



WQPN 89, July 2009

Remote drinking water sources – self-supplied Indigenous communities

Purpose

This water quality protection note aims at improving the quality of drinking water in remote 'self-supplied' Indigenous communities.

There are approximately 287 Indigenous communities in Western Australia, accommodating about 17 000 Indigenous people (Department of Indigenous Affairs 2008). Although the manner in which water services (water supply and wastewater) are delivered to these communities varies according to size and location, for approximately 155 small, remote communities, water services are essentially 'self-supplied'. In many of these small remote settlements the infrastructure and community has developed around the water source. This has put the drinking water source (and community health) at risk from inappropriately located land uses and associated infrastructure such as septic tanks, wastewater, fuel storage and landfills. Community education is vital to ensure that water sources are protected effectively and the signs of potential contamination are recognised.

The Department of Water is responsible for managing and protecting the state's water resources. It is also a lead agency for water conservation and reuse. This note aims to inform self-supplied communities on:

- how to minimise impacts on water resources from incompatible land uses and activities
- acceptable practices that can be used to protect water quality.

This note provides a general guide on issues of concern, and offers potential solutions based on professional judgement and precedent. Recommendations made in this note do not override any statutory obligation or government policy statement. Alternative practical environmental solutions suited to local conditions may be considered. This note should not be used as this department's policy position on a specific matter unless first confirmed in writing, because it may be amended from time to time as new data becomes available.

Where a conflict arises between our recommendations and any proposed activity that may affect a sensitive water resource, this note may be used to assist negotiations with stakeholders. The negotiated outcome should not result in a greater risk to water quality than if our recommended protection measures were used.

Water service delivery in Indigenous communities

The way in which water services are provided to remote communities currently varies depending on their size and location. Of the approximately 287 Indigenous communities in Western Australia, 41 communities are connected to established town services provided by the Water Corporation and 91 are managed under the *Remote area essential services program* (RAESP). The remaining 155 communities are located in remote or very remote areas of the state and are essentially 'self-supplied'.

The RAESP scheme, managed by the Department of Housing and Works, currently provides power and water services to large remote Indigenous communities. RAESP provides a contracted maintenance service every six to eight weeks, monthly water testing and capital works to communities that meet specified criteria. Day-to-day operation of the infrastructure is the responsibility of the community. RAESP provides some community-based training and employment opportunities through the *Essential service operators program* (ESOP). The aim of this program is to support the day-to-day operations and maintenance of essential services such as water supply. Currently there are 30 communities that have an ESOP officer (Parsons Brinckerhoff 2005).

An emergency breakdown service, jointly funded by the State and Federal governments and administered through the RAESP program, is provided to remote communities that do not meet the RAESP criteria. In general, these communities have a population of less than 50 and are classified as 'self-supplied' for water services.

Scope

This note applies to 'self-supplied' remote Indigenous communities, generally with a population less than 50, who are responsible for the operation and maintenance of their water supply.

The note does not apply to remote Indigenous communities who are serviced by RAESP or another water service provider, but may offer some useful guidance on potential risks to water resources and good practice.

Advice and recommendations

Location

Approximately 75 per cent of remote Indigenous communities with a population of less than 50 obtain their water from groundwater bores (Australian Bureau of Statistics 2001). Hence the recommendations below have a significant focus on groundwater protection.

- 1 Water supply sources should be located upstream of any potential contamination sources. In the case of groundwater this may require knowledge of hydrogeology, which in some instances is available from our *Hydrogeological records series*. This series is available from our website <www.water.wa.gov.au> select *Publications* > *find a publication* > *series browse* > *Hydrogeological record series*.

