



Northern
Territory
Government

TERRITORY
WATER
RESOURCES



greening the
Territory

A Territory Government initiative

Background Report

Great Artesian Basin (NT)
Water Allocation Planning

August 2010

Introduction

The Department of Natural Resources, Environment, The Arts and Sport (NRETAS) has commenced the development of a Water Allocation Plan (WAP) for surface water and groundwater in the Great Artesian Basin Water Control District (the WCD). This plan will define the rules for the sharing of water for the next ten years and will cover the whole of the WCD. The development of a WAP is of vital importance to people in this WCD who depend on its water resources, as well as critical for the protection of natural assets which will maintain environmental and Indigenous cultural values for future generations.

This document is intended to provide information about the planning process and how the community can contribute. It provides:

- Context about water allocation planning in Australia and the Northern Territory;
- Details about the WCD and its water resources;
- Current usage of groundwater in the WCD;
- The processes for community consultation in developing the WAP;
- Key groundwater resource issues within the WCD and identified gaps in our knowledge about the resource;
- Timetable for the planning process; and
- Proposed content of the WAP.

Context

With water being such an important resource, planning for water use and conservation is a priority for all Australian Governments. The Great Artesian Basin (GAB) is a very significant national water resource. To date, water extraction in the WCD has been mainly used for domestic purposes by the community and for watering stock. There are also mining and gas exploration activities within the WCD and these could have significant impacts on future water use in the WCD. The development of a WAP will provide security for all water users including the environment and define the rules for the distribution and management of water resources which will enable developments that depend on groundwater to proceed in a sustainable manner.

a. Water Act 1992 (NT)

The *Water Act 1992 (NT)* (the Act) is the legislation which provides for the investigation, allocation for use, and management of water resources by the Northern Territory Government. This includes the protection of water supply for environmental, economic, recreational, social and cultural uses. The Act allows the declaration of Water Allocation Plans (WAPs) within Water Control Districts (WCDs) in order to allocate water to specific beneficial use categories. Beneficial uses are listed and defined in s4(3) of the Act. WCDs have been declared in the Southern Region of the Northern Territory for Alice Springs, Ti Tree, Tennant Creek, the Western Davenports and the Northern Territory portion of the GAB. WAPs have been created in Alice Springs and Ti Tree, and a draft Plan has been released for the Western Davenports.

b. National Water Initiative

The National Water Initiative 2004 (NWI) is the major policy document of the Federal, Territory and State governments made in relation to water allocation and planning. Its basic premise is that governments have a responsibility to ensure that water is allocated and used to achieve socially and economically beneficial outcomes in a manner that is environmentally sustainable. It advocates management of surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes by achieving secure water access entitlements; transparent, statutory-based water planning; and making statutory provision for environmental and other public benefit outcomes. It specifically calls for recognition of Indigenous needs in relation to water access and management. It also notes that water plans need to give consideration to impacts on downstream users and environments. The Northern Territory Government agreed to an NWI Implementation Plan in 2006.

c. Great Artesian Basin Strategic Management Plan

The GAB underlies about one fifth of the Australian continent and extends into Queensland, New South Wales and South Australia. A Strategic Management Plan was developed for the whole of the GAB in 2000 by the GAB Consultation Council (GABCC). One of its key objectives was to encourage the establishment of legislative and administrative frameworks for sustainable water management and water use within the GAB. Since then the other three states have adopted their own water allocation plans for their respective portions of the GAB. This is the reason the Northern Territory Government nominated the GAB as a priority area under the Raising National Water Standards Program and will need to be mindful of these other management frameworks when developing its own water allocation plan.

d. Environment and Biodiversity Protection Act 1999 (CW)

The Commonwealth is also in the process of developing a Recovery Plan for the community of native species dependent on natural discharge of groundwater from the GAB; which community and some individual species are listed as “endangered” under the *Environment and Biodiversity Protection Act 1999(CW)*. This has significance for the Northern Territory because research is currently being done on whether the water in Northern Territory portion of the GAB eventually feeds into the discharge zones at Dalhousie Springs in South Australia where a number of these species are located.

Background Information

a. Groundwater and the Water Cycle

When rain falls on land, some water evaporates, some runs off to creeks and rivers (which might normally be dry), and some seeps into the ground (infiltration). As the water infiltrates it saturates the soil and moves downwards. Some of this water will be evaporated or used by plants; the rest will percolate further down until it reaches a level known as the water table where all the pores or fractures in the rock are filled with water. Water in this saturated zone below the water table is called groundwater. An aquifer is a localised body of groundwater which shows similar characteristics of quality and yield when the water is extracted to the surface. The process of adding water to the groundwater system or to an aquifer is called recharge. Porous rocks and soil allow the groundwater to slowly move downwards. Sometimes this recharge of groundwater can result in water level changes in a matter of weeks, and sometimes the recharge moving through the whole water system may take much longer. In the GAB recharge can take thousands of years to move through the whole system.

