation cover (dust, sediment		
		Poor access to supply		
		Unsustainable water extraction	N/A	
		Aquifer turning saline due to high extraction	N/A	
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	Unknown	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	NO	
		Boil water notices	YES	Elevated turbidity and iron levels during June/July 2007
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	NO	
		Taste and odour issues	NO	
		Other contamination that would affect	NO	
Notes			This was due to heavy rainfall around the Upper Yarra Reservoir, which caused high inflows of water into the reservoir, in a very short period of time. This heavy rainfall has caused naturally occurring sediments to flow into the Reservoir, which caused the water in the Upper Yarra Reservoir to be highly turbid. Filters installed in early 2008 to improve WQ.	

Town # 52

TOWN		State/Territory	VIC	
		Town Name	Myrtleford	
		Town Population	2,728 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	North East Water	
		Rate ($/kL)	$2.00/kL	
		Per Capita Water Consumption (L/day)	Unknown. Total demand on water supply system - 633 ML/annum.	
		Number of Connections	1,524	
CATCHMENT AND WATER SUPPLY		Catchment	Ovens River (Wangaratta)	
		Sub-Catchment	Buffalo Creek Catchment	
		Catchment Management Authority (CMA)	North East Catchment Management Authority	
		CMA Web-Link	http://www.necma.vic.gov.au/	
		Catchment Protection Status	None. Good to Excellent condition.	
		Potable Water Source(s)	Buffalo Creek	
		Supply Capacity	Surface Water Entitlement - 1212 ML/annum	
			Groundwater Licence for 75ML - bore out of order	
WATER QUALITY		Treatment Plant(s)	Myrtleford UV plant	
		Level of Treatment	UV Disinfection (Ozone/Granular Activated Carbon disinfection system has been taken offline).	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	Suspended Solids	High Turbidity (may indicate high SS)
			Faecal Coliforms	98.3% (E. coli)
			Colour	Did not meet guidelines
			Iron	Did not meet guidelines
WATER SECURITY		Current Water Restrictions	No	
		Proportion of Potable Water Supplied to Households (%)	Residential - 40%, Commercial - 15%, Industrial - 22%, Non revenue - 23%	
		Distance from the Coast (km)	Approx 190km South East	
		Climate	Temperate	
		Average Annual Rainfall	946.5 mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	YES	
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	NO	
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction	NO	
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure	YES	36 mains failures over the past 3 years. Only single barrier treatment in place.
		Significant water losses due to leaking pipes	YES	Assumed to be an issue as large number of failures.
	Governance	High per capita water consumption	NO	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	NO	
		Irrigation		
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	YES	Growth Rate of 1.69% P.A. (between 2001 and 2006)
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	YES	E.coli detected on a number of occasions, although due to the large number of samples, they were still compliant.
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	NO	
		Boil water notices	YES	Boil Water Notice was in place from August 2007 to 1 May 2008.
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	NO	
		Taste and odour issues	NO	
		Other contamination that would affect health	YES	Enterococcus detection in December 2007.
Notes			October 2009 - Work has begun on the construction of a treated water storage at Myrtleford, the first stage of a $5 million project to upgrade the town's water supply. The absence of a residual disinfectant is at the request of the local communities.	

Town # 53

TOWN		State/Territory	VIC	
		Town Name	Beechworth	
		Town Population	2,645 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	North East Water	
		Rate ($/kL)	$2.00/kL	
		Per Capita Water Consumption (L/day)	Unknown. 313 kL/household/year.	
		Number of Connections	1396	
CATCHMENT AND WATER SUPPLY		Catchment	Ovens	
		Sub-Catchment	Ovens River catchment	
		Catchment Management Authority (CMA)	North East Catchment Management Authority	
		CMA Web-Link	http://www.necma.vic.gov.au/	
		Catchment Protection Status	None. Good to Excellent condition.	
		Potable Water Source(s)	Nine Mile Creek Frenchman's Creek Lake Kerferd	
		Supply Capacity	Surface Water Entitlement - 1,100 ML/annum	
WATER QUALITY		Treatment Plant(s)	Beechworth WTP	
		Level of Treatment	DAFF Plant - Flocculation, Floatation, Filtration, pH correction, Chloramination	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	Suspended Solids: High Turbidity E Coli: 100% Aluminium: Did not meet guidelines	
WATER SECURITY		Current Water Restrictions	Yes Stage 1 - Started 21/11/08 For details refer to: http://www.ourwater.vic.gov.au/saving/restrictions	
		Proportion of Potable Water Supplied to Households (%)	Residential - 54%, Commercial - 25%, Non revenue - 21%	
		Distance from the Coast (km)	Approx 200km South East	
		Climate	Temperate	
		Average Annual Rainfall	946.5mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	YES	All water from Lake.
		Poor quality water source	NO	
		Sewage overflow or disposal into water	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	NO	
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction	NO	
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking		
	Governance	High per capita water consumption	NO	Water use higher than other towns in the region (313kL/house with a regional average of 305kL/house).
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	NO	
		Irrigation		
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	NO	Decline in population between 2001 and 2006
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 1 - Started 21/11/08, Currently on Stage 2 Restrictions (Water Authority Website)
		Taste and odour issues		
		Other contamination that would affect	YES	Elevated aluminium levels.
Notes				

Town # 54

TOWN		State/Territory	VIC	
		Town Name	Bright	
		Town Population	2,111 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	North East Water	
		Rate ($/kL)	$2.00/kL	
		Per Capita Water Consumption (L/day)	Unknown. Total demand on water supply system - 393ML/annum	
		Number of Connections	1,795	
CATCHMENT AND WATER SUPPLY		Catchment	North East / Ovens	
		Sub-Catchment	Bakers Gully and Ovens River catchments (Ovens River - Proclaimed)	
		Catchment Management Authority (CMA)	North East Catchment Management Authority	
		CMA Web-Link	http://www.necma.vic.gov.au/	
		Catchment Protection Status	None. Good to Excellent condition.	
		Potable Water Source(s)	Ovens River	
			Bakers Gully Creek	
		Supply Capacity	Surface water entitlement - 704ML/annum	
WATER QUALITY		Treatment Plant(s)	Bakers Gully chlorinator and Ovens River chlorinator	
		Level of Treatment	Chlorination	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	Suspended Solids	High Turbidity
			E Coli	98.10%
			Colour	Did not meet guidelines
			Iron	Did not meet guidelines
WATER SECURITY		Current Water Restrictions	No	
		Proportion of Potable Water Supplied to Households (%)	Residential - 42%, Commercial - 20%, Non revenue - 38%	
		Distance from the Coast (km)	Approx 160km South East	
		Climate	Temperate	
		Average Annual Rainfall	1127.2mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	YES	
		Poor quality water source	YES	
		Sewage overflow or disposal into water source	NO	
		Flooding	YES	Storms after a bushire event caused water quality issues.
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, flouride)	YES	High Iron levels recorded.
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction	NO	
		Hard water	NO	
		Aging or inadequate pipework and associated infrastructure	YES	Chlorinator was inadequate for incoming raw water. 18 failures in last 3 years in delivery pipework.
		Significant water losses due to leaking pipes	YES	Assumed to be an issues as large number of failures and significant proportion of non-revenue water.
	Governance	High per capita water consumption	NO	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	Unknown	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	NO	
		Irrigation		
		Chemicals / process	NO	
	Population	Seasonal population loadings	YES	Can increase to 10,000 in peak periods.
		Rapid population growth	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	YES	Bacteria detected in October 2007, extra chlorine dosing undertaken and re-test clear.
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	NO	
		Boil water notices	YES	A number of boil water notices issued due to chlorinator failures and bushfires.
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	NO	
		Taste and odour issues		
		Other contamination that would affect health	YES	Refer to water quality notices.
Notes			Bright, Wandiligong and Porepunkah experienced and extended period under a Boil Water Notice due to the deterioration of the raw water supply. Previous ushfires in the catchment area followed by rain resulted in elevated turbidity levels, in the Ovens River, that compromised the disinfection system in the nfiltered supply at these localities. A Boil Water Notice was implemented while a temporary filtration unit was transferred from Wangaratta, installed and ommissioned in Bright. On the July 16, water quality had improved and the Boil Water Notice could be lifted.	

Town # 55

TOWN		State/Territory	VIC	
		Town Name	Trafalgar	
		Town Population	2,301 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Gippsland Water	
		Rate ($/kL)	$1.56/kL	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Latrobe	
		Sub-Catchment	Not within a designated water supply catchment - Latrobe River Basin	
		Catchment Management Authority (CMA)	West Gippsland Catchment Management Authority	
		CMA Web-Link	http://www.wgcma.vic.gov.au/	
		Catchment Protection Status	None. Variable depending on location - likely to be moderate to poor.	
		Potable Water Source(s)	Tanjil River	
			Narracan Creek	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Moe WTP	
		Level of Treatment	Coagulation, Flocculation, Primary Solids Separation - (Clarification), Secondary Solids Separation - (Sand Filters & Dual Media Filters), Primary and Secondary disinfection, pH Correction, Fluoridation.	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	E Coli	100%
			pH	Maximum pH level was just outside guideline.
WATER SECURITY		Current Water Restrictions	No	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	Approx 70km South	
		Climate	Temperate	
		Average Annual Rainfall	1019.8mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	NO	
		Poor quality water source		
		Sewage overflow or disposal into water source		
		Flooding		
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	NO	
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	NO	
		Irrigation		
		Chemicals / process	NO	
	Population	Seasonal population loadings		
		Rapid population growth	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	NO	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	May have previously been on restrictions but these have now been lifted.
		Taste and odour issues	NO	
		Other contamination that would affect health	YES	High turbidity and aluminium during a high rainfall event.
Notes			Nov 07 - Increase of turbidity and aluminium in water supply due to heavy rainfall event. Malfunction at treatment plant caused by heavy rainfall event. Malfunction rectified and the water treatment plant resumed operation.	

Town # 56

TOWN	State/Territory	VIC		
	Town Name	Wonthaggi		
	Town Population	6,529 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	South Gippsland Water		
	Rate ($/kL)	$1.27/kL		
	Per Capita Water Consumption (L/day)	Unknown		
	Number of Connections	Unknown		
CATCHMENT AND WATER SUPPLY	Catchment	West South Gippsland River Basin		
	Sub-Catchment	-		
	Catchment Management Authority (CMA)	West Gippsland Catchment Management Authority		
	CMA Web-Link	http://www.wgcma.vic.gov.au/		
	Catchment Protection Status	Poor to Moderate		
	Potable Water Source(s)	Lance Creek Powlett River		
	Supply Capacity	Unknown		
WATER QUALITY	Treatment Plant(s)	Lance Creek WTP		
	Level of Treatment	Reservoir Destratification Taste and Odour pH Correction Manganese Oxidation Flocculation/Coagulation Filtration Chlorination/Re-chlorination		
	Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)		
	Results (% compliance for 2008 reporting period)	E Coli	100%	
		THM's	Did not comply with standards	
WATER SECURITY	Current Water Restrictions	No		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	Approx 5km South-West		
	Climate	Temperate		
	Average Annual Rainfall	933.6mm		
FACTOR		YES / NO	NOTES / EXPLANATION	
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	NO	
		Poor quality water source	NO	
		source		
		Flooding		
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	NO	
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high	NO	
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance		
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals	NO	
		Irrigation		
		Chemicals / process	NO	
	Population	Seasonal population loadings		
		Rapid population growth	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	YES	A blue-green algal bloom event was reported on the 30th August 2007 for the Lance Creek Reservoir.
		Heavy metal contamination	NO	
		Poor chlorine residuals		
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	NO	
		Taste and odour issues	NO	
		Other contamination that would affect	YES	Elevated THM's.

Notes	Introduction of chloramination system to replace present chlorination disinfection and thereby reduce trihalomethane formation - Due for completion in April 2009. Inverloch is another town with the same issues as its water supply comes from the same system.

Town # 57

TOWN		State/Territory	VIC	
		Town Name	Kerang	
		Town Population	3,780 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Lower Murray Water	
		Rate ($/kL)	Tier 1 $0.33/kL, Tier 2 $0.59/kL, Tier 3 $0.76/kL	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	North Loddon River Basin	
		Sub-Catchment	Not within a designated water supply catchment	
		Catchment Management Authority (CMA)	North Central Catchment Management Authority	
		CMA Web-Link	http://www.nccma.vic.gov.au/	
		Catchment Protection Status	None. Moderate condition.	
		Potable Water Source(s)	Murray River (directly)	
			Goulburn Murray Water Irrigation Channel (water originates from the Murray River)	
			Loddon River	
		Supply Capacity	Murray River (approx 50L/sec)	
WATER QUALITY		Treatment Plant(s)	Kerang WTP	
		Level of Treatment	Coagulation/flocculation, Disinfection, pH correction, Taste & odour removal	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	Aluminium	92% - Did not comply with standards
			E Coli	100%
WATER SECURITY		Current Water Restrictions	Yes Stage 3 - Started 17/01/08 For details refer to: http://www.ourwater.vic.gov.au/saving/restrictions	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	Approx 290km South	
		Climate	Temperate	
		Average Annual Rainfall	371.9 mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source		
		Poor quality water source		
		Sewage overflow or disposal into water source		
		Flooding		
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills		
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water		
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance		
		Poor management or governance		
		Vandalism / sabotage / terrorism		
		Insufficient trained personnel		
		Inadequate funding for maintenance or upgrades		
	Industries	Mining / minerals		
		Irrigation		
		Chemicals / process		
	Population	Seasonal population loadings		
		Rapid population growth	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 3 currently in place
		Taste and odour issues	NO	
		Other contamination that would affect health	YES	Elevated levels of aluminium. High aluminium residual was due to a higher than normal pH of the settled water prior to filtration.
Notes			Very little information available on Kerang water supply system.	

Town # 58

TOWN		State/Territory	VIC	
		Town Name	Ararat	
		Town Population	7,169 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Grampians Wimmera Mallee Water	
		Rate ($/kL)	$1.30/kL - fully treated water	
		Per Capita Water Consumption (L/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	Hopkins River Basin	
		Sub-Catchment	Not within a designated Catchment	
		Catchment Management Authority (CMA)	Glenelg Hopkins Catchment Management Authority	
		CMA Web-Link	http://www.ghcma.vic.gov.au/	
		Catchment Protection Status	None. Very Poor to Poor condition.	
		Potable Water Source(s)	Lake Fyans	
			Mt Cole Reservoir	
			Langi Ghiran Reservoir	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Ararat WTP	
		Level of Treatment	Coagulation, flocculation, dissolved air flotation, filtration, disinfection, pH correction	
		Drinking Water Guidelines	Australian Drinking Water Guidelines (2004) and Safe Drinking Water Regulations (2005)	
		Results (% compliance for 2008 reporting period)	E Coli	100%
			THM's	Did not comply with standards
WATER SECURITY		Current Water Restrictions	Yes Recently revised from Stage 4 to Stage 1	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	Approx 130km South-West	
		Climate	Temperate	
		Average Annual Rainfall	587.1 mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Majority of Victoria experiencing drought (or Exceptional Circumstances, whereby farmers can apply for rebates) http://www.daff.gov.au/agriculture-food/drought/ec/victoria
		Single drinking water source	NO	
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	
		Fauna defecating in supply		
		Fauna destroying water intake structures		
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	NO	
		Extensive agriculture		
		Low vegetation cover (dust, sediment runoff)		
		Poor access to supply		
		Unsustainable water extraction		
		Aquifer turning saline due to high extraction		
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure		
		Significant water losses due to leaking pipes		
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	??	
		Poor management or governance	NO	
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	?	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	NO	
	Population	Seasonal population loadings		
		Rapid population growth	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	NO	
		Heavy metal contamination	NO	
		Poor chlorine residuals	?	
		Pesticide contamination	NO	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Stage 4 - Started 10/02/09 recently revised to Stage 1.
		Taste and odour issues	NO	
		Other contamination that would affect health	YES	Elevated trihalomethanes.
Notes			WTP operated under a BOOT agreement	

AECOM

Town Profiles – SA

Review of Regional Water Quality & Security

Appendices
Volume 2

Town # 59

TOWN	State/Territory	SA	
	Town Name	Port Augusta	
	Town Population	13,199 (SA Water Data, based on suburbs Pt Augusta, Pt Augusta West and Stirling North)	
WATER UTILITY	Name of Water Utility	SA Water	
	Rate ($/kL)	Quarterly supply charge of $34.40	
	Per Capita Water Consumption (ML/day)	360 L/person/day (based on residential use only)	
	Number of Connections	5,860	
CATCHMENT AND WATER SUPPLY	Catchment	Murray River Basin Catchment	
	Sub-Catchment	Lower Murray	
	Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB), Natural Resources Management Board (NRMB)	
	CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/	
	Catchment Protection Status	Prescribed	
	Potable Water Source(s)	Murray River	
	Supply Capacity	Water is delivered via the Morgan – Whyalla pipeline from SA Water's existing Country Allocation from the River Murray. Unrestricted, this allocation is 50 GL/a. However, recent drought conditions have seen the allocations drop to 31 GL/a in 2007-08. Supply capacity to particular town is unknown.	
WATER QUALITY	Treatment Plant(s)	Morgan Filtration Plant, Morgan (Morgan-Whyalla pipeline)	
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (NHCl2), Fluoridation, Storage and distribution)	
	Drinking Water Guidelines	ADWG 2004	
	Results (% compliance for 2008 reporting period)	Source:	SA Water (email)
		Faecal Coliforms/100 mL	100%
		E.Coli/100mL	100%
		Chlorine Residual-Free [mg/L]	N/A
		Chlorine Residual- Total [mg/L]	100%
		TDS [by EC] [mg/L]	100%
		Colour-True [HU]	100%
		Turbidity [NTU]	100%
		pH Units	1%
		Trialomethanes-Total [ug/L]	100%
		Fluoride [mg/L]	100%
		Iron-Total [mg/L]	100%
		Total Hardness as CaCO3 [mg/L]	100%
		Manganese	100%
WATER SECURITY	Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.	
	Proportion of Potable Water Supplied to Households (%)	72% residential, 28% non-residential (incl. commercial, industrial, mining, public institution, public utilities & recreation)	
	Distance from the Coast (km)	0	
	Climate	Temperate	
	Average Annual Rainfall	242.8mm	

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	From the Morgan-Whyalla Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No historical record for Pt Augusta
		Fauna defecating in supply	Yes	Not an issue due to treatment plant
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	Extensive grazing and cropping. Dryland and irrigated agriculture.
		Low vegetation cover (dust, sediment runoff)	YES	Cleared and modified native vegetation, cropping and grasslands.
		Poor access to supply	NO	
		Unsustainable water extraction	YES	Low flows causing several issues for Murray River Region.
		Aquifer turning saline due to high extraction	NO	
		Hard water	NO	Water quality report shows WTP water to be of good quality.
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to SA WATER
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	Irrigated cropping occurs in this catchment.
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	

Populatio	Rapid population growth	NO	During the period leading up to 2001 the region was enduring an extended period of population decline, however from 2001 to 2006 this changed with the region experiencing growth of approximately 0.75 % per annum.
WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	NO	100% of all tests are above AWDG guidelines this year
	Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
	Heavy metal contamination	Unknown	
	Poor chlorine residuals	NO	
	Pesticide contamination	YES	The recent rains may have washed stormwater pollution (such as fertilisers, manure and detergent) into our creeks and rivers. Due to high agriculture it seems likely, although could not find dat.
	Boil water notices	NO	
	Deaths or illness due to water quality	NO	
	Water restrictions (current and historic)	YES	Since 2003.
	Taste and odour issues	YES	
	Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality). Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall).
Notes			

Town # 60

TOWN	State/Territory	SA	
	Town Name	Port Pirie	
	Town Population	13,752 (SA Water Data, based on suburbs of Port Pirie, Port Pirie West, Port Pirie South, Risdon Park, Risdon Park South, Solomontown)	
WATER UTILITY	Name of Water Utility	SA Water	
	Rate ($/kL)	13,752	
	Per Capita Water Consumption (L/day)	290 L/person/day (based on residential use only)	
	Number of Connections	6,538	
CATCHMENT AND WATER SUPPLY	Catchment	Murray River Basin Catchment	
	Sub-Catchment	Southern Basin	
	Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB) , Natural Resources Management Board (NRMB)	
	CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/	
	Catchment Protection Status	Prescribed	
	Potable Water Source(s)	Murray River	
	Supply Capacity	Water delivered via the Morgan – Whyalla pipeline is from SA Water's existing Country Allocation from the River Murray. Unrestricted, this allocation is 50 GL/a. However, recent drought conditions have seen the allocations drop to 31 GL/a in 2007-08. Supply capacity	
WATER QUALITY	Treatment Plant(s)	Morgan Filtration Plant, Morgan	
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (NHCl2), Fluoridation, Storage and distribution)	
	Drinking Water Guidelines	ADWG 2004	
	Results (% compliance for 2008 reporting period)	Source	SA Water (email).
		Faecal Coliforms/100 mL	100%
		E.Coli/100mL	100%
		Chlorine Residual-Free [mg/L]	N/A
		Chlorine Residual- Total [mg/L]	100%
		TDS [by EC] [mg/L]	100%
		Colour-True [HU]	100%
		Turbidity [NTU]	100%
		pH Units	1%
		Trialomethanes-Total [ug/L]	100%
		Fluoride [mg/L]	100%
		Iron-Total [mg/L]	100%
		Total Hardness as CaCO3 [mg/L]	100%
		Manganese	100%
WATER SECURITY	Current Water Restrictions	Yes. Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned	
	Proportion of Potable Water Supplied to Households (%)	28% residential, 72% non-residential (incl. commercial, industrial, mining, public institution, public utilities & recreation).	
	Distance from the Coast (km)	0	
	Climate	Temperate	
	Average Annual Rainfall	344.6mm	

		FACTOR	YES / NO	NOTES / EXPLANATION
Y OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps.
		Single drinking water source	YES	From the Morgan-Whyalla Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No historical record for Pt Augusta
		Fauna defecating in supply	Yes	Not an issue due to treatment plant
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	Extensive grazing and cropping. Dryland and irrigated agriculture
		Low vegetation cover (dust, sediment runoff)	YES	Cleared and modified native vegetation, cropping and grasslands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	Low flows causing several issues for Murray River Region
		Aquifer turning saline due to high extraction	NO	
		Hard water	NO	Water quality report shows WTP water to be of good quality
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		High per capita water consumption	NO	According to SA WATER

WATER QUALITY	Governance	Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	Irrigated cropping occurs in this catchment.
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	NO	During the period leading up to 2001 the region was enduring an extended period of population decline, however from 2001 to 2006 this changed with the region experiencing growth of approximately 0.75 % per annum.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	100% of all tests are above AWDG guidelines this year.
		Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	NO	
		Pesticide contamination	YES	The recent rains may have washed stormwater pollution (such as fertilisers, manure and detergent) into our creeks and rivers. Due to high agriculture it seems likely, although could not find data
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Since 2003.
		Taste and odour issues	YES	
		Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality). Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall).
Notes				