- 2 Preparation of a *community layout plan* (CLP) is recommended to assess the possibility of water source contamination and assist in directing any future growth of the community without compromising the safety of their water source. For more information on CLP, please contact the Western Australian Planning Commission (Appendix B – Useful contacts).
- 3 Drinking water sources should be located in an area which is at least 500 metres away from any potential sources of contamination such as sewerage treatment or disposal systems, fuel/chemical storage, waste dumps (landfills), animals (faeces or carcasses), stockyards, mechanical servicing and irrigated crops (pesticides and fertilisers). The water sources should also be at least 300 metres away from other land uses such as workshops and storage sheds (Department for Planning and Infrastructure 2007).
- 4 The storage, use and/or disposal of any chemicals (such as fuels; oil; pesticides; fertilisers) should be at least 500 metres away from water supply sources. These chemicals can move through the soil or be washed by stormwater with the potential to contaminate the water source. Stormwater diversion drains can be used to ensure contaminated water is not washed towards the water supply source.
- 5 An area of natural vegetation should be maintained around any surface water source (i.e. a river or dam). Vegetation assists in filtering any potentially contaminated water before it enters the water source. For more information see Water quality protection note 6 *Vegetated buffers to sensitive water resources* and Foreshore policy 1 *Identifying the foreshore area* (both available from our website).

System design and construction

- 6 Bores should be constructed in accordance with the recommendations made in the guideline document *Minimum construction requirements for water bores in Australia* (2003). This document is available from our website.
- 7 Bores should be constructed in consultation with both community members and traditional owners, and comply with the requirements of the *Aboriginal Heritage Act 1972*.
- 8 Bores should be located in an area which is not prone to flooding or wildfire damage. It is also important to place a concrete seal around the top of the bore casing to prevent entry of any potentially contaminated surface water.
- 9 The area surrounding a bore(s) should be security fenced to prevent access by animals, vandalism or accidental contamination.
- 10 If a diesel motor is used for the pump, ensure there is bunding around the area of the pump and fuel tank. This prevents any potential contamination of the groundwater. The construction of an impermeable sump, with a capacity greater than the volume of fuel, is also recommended.
- 11 If practical, water should be stored in an enclosed tank before use. This allows sediment to settle, provides for operation of the water supply during pump equipment maintenance and if elevated, can improve water pressure. A backflow prevention

device should separate source water from drinking water and the area should be fenced off to minimise the risk of falling from height. Stored water should also have management systems to deter mosquito breeding and prevent contamination by birds and other small animals.

- 12 Flush diverters, which prevent the initial roof-cleaning wash of water from entering tanks, are recommended for rainwater tanks. If flush diverters are not available, a detachable downpipe can be used to provide the same result. For more information please refer to *Guidance on use of rainwater tanks*, produced by the enHealth Council.
- 13 Water used for drinking should be treated and disinfected before consumption. It is recommended that a water treatment system that is appropriate to the water quality is professionally designed and installed. Water used for drinking should also be professionally tested for quality as there may be concentrations of naturally occurring elements such as arsenic, uranium, or nitrates from agricultural land uses, which exceed health criteria (*Australian drinking water guidelines* chapter 4.2.1).

Operation and management

Risk assessment and management

- 14 Key information needed to assess the contamination risks to a water supply is provided in Appendix A. For more information see Water quality protection note 77 *Risk assessment in public drinking water source areas*, available from our website, or Chapter 3.2.3 of the *Australian drinking water guidelines* (ADWG).
- 15 The *Community water planner* (CWP) was published in 2005 by the National Health and Medical Research Council. This is a tool to help prepare a water risk management plan. It is a software program provided on CD-ROM which can generate the basis of a management plan from information entered by the user. This information includes settlement and water system characteristics. To obtain a copy of the CD-ROM please contact National Mailing and Marketing (Appendix B – Useful contacts).
- 16 Arup Consultants are currently in the process of developing a *Guidance management plan* and *Risk management tool* to assess chemical, physical and radiological risks to potable water supply in remote Indigenous communities. For more information please contact Arup Consultants (Appendix B – Useful contacts).
- 17 Groundwater in shallow, sand or gravel aquifers is most vulnerable to contamination, whereas deep aquifers fully confined by clay, shale or low-permeability rock may be less susceptible. The recharge (infiltration to groundwater) or runoff (surface water) areas need to be defined and protected. Information contained within our *Hydrogeological records series* (where available) would assist in this process.
- 18 It is important to ensure that bores or tank systems (not including the treatment system) are switched off when not required. Simple float valves can be installed in tank inlets so this happens automatically. It is also important to ensure that dripping taps and system leaks are fixed. Water leakage (excessive water use) can result in drawdown of the

source. This could cause the water to become saline and may lead to loss of bore productivity.