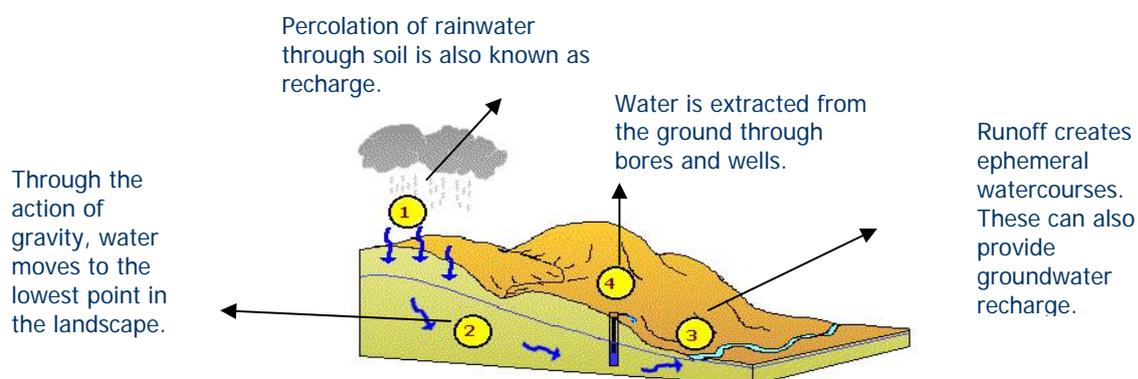


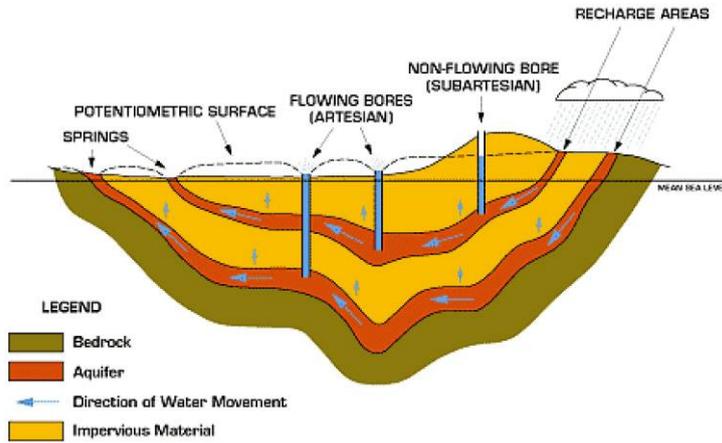
Figure 1: The Water Cycle

b. Description of the resource

The GAB underlies 22 per cent of Australia and has been estimated to store anything between 10 (New South Wales) to 65 (Queensland) million gigalitres of water*. Around 5 per cent of the GAB underlies the Northern Territory. The GAB is formed by alternate layers of water holding sandstone aquifers and impermeable siltstones and mudstones. Recharge enters the GAB aquifer through the percolation of rainwater along the margin of the basin where the aquifer is at the ground surface. By the time GAB water has moved from the main intake or recharge zones in tropical North Queensland southwest to South Australia the water is estimated to be two million years old. Recharge is also believed to occur along the western margin of the GAB, in particular the Northern Territory. However, due to the arid climate in this part of the Northern Territory, most rainfall evaporates before it reaches the watertable. In the Northern Territory the percolation of flood water from arid rivers is thought to be the main method by which recharge enters the GAB.

Groundwater exits the GAB aquifers through upward diffuse leakage to the regional watertable, through springs – which form where the overlying shale is fractured and thin – and through groundwater bores. In the southwest of the GAB all springs occur in the South Australian portion of the basin. Significant GAB springs include the Dalhousie Spring complex just south of the Northern Territory/South Australian border. There are no natural GAB springs in the Northern Territory.

* One gigalitre is commonly thought of as the amount of water in Sydney Harbour. The two different figures quoted above are used respectively in the background documentation to the New South Wales and Queensland Water Plans.