Town # 61

TOWN	State/Territory	SA	
	Town Name	Port Lincoln	
	Town Population	13,044 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	SA Water	
	Rate ($/kL)	Quarterly supply charge of $34.40	
	Per Capita Water Consumption (L/day)	240 L/person/day (based on residential use only)	
	Number of Connections	6137	
CATCHMENT AND WATER SUPPLY	Catchment	Lincoln Basin/ Uley South/Uley Wanilla	
	Sub-Catchment	-	
	Catchment Management Authority (CMA)	− Department of Water, Land and Biodiversity Conservation (DWLBC) − Eyre Peninsula Natural Resources Management Board (EPNRMB) − EPNRMB Water Resources Advisory Committee (WRAC)	
	CMA Web-Link	www.epnrmb.sa.gov.au	
	Catchment Protection Status	Prescribed	
	Potable Water Source(s)	Lincoln Basin/ Uley South/Uley Wanilla	
	Supply Capacity	Bore Field - allowable extraction Recharge rates are applied to the assessed 'catchment' area of each lens to generate an annual recharge volume for each lens. 60% of this annual recharge is set aside to maintain the integrity of the resource, leaving ~40% available for allocation (a percentage of which is set aside for stock and domestic users). Recharge rates are gazetted in November each year,which set the allocation for the following financial year. Uley Wanilla 230.9 ML/a Uley East 180.9 ML/a Uley South 7224.0 ML/a Lincoln A, B and C 928.6 ML/a	
WATER QUALITY	Treatment Plant(s)	N/A	
	Level of Treatment	Cl2 Disinfection Only	
	Drinking Water Guidelines	ADWG 2004	
	Results (% compliance for 2008 reporting period)	Lincoln Uley South Uley Wanilla Basin	
		Source:	SA Water Drinking Water Quality Report 07-08
		Faecal Coliforms/100 mL	100%
		E.Coli/100mL	100%
		Chlorine Residual-Free [mg/L]	100%
		Chlorine Residual- Total [mg/L]	N/A
		TDS [by EC] [mg/L]	0%
		Colour-True [HU]	100%
		Turbidity [NTU]	100%
		pH Units	100%
		Trialomethanes-Total [ug/L]	100%
		Fluoride [mg/L]	100%
		Iron-Total [mg/L]	100%
		Total Hardness as CaCO3 [mg/L]	0%
		Manganese	100%
WATER SECURITY	Current Water Restrictions	Yes, Level 3 Enhanced Water Restrictions since July 2009 (Dripper and trigger nozzle hoses 3 hours a week, buckets and watering cans any time, permits required for swimming pools).	
	Proportion of Potable Water Supplied to Households (%)	Commercial-4.5%, Industrial 8.3%, Primary Production, 0.5 %, Public Institution, 4.7 %, Public Utilities 0.9 %, Recreation, 4.3 %, Residential 67.4%, Unclassified 5.6%, Vacant Land 3.8%	
	Distance from the Coast (km)	0	
	Climate	Temperate	
	Average Annual Rainfall	490.9mm	

		FACTOR	YES / NO	NOTES / EXPLANATION
QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	Uley and Lincoln Bores. Tod Reservoir is an integral part of the overall contingency plan for the region and presents a future option to ensure that the water quality in Tod Reservoir is suitable for use as an emergency supply.
		Poor quality water source	NO	The groundwater is classified as moderate for drinking water due to elevated salinity in some areas. This is largely due to excess irrigation water leaching salts through the soil to the shallow (quaternary aquifer) system. The salinity was between 494mg/L and 1312 mg/L across the region, while the NH&MRC guideline (for taste) has a low value of 500mg/L and an upper value of 1000mg/L.
		Sewage overflow or disposal into water source	NO	
		Flooding	YES	Due to high tides.
		Fauna defecating in supply	NO	
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	Extensive cropping, although the bore fields are in national parks.
		Low vegetation cover (dust, sediment runoff)	NO	
		Poor access to supply	NO	
		Unsustainable water extraction	YES	Water levels in Eyre Peninsula groundwater basins have dropped by up to five metres since 1970 due to below average rainfall and unsustainable extraction.
		Aquifer turning saline due to high extraction	YES	A lack of recent rainfall and increasing demand on some of the region's smaller groundwater resources has lessened the amount of fresh water within these lenses and increased salinity. Potential for seawater incursion is also becoming a concern.
		Hard water	YES	Lincoln basin averages 360 mg/L, Uley South averages 270, Uley Wanilla averages 280 CaCO3 for 2004 to 2007 (200-500 mg/L causes increase in scaling problems).
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.

WATER QU		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to SA Water
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	Agriculture
		Chemicals / process	YES	Fishing industry/potential mine industry
	Population	Seasonal population loadings	YES	Moderate population changes due to fishing industry.
		Rapid population growth	NO	Population increase = 0.51%/annum based on 2006/2001 census (Urban Centre/Locality), which is below the state average (0.76%/annum) for the same period.
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
		Algal blooms	NO	
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	NO	
		Pesticide contamination	Unknown	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	NO	Yes has been level 3 in the past and now is enhanced level 3.
		Taste and odour issues	NO	
		Other contamination that would affect health	YES	High salts and hardness.
Notes			Morgan-Whyalla pipeline will be connected to other rural towns using the groundwater this year. This will reduce the pressure in the groundwater.	

Town # 62

TOWN	State/Territory	SA		
	Town Name	Mt Barker		
	Town Population	10,272 (SA Water Data, based on the suburb of Mount Barker)		
WATER UTILITY	Name of Water Utility	Riverland Water		
	Rate ($/kL)	Quarterly supply charge of $34.40 Quarterly water use charges based meter readings taken approximately every 3 months*: For the first 0.3288 kL used per day $0.97 per kilolitre (kL) For use above 0.3288 kL per day $1.88 per kL For use above 1.4247kL per day for homes, home units, maisonettes, townhouses, row houses and some shacks $2.26 per kL.		
	Per Capita Water Consumption (L/day)	180 L/person/day (based on residential use only)		
	Number of Connections	3,873		
CATCHMENT AND WATER SUPPLY	Catchment	Murray River		
	Sub-Catchment	Lower Murray		
	Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB) , Natural Resources Management Board (NRMB)		
	CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	Murray River		
	Supply Capacity	River - allowable extraction		
WATER QUALITY	Treatment Plant(s)	Summit WTP, Balhannah		
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (UV and NHCl2), Fluoridation, Storage and distribution)		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Source	SA Water Drinking Water Quality Report 07-08	
		Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	N/A	
		Chlorine Residual- Total [mg/L]	100%	
		TDS [by EC] [mg/L]	86%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	100%	
		pH Units	30%	
		Trialomethanes-Total [ug/L]	100%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	100%	
		Total Hardness as CaCO3 [mg/L]	100%	
		Manganese as CaCo3 [mg/L]	100%	
WATER SECURITY	Current Water Restrictions	Yes, Level 3 Enhanced Water Restrictions (Dripper and trigger nozzle hoses 3 hours a week, buckets and watering cans any time, permits required for swimming pools). Level 3 water restrictions apply to all properties under a Supply by Measure Agreement connected directly or indirectly to any of the following trunk mains: Mannum Adelaide.		
	Proportion of Potable Water Supplied to Households (%)	70% residential, 30% non-residential.		
	Distance from the Coast (km)	30		
	Climate	Temperate		
	Average Annual Rainfall	764mm		
FACTOR		YES / NO	NOTES / EXPLANATION	
WATER QUALITY OR SECURITY RISK (CAUSE) — Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps	
	Single drinking water source	YES	Mannum-Adelaide Pipeline	
	Poor quality water source	NO		
	Sewage overflow or disposal into water source	NO		
	Flooding	YES	Historical floods in Mt Barker and Murray River	
	Fauna defecating in supply	YES	Not a problem due to WTP	
	Fauna destroying water intake structures	NO		
	Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown		
	Un-lined landfills	NO		
	Extensive agriculture	YES	Extensive grazing and cropping. Dryland and irrigated agriculture.	
	Low vegetation cover (dust, sediment runoff)	YES	Cleared and modified native vegetation, cropping and grasslands.	
	Poor access to supply	NO		
	Unsustainable water extraction	YES	Low flows causing several issues for Murray River Region.	
	Aquifer turning saline due to high extraction	NO		
	Hard water	NO	Water quality report shows WTP water to be of good quality	
	Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.	
	Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.	
Governance	High per capita water consumption	NO	According to SA Water	
	Inappropriate water quality standards / objectives	NO		
	Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.	
	Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.	
	Vandalism / sabotage / terrorism	NO		
	Insufficient trained personnel	NO		
	Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.	
ustries	Mining / minerals	NO		
	Irrigation	YES	Irrigated cropping occurs in this catchment.	

	Ind	Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	YES	Above state average (.76%/annum) - 5.28%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality))
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	100% of all tests meet AWDG guidelines this year
		Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	NO	
		Pesticide contamination	Unknown	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Since 2003
		Taste and odour issues	YES	
		Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality). Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall)
Notes				

Town # 63

TOWN	State/Territory	SA		
	Town Name	Victor Harbor		
	Town Population	10,794 (SA Water Data, based on the suburbs of Encounter Bay, Victor Harbor, McCracken, Hayborough)		
WATER UTILITY	Name of Water Utility	SA Water -United Group Infrastructure/United water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	270 L/person/day (based on residential use only)		
	Number of Connections	6412		
CATCHMENT AND WATER SUPPLY	Catchment	River Murray and Myponga River Catchment		
	Sub-Catchment	Lower Murray		
	Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB)/Adelaide and Mount Lofty Ranges Natural Resources Management Board		
	CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	River Murray		
		Myponga reservoir		
	Supply Capacity	Murray River - allowable extraction		
		Myponga Reservoir - 15 000 megalitres per year average, 26 800 megalitres maximum		
WATER QUALITY	Treatment Plant(s)	Myponga WTP		
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (UV and NHCl2), Fluoridation, Storage and distribution) for the Reservoir, Membrane plant with CL2 Disinfection for the River Murray.		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	100%	
		Chlorine Residual- Total [mg/L]	N/A	
		TDS [by EC] [mg/L]	100%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	100%	
		pH Units	100%	
		Trialomethanes-Total [ug/L]	66%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	100%	
		Total Hardness as CaCO3 [mg/L]	100%	
		Manganese	100%	
WATER SECURITY	Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.		
	Proportion of Potable Water Supplied to Households (%)	75% residential, 25% non-residential		
	Distance from the Coast (km)	0		
	Climate	Temperate		
	Average Annual Rainfall	535mm Victor Harbor/750mm Myponga Catchment		
FACTOR		YES / NO	NOTES / EXPLANATION	
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	NO	Reservoir and river Murray water.
		Poor quality water source	YES	The Myponga River catchment is used intensively for grazing dairy cattle. Water quality is frequently poor in terms of nutrient concentrations, organic carbon levels and protozoan contamination. Oxidised Nitrogen Good Total Nitrogen Good Soluble Phosphorus Poor Total Phosphorus Moderate Turbidity Good
		Sewage overflow or disposal into water source	NO	Sewer overflows to the environment have been reduced from 20.7 per 100km of main in 2005-2006 to 0 in 2006-2007.
		Flooding	NO	Improvements to flood due to high tide have been made recently.
		Fauna defecating in supply	YES	Myponga catchments has intensive livestock land use, but this should not be an issue due to WTP.
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	There is an unlined landfill in the region. This is no longer in use and can not be located via the internet. It is not mentioned in river health/water quality documents so is unlikely to be an issue.
		Extensive agriculture	YES	Myponga catchments has intensive livestock land use.
		Low vegetation cover (dust, sediment runoff)	NO	Farming with some remnant forest and woodlands.
		Poor access to supply	NO	
		Unsustainable water extraction	YES	Available information suggests that the current flow conditions are providing adequate environmental flows to maintain health in the Myponga River. This is not the case with the Murray River.
		Aquifer turning saline due to high extraction	YES	Documents suggest allocation greater than sustainable yield. Full use of allocation will increase water level decline and potentially increase salinity. Declining groundwater levels increasing the potential for leakage and contamination between aquifers and loss to stream flow.
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		High per capita water consumption	NO	According to SA Water

	Governance	Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	Yes	Dairy farms
	Population	Seasonal population loadings	YES	Holiday Destination
		Rapid population growth	YES	Above state average (.76%/annum) - 3.27%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality))
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	YES	Myponga catchments has intensive livestock land use
		Algal blooms	YES	SA Water has identified continuation of cyanobacterial bloom management at Myponga reservoir
		Heavy metal contamination	YES	Moderate amounts of total copper and soluble aluminium, poor levels of total iron
		Poor chlorine residuals	NO	
		Pesticide contamination	Unknown	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Since 2003
		Taste and odour issues	Unknown	
		Other contamination that would affect health	YES	The nutrient levels in the Myponga River are often elevated in the winter months, coinciding with higher rainfall flushing animal wastes into the river. Nutrient levels in the Myponga catchment are being addressed by the EPA through a Myponga Watercourse Restoration Project.
Notes				

Town # 64

TOWN	State/Territory	SA		
	Town Name	Goolwa		
	Town Population	6,055 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	SA Water -United Group Infrastructure/United water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	280 L/person/day (based on residential use only)		
	Number of Connections	3923		
CATCHMENT AND WATER SUPPLY	Catchment	River Murray and Myponga River Catchment		
	Sub-Catchment	Lower Murray		
	Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB)/Adelaide and Mount Lofty Ranges Natural Resources Management Board		
	CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	River Murray		
		Myponga reservoir		
	Supply Capacity	Murray River - allowable extraction		
		Myponga Reservoir - 15 000 megalitres per year average, 26 800 megalitres maximum		
WATER QUALITY	Treatment Plant(s)	Myponga WTP		
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (UV and NHCl2), Fluoridation, Storage and distribution) for the Reservoir, Membrane plant with CL2 Disinfection for the River Murray		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	100%	
		Chlorine Residual- Total [mg/L]	N/A	
		TDS [by EC] [mg/L]	100%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	59%	
		pH Units	81%	
		Trialomethanes-Total [ug/L]	96%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	92%	
		Total Hardness as CaCO3 [mg/L]	100%	
		Manganese	100%	
WATER SECURITY	Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.		
	Proportion of Potable Water Supplied to Households (%)	85% residential, 15% non-residential		
	Distance from the Coast (km)	0		
	Climate	temperate		
	Average Annual Rainfall	535mm Victor Harbor/750mm Myponga Catchment		
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	NO	reservoir and river Murray water
		Poor quality water source	YES	The Myponga River catchment is used intensively for grazing dairy cattle. Water quality is frequently poor in terms of nutrient concentrations, organic carbon levels and protozoan contamination. Oxidised Nitrogen Good Total Nitrogen Good Soluble Phosphorus Poor Total Phosphorus Moderate Turbidity Good
		Sewage overflow or disposal into water source	NO	Sewer overflows to the environment have been reduced form 20.7 per 100km of main in 2005-2006 to 0 in 2006-2007.
		Flooding	NO	Improvements to flood due to high tide have been made recently
		Fauna defecating in supply	YES	Myponga catchments has intensive livestock land use, but this should not be an issue due to WTP.
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	NO	There is an unlined landfill in the region. This is no longer in use and can not be located via the internet. It is not mentioned in river health/water quality documents so is unlikely to be an issue.
		Extensive agriculture	YES	Myponga catchments has intensive livestock land use
		Low vegetation cover (dust, sediment runoff)	NO	Farming with some remnant forest and woodlands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	Available information suggests that the current flow conditions are providing adequate environmental flows to maintain health in the Myponga River. Thos is not the case with the Murray River
		Aquifer turning saline due to high extraction	YES	Documents suggest allocation greater than sustainable yield. Full use of allocation will increase water level decline and potentially increase salinity. Declining groundwater levels increasing the potential for leakage and contamination between aquifers and loss to stream flow.
		Hard water	NO	
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		High per capita water consumption	NO	According to SA Water
		Inappropriate water quality standards / objectives	NO	

	Governance	Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	NO	
		Chemicals / process	Yes	Dairy farms
	Population	Seasonal population loadings	YES	Holiday Destination
		Rapid population growth	YES	Above state average (.76%/annum) - 7.18%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality))
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	YES	Myponga catchments has intensive livestock land use
		Algal blooms	YES	SA Water has identified continuation of cyanobacterial bloom management at Myponga reservoir
		Heavy metal contamination	YES	Moderate amounts of total copper and soluble aluminium, poor levels of total iron.
		Poor chlorine residuals	NO	
		Pesticide contamination	Unknown	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Since 2003
		Taste and odour issues	Unknown	
		Other contamination that would affect health	YES	The nutrient levels in the Myponga River are often elevated in the winter months, coinciding with higher rainfall flushing animal wastes into the river. Nutrient levels in the Myponga catchment are being addressed by the EPA through a Myponga Watercourse Restoration Project.
Notes				

Town # 65

TOWN	State/Territory	SA		
	Town Name	Naracoorte		
	Town Population	4,888 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	SA Water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	260 L/person/day (based on residential use only)		
	Number of Connections	2,227		
CATCHMENT AND WATER SUPPLY	Catchment	Limestone Aquifer		
	Sub-Catchment	Naracoorte Ranges Unconfined Aquifer		
	Catchment Management Authority (CMA)	EPA-South Australia, South East Natural Resources Management Board. The EPA focuses its water quality monitoring on the unconfined aquifer in the area		
	CMA Web-Link	http://www.senrm.sa.gov.au/		
	Catchment Protection Status	None		
	Potable Water Source(s)	Limestone Aquifer		
	Supply Capacity	Groundwater bore - allowable extraction/sustainable yield is 4,500 ML/yr		
WATER QUALITY	Treatment Plant(s)	N/A		
	Level of Treatment	Cl2 Disinfection Only		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	100%	
		Chlorine Residual- Total [mg/L]	N/A	
		TDS [by EC] [mg/L]	0%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	100%	
		pH Units	100%	
		Trialomethanes-Total [ug/L]	100%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	67%	
		Total Hardness as CaCO3 [mg/L]	0%	
		Manganese	100%	
WATER SECURITY	Current Water Restrictions	Permanent Water Conservation Measures- 1. Watering gardens, grounds and nurseries Public or private gardens, recreational areas, sports grounds or nurseries can be watered: By hand, Through a drip-feed irrigation system , through a sprinkler - after 5pm and before 10am on any day (including public or private gardens, recreation areas, sports grounds and nurseries. 2. Water must not be used to clean a motor vehicle or boat unless the water is applied from a bucket, high-pressure low volume water cleaner, trigger nozzle hose or a commercial car wash. 3. Construction sites: Water must not be used to control dust or other pollutants resulting from building works unless the water is applied from a hand-held hose fitted with a trigger nozzle, or directly from a motor vehicle designed to carry and deposit water.		
	Proportion of Potable Water Supplied to Households (%)	83% residential, 17% non-residential		
	Distance from the Coast (km)	80		
	Climate	Temperate		
	Average Annual Rainfall	577.9mm		

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	Bore field.
		Poor quality water source	YES	In terms of drinking water quality, the groundwater in the South East is
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No records found
		Fauna defecating in supply	NO	
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	YES	testing of WQ in the south east region shows high levels of nitrates
		Un-lined landfills	NO	
		Extensive agriculture	YES	Australian Intensive Agriculture Zone
		Low vegetation cover (dust, sediment runoff)	NO	
		Poor access to supply	NO	
		Unsustainable water extraction	NO	Low level of extraction (0-29%).
		Aquifer turning saline due to high extraction	NO	Turning saline due to land practices.
		Hard water	YES	Refer to WQ compliance stats.
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to SA Water.
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	ustries	Mining / minerals	NO	
		Irrigation	YES	Cropping

	Ind	Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	NO	Below state average (.76%/annum) - 0.5%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality)))
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	Unknown	
		Algal blooms	NO	
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	Unknown	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Permanent water conservation measures since 2002.
		Taste and odour issues	Unknown	
		Other contamination that would affect health	Unknown	High nitrates
Notes				

Town # 66

TOWN	State/Territory	SA		
	Town Name	Millicent		
	Town Population	4,771 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	SA Water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	160 L/person/day (based on residential use only)		
	Number of Connections	2000		
CATCHMENT AND WATER SUPPLY	Catchment	Limestone Aquifer		
	Sub-Catchment	There are two aquifers in the area - an upper unconfined aquifer and a lower confined aquifer.		
	Catchment Management Authority (CMA)	EPA-South Australia, South East Natural Resources Management Board. The EPA focuses its water quality monitoring on the unconfined aquifer in the area		
	CMA Web-Link	http://www.senrm.sa.gov.au/		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	Limestone Aquifer		
	Supply Capacity	Groundwater bore - allowable extraction		
WATER QUALITY	Treatment Plant(s)	N/A		
	Level of Treatment	Cl2 Disinfection Only		
	Drinking Water Guidelines	2004 AWDG		
	Results (% compliance for 2008 reporting period)	Faecal Coliforms/100 mL	99%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	100%	
		Chlorine Residual- Total [mg/L]	N/A	
		TDS [by EC] [mg/L]	0%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	83%	
		pH Units	100%	
		Trialomethanes-Total [ug/L]	100%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	100%	
		Total Hardness as CaCO3 [mg/L]	0%	
		Manganese	100%	
WATER SECURITY	Current Water Restrictions	Permanent Water Conservation Measures- 1. Watering gardens, grounds and nurseries Public or private gardens, recreational areas, sports grounds or nurseries can be watered: By hand, Through a drip-feed irrigation system , through a sprinkler - after 5pm and before 10am on any day (including public or private gardens, recreation areas, sports grounds and nurseries. 2. Water must not be used to clean a motor vehicle or boat unless the water is applied from a bucket, high-pressure low volume water cleaner, trigger nozzle hose or a commercial car wash. 3. Construction sites: Water must not be used to control dust or other pollutants resulting from building works unless the water is applied from a hand-held hose fitted with a trigger nozzle, or directly from a motor vehicle designed to carry and deposit water.		
	Proportion of Potable Water Supplied to Households (%)	78% residential, 22% non-residential		
	Distance from the Coast (km)	15		
	Climate	Temperate		
	Average Annual Rainfall	786.5mm		

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	Not in a declared area of EC
		Single drinking water source	YES	Bores
		Poor quality water source	YES	In terms of drinking water quality, the groundwater in the South East is poor because of elevated nitrate agricultural practices. Elevated salinity in groundwater across the South East means that drinking water quality is poor because of the effect on taste. Drinking water quality is also considered poor because of elevated metal concentrations. This is mostly due to iron.
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No records found
		Fauna defecating in supply	NO	
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	YES	Drinking water shows poor levels of nitrates and metals
		Un-lined landfills	NO	
		Extensive agriculture	YES	Intensive cropping-cereals/grain legumes/oil seeds
		Low vegetation cover (dust, sediment runoff)	NO	
		Poor access to supply	NO	
		Unsustainable water extraction	NO	Low level of extraction (0-29% of total aquifer water is extracted for stock/human/irrigation use)
		Aquifer turning saline due to high extraction	NO	Turning Saline due to land use practices (i.e.. Removal of native trees and planting high rotation crops. Extraction levels are not contributing to salinity)
		Hard water	Yes	0% tests passed
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	