- 19 For surface water sources, the highest contamination risk normally arises after heavy rainfall, especially at the onset of the wet season and after wildfires. During these times, care must be taken to ensure contaminants do not have the opportunity to enter the water source.
- 20 For surface water sources, it is important that people and animals are not allowed direct contact with the water body. This may introduce pathogens and can lead to serious health problems. For more information on pathogens see the brochure *Risks from pathogenic micro-organisms in public drinking water source areas*, available from our website.

Water quality testing

- 21 For detailed information on the health aspects specific to water quality management please contact the Department of Health's water unit (Appendix B – Useful contacts)
- 22 If chlorine disinfection is used, chapter 4 of the ADWG *Application to small water supplies* recommends daily testing of chlorine residual for drinking water sources. This can be done using a swimming pool test kit and provides evidence of initial disinfection and residual protection against recontamination. Generally, a chlorine residual of between 0.2 and 0.5 mg/L is adequate.
- 23 Comprehensive testing is not always practical in remote communities. In these situations the ADWG (chapter 4.2.4) recommends that it is more effective to test for a narrow range of characteristics as frequently as possible. These characteristics could include testing of disinfection residuals, pH, turbidity, electrical conductivity and temperature using calibrated meters.
- 24 By having more emphasis on a preventative approach and less emphasis on regular water quality testing (ADWG chapter 4.2), the responsibility lies with the residents to carry out regular surveillance and maintenance to ensure potential contamination is avoided and to take appropriate action if a hazardous event occurs.
- 25 Abnormal operating conditions such as chemicals spills, equipment failure, unauthorised human or animal contact with the water source, high rainfall events and/or water quality complaints should trigger supplementary testing and an appropriate management response.
- 26 Bore water used for drinking should, where practical, be professionally tested for chemical and microbiological contamination by a National Association of Testing Authorities (NATA) registered laboratory. For more information see the brochure *Using bore water safely*, produced by the Department of Health.

Planning for an emergency and reporting

- 27 Indicators of poor water quality include low pH, a chemical or petrol smell, soap suds, changes in colour, cloudiness, unusual taste and dying plants. If basic water quality

testing occurs regularly, then significant changes will be noticeable and precautions can be taken.

- 28 If contamination is suspected, the local environmental health officer should be informed and precautions should be taken until comprehensive water quality testing is conducted.
- 29 In the event that an emergency water system repair is required, please phone your local Indigenous coordination centre (Australian government Department of Families, Housing, Community Services and Indigenous Affairs) or RAESP regional service provider (Appendix B – Useful contacts).
- 30 Strategies should be developed to manage incidents such as drought, fire, loss of power supply, equipment failures, chemical spills and vandalism. These strategies may include signage to inform people that tap water is unsafe to drink, use of an alternative source (if practical) or disinfection of the water by boiling (in the case of microbial contamination) (ADWG chapter 4.2.3). Community members should be trained and equipped to implement these strategies.
- 31 Records of water analysis results, equipment maintenance, system checks and contamination incidents should be kept on-site for at least two years.

More information

We welcome your views on this note. All feedback is retained on our file number WT3191.

To comment on this note or for more information, please contact our water source protection branch as shown below, citing the note topic and version.

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This note will be updated periodically as new information is received or industry/activity standards change. Updated versions are placed online at <www.water.wa.gov.au> select *Waterways Health > water quality > water quality protection notes*.