OPERATION OF AN ARTESIAN BASIN

Figure 2: Cross section

(Source: Qld NR&M Modified after Cox, R and Barron, A (1998) The nature and use of the Great Artesian Basin :Proceedings of the National Agricultural and Resource Outlook Conference. Canberra 3-5 February 1998. ABARE)

A large proportion of the GAB aquifer is confined by an impermeable layer of shale. The resulting pressure causes the groundwater to rise above ground level when a bore is drilled. This is called an artesian bore. In a sub-artesian bore the water does not rise above ground level and a pump is required to extract the groundwater. Over the last 150 years of development many bores were drilled in the artesian area of the basin and were allowed to flow uncontrolled; although only three such bores were drilled in the Northern Territory and these have since been controlled. This has led to a loss of pressure in some parts of the GAB, and about one third of all artesian bores which flowed when initially drilled now need pumps to bring water to the surface. Interstate water management plans are often concerned with reducing this pressure loss as much as achieving sustainable levels of water extraction.

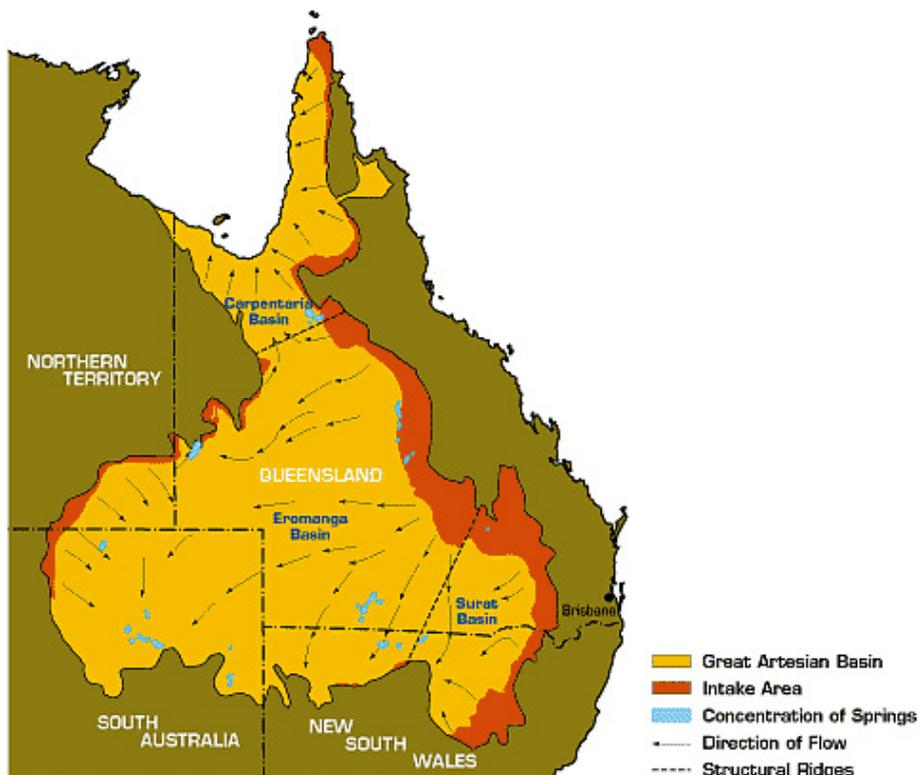


Figure 3: The Great Artesian Basin (Source: Qld NR&M taken from <http://www.gabcc.org.au>)

Most of the groundwater in the WCD is artesian, however, the vast majority of the artesian resource is located very deep beneath the Simpson Desert. Within the WCD, most groundwater use occurs in the sub-artesian area which is more readily accessible, on the margin of the basin.

The main aquifer within the Northern Territory portion of the GAB is in De Souza* Sandstone which consists of fine to coarse grained sandstone. The overlying Rumbalara♦ Shale acts as the confining layer and contains claystone. The water quality in the De Souza Sandstone is generally very good and groundwater extracted from this resource in the Northern Territory is predominantly used for domestic purposes and to water stock. Poorer quality water occurs within thin sandstone layers within and at the base of the Rumbalara Shale. This water contains too much salt to be used as a potable water supply.

Within the WCD there are also ephemeral surface watercourses, that is, the creeks and rivers only flow after rain and dry up quickly after rain events have passed. These include the Hay, Plenty, Todd, Hale and Finke Rivers and the Illogwa, Peebles and Goyder Creeks. Because of their ephemeral nature they are not a reliable point of water extraction. In the Arid Zone the Northern Territory Government applies a guideline for extraction that no more than 5 per cent of arid river flow at any time and at any point can be extracted for consumptive use. While these watercourses are consequently not significant as a source of water extraction, they are potentially very important as sources of recharge into the groundwater system.