		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	Cropping
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	YES	Above state average (.76%/annum) - 1.5%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality))
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	YES	There was not 100% tests above AWDG
		Algal blooms	NO	
		Heavy metal contamination	YES	Water quality classification has labelled it poor for drinking water quality. Drinking water quality is also considered poor because of elevated metal concentrations. This is mostly due to iron, which can discolour water.
		Poor chlorine residuals	NO	
		Pesticide contamination	NO	No results of pesticide contamination in the Millicent area form 1998-2005.
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	
		Taste and odour issues	NO	
		Other contamination that would affect health	YES	Nitrites - concerns regarding the extensive grazing and dairying on the Limestone aquifers in the south-east of South Australia. A groundwater quality management plan is being implemented.
Notes				

Town # 67

TOWN	State/Territory	SA		
	Town Name	Nuriootpa		
	Town Population	5,114 (SA Water Data, based on suburb of Nuriootpa)		
WATER UTILITY	Name of Water Utility	SA Water -Riverland Water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	240 L/person/day (based on residential use only)		
	Number of Connections	2057		
CATCHMENT AND WATER SUPPLY	Catchment	Murray River Catchment		
	Sub-Catchment	Lower Murray		
	Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB) , Natural Resources Management Board (NRMB)		
	CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	Murray River		
	Supply Capacity	Murray River - allowable extraction unknown		
WATER QUALITY	Treatment Plant(s)	Swan Reach WTP		
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (UV and NHCl2), Fluoridation, Storage and distribution)		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Overall		
		Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	N/A	
		Chlorine Residual- Total [mg/L]	100%	
		TDS [by EC] [mg/L]	100%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	100%	
		pH Units	0%	
		Trialomethanes-Total [ug/L]	100%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	100%	
		Total Hardness as CaCO3 [mg/L]	100%	
		Manganese	100%	
WATER SECURITY	Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.		
	Proportion of Potable Water Supplied to Households (%)	52% residential, 48% non-residential		
	Distance from the Coast (km)	50		
	Climate	Temperate		
	Average Annual Rainfall	500.5		

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	From the Morgan-Whyalla Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No historical record for Pt Augusta
		Fauna defecating in supply	YES	Not a problem due to WTP
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	fruit industry/vineyards and cropping
		Low vegetation cover (dust, sediment runoff)	YES	cleared and modified native vegetation, cropping and grasslands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	low flows causing several issues for Murray River Region
		Aquifer turning saline due to high extraction	NO	from high river extraction
		Hard water	NO	Water quality report shows WTP water to be of good quality
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to SA Water
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	irrigated cropping occurs in this catchment
		Chemicals / process	NO	
	n	Seasonal population loadings	NO	

Populatio	Rapid population growth	YES	Above state average (.76%/annum) - 2.9 %/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality)). Barossa is identified in the SA Government 30 year growth plan as an area to experience growth.
WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	NO	100% of all tests are above AWDG guidelines this year
	Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
	Heavy metal contamination	Unknown	
	Poor chlorine residuals	NO	
	Pesticide contamination	Unknown	
	Boil water notices	NO	
	Deaths or illness due to water quality	NO	
	Water restrictions (current and historic)	YES	since 2003
	Taste and odour issues	YES	
	Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality). Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall).
Notes			

Town # 68

TOWN		State/Territory	SA	
		Town Name	Renmark	
		Town Population	4,339 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	SA Water -River Water	
		Rate ($/kL)	Quarterly supply charge of $34.40	
		Per Capita Water Consumption (ML/day)	410 L/person/day (based on residential use only)	
		Number of Connections	1983	
CATCHMENT AND WATER SUPPLY		Catchment	Murray River	
		Sub-Catchment	Lower Murray	
		Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB) , Natural Resources Management Board (NRMB)	
		CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/	
		Catchment Protection Status	Prescribed	
		Potable Water Source(s)	Murray River	
		Supply Capacity	River - allowable extraction unknown	
WATER QUALITY		Treatment Plant(s)	Renmark WTP, Renmark	
		Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (UV and Cl2), Fluoridation, Storage and distribution)	
		Drinking Water Guidelines	ADWG 2004	
		Results (% compliance for 2008 reporting period)	Faecal Coliforms/100 mL	100%
			E.Coli/100mL	100%
			Chlorine Residual-Free [mg/L]	100%
			Chlorine Residual- Total [mg/L]	N/A
			TDS [by EC] [mg/L]	100%
			Colour-True [HU]	100%
			Turbidity [NTU]	100%
			pH Units	100%
			Trialomethanes-Total [ug/L]	100%
			Fluoride [mg/L]	100%
			Iron-Total [mg/L]	100%
			Total Hardness as CaCO3 [mg/L]	100%
			Manganese	100%
WATER SECURITY		Current Water Restrictions	Level 3 Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.	
		Proportion of Potable Water Supplied to Households (%)	81% residential, 19% non-residential	
		Distance from the Coast (km)	218	
		Climate	Temperate	
		Average Annual Rainfall	260.5mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	From the Morgan-Whyalla Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No historical record for Pt Augusta
		Fauna defecating in supply	YES	Not an issue due to WTP
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	fruit industry/vineyards and cropping
		Low vegetation cover (dust, sediment runoff)	YES	cleared and modified native vegetation, cropping and grasslands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	low flows causing several issues for Murray River Region
		Aquifer turning saline due to high extraction	N/A	from high river extraction
		Hard water	NO	Water quality report shows WTP water to be of good quality
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	irrigated cropping occurs in this catchment
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	NO	population decreasing
T)		Pathogenic contamination	NO	100% of all tests are above AWDG guidelines this year

WATER QUALITY OR SECURITY RISK (EFFEC	Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
	Heavy metal contamination	YES	
	Poor chlorine residuals	NO	
	Pesticide contamination	Unknown	
	Boil water notices	NO	
	Deaths or illness due to water quality	NO	
	Water restrictions (current and historic)	YES	Since 2002
	Taste and odour issues	YES	
	Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality).Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall).
Notes			

Town # 69

TOWN	State/Territory	SA		
	Town Name	Tanunda		
	Town Population	4,500 (SA Water Data, based on suburb of Tanunda)		
WATER UTILITY	Name of Water Utility	SA Water -Riverland Water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	280 L/person/day (based on residential use only)		
	Number of Connections	1956		
CATCHMENT AND WATER SUPPLY	Catchment	Murray River		
	Sub-Catchment	Lower Murray		
	Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB) , Natural Resources Management Board (NRMB)		
	CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	Murray River		
	Supply Capacity	River - allowable extraction unknown		
WATER QUALITY	Treatment Plant(s)	Swan Reach WTP		
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (UV and NHCl2), Fluoridation, Storage and distribution)		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Overall	100%	
		Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	100%	
		Chlorine Residual- Total [mg/L]	N/A	
		TDS [by EC] [mg/L]	100%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	100%	
		pH Units	100%	
		Trialomethanes-Total [ug/L]	100%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	100%	
		Total Hardness as CaCO3 [mg/L]	100%	
		Manganese	100%	
WATER SECURITY	Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.		
	Proportion of Potable Water Supplied to Households (%)	59% residential, 41% non-residential		
	Distance from the Coast (km)	46		
	Climate	Temperate		
	Average Annual Rainfall	493.4mm		

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	From the Swan Reach-Stockwell Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	
		Fauna defecating in supply	YES	Not an issue due to WTP
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	fruit industry/vineyards and cropping
		Low vegetation cover (dust, sediment runoff)	YES	cleared and modified native vegetation, cropping and grasslands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	low flows causing several issues for Murray River Region
		Aquifer turning saline due to high extraction	YES	from high river extraction
		Hard water	NO	Water quality report shows WTP water to be of good quality
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to SA Water
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	irrigated cropping occurs in this catchment
		Chemicals / process	NO	

	Population	Seasonal population loadings	NO	
		Rapid population growth	YES	Above state average (.76%/annum) - 1.65%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality))
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	100% of all tests are above AWDG guidelines this year
		Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	Unknown	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	Since 2002
		Taste and odour issues	YES	
		Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality). Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall).
Notes				

Town # 70

TOWN	State/Territory	SA		
	Town Name	Berri		
	Town Population	4,008 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	SA Water (Riverland Water)		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	360 L/person/day (based on residential use only)		
	Number of Connections	1756		
CATCHMENT AND WATER SUPPLY	Catchment	Murray River		
	Sub-Catchment	Lower Murray		
	Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB) , Natural Resources Management Board (NRMB)		
	CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	River Murray		
	Supply Capacity	River - allowable extraction unknown		
WATER QUALITY	Treatment Plant(s)	Berri WTP, Berri		
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (UV and Cl2), Fluoridation, Storage and distribution)		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Overall	100%	
		Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	100%	
		Chlorine Residual- Total [mg/L]	N/A	
		TDS [by EC] [mg/L]	100%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	100%	
		pH Units	100%	
		Trialomethanes-Total [ug/L]	100%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	100%	
		Total Hardness as CaCO3 [mg/L]	100%	
		Manganese	100%	
WATER SECURITY	Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.		
	Proportion of Potable Water Supplied to Households (%)	73% residential, 27% non-residential		
	Distance from the Coast (km)	202		
	Climate	Temperate		
	Average Annual Rainfall	261.3mm		

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	From the Morgan-Whyalla Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No historical record for Pt Augusta
		Fauna defecating in supply	YES	Not an issue due to the WTP
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	fruit industry/vineyards and cropping
		Low vegetation cover (dust, sediment runoff)	YES	cleared and modified native vegetation, cropping and grasslands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	low flows causing several issues for Murray River Region
		Aquifer turning saline due to high extraction	YES	from high river extraction
		Hard water	NO	Water quality report shows WTP water to be of good quality
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to Sa Water
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	irrigated cropping occurs in this catchment
		Chemicals / process	NO	
	lation	Seasonal population loadings	NO	

Popu	Rapid population growth	NO	Population is decreasing
WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	NO	100% of all tests are above AWDG guidelines this year
	Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
	Heavy metal contamination	YES	
	Poor chlorine residuals	NO	
	Pesticide contamination	YES	
	Boil water notices	NO	
	Deaths or illness due to water quality	NO	
	Water restrictions (current and historic)	YES	Since 2002
	Taste and odour issues	YES	
	Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality). Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall).
Notes			

Town # 71

TOWN	State/Territory	SA		
	Town Name	Strathalbyn		
	Town Population	4,861 (SA Water Data, based on suburb of Strathalbyn)		
WATER UTILITY	Name of Water Utility	SA Water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	240 L/person/day (based on residential use only)		
	Number of Connections	1889		
CATCHMENT AND WATER SUPPLY	Catchment	River Murray		
	Sub-Catchment	Lower Murray		
	Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB)/Adelaide and Mount Lofty Ranges Natural Resources Management Board		
	CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	River Murray		
		Myponga reservoir		
	Supply Capacity	Murray River - allowable extraction unknown		
		Myponga Reservoir - 15 000 megalitres per year average, 26 800 megalitres maximum		
WATER QUALITY	Treatment Plant(s)	Summit WTP, Balhanna		
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimention, Filtration, Disinfection (UV and		
	Drinking Water Guidelines	2004 ADWG		
	Results (% compliance for 2008 reporting period)	Overall		
		Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	N/A	
		Chlorine Residual- Total [mg/L]	100%	
		TDS [by EC] [mg/L]	100%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	86%	
		pH Units	30%	
		Trialomethanes-Total [ug/L]	100%	
		Flouride [mg/L]	100%	
		Iron-Total [mg/L]	91%	
		Total Hardness as CaCO3 [mg/L]	100%	
		Manganese as CaCo3 [mg/L]	100%	
WATER SECURITY	Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.		
	Proportion of Potable Water Supplied to Households (%)	77% residential, 23% non- residential		
	Distance from the Coast (km)	0		
	Climate	Temperate		
	Average Annual Rainfall	535mm Victor Harbor/750mm Myponga Catchment		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	Mannum-Adelaide Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	YES	Historical floods in Mt Barker and Murrya River
		Fauna defecating in supply	YES	Not a problem due to WTP
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, flouride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	extensive grazing and cropping. Dryland and irrigated agriculture
		Low vegetation cover (dust, sediment runoff)	YES	cleared and modifed native vegetation, cropping and grasslands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	low flows causing several issues for Murray River Region
		Aquifer turning saline due to high extraction	NO	from high river extraction
		Hard water	NO	Water quality report shows WTP water to be of good quality
		Aging or inadequate pipework and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to SA Water
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	irrigated cropping occurs in this catchment
		Chemicals / process	NO	
	Operati	Seasonal population loadings	NO	

	Rapid population growth	YES	
WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	NO	100% of all tests are above AWDG guidlelines this year
	Algal blooms	YES	At the beginning of 2007, the predictions for low Murray River flows into South Australia were a cause for concern. The potential water quality issues from these low flows included elevated cyanobacterial blooms and buildup of cyanobacteria in connected wetlands. SA Water, with support from MDBC, undertook a pilot project to investigate the use of high-definition aerial photography for the early detection of potential water quality issues. This monitoring has proven to be invaluable. Algal blooms were detected early in the river channel and water treatment was enhanced at the local treatment plant. Blooms in connected wetlands were detected, as well as numerous issues in both the main channel of the Murray and in backwaters and wetlands. The aerial imagery enabled improved management of these issues and has established a benchmark for Murray River floodplain management. Cyanobacteria or blue-green algae are naturally occurring organisms that can increase in numbers to produce a freshwater algal bloom, under certain conditions. Some human activities, such as farming with lots of fertilisers, produce high levels of nutrients in water, which can lead to algal blooms. These occur when
	Heavy metal contamination	Unknown	
	Poor chlorine residuals	NO	
	Pesticide contamination	Unknown	
	Boil water notices	NO	
	Deaths or illness due to water quality	NO	
	Water restrictions (current and historic)	YES	Since 2003
	Taste and odour issues	YES	
	Other contamination that would affect health	YES	Increasing salinity in the Murray River is a critical issue for the quality of our drinking water. Long-term below average rainfall over the past 10 years has reduced river. was a number of elevated phosphorus and nitrate readings. The recent rains may have washed stormwater pollution (such as fertilisers, manure and detergent) into our creeks and rivers. Ten sites recorded phosphorous levels higher than 0.1mgL. 0.4mgL of phosphorous were taken at Angas River (ANG300), Wellington (MUR410) and Byethorne Park (BYE010) which could lead to algal blooms flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality.
Notes			

Town # 72

TOWN		State/Territory	SA	
		Town Name	Roxby Downs	
		Town Population	5,160 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Roxby Water	
		Rate ($/kL)	$2.83	
		Per Capita Water Consumption (ML/day)	2.0	
		Number of Connections	10800	
CATCHMENT AND WATER SUPPLY		Catchment	Great Artesian Basin	
		Sub-Catchment	Eromanga Basin near the southern and eastern areas of lake Eyre	
		Catchment Management Authority (CMA)	Arid Areas Catchment Water Management Board	
		CMA Web-Link	http://www.saalnrm.sa.gov.au/About_Us/What_we_do.aspx	
		Catchment Protection Status	Water Resources Act 1997 on 27 March 2003	
		Potable Water Source(s)	Eromanga Basin	
		Supply Capacity	Groundwater Bores- 40ML/d (this includes water to Olympic dam)	
WATER QUALITY		Treatment Plant(s)	BHP desal and WTP Plant	
		Level of Treatment	Desalinisation Plant and "treatment" by The Western Mining Corporation, Chlorine injection by Roxby Council	
		Drinking Water Guidelines	Guidelines created based on AWDG 2004	
		Results (% compliance for 2008 reporting period)	Overall	Statement found indicates that Water quality is above or on par with that of SA WATER results.
WATER SECURITY		Current Water Restrictions	No- not to any federal or state requirements	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	210	
		Climate	Temperate	
		Average Annual Rainfall	211mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	EC and BOM
		Single drinking water source	YES	Total water is sourced from surface water
		Poor quality water source	YES	Water is very soft, of high quality, has a small amount of natural fluoride and is low in dissolved solids. Water has been tested and compared against a range of other urban water supplies and bottled water with favourable results.
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No historical data
		Fauna defecating in supply	NO	
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	YES	Seems likely due to proximity of Olympic dam
		Un-lined landfills	NO	
		Extensive agriculture	NO	
		Low vegetation cover (dust, sediment runoff)	YES	Native grasslands and minimally modified pastures
		Poor access to supply	NO	
		Unsustainable water extraction	Unknown	
		Aquifer turning saline due to high extraction	Unknown	
		Hard water	NO	Council report states that Water is very soft
		Aging or inadequate pipe work and associated infrastructure	NO	
		Significant water losses due to leaking pipes	NO	
	Governance	High per capita water consumption	Unknown	
		Inappropriate water quality standards / objectives	NO	Council Report indicates the standards on par with AWDG 2004
		Lack of infrastructure maintenance	NO	
		Poor management or governance	NO	Run by BHP
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	YES	Olympic Dam
		Irrigation	NO	
		Chemicals / process	YES	Olympic Dam
	Population	Seasonal population loadings	NO	
		Rapid population growth	YES	Above state average (.76%/annum) - 1.3%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality))
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination		
		Algal blooms		
		Heavy metal contamination		
		Poor chlorine residuals		
		Pesticide contamination		
		Boil water notices		
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)		
		Taste and odour issues		
		Other contamination that would affect health		
Notes				

Town # 73

TOWN		State/Territory	SA	
		Town Name	Loxton	
		Town Population	4,419 (SA Water Data, based on suburb of Loxton)	
WATER UTILITY		Name of Water Utility	SA Water -Riverland Water	
		Rate ($/kL)	Quarterly supply charge of $34.40	
		Per Capita Water Consumption (ML/day)	350 L/person/day (based on residential use only)	
		Number of Connections	1644	
CATCHMENT AND WATER SUPPLY		Catchment	Murray Darling Basin	
		Sub-Catchment	Southern Basin	
		Catchment Management Authority (CMA)	South Australia Murray Darling Basin (SAMDB) , Natural Resources Management Board (NRMB)	
		CMA Web-Link	http://www.mdba.gov.au/ http://www.nrm.sa.gov.au/	
		Catchment Protection Status	prescribed	
		Potable Water Source(s)	River Murray	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Loxton WTP, Loxton	
		Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (UV and NHCl2), Fluoridation, Storage and distribution)	
		Drinking Water Guidelines	ADWG 2004	
		Results (% compliance for 2008 reporting period)	Faecal Coliforms/100 mL	100%
			E.Coli/100mL	100%
			Chlorine Residual-Free [mg/L]	N/A
			Chlorine Residual- Total [mg/L]	100%
			TDS [by EC] [mg/L]	100%
			Colour-True [HU]	100%
			Turbidity [NTU]	100%
			pH Units	4%
			Trialomethanes-Total [ug/L]	100%
			Fluoride [mg/L]	100%
			Iron-Total [mg/L]	100%
			Total Hardness as CaCO3 [mg/L]	100%
			Manganese	100%
WATER SECURITY		Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.	
		Proportion of Potable Water Supplied to Households (%)	84% residential, 16% non-residential	
		Distance from the Coast (km)	117	
		Climate	Temperate	
		Average Annual Rainfall	272.3mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	From the Morgan-Whyalla Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No historical record for Pt Augusta
		Fauna defecating in supply	YES	Not an issue due to WTP
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	extensive grazing and cropping. Dryland and irrigated agriculture
		Low vegetation cover (dust, sediment runoff)	YES	cleared and modified native vegetation, cropping and grasslands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	low flows causing several issues for Murray River Region
		Aquifer turning saline due to high extraction	YES	from high river extraction
		Hard water	NO	Water quality report shows WTP water to be of good quality
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to SA Water
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	irrigated cropping occurs in this catchment
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	NO	Below state average (.76%/annum) - .47%/annum;. (population decrease based on 2006/2001 census (Urban Centre/Locality))
		Pathogenic contamination	NO	100% of all tests are above AWDG guidelines this year

WATER QUALITY OR SECURITY RISK (EFFECT)	Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
	Heavy metal contamination	Unknown	
	Poor chlorine residuals	NO	
	Pesticide contamination	Unknown	
	Boil water notices	NO	
	Deaths or illness due to water quality	NO	
	Water restrictions (current and historic)	YES	
	Taste and odour issues	YES	
	Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality). Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall).
Notes			

Town # 74

TOWN	State/Territory	SA	
	Town Name	Moonta	
	Town Population	3,404 (SA Water Data, based on suburbs cross roads, kooroona, moonta, moonta bay, moonta mines, north moonta, north yelta, port hughes)	
WATER UTILITY	Name of Water Utility	SA Water	
	Rate ($/kL)	Quarterly supply charge of $34.40 Quarterly water use charges based meter readings taken approximately every 3 months*: For the first 0.3288 kL used per day $0.97 per kilolitre (kL) For use above 0.3288 kL per day $1.88 per kL For use above 1.4247kL per day for homes, home units, maisonettes, townhouses, row houses and some shacks $2.26 per kL	
	Per Capita Water Consumption (ML/day)	340 L/person/day (based on residential use only)	
	Number of Connections	2419	
CATCHMENT AND WATER SUPPLY	Catchment	Murray Darling Basin	
	Sub-Catchment	Southern Basin	
	Catchment Management Authority (CMA)	Murray-Darling Basin Authority	
	CMA Web-Link	http://www.mdba.gov.au/	
	Catchment Protection Status	Prescribed	
	Potable Water Source(s)	River Murray	
	Supply Capacity	River - allowable extraction unknown	
WATER QUALITY	Treatment Plant(s)	Morgan-Swan Reach WTP	
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (UV and NHCl2), Fluoridation, Storage and distribution)	
	Drinking Water Guidelines	ADWG 2004	
	Results (% compliance for 2008 reporting period)	Overall	Source: SA Water Drinking Water Quality Report 07-08
		Faecal Coliforms/100 mL	100%
		E.Coli/100mL	100%
		Chlorine Residual-Free [mg/L]	N/A
		Chlorine Residual- Total [mg/L]	100%
		TDS [by EC] [mg/L]	100%
		Colour-True [HU]	100%
		Turbidity [NTU]	100%
		pH Units	1%
		Trialomethanes-Total [ug/L]	100%
		Fluoride [mg/L]	100%
		Iron-Total [mg/L]	100%
		Total Hardness as CaCO3 [mg/L]	100%
WATER SECURITY	Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.	
	Proportion of Potable Water Supplied to Households (%)	82% residential, 18% non-residential	
	Distance from the Coast (km)	0	
	Climate	Temperate	
	Average Annual Rainfall	388.6mm	