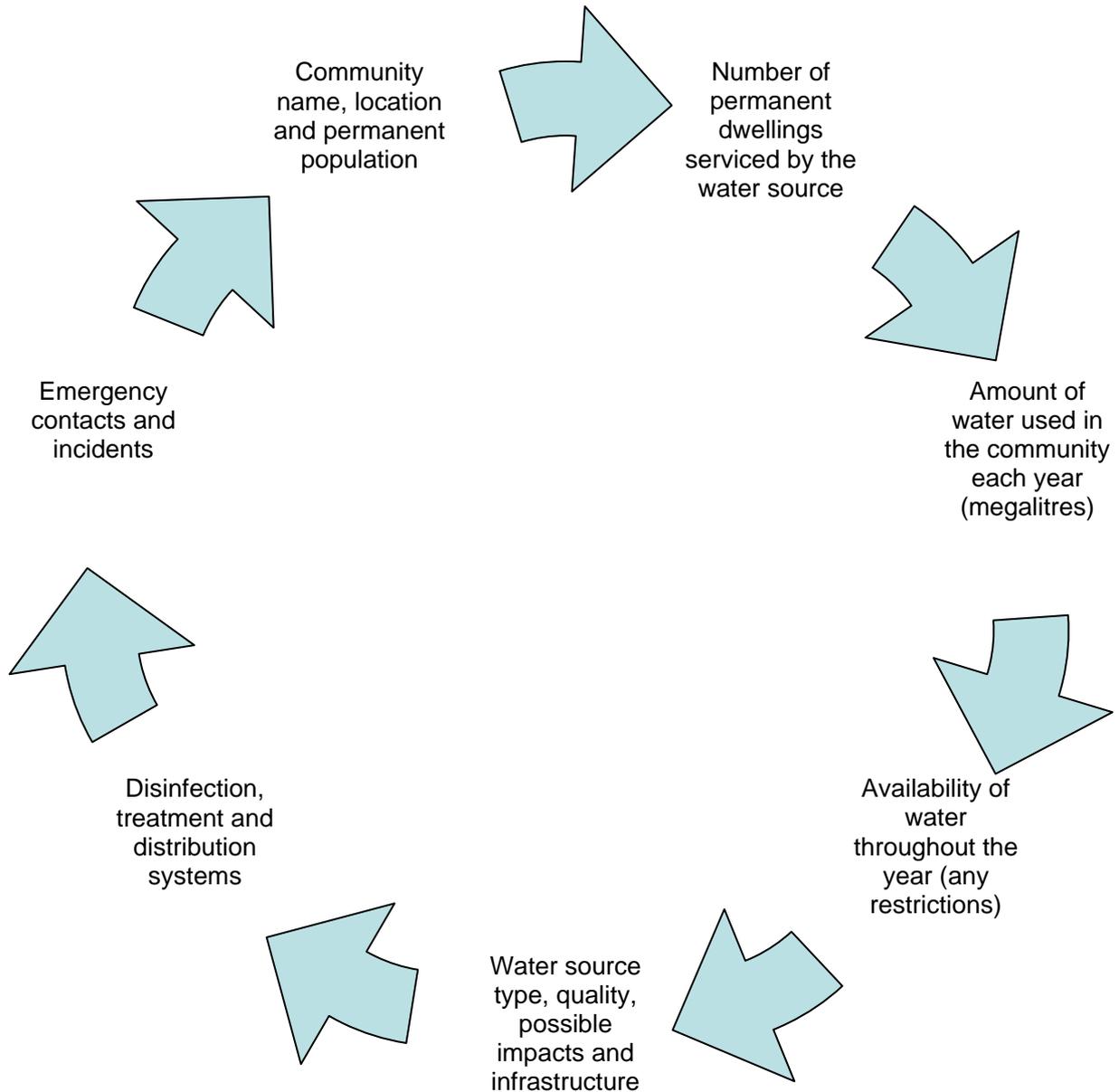
References and further reading

- 1 Arup Consultants, 2009, Guidance management plan (draft), Australia.
- 2 Australian Bureau of Statistics 2001, see online information at <www.abs.gov.au>.
- 3 Department of Health, 2008, *Using bore water safely*, Perth.
- 4 Department for Planning and Infrastructure, 2007, *Land use buffers for Aboriginal communities* (draft), Perth.
- 5 Department of Water, available at <www.water.wa.gov.au>
 - a Hydrogeological record series
 - b Water quality protection note 6 *Vegetated buffers to sensitive water resources*
 - c Water quality protection note 41 *Private drinking water supplies*
 - d Water quality protection note 77 *Risk assessment in public drinking water source areas*
 - e *Small Indigenous community water supply infrastructure audit report* (draft) 2008
 - f Foreshore policy 1 *Identifying the foreshore area*.
- 6 enHealth Council, 2004, *Guidance on the use of rainwater tanks*, Australian Government.
- 7 Green K, 2006, *Alternative analysis techniques for remote community water management*, Northern Territory Power and Water Corporation and Cooperative Research Centre for Water Quality and Treatment, Darwin (internal document).
- 8 Ketteringham et al, 2007, Quality of drinking water supplied to Aboriginal communities – Western Australia: causes, implications and protection measures, Groundwater Conference 2007.
- 9 National Health and Medical Research Council, 2004, *Australian drinking water guidelines*, Australian Government.
- 10 National Health and Medical Research Council, 2005, *Community Water Planner – A tool for small communities to develop drinking water management plans*, Australian Government.
- 11 National minimum bore specifications committee, 2003, *Minimum construction requirements for water bores in Australia*, Land and Biodiversity Committee, Queensland.
- 12 Parsons Brinckerhoff, 2005, *RAESP Status Report*, Perth, Department of Housing and Works.

- 13 Robyn Grey-Gardner, 2008, Report 27 *Remote community management*, Desert Knowledge Cooperative Research Centre, Alice Springs.