The Northern Territory portion of the GAB does not contain any springs or natural groundwater dependent environments. However surface water resources within the WCD are important as they sustain most of the significant cultural and environmental sites in the area, such as swamps and floodouts, and support the biodiversity to be found at such sites. Important surfacewater sites within the WCD include the interdunal swale lakes fed by the Finke River floodout, the Finke River floodout forest, MacDills Lake (which is an artificial wetland fed by a controlled artesian bore) and the Lake Caroline area and other swamps associated with the Hay River.

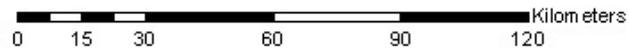


Figure 4: MacDills Lake

* The De Souza Sandstone is also variously known as the Hooray Sandstone, Algebuckina Sandstone in the SA portion of the GAB and the Longsight Sandstone in western Queensland.

♦ Also known as Bulldog Shale.

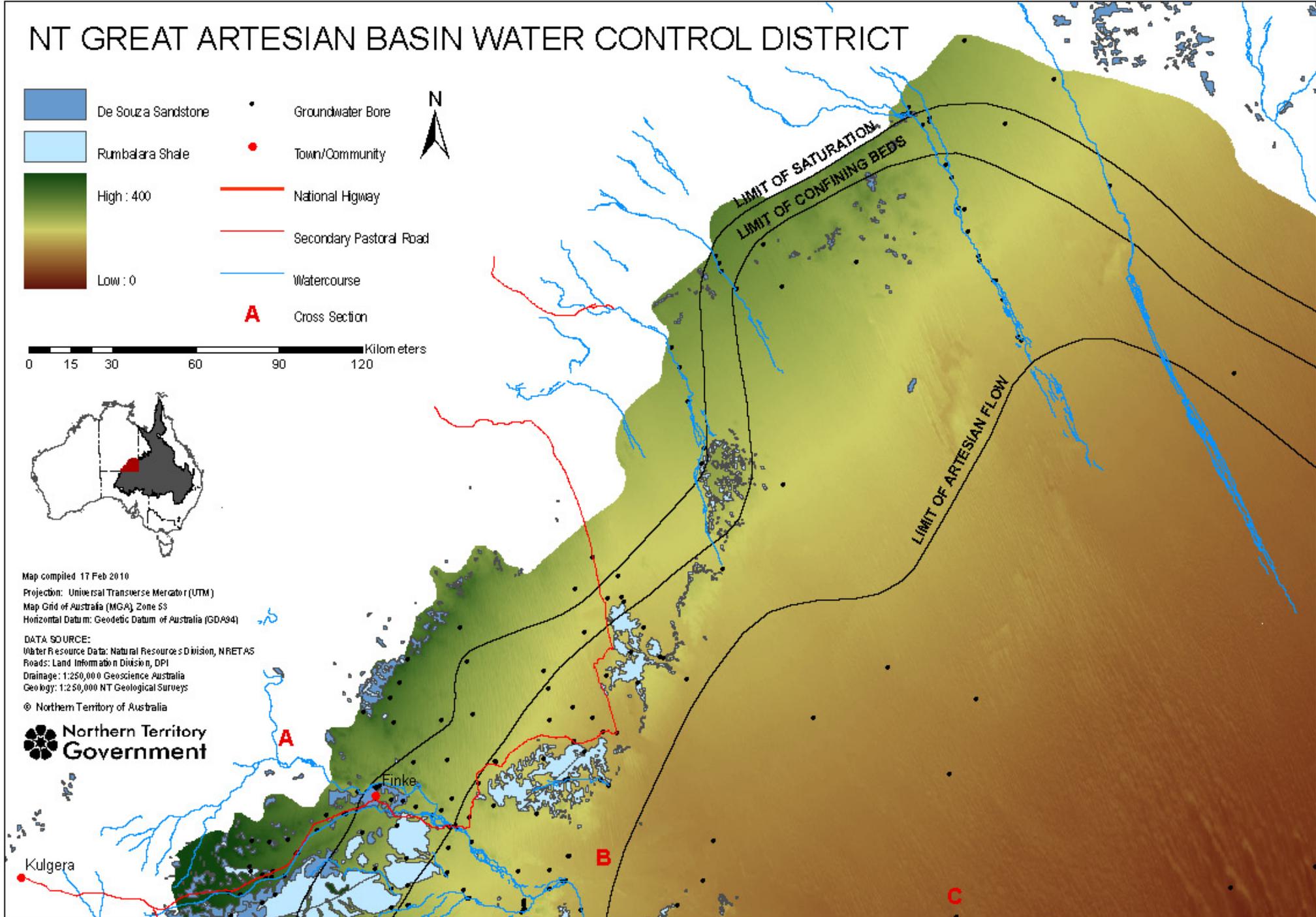
NT GREAT ARTESIAN BASIN WATER CONTROL DISTRICT



Map compiled 17 Feb 2010
 Projection: Universal Transverse Mercator (UTM)
 Map Grid of Australia (MGA) Zone 58
 Horizontal Datum: Geodetic Datum of Australia (GDA94)