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	From the Morgan-Whyalla Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No historical record for Pt Augusta
		Fauna defecating in supply	YES	Not an issue because of WTP
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	extensive grazing and cropping. Dryland and irrigated agriculture
		Low vegetation cover (dust, sediment runoff)	YES	cleared and modified native vegetation, cropping and grasslands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	low flows causing several issues for Murray River Region
		Aquifer turning saline due to high extraction	YES	from high river extraction
		Hard water	NO	Water quality report shows WTP water to be of good quality
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to SA Water
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	

		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	irrigated cropping occurs in this catchment
		Chemicals / process	NO	
	Population	Seasonal population loadings	Yes	According to SA Water Data
		Rapid population growth	Yes	Above state average (.76%/annum) - 1.8%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality))
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	100% of all tests are above AWDG guidelines this year
		Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	Unknown	
		Pesticide contamination	Unknown	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	YES	
		Taste and odour issues	YES	
		Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality). Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall).
Notes				

Town # 75

TOWN	State/Territory	SA		
	Town Name	Clare		
	Town Population	3,063 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	SA Water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	320 L/person/day (based on residential use only)		
	Number of Connections	1457		
CATCHMENT AND WATER SUPPLY	Catchment	Murray Darling Basin		
	Sub-Catchment	Southern Basin		
	Catchment Management Authority (CMA)	-		
	CMA Web-Link	http://www.mdba.gov.au/		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	Murray River		
	Supply Capacity	Water delivered via the Morgan – Whyalla pipeline is from SA Water's existing Country Allocation from the River Murray. Unrestricted, this allocation is 50 GL/a. However, recent drought conditions have seen the allocations drop to 31 GL/a in 2007-08. Supply capacity to particular town is unknown.		
WATER QUALITY	Treatment Plant(s)	Morgan Filtration Plant, Morgan		
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (NHCl2),		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	N/A	
		Chlorine Residual- Total [mg/L]	100%	
		TDS [by EC] [mg/L]	96%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	99%	
		pH Units	52%	
		Trialomethanes-Total [ug/L]	96%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	100%	
		Total Hardness as CaCO3 [mg/L]	100%	
WATER SECURITY	Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.		
	Proportion of Potable Water Supplied to Households (%)	75% residential, 25% non-residential		
	Distance from the Coast (km)	37		
	Climate	Temperate		
	Average Annual Rainfall	530.5		

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	From the Morgan-Whyalla Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No historical record for Pt Augusta
		Fauna defecating in supply	YES	Not an issue due to WTP
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	extensive grazing and cropping. Dryland and irrigated agriculture
		Low vegetation cover (dust, sediment runoff)	YES	cleared and modified native vegetation, cropping and grasslands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	low flows causing several issues for Murray River Region
		Aquifer turning saline due to high extraction	YES	from high river extraction
		Hard water	NO	Water quality report shows WTP water to be of good quality
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to SA Water Data
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	irrigated cropping occurs in this catchment
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	NO	Above state average (.76%/annum) - 1%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality))
T)		Pathogenic contamination	NO	100% of all tests meet AWDG guidelines this year

WATER QUALITY OR SECURITY RISK (EFFEC	Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
	Heavy metal contamination	Unknown	
	Poor chlorine residuals	NO	
	Pesticide contamination	Unknown	
	Boil water notices	NO	
	Deaths or illness due to water quality	NO	
	Water restrictions (current and historic)	YES	
	Taste and odour issues	YES	
	Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality). Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall).
Notes			

Town # 76

TOWN	State/Territory	SA		
	Town Name	Wallaroo		
	Town Population	3,144 (SA Water Data, based on suburbs North Beach and Wallaroo)		
WATER UTILITY	Name of Water Utility	SA Water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	280 L/person/day (based on residential use only)		
	Number of Connections	2132		
CATCHMENT AND WATER SUPPLY	Catchment	Murray River		
	Sub-Catchment	Lower Murray		
	Catchment Management Authority (CMA)	Murray-Darling Basin Authority		
	CMA Web-Link	http://www.mdba.gov.au/		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	Murray River		
	Supply Capacity	River - allowable extraction		
WATER QUALITY	Treatment Plant(s)	Swan Reach WTP		
	Level of Treatment	Conventional Water Treatment Plant (Coagulation, Flocculation, Sedimentation, Filtration, Disinfection (NHCl2),		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	100%	
		Chlorine Residual- Total [mg/L]	N/A	
		TDS [by EC] [mg/L]	100%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	100%	
		pH Units	0%	
		Trialomethanes-Total [ug/L]	100%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	100%	
		Total Hardness as CaCO3 [mg/L]	100%	
		Manganese	100%	
WATER SECURITY	Current Water Restrictions	Level 3 Enhanced Water Restrictions- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.		
	Proportion of Potable Water Supplied to Households (%)	70% residential, 30% non-residential		
	Distance from the Coast (km)	0		
	Climate	Temperate		
	Average Annual Rainfall	388.6		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	YES	From the Morgan-Whyalla Pipeline
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	No historical record for Pt Augusta
		Fauna defecating in supply	YES	
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	extensive grazing and cropping. Dryland and irrigated agriculture
		Low vegetation cover (dust, sediment runoff)	YES	cleared and modified native vegetation, cropping and grasslands
		Poor access to supply	NO	
		Unsustainable water extraction	YES	low flows causing several issues for Murray River Region
		Aquifer turning saline due to high extraction	YES	from high river extraction
		Hard water	NO	Water quality report shows WTP water to be of good quality
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	NO	According to SA Water
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	NO	
		Irrigation	YES	irrigated cropping occurs in this catchment
		Chemicals / process	NO	
	Population	Seasonal population loadings	YES	Holiday retirement destination
		Rapid population growth	YES	Above state average (.76%/annum) - 2.5%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality))
SK (EFFECT)		Pathogenic contamination	NO	100% of all tests are above AWDG guidelines this year
		Algal blooms	YES	A total of 53 blooms were recorded in SA Water Reservoirs between 2002 and 2007, while a further 100 blooms were detected along the Murray River.
		Heavy metal contamination	Unknown	

WATER QUALITY OR SECURITY RI	Poor chlorine residuals	NO	
	Pesticide contamination	Unknown	
	Boil water notices	NO	
	Deaths or illness due to water quality	NO	
	Water restrictions (current and historic)	YES	since 2002 and level 3 enhanced currently
	Taste and odour issues	YES	
	Other contamination that would affect health	YES	Increasing salinity -(critical issue for the quality of our drinking water in the Murray. Long-term below average rainfall over the past 10 years has reduced river flows and salt has accumulated in the floodplains and disconnected wetlands. While the water quality meets drinking water guidelines at the moment, when river flows are increased, this accumulated salt may reduce water quality). Elevated phosphorus and nitrate readings (fertilisers, manure and detergent washed in from rainfall).
Notes			

Town # 77

TOWN	State/Territory	SA		
	Town Name	Bordertown		
	Town Population	2,581 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	SA Water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	310 L/person/day (based on residential use only)		
	Number of Connections	1330		
CATCHMENT AND WATER SUPPLY	Catchment	Limestone Aquifer		
	Sub-Catchment	unconfined aquifer in the Keith-Willalooka-Bordertown area		
	Catchment Management Authority (CMA)	EPA-South Australia, South East Natural Resources Management Board. The EPA focuses its water quality monitoring on the unconfined aquifer in the area		
	CMA Web-Link	http://www.senrm.sa.gov.au/		
	Catchment Protection Status	prescribed		
	Potable Water Source(s)	unconfined aquifer in the Keith-Willalooka-Bordertown area		
	Supply Capacity	Groundwater bore - allowable extraction		
WATER QUALITY	Treatment Plant(s)	N/A		
	Level of Treatment	Cl2 Disinfection Only		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Overall		
		Faecal Coliforms/100 mL	98%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	100%	
		Chlorine Residual- Total [mg/L]	N/A	
		TDS [by EC] [mg/L]	25%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	100%	
		pH Units	100%	
		Trialomethanes-Total [ug/L]	100%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	100%	
		Total Hardness as CaCO3 [mg/L]	0%	
		Manganese	100%	
WATER SECURITY	Current Water Restrictions	Permanent Water Conservation Measures- 1. Watering gardens, grounds and nurseries Public or private gardens, recreational areas, sports grounds or nurseries can be watered: By hand, Through a drip-feed irrigation system , through a sprinkler - after 5pm and before 10am on any day (including public or private gardens, recreation areas, sports grounds and nurseries. 2. Water must not be used to clean a motor vehicle or boat unless the water is applied from a bucket, high-pressure low volume water cleaner, trigger nozzle hose or a commercial car wash. 3. Construction sites: Water must not be used to control dust or other pollutants resulting from building works unless the water is applied from a hand-held hose fitted with a trigger nozzle, or directly from a motor vehicle designed to carry and deposit water.		
	Proportion of Potable Water Supplied to Households (%)	75% residential, 25% non-residential		
	Distance from the Coast (km)	56		
	Climate	Temperate		
	Average Annual Rainfall	462.4mm		
FACTOR		YES / NO	NOTES / EXPLANATION	
WATER QUALITY OR SECURITY RISK (CAUSE)	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps	
Catchment and Water Supply	Single drinking water source	YES	Bores	
	Poor quality water source	YES	In terms of drinking water quality, the groundwater in the South East is poor because of elevated nitrate agricultural practices. Elevated salinity in groundwater across the South East means that drinking water quality is poor because of its effect on taste. Drinking water quality is also considered poor because of elevated metal concentrations. This is mostly due to iron, which can discolour water.	
	Sewage overflow or disposal into water source	NO		
	Flooding	NO	No historical flooding	
	Fauna defecating in supply	NO		
	Fauna destroying water intake structures	NO		
	Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	YES	South east area has high nitrate levels	
	Un-lined landfills	NO		
	Extensive agriculture	YES	Intensive Cropping-Cereals/Grain Legumes/Oil Seeds (Black Soils)	
	Low vegetation cover (dust, sediment runoff)	NO		
	Poor access to supply	NO		
	Unsustainable water extraction	YES	High level of extraction (70-100%). The groundwater extractions have been compared to the sustainable yield and categorised in each groundwater management unit by percentage. The volumes of extraction and sustainable yield are for 2004/05. In many areas, management actions since 2005 have led to reduced levels of extraction.	
	Aquifer turning saline due to high extraction	NO	turning saline due to land use	
	Hard water	YES	Does not meet AWDG guidelines	
	Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.	
	Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.	
ance	High per capita water consumption	NO	According to SA Water	
	Inappropriate water quality standards / objectives	NO		
	Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.	

	Govern	Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	
		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	
	Industries	Mining / minerals	NO	
		Irrigation	YES	
		Chemicals / process	NO	
	Population	Seasonal population loadings	NO	
		Rapid population growth	NO	Above state average (.76%/annum) - 1.2%/annum;. (population increase based on 2006/2001 census (Urban Centre/Locality))
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	Yes	At test site has not had 100% compliance.
		Algal blooms	NO	
		Heavy metal contamination	Unknown	
		Poor chlorine residuals	NO	
		Pesticide contamination	Unknown	
		Boil water notices	NO	
		Deaths or illness due to water quality	NO	
		Water restrictions (current and historic)	Yes	
		Taste and odour issues	NO	
		Other contamination that would affect health	Unknown	
Notes				

Town # 78

TOWN	State/Territory	SA		
	Town Name	Ceduna		
	Town Population	2,304 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	SA Water		
	Rate ($/kL)	Quarterly supply charge of $34.40		
	Per Capita Water Consumption (ML/day)	200 L/person/day (based on residential use only)		
	Number of Connections	852		
CATCHMENT AND WATER SUPPLY	Catchment	Uley Basin/Lincoln Basin		
	Sub-Catchment	N/A		
	Catchment Management Authority (CMA)	− Department of Water, Land and Biodiversity Conservation (DWLBC) − Eyre Peninsula Natural Resources Management Board (EPNRMB) − EPNRMB Water Resources Advisory Committee (WRAC)		
	CMA Web-Link	www.epnrm.sa.gov.au		
	Catchment Protection Status	Prescribed		
	Potable Water Source(s)	Uley Basin South/Uley Wanilla/Lincoln Basin		
	Supply Capacity	Bore Field - allowable extraction. Recharge rates are applied to the assessed 'catchment' area of each lens to generate an annual recharge volume for each lens. 60% of this annual recharge is set aside to maintain the integrity of the resource, leaving ~40% available for allocation (a percentage of which is set aside for stock and domestic users). Recharge rates are gazetted in November each year, which set the allocation for the following financial year. Uley Wanilla 230.9 ML/a Uley East 180.9 ML/a Uley South 7224.0 ML/a Lincoln A, B and C 928.6 ML/a		
WATER QUALITY	Treatment Plant(s)	N/A		
	Level of Treatment	Cl2 Disinfection Only		
	Drinking Water Guidelines	ADWG 2004		
	Results (% compliance for 2008 reporting period)	Faecal Coliforms/100 mL	100%	
		E.Coli/100mL	100%	
		Chlorine Residual-Free [mg/L]	100%	
		Chlorine Residual- Total [mg/L]	N/A	
		TDS [by EC] [mg/L]	0%	
		Colour-True [HU]	100%	
		Turbidity [NTU]	100%	
		pH Units	100%	
		Trialomethanes-Total [ug/L]	100%	
		Fluoride [mg/L]	100%	
		Iron-Total [mg/L]	100%	
		Total Hardness as CaCO3 [mg/L]	0%	
WATER SECURITY	Current Water Restrictions	Yes, Level 3 Enhanced Water Restrictions since July 2009- Dripper systems and hand-held hoses fitted with a trigger nozzle can be used for a maximum of 3 hours 2 days a week between 6 am - 9 am or 6pm - 9 pm. Watering cans and buckets can be used on any day/time. Sprinklers and other watering systems remain banned.		
	Proportion of Potable Water Supplied to Households (%)	commercial 6.5%, Industrial 0.3%, Primary Production 0.0%, Public Institution 7.5%, Public Utilities 0.2%, Recreation 7.4%, Residential 63.9%, Unclassified 7.4%, Vacant Land 6.8%		
	Distance from the Coast (km)	0		
	Climate	Temperate		
	Average Annual Rainfall	297.2mm		
FACTOR		YES / NO	NOTES / EXPLANATION	
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	YES	Yes, Based on the PIRSA EC maps and BOM 3 year rain maps
		Single drinking water source	NO	Uley and Lincoln groundwater
		Poor quality water source	NO	
		Sewage overflow or disposal into water source	NO	
		Flooding	NO	
		Fauna defecating in supply	NO	
		Fauna destroying water intake structures	NO	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Unknown	
		Un-lined landfills	NO	
		Extensive agriculture	YES	Yes surrounding the Pt Lincoln Area, bores are in national park
		Low vegetation cover (dust, sediment runoff)	NO	
		Poor access to supply	NO	
		Unsustainable water extraction	YES	WATER levels in Eyre Peninsula groundwater basins have dropped by up to five metres since 1970 due to below average rainfall and unsustainable extraction
		Aquifer turning saline due to high extraction	YES	due to low levels. Potential for seawater incursion is also becoming a concern
		Hard water	YES	Lincoln basin averages 360 mg/L, Uley South averages 270, Uley Wanilla averages 280 CaCO3 for 2004 to 2007 (200-500 mg/L causes increasing scaling problems)
		Aging or inadequate pipe work and associated infrastructure	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Significant water losses due to leaking pipes	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Governance	High per capita water consumption	No	
		Inappropriate water quality standards / objectives	NO	
		Lack of infrastructure maintenance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Poor management or governance	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
		Vandalism / sabotage / terrorism	NO	

		Insufficient trained personnel	NO	
		Inadequate funding for maintenance or upgrades	NO	SA Water undertakes integrated asset management covering all of its water infrastructure across South Australia, that ensures ongoing satisfactory operation of the assets and reliable service to customers.
	Industries	Mining / minerals	YES	Iluka Resources Limited plans to begin mining and shipping heavy mineral concentrate mine by the end of the first quarter in 2010
	Industries	Irrigation	NO	
	Industries	Chemicals / process	YES	Fishing/aquaculture
	Population	Seasonal population loadings	NO	
	Population	Rapid population growth	NO	Population is deceasing however it is expected to increase in the near future due to mining
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Algal blooms	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Heavy metal contamination	Unknown	
WATER QUALITY OR SECURITY RISK (EFFECT)		Poor chlorine residuals	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pesticide contamination	Unknown	
WATER QUALITY OR SECURITY RISK (EFFECT)		Boil water notices	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Deaths or illness due to water quality	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Water restrictions (current and historic)	YES	it has been level 2 since 2003 and now is level 3 enhanced
WATER QUALITY OR SECURITY RISK (EFFECT)		Taste and odour issues	NO	
WATER QUALITY OR SECURITY RISK (EFFECT)		Other contamination that would affect health	NO	
Notes			Ceduna will be connected to the Morgan-Whyalla pipeline this year to reduce the pressure on the groundwater resources	

AECOM

Town Profiles – WA

Review of Regional Water Quality & Security

Appendices
Volume 2

Town # 79

TOWN		State/Territory	WA	
		Town Name	Bridgetown	
		Town Population	2,322 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Water Corporation of WA	
		Rate ($/kL)	$0.72 to $7.69 per kL	
		Per Capita Water Consumption (ML/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	South West Region	
		Sub-Catchment	Boyup Brook	
		Catchment Protection Status	Unknown	
		Potable Water Source(s)	Boyup Brook	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Yes	
		Level of Treatment	Unknown	
		Drinking Water Guidelines	ADWG 1987	
		Results (% compliance for 2008 reporting period)	Overall	100% compliance
			Thermotolerant Coliforms	Samples taken 51; 100% compliance
			Thermophilic Naegleria	Samples taken 26; 100% compliance
			Fluoride (mean)	Samples taken 2 (<0.10mg/L);
			Hydrocarbons	Samples taken 0
			Metals	Samples taken 2; 100% compliance
			Nitrate (mean)	Samples taken 4 (<0.05mg/L); 100% compliance
			Pesticides	Samples taken 2; 100% compliance
			Radiological	Samples taken 0;
			Trihalomethanes (mean)	Samples taken 2 (0.098mg/L); 100% compliance
WATER SECURITY		Current Water Restrictions	Yes	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	100km	
		Climate	Temperate; Max mean temperature 22.3; Min mean temperature 8.4	
		Average Annual Rainfall	829.9 mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills		Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Extensive agriculture	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Low vegetation cover (dust, sediment runoff)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	No	Unconfirmed Local Knowledge.
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	Yes	Holiday town
		Rapid population growth	No	Unconfirmed Local Knowledge.

WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 80

TOWN	State/Territory	WA		
	Town Name	Broome		
	Town Population	11,548 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Water Corporation of WA		
	Rate ($/kL)	$0.72 to $2.76 per kL		
	Per Capita Water Consumption (ML/day)	Unknown		
	Number of Connections	Unknown		
CATCHMENT AND WATER SUPPLY	Catchment	NorthWest Region		
	Sub-Catchment	Unknown		
	Catchment Protection Status	Unknown		
	Potable Water Source(s)	Ground Water		
	Supply Capacity	Unknown		
WATER QUALITY	Treatment Plant(s)	Yes		
	Level of Treatment	Unknown		
	Drinking Water Guidelines	ADWG 1987		
	Results (% compliance for 2008 reporting period)	Overall	100% compliance	
		Thermotolerant Coliforms	Samples taken 72; 100% compliance	
		Thermophilic Naegleria	Samples taken 72; 100% compliance	
		Fluoride (mean)	Samples taken 52 (0.61mg/L);	
		Hydrocarbons	Samples taken 0	
		Metals	Samples taken 4; 100% compliance	
		Nitrate (mean)	Samples taken 4 (4.4mg/L); 100% compliance	
		Pesticides	Samples taken 2; 100% compliance	
		Radiological	Samples taken 0;	
		Trihalomethanes (mean)	Samples taken 4 (<0.004mg/L); 100% compliance	
WATER SECURITY	Current Water Restrictions	Yes		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	0 km		
	Climate	Grassland; Max mean temperature 32.1; Min mean temperature 21.1		
	Average Annual Rainfall	574.9 mm		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Extensive agriculture	No	Unconfirmed Local Knowledge.
		Low vegetation cover (dust, sediment runoff)	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	No	Unconfirmed Local Knowledge.
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	Not known	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	Yes	Holiday town
		Rapid population growth	Yes	5% per year - Shire of Broome- Local Housing Development Strategy 2009

WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 81

TOWN	State/Territory	WA		
	Town Name	Carnarvon		
	Town Population	5,284 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Water Corporation of WA		
	Rate ($/kL)	$0.72 to $6.54 per kL		
	Per Capita Water Consumption (L/day)	Unknown		
	Number of Connections	Unknown		
CATCHMENT AND WATER SUPPLY	Catchment	Mid West Region		
	Sub-Catchment	Not known		
	Catchment Protection Status	Not known		
	Potable Water Source(s)	Not known		
	Supply Capacity	Not known		
WATER QUALITY	Treatment Plant(s)	Yes		
	Level of Treatment	Not known		
	Drinking Water Guidelines	ADWG 1987		
	Results (% compliance for 2008 reporting period)	Overall	100% compliance	
		Thermotolerant Coliforms	Samples taken 65; 100% compliance	
		Thermophilic Naegleria	Samples taken 40; 100% compliance	
		Fluoride (mean)	Samples taken 4 (0.49mg/L);	
		Hydrocarbons	Samples taken 0	
		Metals	Samples taken 8; 100% compliance	
		Nitrate (mean)	Samples taken 2 (0.8mg/L); 100% compliance	
		Pesticides	Samples taken 4; 100% compliance	
		Radiological	Samples taken 1; 100% compliance	
		Trihalomethanes (mean)	Samples taken 2 (0.006mg/L); 100% compliance	
WATER SECURITY	Current Water Restrictions	Yes		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	0 km		
	Climate	Desert; Max mean temperature 27.2; Min mean temperature 16.6		
	Average Annual Rainfall	230.8 mm		
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge.
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	Yes	Unconfirmed Local Knowledge: Gascoyne River basin
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Extensive agriculture	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Low vegetation cover (dust, sediment runoff)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	No	Unconfirmed Local Knowledge.
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Unconfirmed Local Knowledge.
ECT)		Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues

WATER QUALITY OR SECURITY RISK (EFF	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 82

TOWN		State/Territory	WA	
		Town Name	Collie	
		Town Population	7,083 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Water Corporation of WA	
		Rate ($/kL)	$0.72 to $4.42 per kL	
		Per Capita Water Consumption (ML/day)	Unknown	
		Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY		Catchment	South West Region	
		Sub-Catchment	-	
		Catchment Protection Status	Good	
		Potable Water Source(s)	Harris Dam	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Yes	
		Level of Treatment	Not known	
		Drinking Water Guidelines	ADWG 1987	
		Results (% compliance for 2008 reporting period)	Overall	100% compliance
			Thermotolerant Coliforms	Samples taken 69; 100% compliance
			Thermophilic Naegleria	Samples taken 33; 100% compliance
			Fluoride (mean)	Samples taken 52 (0.74mg/L);
			Hydrocarbons	Samples taken 0
			Metals	Samples taken 4; 100% compliance
			Nitrate (mean)	Samples taken 8 (<0.05mg/L); 100% compliance
			Pesticides	Samples taken 2; 100% compliance
			Radiological	Samples taken 0;
			Trihalomethanes (mean)	Samples taken 6 (0.076mg/L); 100% compliance
WATER SECURITY		Current Water Restrictions	Yes	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	60km	
		Climate	Temperate; Max mean temperature 22.5; Min mean temperature 8.4	
		Average Annual Rainfall	938.8 mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge.
		Poor quality water source	No	Wellington Dam source has Salinity Issues. Harris Dam Option is used.
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	No	Unconfirmed Local Knowledge
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	Yes	Plans for lining in future - Source Shire Engineer
		Extensive agriculture	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Low vegetation cover (dust, sediment runoff)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	Yes	Coal Mining Operations in the area
		Irrigation	Yes	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Unconfirmed Local Knowledge.
(EFFECT)		Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues

WATER QUALITY OR SECURITY RISK	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge. Drought related.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 83

TOWN		State/Territory	WA	
		Town Name	Esperance	
		Town Population	9,535 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Water Corporation of WA	
		Rate ($/kL)	$0.72 to $4.42 per kL	
		Per Capita Water Consumption (ML/day)	Not known	
		Number of Connections	Not known	
CATCHMENT AND WATER SUPPLY		Catchment	Gold Fields and Agricultural Region	
		Sub-Catchment	Not known	
		Catchment Protection Status	Not known	
		Potable Water Source(s)	Ground and Surface	
		Supply Capacity	Not known	
WATER QUALITY		Treatment Plant(s)	Yes	
		Level of Treatment	None	
		Drinking Water Guidelines	ADWG 1987	
		Results (% compliance for 2008 reporting period)	Overall	100% compliance
			Thermotolerant Coliforms	Samples taken 91; 100% compliance
			Thermophilic Naegleria	Samples taken 61; 100% compliance
			Fluoride (mean)	Samples taken 54 (0.83mg/L);
			Hydrocarbons	Samples taken 0
			Metals	Samples taken 2; 100% compliance
			Nitrate (mean)	Samples taken 5 (4.2mg/L); 100% compliance
			Pesticides	Samples taken 5; 100% compliance
			Radiological	Samples taken 0;
			Trihalomethanes (mean)	Samples taken 2 (0.044mg/L); 100% compliance
WATER SECURITY		Current Water Restrictions	Yes	
		Proportion of Potable Water Supplied to Households (%)	Unknown	
		Distance from the Coast (km)	0 km	
		Climate	Temperate; Max mean temperature 21.8; Min mean temperature 12.0	
		Average Annual Rainfall	623.2 mm	

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	Yes	Shire Engineer
		Extensive agriculture	No	Unconfirmed Local Knowledge.
		Low vegetation cover (dust, sediment runoff)	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	Yes	Coastal town
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	No	Unconfirmed Local Knowledge.
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	Yes	Holiday town
		Rapid population growth	No	Unconfirmed Local Knowledge.

WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 84

TOWN	State/Territory		WA	
	Town Name		Exmouth	
	Town Population		1,843 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility		Water Corporation of WA	
	Rate ($/kL)		$0.72 to $5.33 per kL	
	Per Capita Water Consumption (ML/day)		Not known	
	Number of Connections		Not known	
CATCHMENT AND WATER SUPPLY	Catchment		Mid West Region	
	Sub-Catchment		Not known	
	Catchment Protection Status		Not known	
	Potable Water Source(s)		Ground	
	Supply Capacity		Not known	
WATER QUALITY	Treatment Plant(s)		Yes	
	Level of Treatment		None	
	Drinking Water Guidelines		ADWG 1987	
	Results (% compliance for 2008 reporting period)	Overall	100% compliance	
		Thermotolerant Coliforms	Samples taken 65; 100% compliance	
		Thermophilic Naegleria	Samples taken 40; 100% compliance	
		Fluoride (mean)	Samples taken 53 (0.68mg/L);	
		Hydrocarbons	Samples taken 0	
		Metals	Samples taken 2; 100% compliance	
		Nitrate (mean)	Samples taken 3 (1.9mg/L); 100% compliance	
		Pesticides	Samples taken 1; 100% compliance	
		Radiological	Samples taken 1; 100% compliance	
		Trihalomethanes (mean)	Samples taken 2 (0.003mg/L); 100% compliance	
WATER SECURITY	Current Water Restrictions		Yes	
	Proportion of Potable Water Supplied to Households (%)		Unknown	
	Distance from the Coast (km)		0 km	
	Climate		Grassland; Max mean temperature 28.8; Min mean temperature 19.1 (Vlamingh Head)	
	Average Annual Rainfall		296.1 mm (Vlamingh Head)	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	Yes	Shire Engineering section
		Extensive agriculture	No	Unconfirmed Local Knowledge.
		Low vegetation cover (dust, sediment runoff)	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	Yes	Coastal town
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	No	Unconfirmed Local Knowledge.
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	Yes	Holiday town
		Rapid population growth	No	Unconfirmed Local Knowledge.

WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 85

TOWN	State/Territory	WA		
	Town Name	Kalbarri		
	Town Population	1,328 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Water Corporation of WA		
	Rate ($/kL)	$0.72 to $2.76 per kL		
	Per Capita Water Consumption (L/day)	Not known		
	Number of Connections	Not known		
CATCHMENT AND WATER SUPPLY	Catchment	Mid West Region		
	Sub-Catchment	Not known		
	Catchment Protection Status	Not known		
	Potable Water Source(s)	Ground Water		
	Supply Capacity	Not known		
WATER QUALITY	Treatment Plant(s)	Yes		
	Level of Treatment	Not known		
	Drinking Water Guidelines	ADWG 1987		
	Results (% compliance for 2008 reporting period)	Overall	100% compliance	
		Thermotolerant Coliforms	Samples taken 52; 100% compliance	
		Thermophilic Naegleria	Samples taken 27; 100% compliance	
		Fluoride (mean)	Samples taken 2 (<0.10mg/L);	
		Hydrocarbons	Samples taken 0	
		Metals	Samples taken 2; 100% compliance	
		Nitrate (mean)	Samples taken 2 (0.7mg/L); 100% compliance	
		Pesticides	Samples taken 1; 100% compliance	
		Radiological	Samples taken 0	
		Trihalomethanes (mean)	Samples taken 2 (0.004mg/L); 100% compliance	
WATER SECURITY	Current Water Restrictions	Yes		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	0 km		
	Climate	Grassland; Max mean temperature 27.5; Min mean temperature 14.5		
	Average Annual Rainfall	353.8 mm		

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Extensive agriculture	No	Unconfirmed Local Knowledge.
		Low vegetation cover (dust, sediment runoff)	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	Yes	Coastal town
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	No	Unconfirmed Local Knowledge.
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	Yes	Holiday town
		Rapid population growth	No	Unconfirmed Local Knowledge.

WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 86

TOWN	State/Territory	WA		
	Town Name	Karratha		
	Town Population	11,727 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Water Corporation of WA		
	Rate ($/kL)	$0.76 to $5.33 per kL		
	Per Capita Water Consumption (ML/day)	Not known		
	Number of Connections	Not known		
CATCHMENT AND WATER SUPPLY	Catchment	North West Region		
	Sub-Catchment	Not known		
	Catchment Protection Status	Not known		
	Potable Water Source(s)	Ground and Surface Water		
	Supply Capacity	Not known		
WATER QUALITY	Treatment Plant(s)	Yes		
	Level of Treatment	Not known		
	Drinking Water Guidelines	ADWG 1987		
	Results (% compliance for 2008 reporting period)	Overall	100% compliance	
		Thermotolerant Coliforms	Samples taken 72; 100% compliance	
		Thermophilic Naegleria	Samples taken 72; 100% compliance	
		Fluoride (mean)	Samples taken 54 (0.66mg/L);	
		Hydrocarbons	Samples taken 0	
		Metals	Samples taken 1; 100% compliance	
		Nitrate (mean)	Samples taken 4 (<0.05mg/L); 100% compliance	
		Pesticides	Samples taken 1; 100% compliance	
		Radiological	Samples taken 0	
		Trihalomethanes (mean)	Samples taken 4 (0.158mg/L); 100% compliance	
WATER SECURITY	Current Water Restrictions	Yes		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	0 km		
	Climate	Desert; Max mean temperature 32.3; Min mean temperature 20.7		
	Average Annual Rainfall	281.6 mm		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Extensive agriculture	No	Unconfirmed Local Knowledge.
		Low vegetation cover (dust, sediment runoff)	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	Yes	Coastal town
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	Yes	Mineral Export Port Facility
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	No	Large proportion of non resident (FIFO) workforce
		Rapid population growth	Yes	"Karratha Vision 2020" - Shire of Karratha
ECT)		Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues

WATER QUALITY OR SECURITY RISK (EFF	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 87

TOWN		State/Territory	WA	
		Town Name	Manjimup	
		Town Population	4,239 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Water Corporation of WA	
		Rate ($/kL)	$0.76 to $6.54 per kL	
		Per Capita Water Consumption (ML/day)	Not known	
		Number of Connections	Not known	
CATCHMENT AND WATER SUPPLY		Catchment	South West Region	
		Sub-Catchment	Not known	
		Catchment Protection Status	Not known	
		Potable Water Source(s)	Not known	
		Supply Capacity	Not known	
WATER QUALITY		Treatment Plant(s)	Yes	
		Level of Treatment	Not known	
		Drinking Water Guidelines	ADWG 1987	
		Results (% compliance for 2008 reporting period)	Overall	100% compliance
			Thermotolerant Coliforms	Samples taken 65; 100% compliance
			Thermophilic Naegleria	Samples taken 32; 100% compliance
			Fluoride (mean)	Samples taken 56 (0.73mg/L);
			Hydrocarbons	Samples taken 0
			Metals	Samples taken 2; 100% compliance
			Nitrate (mean)	Samples taken 4 (<0.05mg/L); 100% compliance
			Pesticides	Samples taken 4; 100% compliance
			Radiological	Samples taken 0
			Trihalomethanes (mean)	Samples taken 2 (0.045mg/L); 100% compliance
WATER SECURITY		Current Water Restrictions	Yes	
		Proportion of Potable Water Supplied to Households (%)	Not known	
		Distance from the Coast (km)	100km	
		Climate	Temperate; Max mean temperature 20.3; Min mean temperature 9.6	
		Average Annual Rainfall	1013.7mm	

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	Yes	
		Extensive agriculture	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Low vegetation cover (dust, sediment runoff)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	No	Unconfirmed Local Knowledge.
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	Yes	Holiday town
		Rapid population growth	No	Unconfirmed Local Knowledge.

WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 88

TOWN		State/Territory	WA	
		Town Name	Margaret River	
		Town Population	4,414 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Water Corporation of WA	
		Rate ($/kL)	$0.76 to $2.76 per kL	
		Per Capita Water Consumption (ML/day)	Not known	
		Number of Connections	Not known	
CATCHMENT AND WATER SUPPLY		Catchment	South West Region	
		Sub-Catchment	Not known	
		Catchment Protection Status	Not known	
		Potable Water Source(s)	Not known	
		Supply Capacity	Not known	
WATER QUALITY		Treatment Plant(s)	Yes	
		Level of Treatment	Not known	
		Drinking Water Guidelines	ADWG 1987	
		Results (% compliance for 2008 reporting period)	Overall	100% compliance
			Thermotolerant Coliforms	Samples taken 65; 100% compliance
			Thermophilic Naegleria	Samples taken 32; 100% compliance
			Fluoride (mean)	Samples taken 2 (<0.10mg/L);
			Hydrocarbons	Samples taken 0
			Metals	Samples taken 5; 100% compliance
			Nitrate (mean)	Samples taken 5 (0.1mg/L); 100% compliance
			Pesticides	Samples taken 4; 100% compliance
			Radiological	Samples taken 0
			Trihalomethanes (mean)	Samples taken 4 (0.096mg/L); 100% compliance
WATER SECURITY		Current Water Restrictions	Yes	
		Proportion of Potable Water Supplied to Households (%)	Not known	
		Distance from the Coast (km)	20km	
		Climate	Temperate; Max mean temperature 20.3; Min mean temperature 9.6	
		Average Annual Rainfall	1013.7mm	

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Extensive agriculture	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Low vegetation cover (dust, sediment runoff)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	No	Unconfirmed Local Knowledge.
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	Yes	Holiday town
		Rapid population growth	No	Unconfirmed Local Knowledge.

WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 89

TOWN	State/Territory	WA		
	Town Name	Narrogin		
	Town Population	4,238 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Water Corporation of WA		
	Rate ($/kL)	$0.76 to $6.54 per kL		
	Per Capita Water Consumption (ML/day)	Not known		
	Number of Connections	Not known		
CATCHMENT AND WATER SUPPLY	Catchment	Harris Dam Supply		
	Sub-Catchment	Harris dam		
	Catchment Protection Status	Good		
	Potable Water Source(s)	Not known		
	Supply Capacity	Not known		
WATER QUALITY	Treatment Plant(s)	Yes, at Harris Dam and re-chlorination on site		
	Level of Treatment	Not known		
	Drinking Water Guidelines	ADWG 1987		
	Results (% compliance for 2008 reporting period)	Overall	100% compliance	
		Thermotolerant Coliforms	Samples taken 60; 100% compliance	
		Thermophilic Naegleria	Samples taken 60; 100% compliance	
		Fluoride (mean)	Samples taken 50 (0.73mg/L);	
		Hydrocarbons	Samples taken 0	
		Metals	Samples taken 2; 100% compliance	
		Nitrate (mean)	Samples taken 2 (0.1mg/L); 100% compliance	
		Pesticides	Samples taken 1; 100% compliance	
		Radiological	Samples taken 1; 100% compliance	
		Trihalomethanes (mean)	Samples taken 2 (0.136mg/L); 100% compliance	
WATER SECURITY	Current Water Restrictions	Yes		
	Proportion of Potable Water Supplied to Households (%)	Unknown		
	Distance from the Coast (km)	100km		
	Climate	Temperate; Max mean temperature 22.3; Min mean temperature 9.3		
	Average Annual Rainfall	495.9 mm		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	Yes	
		Extensive agriculture	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Low vegetation cover (dust, sediment runoff)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industri	Mining / minerals	No	Unconfirmed Local Knowledge.

	Industries	Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
		Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes				

Town # 90

TOWN	State/Territory	WA		
	Town Name	Newman		
	Town Population	4,248 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Water Corporation of WA		
	Rate ($/kL)	$0.76 to $2.76 per kL		
	Per Capita Water Consumption (ML/day)	Not known		
	Number of Connections	Not known		
CATCHMENT AND WATER SUPPLY	Catchment	North West Region		
	Sub-Catchment	Not known		
	Catchment Protection Status	Not known		
	Potable Water Source(s)	Ground water		
	Supply Capacity	Not known		
WATER QUALITY	Treatment Plant(s)	yes		
	Level of Treatment	Not known		
	Drinking Water Guidelines	ADWG 1987		
	Results (% compliance for 2008 reporting period)	Overall	100% compliance	
		Thermotolerant Coliforms	Samples taken 62; 100% compliance	
		Thermophilic Naegleria	Samples taken 48; 100% compliance	
		Fluoride (mean)	Samples taken 1 (0.55mg/L);	
		Hydrocarbons	Samples taken 0	
		Metals	Samples taken 2; 100% compliance	
		Nitrate (mean)	Samples taken 2 (1.2mg/L); 100% compliance	
		Pesticides	Samples taken 1; 100% compliance	
		Radiological	Samples taken 1; 100% compliance	
		Trihalomethanes (mean)	Samples taken 2 (0.009mg/L); 100% compliance	
WATER SECURITY	Current Water Restrictions	Yes		
	Proportion of Potable Water Supplied to Households (%)	Not known		
	Distance from the Coast (km)	350km		
	Climate	Desert; Max mean temperature 31.4; Min mean temperature 17.3		
	Average Annual Rainfall	310.2 mm		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Extensive agriculture	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Low vegetation cover (dust, sediment runoff)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	Yes	Iron Ore mining Town
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	ulation	Seasonal population loadings	No	

	Popu	Rapid population growth	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
		Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes				

Town # 91

TOWN	State/Territory	WA		
	Town Name	Northam		
	Town Population	6,006 (Census 2006, Urban Centre/Locality)		
WATER UTILITY	Name of Water Utility	Water Corporation of WA		
	Rate ($/kL)	$0.76 to $5.33 per kL		
	Per Capita Water Consumption (ML/day)	Not known		
	Number of Connections	Not known		
CATCHMENT AND WATER SUPPLY	Catchment	Gold Fields and Agricultural Region		
	Sub-Catchment	Not known		
	Catchment Protection Status	Not known		
	Potable Water Source(s)	Not known		
	Supply Capacity	Not known		
WATER QUALITY	Treatment Plant(s)	Not known		
	Level of Treatment	Not known		
	Drinking Water Guidelines	ADWG 1987		
	Results (% compliance for 2008 reporting period)	Overall	100% compliance	
		Thermotolerant Coliforms	Samples taken 66; 100% compliance	
		Thermophilic Naegleria	Samples taken 66; 100% compliance	
		Fluoride (mean)	Samples taken 53 (0.84mg/L);	
		Hydrocarbons	Samples taken 0	
		Metals	Samples taken 2; 100% compliance	
		Nitrate (mean)	Samples taken 2 (0.6mg/L); 100% compliance	
		Pesticides	Samples taken 1; 100% compliance	
		Radiological	Samples taken 0	
		Trihalomethanes (mean)	Samples taken 2 (0.033mg/L); 100% compliance	
WATER SECURITY	Current Water Restrictions	Yes		
	Proportion of Potable Water Supplied to Households (%)	Not known		
	Distance from the Coast (km)	100km		
	Climate	Temperate; Max mean temperature 25.3; Min mean temperature 10.9		
	Average Annual Rainfall	429.5 mm		

		FACTOR	YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	Not known	
		Extensive agriculture	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Low vegetation cover (dust, sediment runoff)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	Yes	Iron Ore mining Town
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	No	
		Rapid population growth	No	Unconfirmed Local Knowledge.

WATER QUALITY OR SECURITY RISK (EFFECT)	Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

Town # 92

TOWN		State/Territory	WA	
		Town Name	Port Hedland	
		Town Population	11,557 (Census 2006, Urban Centre/Locality)	
WATER UTILITY		Name of Water Utility	Water Corporation of WA	
		Rate ($/kL)	$0.76 to $4.42 per kL	
		Per Capita Water Consumption (ML/day)	Not known	
		Number of Connections	Not known	
CATCHMENT AND WATER SUPPLY		Catchment	North West Region	
		Sub-Catchment	Not known	
		Catchment Protection Status	Not known	
		Potable Water Source(s)	Ground Water	
		Supply Capacity	Not known	
WATER QUALITY		Treatment Plant(s)	Yes	
		Level of Treatment	Not known	
		Drinking Water Guidelines	ADWG 1987	
		Results (% compliance for 2008 reporting period)	Overall	100% compliance
			Thermotolerant Coliforms	Samples taken 72; 100% compliance
			Thermophilic Naegleria	Samples taken 72; 100% compliance
			Fluoride (mean)	Samples taken 52 (0.43mg/L);
			Hydrocarbons	Samples taken 2; 100% compliance
			Metals	Samples taken 10; 100% compliance
			Nitrate (mean)	Samples taken 8 (0.9mg/L); 100% compliance
			Pesticides	Samples taken 2; 100% compliance
			Radiological	Samples taken 2; 100% compliance
			Trihalomethanes (mean)	Samples taken 4 (<0.004mg/L); 100% compliance
WATER SECURITY		Current Water Restrictions	Yes	
		Proportion of Potable Water Supplied to Households (%)	Not known	
		Distance from the Coast (km)	0 km	
		Climate	Desert; Max mean temperature 31.8; Min mean temperature 20.4	
		Average Annual Rainfall	329.5 mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Single drinking water source	Yes	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor quality water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Sewage overflow or disposal into water source	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Flooding	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna defecating in supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Fauna destroying water intake structures	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Un-lined landfills	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Extensive agriculture	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Low vegetation cover (dust, sediment runoff)	yes	Unconfirmed Local Knowledge.
		Poor access to supply	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Unsustainable water extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aquifer turning saline due to high extraction	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Hard water	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Aging or inadequate pipe work and associated infrastructure	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Significant water losses due to leaking pipes	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Governance	High per capita water consumption	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inappropriate water quality standards / objectives	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Lack of infrastructure maintenance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Poor management or governance	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Vandalism / sabotage / terrorism	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Insufficient trained personnel	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
		Inadequate funding for maintenance or upgrades	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Industries	Mining / minerals	Yes	Minerals Export - Port Facility
		Irrigation	No	Unconfirmed Local Knowledge.
		Chemicals / process	No	Unconfirmed Local Knowledge.
	Population	Seasonal population loadings	No	
		Rapid population growth	Yes	Growth in Minerals Industry
ECT)		Pathogenic contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues

WATER QUALITY OR SECURITY RISK (EFFI	Algal blooms	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Heavy metal contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Poor chlorine residuals	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Pesticide contamination	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Boil water notices	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Deaths or illness due to water quality	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Water restrictions (current and historic)	Yes	Unconfirmed Local Knowledge.
	Taste and odour issues	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
	Other contamination that would affect health	No	Unconfirmed Local Knowledge: based on Water Corporation advice that there are no issues
Notes			