- 14 Western Australian Planning Commission, 1999, *Guidelines for the preparation of community layout plans for Western Australian Aboriginal communities*, Perth.
- 15 Western Australian Planning Commission, 2003, *State planning policy No. 2.3: Planning for Aboriginal Communities*, Perth.
- 16 Western Australian Planning Commission, 2006, *Code of practice for housing and environmental infrastructure development in Aboriginal communities in Western Australia*, Perth.
- 17 World Health Organisation, 2008, *Guidelines for drinking water quality*, Geneva.

Appendices

Appendix A Key information needed to assess a drinking water supply



Appendix B Useful contacts

1 Western Australian Planning Commission

Phone (08) 9264 7777

<www.planning.wa.gov.au>

2 Department of Housing Remote Areas Essential Services Program (RAESP)

Aboriginal Housing and Infrastructure Manager, Capital Works, Essential Services and Maintenance Programs

99 Plain Street, East Perth WA 6004

Phone 1800 621 826 (free call) or (08) 9222 4777

<www.housing.wa.gov.au>

3 National Mailing and Marketing

PO Box 7077, Canberra ACT 2610

Phone 1800 020 103 (free call) or (02) 6269 1000

Email: <nmm@nationalmailing.com.au>

4 Arup Consultants

11 Harvest Terrace, West Perth WA 6005

Phone (08) 9332 1400

<www.arup.com.au>

5 Department of Health (Water unit)

Phone (08) 9388 4999

<www.public.health.wa.gov.au>

6 Australian government Department of Families, Housing, Community Services and Indigenous Affairs (FaHSCIA)

Phone 1300 653 227 or (08) 9229 1500

<www.fahscia.gov.au>

7 Indigenous coordination centres

Perth – Phone 1800 079 098 (free call) or (08) 9237 7711

Broome – Phone 1800 079 098 (free call) or (08) 9192 7855

Derby – Phone 1800 079 098 (free call) or (08) 9193 2600

Geraldton – Phone 1800 079 098 (free call) or (08) 9921 9500

Kalgoorlie – Phone 1800 193 357 (free call) or (08) 9024 1100

Kununurra – Phone 1800 193 348 (free call) or (08) 9168 2350

South Hedland – Phone 1800 079 098 (free call) or (08) 9140 2163