DATA SOURCE:
 Water Resource Data: Natural Resources Division, NRETAS
 Roads: Land Information Division, DPI
 Drainage: 1:250,000 Geoscience Australia
 Geology: 1:250,000 NT Geological Surveys

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c. Great Artesian Basin Water Control District

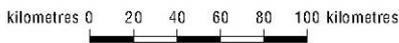
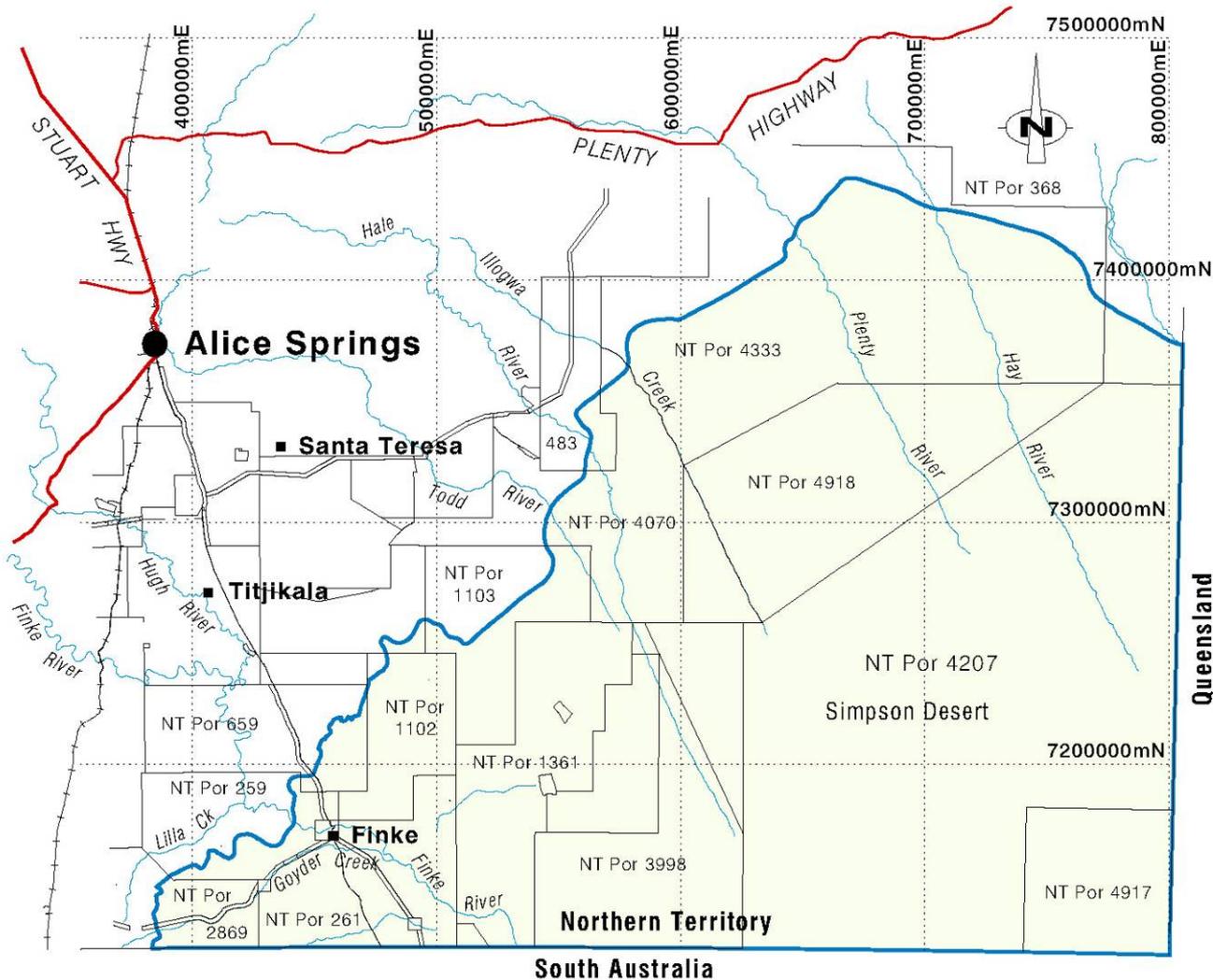
The WCD was declared by the Minister for Natural Resources, Environment and Heritage on 22 January 2010 and covers an area of approximately 86,500 km². WCDs are statutory instruments under the Act that allow implementation of a greater degree of water management. Within a WCD:

- All groundwater and surface water extraction, excluding for stock and domestic purposes, must be licensed and metered;
- Bore construction permits with minimum construction standards designed to prevent contamination of the aquifer are required for all bores more than 3m deep; and
- Water allocation plans can be declared.

d. Great Artesian Basin Water Allocation Plan

The Great Artesian Basin WAP will include an assessment of:

- Water availability from this resource, taking into consideration environmental and cultural water requirements, and community needs.
- Sources of future demand, including needs arising from growth in existing and emerging activities including public water supply, pastoral stock and domestic use, mining, horticulture and Indigenous economic development opportunities.
- Community response to the economic opportunities associated with the use of water from this resource.



Universal Transverse Mercator Projection
 Map Grid of Australia (MGA) Zone 53
 Horizontal Datum: GDA 94



Design File: Great-Artesian-Basin WCD m53
 Plot File: Great-Artesian-Basin WCD
 Prepared: February 2010

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- Water Control District
- Property boundary
- Alice Springs
- Santa Teresa
- Highway
- Railway
- Drainage line
- Town
- Aboriginal community

LOCATION MAP



**GREAT ARTESIAN BASIN
 WATER CONTROL DISTRICT**

Note

1. The Great Artesian Basin Water Control District was declared for the purposes of surface water and groundwater management on 22 January 2010 and published in the Northern Territory Government Gazette No. G5, 3 February 2010

Northern Territory Government
GREAT ARTESIAN BASIN
WATER CONTROL DISTRICT

Allocations

a. Beneficial uses

Under the Act, a WAP must allocate water to beneficial uses to ensure all user groups, including the environment, are accounted for and managed appropriately. Beneficial uses (which are defined and listed in s.4(3) of the Act) are a way of describing the different purposes for which water is valued. They are separated into two categories, consumptive and non-consumptive uses. Non-consumptive use is the water necessary for the survival of water dependent environmental and cultural sites. Consumptive use is the water that is extracted for consumptive purposes such as horticulture and industry, and will only be allocated after the non-consumptive uses have been met. A WAP is declared to ensure that water within the WCD is allocated to beneficial uses.

b. Non-consumptive uses

There are a number of significant ephemeral swamps and flood outs in the WCD including those described previously, which are generally considered to be dependent on surface water flows. It is likely that many of these sites are culturally and spiritually significant to local Indigenous communities. There is a lack of knowledge about their level of significance for cultural and environmental purposes. The extent, if at all, to which any of these sites is dependent on groundwater is also unknown. Part of this planning process will endeavour to identify and assess these sites.

Current Usage

Groundwater is the main water resource for consumptive use in the southern region of the Northern Territory. A significant use of groundwater in the WCD which does not require licensing or metering is for stock and domestic purposes. Assuming that there is a maximum carrying capacity of 17 500 head of cattle within the WCD which require an average of 50 L/day, it is estimated that a maximum total of 320 ML is used per annum to water stock*. On the basis of the population residing on stations, Aboriginal outstations and other communities **not** using licensed public water supplies, estimated at a total of 100 people with an average use of 1000L/person/day for domestic use*, total extraction for domestic use is estimated as a total of 36.5 ML per annum.

The other potentially significant and unlicensed groundwater use in the WCD is mining and exploration activities which are not required to be licensed under the Act. NRETAS does have an agreement with the Department of Resources that water extraction for mining and exploration purposes should not impact on other water users. It will be important for the planning process that estimates for future potential water extraction for mining and exploration are considered in the allocation of the consumptive pool under the WAP.

When licences are issued, usage is metered and monthly extraction amounts are reported to NRETAS. However as a WCD has only just been declared, there are no current licensees. It is however anticipated that Power and Water Corporation will apply for a groundwater extraction licence of approximately 100 ML per annum to continue to supply water to the community of Finke (which has an estimated population of 240).

* These estimates are based on carrying capacity figures taken from the Australian Valuation Office (2000).

* The water design criteria for remote communities recommend a reference level for design purposes as 1200 litres per equivalent person per peak day (Indigenous Community Engineering Guidelines: 2008). Peak demand anticipates that population is not stable year round and so this figure has been rounded down to suggest an annual average.