AECOM

Town Profiles – NT

Review of Regional Water Quality & Security

Appendices
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Town # 93

TOWN	State/Territory	NT	
	Town Name	Alice Springs	
	Town Population	27,481 (ABS ERP SLA for 2008 Reference 3218.0)	
WATER UTILITY	Name of Water Utility	Power and Water Corporation	
	Rate ($/kL)	89.90 cents/kL for domestic and commercial; 95.36 cents/kL for government	
	Per Capita Water Consumption (ML/day)	1212kL/connection/annum	
	Number of Connections	7,612	
CATCHMENT AND WATER SUPPLY	Catchment	Amadeus Basin (Groundwater)	
	Sub-Catchment	Mereenie Rock Aquifer System	
	Catchment Management Authority (CMA)	Dept of Natural Resources, Environment, The Arts and Sport	
	CMA Web-Link	www.nt.gov.au/nreta/water	
	Catchment Protection Status	None	
	Potable Water Source(s)	Roe Creek Borefield - multiple aquifers	
	Supply Capacity	10,757 ML/yr (under 2006-2015 water allocation plan)	
WATER QUALITY	Level of Treatment	Disinfection	
	Treatment Plant(s)	Temple Bar	
	Drinking Water Guidelines	ADWG 2004, TDS guideline value set by the Department of Environmental Health.	
	Results (% compliance for 2008 reporting period)	*Health Parameters - 95th Percentile Values (mg/L)*	
		Antimony	<0.0002
		Arsenic	0.0010
		Barium	0.10
		Boron	0.14
		Cadmium	<0.0002
		Chlorine (free)	DNA
		Chromium	<0.005
		Copper	0.22
		Fluoride	0.5
		Iodide	**0.15**
		Lead	0.006
		Manganese	0.023
		Mercury	<0.0001
		Molybdenum	<0.005
		Nickel	0.006
		Nitrate	7
		Radiological mSv/yr	DNA
		Selenium	0.004
		Silver	<0.01
		Sulfate	68
		THM's	<0.004
		Uranium	0.00956
		Aesthetic Parameters - Mean Values (mg/L)	
		Aluminium	<0.02
		Chloride	73
		Chlorine (free)	DNA
		Copper	0.10
		Hardness (mg/L) CaCO3	**219**
		Iron	0.03
		Manganese	0.007
		pH	7.7
		Sodium	77
		Sulfate	60
		TDS	463
		Zinc	0.05
		Other Parameters - Mean Values (mg/L)	
		Alkalinity	256
		Beryllium	<0.001
		Bromide	0.42
		Calcium	47
		(µS/cm)	816
		Magnesium	25
		Potassium	6.6
		Silica	18
		Tin	<0.01
		* Radiological value reported is an average annual dose	
		* Values in bold exceed ADWG values	
		* DNA - Data Not Available	
		Bacteriological Parameters (% compliance 2007-08)	
		E. coli	100%
		Total Coliforms	100%
WATER SECURITY	Current Water Restrictions	No	
	Proportion of Potable Water Supplied to Households (%)	59%	
	Distance from the Coast (km)	Approximately 1500 km	
	Climate	Desert/Arid	
	Average Annual Rainfall	278.2mm (Alice Springs Airport)	

FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	No	
		Single drinking water source	Yes	
		Poor quality water source	No	
		Sewage overflow or disposal into water source	No	
		Flooding	Yes	
		Fauna defecating in supply	No	
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Iodide.
		Un-lined landfills	No	
		Extensive agriculture	No	
		Low vegetation cover (dust, sediment runoff)	No	
		Poor access to supply	Yes?	Bores to 500m deep.
		Unsustainable water extraction	Yes	Non-renewable supply.
		Aquifer turning saline due to high extraction	No	
		Hard water	Yes	219mg/L CaCO3.
		Aging or inadequate pipe work and associated infrastructure	No	
		Significant water losses due to leaking pipes	No	
	Governance	High per capita water consumption	Yes	
		Inappropriate water quality standards / objectives	N/A	
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	No	
		Irrigation	No	
		Chemicals / process	No	
	Population	Seasonal population loadings	Yes	Popular tourist destination, particularly during winter.
		Rapid population growth	No	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	No	No E. coli detected or Naegleria fowleri detected in 2007-08.
		Algal blooms	No	
		Heavy metal contamination	No	
		Poor chlorine residuals	No	
		Pesticide contamination	No	
		Boil water notices	No	None in 2007-08 but may potentially be issued during flooding.
		Deaths or illness due to water quality	No reported deaths	Risk of potential illness if boil water alert instructions not adhered to.
		Water restrictions (current and historic)	No	
		Taste and odour issues	No	
		Other contamination that would affect health	No	Current ADWG value for iodide exceeded but ADWG 2010 value expected to be raised to 0.4 mg/L.
Notes				

Town # 94

TOWN	State/Territory	NT	
	Town Name	Katherine	
	Town Population	9,912 (ABS ERP SLA for 2008 Reference 3218.0)	
WATER UTILITY	Name of Water Utility	Power and Water Corporation	
	Rate ($/kL)	89.90 cents/kL for domestic and commercial; 95.36 cents/kL for government	
	Per Capita Water Consumption (L/day)	1565kL/connection/annum	
	Number of Connections	2031	
CATCHMENT AND WATER SUPPLY	Catchment	Daly	
	Sub-Catchment	Katherine River	
	Catchment Management Authority (CMA)	Regulator - NT Dept of Natural Resources, Environment, The Arts and Sport	
	CMA Web-Link	www.nt.gov.au/nreta/water	
	Catchment Protection Status	Surface Water - part of catchment zoned Water Management under NT Planning Scheme	
	Potable Water Source(s)	Surface Water - Katherine River	
		Groundwater - Tindal Aquifer	
	Supply Capacity	Surface Water - 4500 ML/yr (under review)	
		Groundwater - 1876 ML/yr at Total Security (plus an additional 2200 ML/yr subject to allocations)	
WATER QUALITY	Level of Treatment	River water:- Coagulation/flocculation, filtration, disinfection and fluoridation Groundwater:-Disinfection and fluoridation	
	Treatment Plant(s)	Katherine Water Treatment Plant, Morris Road Katherine NT 0850	
	Drinking Water Guidelines	ADWG 2004, TDS guideline value set by the Department of Environmental Health.	
	Results (% compliance for 2008 reporting period)	*Health Parameters - 95th Percentile Values (mg/L)*	
		Antimony	0.0005
		Arsenic	<0.0005
		Barium	<0.05
		Boron	<0.02
		Cadmium	<0.0002
		Chlorine (free)	0.81
		Chromium	<0.005
		Copper	0.03
		Fluoride	0.5
		Iodide	<0.01
		Lead	<0.001
		Manganese	0.005
		Mercury	<0.0001
		Molybdenum	<0.005
		Nickel	<0.002
		Nitrate	1
		Radiological mSv/yr	DNA
		Selenium	<0.001
		Silver	<0.01
		Sulfate	15
		THM's	0.040
		Uranium	0.00017
		Aesthetic Parameters - Mean Values (mg/L)	
		Aluminium	0.03
		Chloride	5
		Chlorine (free)	0.58
		Copper	0.01
		Hardness (mg/L) CaCO3	109
		Iron	0.02
		Manganese	<0.005
		pH	7.7
		Sodium	6
		Sulfate	5
		TDS	129
		Zinc	0.12
		Other Parameters - Mean Values (mg/L)	
		Alkalinity	107
		Beryllium	<0.001
		Bromide	0.02
		Calcium	25
		Electrical conductivity (µS/cm)	222
		Magnesium	11
		Potassium	1.0
		Silica	10
		Tin	<0.01
		* Radiological value reported is an average annual dose	
		* Values in bold exceed ADWG values	
		* DNA - Data not available	
		Bacteriological Parameters (% compliance 2007-08)	
		E. coli	100%
		Total Coliforms	99%
WATER SECURITY	Current Water Restrictions	No	
	Proportion of Potable Water Supplied to Households (%)	41%	
	Distance from the Coast (km)	Approximately 270 km	
	Climate	Wet/Dry Tropics	
	Average Annual Rainfall	989.8mm (Katherine Council)	
FACTOR		YES / NO	NOTES / EXPLANATION
	Drought	No	
	Single drinking water source	No	

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Poor quality water source	Yes	Conventional treatment of surface water required. Groundwater has high hardness and aquifer at risk of contamination.
		Sewage overflow or disposal into water source	Yes	Rural residential properties with septic tanks located along Katherine River. On-site sewage treatment plant at Katherine Gorge park and tourist boats operating on Katherine River.
		Flooding	Yes	Large portion of town is located on flood plain.
		Fauna defecating in supply	Yes	
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	
		Un-lined landfills	No	
		Extensive agriculture	Yes	Small-scale horticulture plus pastoral in catchments.
		Low vegetation cover (dust, sediment runoff)	Yes	Sediment runoff is a consideration during first flush wet season events.
		Poor access to supply	No	
		Unsustainable water extraction	No	
		Aquifer turning saline due to high extraction	No	
		Hard water	Yes	Ground water source hardness approx 400 mg/L CaCo3. Blended supply can reach 150+mg/L CaCo3.
		Aging or inadequate pipe work and associated infrastructure	No	
		Significant water losses due to leaking pipes	No	
	Governance	High per capita water consumption	Yes	
		Inappropriate water quality standards / objectives	N/A	
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	Yes	Previous vandalism and intrusions to service storage tanks detected.
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	Yes	Proposed significant mine within catchment.
		Irrigation	Yes	Groundwater component shared with irrigators.
		Chemicals / process	No	
	Population	Seasonal population loadings	Yes	Popular tourist destination.
		Rapid population growth	No	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	No	No E. coli detected or Naegleria fowleri detected in 2007-08.
		Algal blooms	No	
		Heavy metal contamination	No	
		Poor chlorine residuals	No	
		Pesticide contamination	No	
		Boil water notices	No	None in 2007-08 but may potentially be issued during flooding.
		Deaths or illness due to water quality	No reported deaths	Risk of potential illness if boil water alert instructions not adhered to.
		Water restrictions (current and historic)	No	
		Taste and odour issues	No	
		Other contamination that would affect health	No	
Notes				

Town # 95

TOWN	State/Territory	NT	
	Town Name	Maningrida	
	Town Population	2,746 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Power and Water Corporation	
	Rate ($/kL)	89.90 cents/kL for domestic and commercial; 95.36 cents/kL for government	
	Per Capita Water Consumption (L/day)	500L/day	
	Number of Connections	Could not be obtained	
CATCHMENT AND WATER SUPPLY	Catchment	Marchinbar Sandstone	
	Sub-Catchment	Upper Section	
	Catchment Management Authority (CMA)	Regulator - NT Dept of Natural Resources, Entertainment, the Arts and Sports	
	CMA Web-Link	www.nt.gov.au/nreta/water	
	Catchment Protection Status	State wide Policy	
	Potable Water Source(s)	Groundwater - Upper section of the Marchinbar Sandstone	
	Supply Capacity	Sustainable yield of the Marchinbar Sandstone is 15000 ML/year, however the sustainable yield of the lower aquifer used for current extraction is 1497 ML/year	
WATER QUALITY	Level of Treatment	Groundwater:-Disinfection	
	Treatment Plant(s)	In-line Sodium Hypochlorite dosing	
	Drinking Water Guidelines	ADWG 2004, TDS guideline value set by the Department of Environmental Health.	
	Results (% compliance for 2008 reporting period)	*Health Parameters - 95th Percentile Values (mg/L)*	
		Antimony	0.0001
		Arsenic	0.00025
		Barium	0.025
		Boron	0.04
		Cadmium	0.0001
		Chromium	0.0025
		Fluoride	0.05
		Lead	0.001925
		Mercury	0.00005
		Molybdenum	0.0025
		Nickel	0.001
		Nitrate	0.5
		Nitrite	DNA
		Radiological (mSv/yr)	Gross α,β < 0.5 Bq/L
		Selenium	0.0005
		Silver	0.005
		Uranium	0.00003
		Aesthetic Parameters - Mean Values (mg/L)	
		Aluminium	0.01
		Chloride	8.35
		Copper	0.025
		Hardness	7.9
		Iodine	0.01
		Iron Fe_T	0.01
		Manganese	0.035
		pH (pH Units)	6.65
		Sodium	4.65
		Sulfate	0.645
		Total Dissolved Solids	49.5
		True Colour (CU)	1.55
		Turbidity (NTU)	0.165
		Zinc	0.02
		Other Parameters - Mean Values (mg/L)	
		Alkalinity	8.55
		Beryllium	0.0005
		Bromide	0.141
		Calcium	1.98
		Electrical conductivity (µS/cm)	46
		Magnesium	0.785
		Potassium	0.82
		Silica	14
		Tin	0.005
		* Radiological value reported is an average annual dose	
		* Values in bold exceed ADWG values	
		* DNA - Data not available	
		Bacteriological Parameters (% compliance 2008-09)	
		E. coli	100%
		Total Coliforms	100%
WATER SECURITY	Current Water Restrictions	A cap has been placed on the abstraction of groundwater	
	Proportion of Potable Water Supplied to Households (%)	Could not be obtained	
	Distance from the Coast (km)	On the coast line (<500 m)	
	Climate	Wet/Dry Tropics	
	Average Annual Rainfall	1284.4 mm (45 years historical data - BOM)	
FACTOR		YES / NO	NOTES / EXPLANATION
	Drought	No	

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Single drinking water source	Yes	
		Poor quality water source	No	
		Sewage overflow or disposal into water source	No	Arafura Sea 180m North Pond
		Flooding	Yes	
		Fauna defecating in supply	No	
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	
		Un-lined landfills		
		Extensive agriculture	No	
		Low vegetation cover (dust, sediment runoff)	No	
		Poor access to supply	No	
		Unsustainable water extraction	No	
		Aquifer turning saline due to high extraction	No	
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	No	
		Significant water losses due to leaking pipes	No	
	Governance	High per capita water consumption	Yes	
		Inappropriate water quality standards / objectives	No	
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	No	
		Irrigation	No	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	No	2%pa (from ABS Census 2001-2006)
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	No	
		Algal blooms	No	
		Heavy metal contamination	No	
		Poor chlorine residuals	No	
		Pesticide contamination	No	
		Boil water notices	No	
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	No	
		Taste and odour issues	No	
		Other contamination that would affect health	No	
Notes				

Town # 96

TOWN	State/Territory	NT	
	Town Name	Tennant Creek	
	Town Population	3,494 (ABS ERP SLA for 2008 Reference 3218.0)	
WATER UTILITY	Name of Water Utility	Power and Water Corporation	
	Rate ($/kL)	89.90 cents/kL for domestic and commercial; 95.36 cents/kL for government	
	Per Capita Water Consumption (ML/day)	1346kL/connection/annum	
	Number of Connections	1138	
CATCHMENT AND WATER SUPPLY	Catchment	Western Plateau	
	Sub-Catchment	Wiso Basin	
	Catchment Management Authority (CMA)	Dept of Natural Resources, Environment, The Arts and Sport	
	CMA Web-Link	www.nt.gov.au/nreta/water	
	Catchment Protection Status	None	
	Potable Water Source(s)	Kelly Well and Cabbage Gum bore fields	
	Supply Capacity	Kelly Well Bore field - 2000 ML/yr	
		Cabbage Gum Bore field - 200 ML/yr	
WATER QUALITY	Level of Treatment	None	
	Treatment Plant(s)	N/A	
	Drinking Water Guidelines	ADWG 2004, TDS guideline value set by the Department of Environmental Health.	
	Results (% compliance for 2008 reporting period)	*Health Parameters - 95th Percentile Values (mg/L)*	
		Antimony	<0.0002
		Arsenic	0.0030
		Barium	<0.05
		Boron	0.52
		Cadmium	0.0008
		Chlorine (free)	DNA
		Chromium	<0.005
		Copper	0.10
		Fluoride	**1.7**
		Iodide	**0.39**
		Lead	<0.001
		Manganese	0.005
		Mercury	<0.0001
		Molybdenum	<0.005
		Nickel	<0.002
		Nitrate	44
		Radiological mSv/yr	DNA
		Selenium	0.006
		Silver	<0.01
		Sulfate	88
		THM's	<0.004
		Uranium	0.00916
		Aesthetic Parameters - Mean Values (mg/L)	
		Aluminium	<0.02
		Chloride	90
		Chlorine (free)	DNA
		Copper	0.02
		Hardness (mg/L) CaCO3	172
		Iron	0.07
		Manganese	<0.005
		pH	7.8
		Sodium	111
		Sulfate	50
		TDS	608
		Zinc	0.01
		Other Parameters - Mean Values (mg/L)	
		Alkalinity	271
		Beryllium	<0.001
		Bromide	0.77
		Calcium	27
		Electrical conductivity (µS/cm)	944
		Magnesium	25
		Potassium	29.4
		Silica	42
		Tin	<0.01
		* Radiological value reported is an average annual dose	
		* Values in bold exceed ADWG values	
		* DNA - Data Not Available	
		Bacteriological Parameters (% compliance 2007-08)	
		E. coli	99%
		Total Coliforms	85%
WATER SECURITY	Current Water Restrictions	No	
	Proportion of Potable Water Supplied to Households (%)	39%	
	Distance from the Coast (km)	Approximately 1000 km	
	Climate	Desert/Arid	
	Average Annual Rainfall	452.1mm (Tennant Creek Airport)	

FACTOR	YES / NO	NOTES / EXPLANATION
Drought	No	
Single drinking water source	Yes	
Poor quality water source	No	
Sewage overflow or disposal into water source	No	

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Flooding	No	
		Fauna defecating in supply	No	
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Fluoride, iodide and nitrate.
		Un-lined landfills	No	
		Extensive agriculture	No	
		Low vegetation cover (dust, sediment runoff)	No	
		Poor access to supply	No	
		Unsustainable water extraction	No*	Extraction considered to be within sustainable limits, but may require reassessment due to climate change.
		Aquifer turning saline due to high extraction	No	
		Hard water	Yes	172 mg/L vs. ADWG value of 200 mg/L.
		Aging or inadequate pipe work and associated infrastructure	No	
		Significant water losses due to leaking pipes	No	
	Governance	High per capita water consumption	Yes	
		Inappropriate water quality standards / objectives	N/A	
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	Yes	Previous vandalism and intrusions to service storages detected.
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	No	
		Irrigation	No	
		Chemicals / process	No	
	Population	Seasonal population loadings	Yes	Popular tourist gateway.
		Rapid population growth	No	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	Yes	E. coli detected throughout system in May 2009.
		Algal blooms	N/A	
		Heavy metal contamination	No	
		Poor chlorine residuals	Yes	No disinfection barrier so no chlorine residual maintained.
		Pesticide contamination	No	
		Boil water notices	Yes	One issued in May 2009.
		Deaths or illness due to water quality	No reported deaths	Elevated risk of contamination as no disinfection barrier and hence heightened risk of illness in community. Risk of potential illness if boil water alert instructions not adhered to.
		Water restrictions (current and historic)	No	
		Taste and odour issues	No	
		Other contamination that would affect health	Elevated fluoride and iodide	Elevated fluoride level is naturally occurring. Iodide level in ADWG 2010 expected to be raised to 0.4 mg/L.
Notes				

Town # 97

TOWN	State/Territory	NT	
	Town Name	Yulara	
	Town Population	1,186 (ABS ERP SLA for 2008 Reference 3218.0)	
WATER UTILITY	Name of Water Utility	Power and Water Corporation	
	Rate ($/kL)	89.90 cents/kL for domestic and commercial; 95.36 cents/kL for government	
	Per Capita Water Consumption (ML/day)	2260kL/connection/annum	
	Number of Connections	247	
CATCHMENT AND WATER SUPPLY	Catchment	Western Plateau	
	Sub-Catchment	-	
	Catchment Management Authority (CMA)	NT Dept of Natural Resources, Environment, The Arts and Sport	
	CMA Web-Link	www.nt.gov.au/nreta/water	
	Catchment Protection Status	None	
	Potable Water Source(s)	Dune Plains Aquifer - groundwater - 6 bores	
	Supply Capacity	1600 ML/yr total borefield licence	
WATER QUALITY	Level of Treatment	Reverse osmosis and disinfection (for potable component)	
	Treatment Plant(s)	Yulara Water Treatment Plant, Yulara NT 0872	
	Drinking Water Guidelines	ADWG 2004, TDS guideline value set by the Department of Environmental Health.	
	Results (% compliance for 2008 reporting period)	*Health Parameters - 95th Percentile Values (mg/L)*	
		Antimony	<0.0002
		Arsenic	<0.0005
		Barium	<0.05
		Boron	0.68
		Cadmium	0.0012
		Chlorine (free)	0.65
		Chromium	<0.005
		Copper	0.15
		Fluoride	0.1
		Iodide	0.06
		Lead	<0.001
		Manganese	0.005
		Mercury	<0.0001
		Molybdenum	<0.005
		Nickel	0.004
		Nitrate	37
		Radiological mSv/yr	DNA
		Selenium	<0.001
		Silver	<0.01
		Sulfate	328
		THM's	<0.004
		Uranium	0.00008
		Aesthetic Parameters - Mean Values (mg/L)	
		Aluminium	<0.02
		Chloride	44
		Chlorine (free)	0.48
		Copper	0.08
		Hardness (mg/L) CaCO3	26
		Iron	0.02
		Manganese	<0.005
		pH	7.0
		Sodium	38
		Sulfate	59
		TDS	158
		Zinc	0.05
		Other Parameters - Mean Values (mg/L)	
		Alkalinity	15
		Beryllium	<0.001
		Bromide	0.27
		Calcium	7
		Electrical conductivity (µS/cm)	266
		Magnesium	2
		Potassium	4.3
		Silica	5
		Tin	<0.01
		* Radiological value reported is an average annual dose	
		* Values in bold exceed ADWG values	
		* DNA - Data Not Available	
		Bacteriological Parameters (% compliance 2007-08)	
		E. coli	100%
		Total Coliforms	100%
WATER SECURITY	Current Water Restrictions	No	
	Proportion of Potable Water Supplied to Households (%)	Yulara is predominantly a tourist resort (household residential consumption is between 2-3%)	
	Distance from the Coast (km)	Approximately 1850 km	
	Climate	Desert/Arid	
	Average Annual Rainfall	266.3mm (Yulara Airport)	

FACTOR	YES / NO	NOTES / EXPLANATION
Drought	No	
Single drinking water source	Yes	
Poor quality water source	Yes	Slightly brackish, requires RO for potable supply.
Sewage overflow or disposal into water source	Yes	Treated effluent recharges the aquifer.
Flooding	No	

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Fauna defecating in supply	No	
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Nitrate.
		Un-lined landfills	Yes	Not overlying aquifer.
		Extensive agriculture	No	
		Low vegetation cover (dust, sediment runoff)	Yes	Not a significant issue.
		Poor access to supply	No	
		Unsustainable water extraction	No	Considered to be approximately at the aquifer sustainable yield.
		Aquifer turning saline due to high extraction	No	
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	No	
		Significant water losses due to leaking pipes	No	
	Governance	High per capita water consumption	Yes	
		Inappropriate water quality standards / objectives	N/A	
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	No	
		Irrigation	No	
		Chemicals / process	No	
	Population	Seasonal population loadings	Yes	Popular tourist destination.
		Rapid population growth	No	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	No	No E. coli detected or Naegleria fowleri detected in 2007-08.
		Algal blooms	N/A	
		Heavy metal contamination	No	
		Poor chlorine residuals	No	
		Pesticide contamination	No	
		Boil water notices	No	None in 2007-08.
		Deaths or illness due to water quality	No reported deaths	
		Water restrictions (current and historic)	No	
		Taste and odour issues	No	
		Other contamination that would affect health	No	
Notes				