Community Consultation

Initial meetings with Traditional Owners occurred in March and April 2010. Public information sessions will also be held in late August in Alice Springs and Finke (Apatula) for the purposes of community consultation. These meetings will assist to identify key interest groups in the WCD, seek local knowledge and determine what regional issues and knowledge gaps need to be addressed in the WAP. Targeted stakeholders will be invited to these general information sessions. The intent is to consult with stakeholders from the WCD about the development of the WAP.

The purpose of community consultation is to ensure relevant advice and recommendations are provided to the Government on behalf of those who hold an interest in the way water is allocated and managed. The aim for NRETAS Water Resources Branch is to have regular contact and discussions with the community and other stakeholders, and to encourage community input throughout the development of the WAP. In other WCDs Water Advisory Committees have been established to advise the Northern Territory Government on water allocation planning processes. However given the limited number of stakeholders in the WCD and their geographic spread, direct consultation with the community is regarded as more advantageous in this instance.

The Water Resources Branch will regularly consult with stakeholders to discuss matters relating to the WAP. The aim of these public meetings will be to provide information from Government staff, technical experts and any other related project outcomes, and to develop the community's expertise and exposure to the water planning process. With this expertise the community will be able to provide recommendations to the Northern Territory Government ensuring community values are incorporated into the WAP.

Once a draft WAP has been prepared, community and stakeholder review and feedback will be sought. At this time stakeholders can provide their comments and feedback by direct submission via email or letter to the Water Resources Branch.

The stakeholders targeted for consultation during the development of the WAP include representation of the following interest groups:

- Public Water Supply Utility (PAWC)
- Local community
- Pastoralists
- Indigenous interests (Central Land Council)
- Indigenous economic interests (Centrefarm)
- Environment
- Tourism/Business
- Local Government (MacDonnell Shire)
- Mining/Industry
- Department of Resources

Consultation and engagement methods during the formulation of the WAP will include communication of licensing and regulation updates to organisations and individual stakeholders, presentations to organisations when requested, at least one public information forum, (probably at Finke which is the largest community within the WCD), solicitation of submissions on the draft WAP either online or in writing, provision of background documentation and supporting material upon request, internet updates to a dedicated website and media releases.

Key Issues and knowledge gaps

As part of the planning process, key issues and knowledge gaps are to be identified. The knowledge gaps are the areas where there is a lack of information to adequately cover the key issues to be addressed by the WAP. Possible issues and proposed investigations intended to assist in covering the knowledge gaps are suggested below. This list is subject to revision following community input.

Key Issues	Explanation	Knowledge Gaps	Investigations Proposed to Assist
Extent of water resources	Investigation work has been done in the past by NRETAS on water resources in various locations within the WCD. There is also further investigation currently occurring into the overall resources within the WCD under a Commonwealth funded project due to be completed by April 2012.	Extent and quality of water resources in the WCD	<ul style="list-style-type: none"> - A Technical Report is being prepared by NRETAS to identify the water resources available for allocation based on sustainable yield. This will be revised in the future to take account of the full results of the current investigation work which is not due to be completed until April 2012.
Protection of water dependent ecosystems	It is important for environmental/conservation groups and Indigenous people is to have water dependent ecosystems protected to ensure the retention of high environmental and cultural values.	Whether changes in groundwater levels associated with extractive use would impact on significant sites.	<ul style="list-style-type: none"> - A report may be commissioned to identify water dependent sites in the WCD and their likely dependence on groundwater.

Unknown Usage	Unlicensed use for stock and domestic purposes, small communities and mining is not known.	Amounts of extraction unknown Lack of observation bores and monitoring data	- Informal investigation of current levels of development.
Assigning water for future development	The WAP will allocate water for uses including irrigation, public water supplies, and stock and domestic purposes. Anticipated use for mining or gas production in particular, which is not required to be licensed under the Act, will need to be considered in development of the WAP.	Water resource capacity	- A preliminary Technical Report has been commissioned to identify the water resources available for allocation based on sustainable yield.
Fulfilling Indigenous cultural values	The WAP will address, as far as possible, the protection of Indigenous cultural values, including protection of significant cultural water dependent sites and retaining the ability for cultural activities.	Location of significant sites and associated water requirements is largely unknown	<ul style="list-style-type: none"> - Identification of water dependent ecosystems - Indigenous Consultation
		How to account for cultural needs that are separate from environmental values.	- Indigenous Consultation

Relevant Investigations to be undertaken

As part of the Great Artesian Basin WAP process, several projects will be undertaken to help bridge some of the identified knowledge gaps.