Town # 98

TOWN	State/Territory	NT	
	Town Name	Galiwinku	
	Town Population	2,156 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Power and Water Corporation	
	Rate ($/kL)	89.90 cents/kL for domestic and commercial; 95.36 cents/kL for government	
	Per Capita Water Consumption (L/day)	562L/day	
	Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY	Catchment	Arafura Basin	
	Sub-Catchment	Elcho Island Formation	
	Catchment Management Authority (CMA)	Regulator - NT Dept of Natural Resources, Entertainment, the Arts and Sports	
	CMA Web-Link	www.nt.gov.au/nreta/water	
	Catchment Protection Status	State wide Policy	
	Potable Water Source(s)	Bore RN8474	
		Bore RN20921	
		Bore RN20922	
		Bore RN20927	
	Supply Capacity	3000 ML/year (sustainable yield)	
WATER QUALITY	Level of Treatment	Groundwater:-Disinfection	
	Treatment Plant(s)	In-line Sodium Hypochlorite dosing	
	Drinking Water Guidelines	ADWG 2004, TDS guideline value set by the Department of Environmental Health.	
	Results (% compliance for 2008 reporting period)	*Health Parameters - 95th Percentile Values (mg/L)*	
		Antimony	0.0001
		Arsenic	0.0003
		Barium	0.03
		Boron	0.01
		Cadmium	0.0001
		Chromium	0.003
		Fluoride	0.05
		Lead	0.0008
		Mercury	0.00005
		Molybdenum	0.003
		Nickel	0.001
		Nitrate	1
		Nitrite	DNA
		Radiological (mSv/yr)	Gross α,β < 0.5 Bq/L
		Selenium	0.0005
		Silver	0.005
		Uranium	0.00002
		Aesthetic Parameters - Mean Values (mg/L)	
		Aluminium	0.01
		Chloride	9
		Copper	0.01
		Hardness	6
		Iodine	0.005
		Iron Fe_T	**0.4**
		Manganese	0.003
		pH (pH Units)	**5.6**
		Sodium	6
		Sulfate	1
		Total Dissolved Solids	40
		True Colour (CU)	DNA
		Turbidity (NTU)	DNA
		Zinc	0.008
		Other Parameters - Mean Values (mg/L)	
		Alkalinity	5
		Beryllium	0.0005
		Bromide	0.03
		Calcium	1
		Electrical conductivity (µS/cm)	50
		Magnesium	0.9
		Potassium	1
		Silica	12
		Tin	0.005
		* Radiological value reported is an average annual dose	
		* Values in bold exceed ADWG values	
		* DNA - Data not available	
		Bacteriological Parameters (% compliance 2008-09)	
		E. coli	100%
		Total Coliforms	100%
WATER SECURITY	Current Water Restrictions	No water restrictions	
	Proportion of Potable Water Supplied to Households (%)	DNA	
	Distance from the Coast (km)	0.1 km	
	Climate	Wet/Dry Tropics	
	Average Annual Rainfall	1430.6 mm (BOM data)	

FACTOR	YES / NO	NOTES / EXPLANATION
Drought	No	
Single drinking water source	Yes	
Poor quality water source	No	
Sewage overflow or disposal into water source	No	Swamp/Marshland
Flooding	Yes	

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Fauna defecating in supply	No	
		Fauna destroying water intake structures	No	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	Yes	Total Iron values above ADW Guidelines
		Un-lined landfills		
		Extensive agriculture	No	
		Low vegetation cover (dust, sediment runoff)	No	
		Poor access to supply	No	
		Unsustainable water extraction	No	
		Aquifer turning saline due to high extraction	No	
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	No	
		Significant water losses due to leaking pipes	No	
	Governance	High per capita water consumption	Yes	
		Inappropriate water quality standards / objectives	No	
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	No	
		Irrigation	No	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	Yes	14.2% - projected (ABS census 2001-2006)
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	No	
		Algal blooms	No	
		Heavy metal contamination	No	
		Poor chlorine residuals	No	
		Pesticide contamination	No	
		Boil water notices	No	
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	No	
		Taste and odour issues	No	
		Other contamination that would affect health	No	
Notes				

Town # 99

TOWN	State/Territory	NT	
	Town Name	Wadeye	
	Town Population	2,675 (Census 2006, Urban Centre/Locality)	
WATER UTILITY	Name of Water Utility	Power and Water Corporation	
	Rate ($/kL)	89.90 cents/kL for domestic and commercial; 95.36 cents/kL for government	
	Per Capita Water Consumption (L/day)	397L/day	
	Number of Connections	Unknown	
CATCHMENT AND WATER SUPPLY	Catchment	Bonaparte Gulf Basin	
	Sub-Catchment	Hyland Bay Formation	
	Catchment Management Authority (CMA)	none	
	CMA Web-Link	none	
	Catchment Protection Status	none	
	Potable Water Source(s)	Groundwater	
	Supply Capacity	912ML/year (Aquifer Sustainable Yield)	
WATER QUALITY	Level of Treatment	Groundwater:-Disinfection	
	Treatment Plant(s)	In-line Sodium Hypochlorite dosing	
	Drinking Water Guidelines	ADWG 2004, TDS guideline value set by the Department of Environmental Health.	
	Results (% compliance for 2008 reporting period)	*Health Parameters - 95th Percentile Values (mg/L)*	
		Antimony	0.0001
		Arsenic	0.0005
		Barium	0.025
		Boron	0.54
		Cadmium	0.0001
		Chromium	0.0025
		Fluoride	0.05
		Lead	0.002
		Mercury	0.00005
		Molybdenum	0.0025
		Nickel	0.001
		Nitrate	0.005
		Nitrite	DNA
		Radiological (mSv/yr)	0.007
		Selenium	0.004
		Silver	0.005
		Uranium	0.0199
		Aesthetic Parameters - Mean Values (mg/L)	
		Aluminium	0.01
		Chloride	6.5
		Copper	0.01
		Hardness	16
		Iodine	**0.34**
		Iron Fe_T	0.18
		Manganese	0.0025
		pH (pH Units)	**5.8**
		Sodium	4.4
		Sulfate	0.59
		Total Dissolved Solids	31
		True Colour (CU)	1
		Turbidity (NTU)	0.1
		Zinc	0.08
		Other Parameters - Mean Values (mg/L)	
		Alkalinity	5.2
		Beryllium	0.0005
		Bromide	2.04
		Calcium	5.6
		Electrical conductivity (µS/cm)	34
		Magnesium	0.6
		Potassium	0.68
		Silica	19
		Tin	0.005
		* Radiological value reported is an average annual dose	
		* Values in bold exceed ADWG values	
		* DNA - Data not available	
		Bacteriological Parameters (% compliance 2008-09)	
		E. coli	98.4%
		Total Coliforms	97.3%
WATER SECURITY	Current Water Restrictions	Nil	
	Proportion of Potable Water Supplied to Households (%)	Unknown	
	Distance from the Coast (km)	6km	
	Climate	Dry Tropics	
	Average Annual Rainfall	1300mm	

FACTOR		YES / NO	NOTES / EXPLANATION
Water Supply	Drought	No	
	Single drinking water source	Yes	
	Poor quality water source	No	
	Sewage overflow or disposal into water source	No	Sewer overflow during wet season - not into water source
	Flooding	Yes	Seasonal during summer Wet season
	Fauna defecating in supply	No	
	Fauna destroying water intake structures	No	
	Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	No	Iodine level above ADWG guidelines
	Un-lined landfills	Unknown	

WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and	Extensive agriculture	No	
		Low vegetation cover (dust, sediment runoff)	No	
		Poor access to supply	No	
		Unsustainable water extraction	No	
		Aquifer turning saline due to high extraction	No	
		Hard water	No	
		Aging or inadequate pipe work and associated infrastructure	Yes	Concrete cancer developing in sewer network
		Significant water losses due to leaking pipes	No	
	Governance	High per capita water consumption	Yes	
		Inappropriate water quality standards / objectives	No	
		Lack of infrastructure maintenance	No	
		Poor management or governance	No	
		Vandalism / sabotage / terrorism	No	
		Insufficient trained personnel	No	
		Inadequate funding for maintenance or upgrades	No	
	Industries	Mining / minerals	No	
		Irrigation	No	
		Chemicals / process	No	
	Population	Seasonal population loadings	No	
		Rapid population growth	Yes	
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	Yes	E.coli Non-conformances: 3
		Algal blooms	No	
		Heavy metal contamination	No	
		Poor chlorine residuals	No	
		Pesticide contamination	No	
		Boil water notices	Yes	Issued 18/12/2008 Lifted 20/12/2008
		Deaths or illness due to water quality	No	
		Water restrictions (current and historic)	No	
		Taste and odour issues	No	
		Other contamination that would affect health	No	
Notes				

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Town Profiles – TAS

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Town # 100

TOWN		State/Territory	TAS	
		Town Name	Ulverstone	
		Town Population	9,514	
WATER UTILITY		Name of Water Utility	Cradle Mountain Water	
		Rate ($/kL)	0.72/kL	
		Per Capita Water Consumption (L/day)	133L/day	
		Number of Connections	28,558	
CATCHMENT AND WATER SUPPLY		Catchment	-	
		Sub-Catchment	-	
		Catchment Management Authority (CMA)	Council - Central Coast Council	
		CMA Web-Link	http://www.centralcoast.tas.gov.au/site/page.cfm	
		Catchment Protection Status	Likely not protected (only catchments in southern Tasmania protected).	
		Potable Water Source(s)	Deep Creek System	
			Cam River	
			Leven River	
			Gawler River, Forth River, Lake Paloona, Lake Barrington, Dowling Creek	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Gawler River, Forth River, Lake Paloona, Lake Barrington, Dowling Creek, Leven River, Cam River, Deep Creek System (137 ML/d each)	
		Level of Treatment	The water supply is 77% treated, 10% Chlorinated and 13% Non - Chlorinated water	
		Drinking Water Guidelines	ADWG, 2004	
		Results	Physical & chemical	100%
			E-coli	100%
WATER SECURITY		Current Water Restrictions	n/a	
		Proportion of Potable Water Supplied to Households (%)	Approximately 70% to domestic users; 30% to 'special' customers.	
		Distance from the Coast (km)	1km	
		Climate	Temperate (no dry season)	
		Average Annual Rainfall	768mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	no	
		Single drinking water source	no	Lake Isandula and the Gawler River
		Poor quality water source	no	
		Sewage overflow or disposal into water	no	
		Flooding	no	
		Fauna defecating in supply	yes	birds breached a service reservoir's vermin proofing early 2008
		Fauna destroying water intake structures	yes	as above
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)		
		Un-lined landfills	no	
		Extensive agriculture	no	although do supply to irrigators
		Low vegetation cover (dust, sediment		
		Poor access to supply		
		Unsustainable water extraction	no	
		Aquifer turning saline due to high extraction	no	
		Hard water	no	although some areas untreated
		Aging or inadequate pipe work and associated infrastructure	yes	Paloona System untreated - extra pipeline built to treat water and supply to customers
		Significant water losses due to leaking	no	
	Governance	High per capita water consumption		
		Inappropriate water quality standards / objectives		
		Lack of infrastructure maintenance	no	
		Poor management or governance	no	Central Coast Council (in collaboration with Cradle Coast Water) prepared a Drinking Water Quality Management Plan
		Vandalism / sabotage / terrorism	no	
		Insufficient trained personnel	yes	Central Coast Council Public Health Report 2007-08 notes there were 'resource shortages throughout the sampling period'.
		Inadequate funding for maintenance or upgrades	no	
	Industries	Mining / minerals		
		Irrigation	yes	
		Chemicals / process		
	Population	Seasonal population loadings	yes	Can increase to 16,000 over summer
		Rapid population growth		
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	yes	Low level of E.coli contamination in the drinking water in January 2008. Caused by birds.
		Algal blooms	no	
		Heavy metal contamination	no	
		Poor chlorine residuals	yes	Customer complaints received by Cradle Coast Water re chlorine taste
		Pesticide contamination	no	
		Boil water notices	yes	A temporary boil water alert was issued in January 2008
		Deaths or illness due to water quality	no	
		Water restrictions (current and historic)	no	
		Taste and odour issues	yes	Cradle Mountain Water (formerly Cradle Coast Water) received 17 complaints in 2007-08. These incl: chlorine taste, dirty water, supplies from the Paloona System (untreated)
		Other contamination that would affect health		
Notes				

Town # 101

TOWN		State/Territory	TAS	
		Town Name	Circular Head	
		Town Population	4,400	
WATER UTILITY		Name of Water Utility	Cradle Mountain Water	
		Rate ($/kL)	$0.72/kL	
		Per Capita Water Consumption (L/day)	681kL/property	
		Number of Connections	28,558	
CATCHMENT AND WATER SUPPLY		Catchment	-	
		Sub-Catchment	-	
		Catchment Management Authority (CMA)	Council - Central Coast Council	
		CMA Web-Link	http://www.centralcoast.tas.gov.au/site/page.cfm	
		Catchment Protection Status	Likely not protected (only catchments in southern Tasmania protected).	
		Potable Water Source(s)	Unknown	
		Supply Capacity	Unknown	
WATER QUALITY		Treatment Plant(s)	Gawler River, Forth River, Lake Paloona, Lake Barrington, Dowling Creek, Leven River, Cam River, Deep Creek System (137 ML/d each)	
		Level of Treatment	The water supply is 77% treated, 10% Chlorinated and 13% Non - Chlorinated water	
		Drinking Water Guidelines	ADWG, 2004	
		Results (% compliance for 2008 reporting period)	Physical & chemical	100%
			E-coli	100%
WATER SECURITY		Current Water Restrictions	n/a	
		Proportion of Potable Water Supplied to Households (%)	Approximately 70% to domestic users; 30% to 'special' customers.	
		Distance from the Coast (km)	6km	
		Climate	temperate (no dry season)	
		Average Annual Rainfall	932mm	
FACTOR			YES / NO	NOTES / EXPLANATION
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	no	
		Single drinking water source	yes	Deep Creek bulk water supply system
		Poor quality water source	no	
		Sewage overflow or disposal into water	no	
		Flooding	yes	Forth Valley flood event after heavy rainfall
		Fauna defecating in supply	no	
		Fauna destroying water intake structures	no	
		Natural mineral pollutants (e.g. uranium, nitrates, iron, fluoride)	yes	occurred to local storm water and nearby creek after ruptured pipe at Burnie treatment plant
		Un-lined landfills	no	
		Extensive agriculture	no	although water is supplied to irrigators, farmers etc.
		Low vegetation cover (dust, sediment	no	
		Poor access to supply	no	
		Unsustainable water extraction	no	
		Aquifer turning saline due to high extraction	no	
		Hard water	no	
		Aging or inadequate pipe work and associated infrastructure	yes	Council investigated infrastructure and found number of risks within system (unknown what they are, however Council is addressing them).
		Significant water losses due to leaking	no	
	Governance	High per capita water consumption	no	
		Inappropriate water quality standards / objectives	no	
		Lack of infrastructure maintenance	yes	Council investigated infrastructure and found number of risks within system (unknown what they are, however Council is addressing them).
		Poor management or governance	yes	Council investigated infrastructure and found number of risks within system (unknown what they are, however Council is addressing them).
		Vandalism / sabotage / terrorism	no	
		Insufficient trained personnel	no	
		Inadequate funding for maintenance or upgrades	no	
	Industries	Mining / minerals		
		Irrigation		
		Chemicals / process		
	Population	Seasonal population loadings		
		Rapid population growth		
WATER QUALITY OR SECURITY RISK (EFFECT)		Pathogenic contamination	yes	Low level E.coli contamination detected in May 2007. Precautionary boil water notice issued and lifted after 5 days.
		Algal blooms	no	
		Heavy metal contamination	no	
		Poor chlorine residuals	no	
		Pesticide contamination	no	
		Boil water notices	yes	Low level E.coli contamination detected in May 2007. Precautionary boil water notice issued and lifted after 5 days.
		Deaths or illness due to water quality	no	
		Water restrictions (current and historic)	no	
		Taste and odour issues	yes	complaints received by Cradle Mountain Water re chlorine taste in water supplies
		Other contamination that would affect		
Notes				

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Case Studies

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Appendix K Case Studies

Risks to public health through poor maintenance and management of treated water reservoirs - corrosion of reservoir roof guttering allowing roof runoff to enter reservoir; poor reservoir hatch design that does not achieve a proper seal; severe corrosion on access ladders; dead animals in the bottom of treated water reservoirs, (WIOA Waterworks Journal, December 2008)

Case Study 1 – Jindabyne/Smiggin Holes, NSW, Australia, E.Coli contamination 2009
In August this year, the **drinking water supply** of Jindabyne and surrounds was affected by a **sewage overflow**. The leak occurred at a sewer pump station behind the Lake Jindabyne Bowling Club. The Snowy River Shire Council telemetry records indicate that the sewage spill began around midday on the 7th August and **went undetected for three days**. An alarm system should have alerted Council workers to the leak, but it did not go off due a technical fault. Between 0.5 and 0.8 mega litres (1ML = 1000,000 L) of sewage spilled into Lake Jindabyne during the event (Summit Sun 13th August 2009). A boil water alert was issued to all customers as a precaution until three consecutive water quality tests revealed no *E.coli* in the reticulation system (Summit Sun 13th August 2009). In a separate incident in the same region, around **120 guests became ill with gastroenteritis** at the Smiggin Holes ski resort. **One child required medical assistance** while on a bus trip home from the ski resort (Summit Sun 20th August 2009). None of the drinking water samples showed any signs of contamination, but Stuart Cohen of the NSW National Parks and Wildlife Service stated that given the number of people who fell ill and the timing of the gastro outbreak, the event was directly related to the drinking water (NSW NPWS, 2009).

Case Study 2 – Cairns/Port Douglas, Qld, Australia, *E.coli* contamination 2008
In September 2008 ***E.coli*** was found in seven of the thirteen Port Douglas and Mossman **reservoirs**, prompting Queensland Health to advise that residents in Port Douglas, Craiglee, Mowbray, Rock Point and Daintree Village to boil drinking water until further notice (Dickson, 2008). Following discovery of the contamination, **seventeen people** presented at Mosman Hospital with **gastroenteritis** symptoms, with **six admitted for overnight observation** (Dickson, 2008). Open areas and damaged roofs on the reservoirs were highlighted as the possible point of contamination. Prior to the detection of this contamination event, only the water treatment plant and the pipe work were being tested for water quality compliance (Dickson, 2008). A one-off dose of chlorine was added to the contaminated reservoirs as local residents had an intense objection to the addition of chlorine to the water supply: **"Chlorination of our water supply tears at our social fabric"** (Friends of the Douglas Shire 7th September 2009) "There doesn't appear to be any comprehension regarding just how passionately the residents of the old Douglas Shire feel about a chemical free water supply, perhaps the Cairns Regional Council think that we will simply fall into line with their dictates like the rest of the Cairns metropolis appears to do. We will need to demonstrate to them that we are indeed not a herd of sheep to be pushed into whatever convenient pen they see fit. **Chemical free water is our right**…" (Friends of the Douglas Shire 7th September 2009) Chlorination of the entire Douglas water system went ahead in October 2009 because of the repeated instances of *E.coli* contamination in the region (Pashley, 2009); between April and September 2009, there were reportedly 40 positive tests for E.coli (ABC News 28 September 2009). Queensland Health indicated that permanent chlorination will not go ahead if the source of contamination could be isolated (Pashley, 2009).

Case Study 3 – Sydney, NSW, cryptosporidium and giardia contamination
In August 1998 Sydney's drinking water supply was affected by cryptosporidium and giardia. Contamination was first detected in the system on the 21st July. A series of tests were conducted across the city to determine the extent and the severity of the contamination. The first boil water alert was issued on the 27th July to some parts of the Eastern CBD. The alert was extended to other parts of the city on the 29th of July and again on the 30th of July. The alerts were progressively lifted between the 2nd and the 4th July. An Inquiry into the incident cited five possible causes of the contamination event: • A localised contamination event in the eastern CBD • Contamination at Potts Hill Reservoir • Catchment area impacts on the inflow to the Prospect Plant (raw water turbidity events, septic systems draining in to Warragamba Dam, contamination in the upper canal or extraction from low levels in the

dam)

- Contamination at the Prospect Plant (release of sediment deposits from the inlet chamber during flow surges; loss of dilution water; reduced effectiveness of the coagulation process; problems in the backwash procedure; cleaning of the clear water tanks and the use of a bypass channel)
- Potential impacts downstream from the prospect plant

Source: (Smith, 1998)

Case Study 4 – Walkerton, Southern Ontario, Canada, *E.Coli and Campylobacter jejuni* contamination

In May 2000, the Walkerton drinking water system became contaminated with *E.coli* and *Campylobacter jejuni*. **Seven people died and over 2,300 people became ill with bloody diarrhoea, stomach pain and nausea.** Some victims, particularly children may experience lasting health effects from the contamination event.

The government of Ontario held an inquiry following the contamination event to determine the cause, who was responsible, how it could have been prevented and how to stop it from happening again. The inquiry heard from 114 witnesses, including residents of the town, local officials, senior civil servants, two former ministers of the environment and the Ontario Premier.

The inquiry found that the primary source of the contamination was from manure that had been spread on a farm near a drinking water well. The main findings of the inquiry were:

- The farmer was following proper practices and should not be faulted
- The contamination event could have been prevented if continuous chlorine residual monitors and turbidity monitors were in place
- Staff at the Walkerton Public Utilities Commission did not have sufficient skills to identify the vulnerability of the well to contamination and the requirement for continuous chlorine residual and turbidity monitors
- The failure to use monitors at the well resulted from short-comings in the approvals and inspections program of the Ministry of the Environment
- The provincial government's budget reductions made it less likely that the Ministry of the Environment would identify poor practices
- For a long period of time (years), the operators had been engaging in improper operating practices including failing to use adequate doses of chlorine, failing to monitor residuals daily, making false entries about residuals and reporting monitoring information at the wrong locations
- Following detection of the contamination event, the boil water alert that was issued should have been more widely disseminated; had this been done, hundreds of illnesses could have been avoided
- When the provincial government ceased government laboratory testing, they should have mandated that non-government testing laboratories notify the regulatory authorities immediately and directly of adverse results so that boil water alerts could have been issued sooner, preventing hundreds of illnesses

Source: (O'Conner, 2002)

Reconstructing the community's water supply is reported to have cost around $11 million, while the estimated total cost of the contamination event was $155 million by 2001 (Meinhardt, 2002, cited in Meinhardt, 2005).

Case Study 5 – Milwaukee, Wisconsin, USA, cryptosporidium

In 1993, Milwaukee in the USA experienced a large outbreak of waterborne cryptosporidiosis. The event was attributed as the underlying or contributing **cause of death in 54 residents** (Meinhardt, 2005). William et. al. (1994) report that an estimated **403,000 residents (or 52% of the population) developed diarrhoea** as a result of the outbreak. **Over 4,000 residents required hospitalisation** (Meinhardt, 2005). Susceptible members of the community were most severely affected (Meinhardt, 2005).

The following factors are highlighted in the literature:

- Cryptosporidium oocysts passed through the filtration system of one of the city's water treatment plants from Lake Michigan (William et. al., 1994)
- The outbreak went undetected for the period between the 23rd March 23 and the 9th April because the water quality standards and testing of patients for cryptosporidium were not adequate to detect the outbreak
- No specific source of the cryptosporidium was ever identified but runoff from abnormally heavy spring rains

most likely carried the cryptosporidium to the lake from a variety of sources (Wisconsin DNR, 2008)

- There are reports to suggest that 725,000 productive days were lost due to the event, costing almost $54 million lost work time and additional expenses to residents and local government (Meinhardt, 2005)
- As a result of the outbreak, more restrictive federal requirements were implemented for turbidity, including more frequent testing and more stringent standards (Wisconsin DNR, 2008)

Case Study 6 – North Thames, United Kingdom, cryptosporidium contamination in groundwater

In 1997, **345 people** were confirmed to be suffering **cryptosporidiosis** due to a large waterborne outbreak in North Thames. Studies carried out by Willocks et. al. (1998) indicate that the outbreak was attributed to one groundwater borehole. Cryptosporidium contamination was detected in the raw water, the filtered water, and in the distribution system (Willocks et. al., 1998). A boil water alert was in place for a period of sixteen days.

This is a unique case because at that time, it may have been the **first published case of cryptosporidium in a groundwater supply** (Willocks et. al., 1998). The cause of the contamination was unclear following investigations into the outbreak, however potential sources of contamination were infiltration from the nearby river through the aquifer and into the well, ingress through the well access system or cracks in the well lining (Willocks et. al., 1998).

Case Study 7 – North Pine, Qld, Australia, fluoride over-dosing/operator error

During April 2009, a series of events lead to **over-dosing of fluoride** at the North Pine water treatment plant in Queensland.

The North Pine treated water pumps were shut down just prior to midnight on the 27th April to allow scheduled maintenance to go ahead. At this time, the delivery flow meter should have displayed a zero flow, corresponding to zero fluoride dosing.

Approximately 19 hours after the pumps were shut down, a **false flow signal from the main delivery flow meter initiated fluoride dosing**. Normally, if the flow meter and flow switch show different signals, dosing will not occur. At this time, the flow switch had been repaired and had not been re-calibrated, so was showing a false signal of 'on'. Therefore the combination of the incorrect (positive) flow signal and the false flow signal of 'on' allowed dosing to go ahead.

There are two separate automated safety alarms that sound when the concentration of fluoride exceeds 1mg/L. Seqwater staff had disabled the function of one alarm due to it being faulty, so dosing occurred intermittently for several hours until the second online analyser initiating a "high high" fluoride alarm. This resulted in an automated shut down of the fluoride dosing facility, which occurred at 12:35am on the 29th April 2009. A total of **13,000 litres** of concentrated fluoride solution had been dosed before it was detected at the online analyser sample point (Queensland Health, 2009). Some of the water was potentially supplied to customers.

The Queensland Health report (2009) cited inappropriate operational responses, **lack of understanding** and **lack of reporting** on the operator's behalf as **contributing factors** to the event.

Case Study 8 - Gideon, Missouri, USA, salmonella contamination in an undisinfected supply

In November 1993, seven cases of *Salmonella typhimurium* gastroenteritis were detected amongst residents of the Anderson Township. The local health department found no common food exposures but all patients had drank water in the township of Gideon, which was an unchlorinated supply. When the water was tested, it was confirmed to contain faecal coliforms. A boil water alert was issued.

By the end of December, more than 650 people were ill, 15 residents had been hospitalised, 28 nursing home residents were ill with diarrhoea, 7 of whom would later die as a result.

The contamination entered the water system at the water storage tower/reservoir. The roof had an improper roof vent that allowed free access to wild birds.

Source: (Angulo et. al., 1997)

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Water Quality Media Monitoring

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Appendix L Water Quality Media Monitoring

Index #	Media Report
1	**'Swansea water clean by summer', *Hobart Mercury*, 15 September 2009.**
	Swansea, TAS The construction of a new dam and water treatment plant will enable residents of Swansea to drink their tap water without having to boil it. The project is expected to be complete by the summer of 2009-2010.
2	**Ker, P, 'Drinking-water fears raised over cattle in rivers', *The Age*, 7 September 2009.**
	VIC There are concerns over the protection of drinking water supplies as the Brumby Government prepares to re-issue licences that allow farmers to let their stock roam on river frontages that are part of Crown land. The managing director of North East Water said there were no doubts cattle created water quality challenges.
3	**'Sewage spill threatens Jindabyne water supply', *Canberra Times*, 12 August 2009.**
	Jindabyne, NSW A sewage spill in Lake Jindabyne contaminated the area's water supply. People reliant on the water source should boil their drinking water to avoid E.Coli bacteria, which causes diarrhoea, pneumonia and other illnesses.
4	**'Not weak on water', *Hobart Mercury*, 4 August 2009.**
	Hobart, TAS A pilot study monitoring bore water across Tasmania has found evidence of pesticides and herbicides commonly used in the farming and forestry sectors. This is not the first time chemicals have been found in Tasmania's water sources.
5	**Hopkin, M, 'Recycled sewage trial on track to start in January', *The West Australian*, 10 July 2009.**
	Perth, WA Perth's groundwater supplies are to be injected with treated sewage as part of the WA Government's plan to boost aquifers. Before injection, the sewage will be subject to an intensive purification process. The Health Department is to issue new quality guidelines for the treated water.
6	**Williams, M, 'Salt threat to city water', *The Advertiser*, 7 July 2009.**
	Adelaide, SA The salinity levels of River Murray water being pumped to the homes of 1.2 million people across Adelaide have more than doubled in the past three years. A fact sheet produced by SA Health warns there could be impacts for those people who need to limit their daily salt intake.
7	**'Sydney's water safe', *Daily Telegraph*, 19 June 2009.**
	Sydney, NSW A Sydney Catchment Authority spokeswoman has said that Sydney's water supply is safe despite high levels of metals and salts in a river feeding it. High levels of arsenic, copper and boron have been found in the Coxs River near Wallerawang power station west of Lithgow.
8	**Cubby, B, Jenson, E, 'Government knew about toxic threat', *The Sydney Morning Herald*, 19 June 2009.**
	Sydney, NSW High levels of toxic metals and poisons, including arsenic, have been found in the Coxs River, which feeds Sydney's water supply. It is thought that the pollution is caused by industries within the catchment, including collieries and power stations.
9	**Cubby, B, 'Toxic metals threat', *The Sydney Morning Herald*, 18 June 2009.**
	Sydney, NSW A University of Western Sydney researcher has identified heavy metals and poisons such as arsenic, copper and boron in the Coxs River, which feeds Sydney's water supply. The source of the pollution is believed to be the Wallerawang power station.
10	**Johnstone, C, 'Still none the wiser – water quality reports delayed', *The Courier-Mail*, 27 May 2009.**
	QLD The Bligh Government has delayed reports detailing water quality results for southeast Queensland's new water grid. The quarterly reports are to detail the monitoring results for fluoride, E.coli and pathogens such as Giardia.

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11	**Ker, P, 'Fight looms over whether to lead cattle to rivers', *The Age*, 26 May 2009.**
	VIC Thousands of licences allowing farmers to graze cattle on river banks in Victoria are up for renewal. There is increased pressure by environmental groups to have cattle barred from river banks. Cattle hooves increase the erosion of river banks and grazing strips the banks of riparian vegetation which is important for controlling water quality. Cows also create problems by defecating, or even dying, in the rivers, increasing the risk of algal blooms and eroding water quality.
12	**'HOPELESS – REVEALED: Even more blunders foul our water', *The Courier-Mail*, 23 May 2009.**
	QLD Inadequately treated drinking water has been distributed around southeast Queensland's troubled water grid. This includes one case where E.coli contaminated a reservoir in Brisbane.
13	**'Open tap on vital water information', *The Courier-Mail*, 23 May 2009.**
	QLD Evidence indicates that there are teething problems with the new southeast Queensland's water system. These problems include a lack of communication between water agencies and government departments, and the reliability of water quality information made available to the public.
14	**'Claims drinking water contaminated by farm chemical', *ABC Rural*, 21 April 2009.**
	QLD Scientists believe the drinking water in several Queensland communities is being contaminated by the commonly used farm herbicide atrazine. The herbicide is suspected to be disruptive to the human endocrine system and it is thought to cause cancer and infertility.
15	**'Algae adds to river urgency', *The Advertiser*, 30 January, 2009; 'Murray toxic algae alert', *The Advertiser*, 30 January, 2009**
	Murray River/Waikerie, VIC Detection of toxic blue-green algae blooms in the River Murray.
16	**Guerrera, O, 'Locals hot under the collar about boiling 'unsafe' water', *The Age*, 28 July 2007.**
	Mt Beauty, Tawonga, Tawonga South and Myrtleford, VIC Boil water notice issued, with a plan to remain in place indefinitely.
17	**'Radiation blunder', *Herald Sun*, 24 July, 2007.**
	Beverley Mine, SA A worker mistakenly added uranium solution rather than hydrochloric acid to a water desalination unit at the mine. Approximately 100 workers were exposed. An EPA spokesman said it was unlikely anyone would be affected as it was a weak solution, but an investigation would be carried out.
18	**'Businesses blamed for WA's contaminated groundwater', *The West Australian*, 2 July 2007.**
	WA The State of the Environment Report 2007 identified water contamination as one of the key issues facing WA. WA businesses are contributing by dumping pesticides and other pollutants into drains. In the Wheat belt, high levels of lead, iron and aluminium had been found in deep drains. Conservation Council president Philip Jennings said that the number of household bores which had been contaminated over recent years was alarming.
19	**Brown, T, 'Waiting at hell's gate', *Herald Sun*, 9 December 2006.**
	Tolmie and surrounds, VIC Township under boil water notice due to ash from bush fires fouling supplies.
20	**'Sigh of relief amid devastation', *Herald Sun*, 22 March, 2006.**
	Innisfail, Qld Residents issued with a boil water notice due to the impacts of Cyclone Larry.
21	**Crawford, W, 'More than surface water', *Hobart Mercury*, 2 October 2004.**
	TAS Opinion piece on the negative media attention on the state of drinking water in Tasmania. Includes info on the contamination of drinking water with atrazine; a potentially carcinogenic herbicide that was being used to spray timber plantations adjacent to drinking water source.
22	**DiGirolamo, R, 'PVC drinking water review in pipeline', *The Australian*, 24 January 2001.**
	Indulkana, SA PVC pipes contaminated drinking water. Lead levels four times the above the guidelines. Cause was human error and confusion over the correct standards to be used for drinking water pipes.

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23	**James, C, 'Block on herbicide use', *Adelaide Advertiser*, 24 January 2001.**
	South Para & Warren Reservoirs, SA Forestry SA forced by the EPA to stop using potentially carcinogenic herbicides after its operations contaminated drinking water supplies. The herbicide was found in the Warren Reservoir "continuously since September 1997". The herbicide was traced to new pine plantations near the Barossa Valley.
24	**'Blooming invaders in our waters', *Canberra Times*, 30 November 2000.**
	Armidale NSW; Palm Island, QLD Studies of blood samples from residents who had consumed water from an algal bloom in Armidale show mild liver damage. Following an algal bloom in the Solomon Dam, Palm Island Qld (in 1979), some children showed signs of gastrointestinal, liver and kidney damage.
25	**Flint, J, 'Water leaves bad taste in union mouth', *The West Australian*, 26 June 1999.**
	Worsley, WA Workers went on strike after their drinking water was contaminated at the Worsley Alumina mine. Heavy rain and construction activity had caused extra soil to wash into the company's fresh water dam, increasing bacteria levels. Unions wanted bottled water be trucked in for workers, rather than drinking water from Collie while an upgrade of the onsite water filtration plant was completed.
26	**Overington, C, 'Polluted water crisis', *The Age*, 31 July 1998.**
	Sydney, NSW Drinking water contamination by cryptosporidium and giardia. Boil water alerts issued.

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27	**Caldwell, A, O'Loan, J, 'Towns near last dregs in drought', *Courier Mail*, 2 December 2009.**
	Maleny and Dalby, QLD Maleny, a town of population 5,000 located in the Queensland Sunshine Coast hinterland may required water to be trucked in within weeks. The town received only 39.2mm of rain in November, which is almost 100mm short of the average. The town has been participating in a water conservation program since September, but are not on track with the program's targets. Dalby, a town of population 12,000 reportedly had only a few hours supply remaining on the 2nd of December. The town was consuming 6.5ML/day when the available supply was only 4.5ML/day, partly due to high temperatures. Councillors are planning on increasing water restrictions to Level 6. The towns of Chinchilla, Miles and Tara are also running short on water, while Toowoomba's dams are only at 8.2% capacity.
28	**Cubby, B, Wilkinson, M, 'People v power station as water levels plunge', *Sydney Morning Herald*, 19 November 2009.**
	Oberon, NSW The record low level of Oberon Dam (currently at 12.5%) has caused friction between two of the dam's priority users; Oberon Council and Wallerawang power station. The township of Oberon, which is under tight water restrictions, uses less than 2 million litres a day against the power station's allocation of 9 million. A spokesman for Water Minister Phil Costa has clearly stated, however, that water for critical human needs comes first.
29	**Tovey, J, 'Rivers, dams fail Lachlan Valley towns', *Sydney Morning Herald*, 26 November 2009**
	Lachlan Valley, NSW Due to prolonged drought, many towns on the Lachlan River are from next month to receive their water rations by truck. Wyangala Dam, at the top of the Lachlan River, is only at 4.9 percent capacity, and if flows from the dam are not reduced and the drought continues there will be no flows left by Autumn.
30	**Gaynore, M, 'Toowoomba runs dry', *The Sunday Mail*, 20 September 2009.**
	Toowoomba, QLD Toowoomba has been forced to tap into an emergency allocation of bore water, while a pipeline connecting the Wivenhoe Dam to the region's water supply is complete. The region is within a decade-long drought, with dam levels falling to below 9.8%. Three years ago the town rejected a recycled water referendum when dam levels were over 23%.
31	**Kretowicz, E, 'Cotter dam expansion may start next month', *Canberra Times*, 17 September 2009.**
	Canberra, ACT The ACT Government has approved the expansion of Cotter Dam. The dam will increase Canberra's water supply by 35 percent.
32	**Jenkin, C, 'Stormwater plan will ease drain on Murray', *The Advertiser*, 14 September 2009.**
	Adelaide, SA A key element of one of South Australia's largest stormwater recycling projects has been approved, helping save 3.8 GL of water each year from the River Murray. The project will help improve the sustainability of the city's water supply.
33	**'Water bans an election risk', *The Advertiser*, 10 September 2009.**
	Adelaide, SA The management and security of Adelaide's water supply is expected to significantly influence the next state government election in March next year.
34	**Ker, P, 'Water plan a 'threat to river'', *The Age*, 9 September 2009.**
	Thomson River, VIC To boost Melbourne's water supply the State Government plans to extract an extra 10 billion litres annually from the Thomson River. This is equivalent to 15% of the river's flow after allocations to farmers. Scientific advice has found that extra extractions from the river would deteriorate water quality and reduce the potential for fish to move up the river.
35	**'Water costs still value for money', *Canberra Times*, 4 September 2009.**
	Canberra, ACT Cotter Dam is to be enlarged and the cost will ultimately be borne by consumers, with annual bills expected to rise by $100 on average. It has been suggested that paying an extra $2 a week to ensure

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	security of supply now and well into the future is money well spent. The increase in water bills reflects the growing scarcity of water supply.
36	**Ker, P, Morton, A, 'Clean-coal technologies may imperil water supply', The Age, 7 August 2009.**
	Melbourne, VIC A report by the National Water Commission has warned that water consumption would significantly increase if carbon capture and storage methods were built into coal-fired power stations. Power stations consume large amounts of fresh water, and the report estimated that incorporating carbon capture and storage could be one-quarter to one-third more water intensive.
37	**Owen M, 'Upgrade to ease Murray's burden', The Australian, 29 July 2009.**
	Adelaide, SA The SA government will spend $400 million on improving the connectivity between Adelaide's southern and northern water supply systems. This will allow the delivery of water at full capacity from Adelaide's desalination plant, which will come online in 2012 and reduce the city's reliance on the Murray River.
38	**Cubby, B, 'New mine could crack dam floor', The Sydney Morning Herald, 23 July 2009.**
	Woronora Catchment, Sydney A new longwall coalmine directly beneath Woronora Reservoir has the potential to crack the dam floor and cause serious leaks from southern Sydney's main drinking water supply.
39	**Cubby, B, Dart, J, 'Toxic waste in town's drinking water', The Sydney Morning Herald, 15 July 2009.**
	Lithgow, NSW Doctors in Lithgow are protesting against Council's plans to increase the amount of recycled industrial water in the town's drinking water supply. No research has been done on possible links between heavy metals in the water and health effects.
40	**Downie, G, 'Cotter Dam EIS gets approval', Canberra Times, 21 June 2009.**
	Canberra, ACT The Environmental Impact Statement assessment report for Canberra's Cotter Dam project has been approved, allowing for development applications to be lodged. The project will increase the capacity of Cotter Dam from 4GL to 78GL and will help to secure Canberra's water supply against drought.
41	**Jenkin, C, 'TECHNOLOGY Industries world leaders in purification making most of the little water we have', The Advertiser, 6 June 2009.**
	Adelaide, SA The water problems facing South Australian have been a key impetus for the growth of the state as a global player in water-related technology and intelligence. Researchers and businesses are developing new and improved methods for dealing with water shortages, with many local businesses now exporting technology and services around the world.
42	**Johnstone, C, 'Supply cut as main floods suburb – giant pipeline given the all-clear recently', The Courier-Mail, 20 May 2009.**
	Brisbane, QLD A giant water distribution main in Brisbane burst, flooding neighbouring properties and nearby creeks. Many properties in Brisbane's west and south were without water supply or with reduced pressure for several hours following the failure.

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Water Quality and Security Risks

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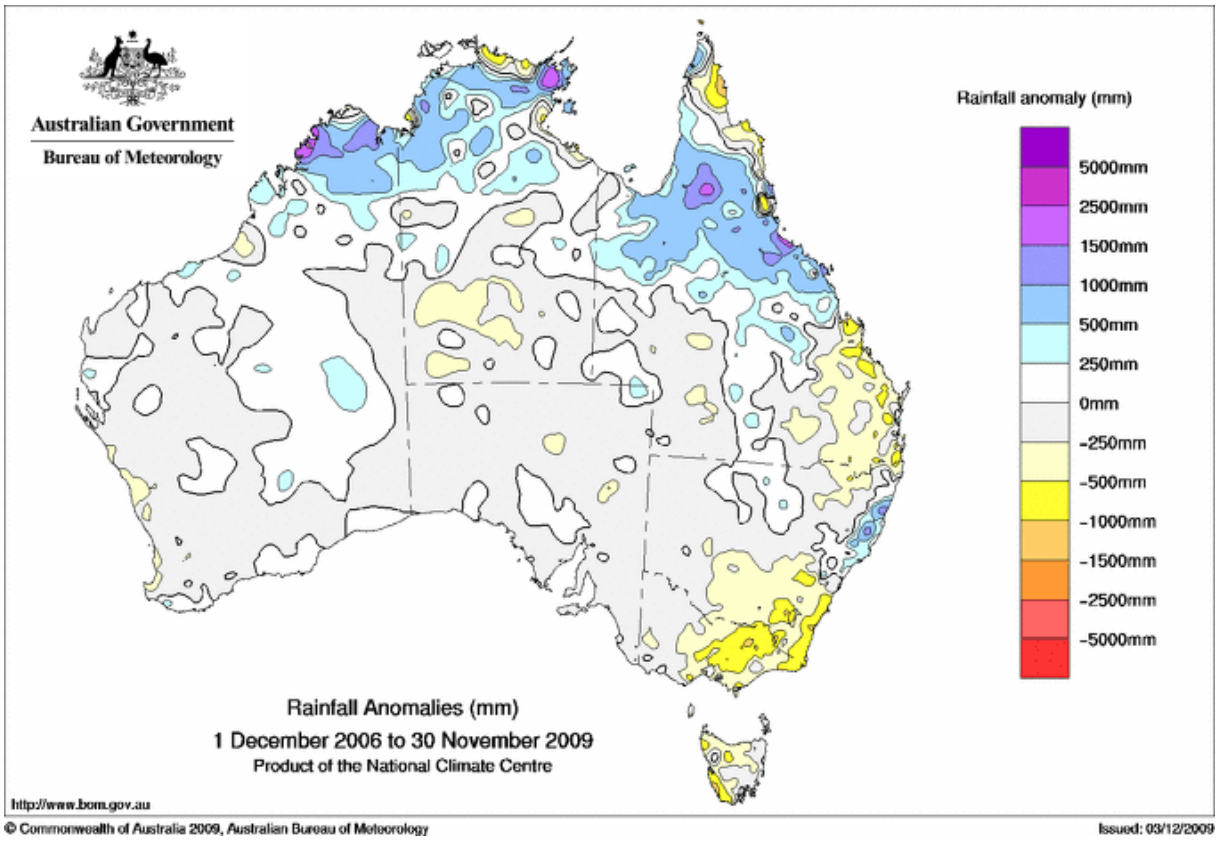

Water Quality or Security Risk			No. of Selected Towns With Risk Factor	% of Selected Towns With Risk Factor
WATER QUALITY OR SECURITY RISK (CAUSE)	Catchment and Water Supply	Drought	75	74
		Single drinking water source	66	65
		Poor quality water source	26	26
		Sewage overflow or disposal into water source	10	10
		Flooding	35	35
		Fauna defecating in supply	44	44
		Fauna destroying water intake structures	7	7
		Natural mineral pollutants (e.g. uranium, nitrates, iron, flouride)	25	25
		Un-lined landfills	14	14
		Extensive agriculture	54	53
		Low vegetation cover (dust, sediment runoff)	46	46
		Poor access to supply	1	1
		Unsustainable water extraction	30	30
		Aquifer turning saline due to high extraction	18	18
		Hard water	9	9
		Aging or inadequate pipework and associated infrastructure	22	22
		Significant water losses due to leaking pipes	7	7
	Governance	High per capita water consumption	11	11
		Inappropriate water quality standards / objectives	0	0
		Lack of infrastructure maintenance	6	6
		Poor management or governance	5	5
		Vandalism / sabotage / terrorism	3	3
		Insufficient trained personnel	4	4
		Inadequate funding for maintenance or upgrades	5	5
	Industries	Mining / minerals	16	16
		Irrigation	45	45
		Chemicals / process	16	16
	Population	Seasonal population loadings	26	26
		Rapid population growth	25	25
WATER QUALITY OR SECURITY RISK (EFFECT)		Bacteriological and / or viral contamination	24	24
		Algal blooms	22	22
		Heavy metal contamination	17	17
		Poor chlorine residuals	14	14
		Pesticide contamination	4	4
		High suspended solids	8	8
		Boil water notices	7	7
		Deaths or illness due to water quality	1	1
		Water restrictions (current and historic)	68	67
		Taste and odour issues	20	20
		Other contamination that may affect health	35	35


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