a. Identification of Water Dependent Ecosystems

The aim of this project is to be able to identify the water dependent ecosystems in the Northern Territory portion of the GAB. The project will have the following aims:

- Undertake a desktop analysis using available data and literature to identify water dependent ecosystems within the WCD
- For such ecosystems assess the level of dependence on groundwater and the optimal environmental groundwater requirement (if any) to maintain their functionality.
- Describe the ecological values of these sites as well as the significance of each of these values to ecosystem function (if possible) and where possible document the risk to each of these values for a range of possible groundwater levels, if the sites are considered groundwater dependent.

b. Informal User Investigation

With the announcement of the planning process for the GAB WCD, all water users will be contacted by Northern Territory Government staff to discuss the implications of how the WAP may affect them. Users will include pastoralists, the local community, Power and Water Corporation, industry (including miners), and any other consumptive users.

c. Indigenous Consultation

The GAB WCD has a high percentage of land which is owned by three Aboriginal Land Trusts (ALTs). The largest community by far in the WCD is Finke (Apatula). There are expectations for the involvement of local Traditional Owners in the water planning process. Departmental staff will work in conjunction with an independent consultant to help facilitate engagement in relation to:

- The identification of water dependent sites that have cultural and social significance to Indigenous people.
- Identification of aspirations for future water dependent economic development.
- The submission of comments on the draft WAP including from Central Land Council.
- Regular communication in relation to WAP updates.

Timetable

An indicative timeframe to develop the WAP is provided below. This is an indicative guide only and may be varied.

STEPS/OUTPUTS	WHEN
Initiation including provision of information to stakeholders	MARCH 2010
Background Report and community consultation	MARCH – AUGUST 2010
First draft of Water Allocation Plan	OCTOBER-NOVEMBER 2010
Public submission period including public feedback on outcomes and objectives	NOVEMBER-DECEMBER 2010
Further community consultation as may be required to respond to public submissions	NOVEMBER- DECEMBER 2010
Final plan including summary and response to submissions	EARLY 2011
Final documents are ready for Ministerial approval	EARLY 2011

Throughout this process community input will be sought and at specific stages broader consultation will take place. This includes formal feedback on the draft WAP, as well as any meetings or workshops as required.

Proposed Content of Water Plan

The aim of the following section is to give a broad understanding of the contents of final WAP. Final content will vary depending on the outcomes of the planning process.

Introduction

The scope of plan, its legal basis and effect, the date of commencement and expiry.

Context of Water Allocation Plan

Description of the policy and legislation underpinning the water allocation plan, and the community consultation involved in its preparation.

Water Control District

Description of the water control district, its population, environment and climate.

Water Resources

The nature and extent of the water resource.

Water Use

The extent of current use in the WCD including current or pending licences issued, as well as environmental and cultural uses. Discussion of possible consumptive uses in the future, Discussion of potential impacts on water resource from extraction.

Objectives and Strategies

What outcomes the WAP seeks to achieve and how it will achieve them.

Water Allocation and Licenses

- Overarching policy on water allocation, including management zones if applicable.
- Specific requirements for bore construction permits and water extraction licenses.
- Explicit provision for further research being required at the discretion of NRETAS from applicants for future water extraction licenses.
- How the Controller is to apply the plan in relation to management of licences and permits, including annual allocations, granting of new licences, granting of new permits, and amendment of existing licences.
- Water license trading rules. Analysis of the limitations of the plan and identifying the assumptions on which the plan is based.

Monitoring, implementation and review of the plan

Sets out how monitoring and performance indicators will be implemented and reported. Also how additional information will be gathered to improve management and inform the five yearly review. How the plan will be reviewed. Sets out the targets for implementing the strategies encapsulated in the Plan and for reporting on implementation.

Appendices

Standard Licence terms and conditions

Summary of stakeholder submissions and responses

Other Relevant Reading

Northern Territory:

Water Act: www.austlii.edu.au/au/legis/nt/consol_act/wa83/ -

Water Resources in Northern Territory: <http://www.nt.gov.au/nreta/water/index.html>

Water Fact Sheets: <http://www.nt.gov.au/nreta/publications/natres/waterfactsheets.html>

Groundwater: <http://www.nt.gov.au/nreta/water/ground/map.html>

Wetlands in the Arid NT: <http://www.nt.gov.au/nreta/wildlife/nature/aridwetlands.html>

Federal Government:

National Water Commission: <http://www.nwc.gov.au>

National Water Initiative: <http://www.nwc.gov.au/nwi/index.cfm>

Great Artesian Basin Coordinating Committee: <http://www.gabcc.org.au>

<http://www.environment.gov.au/water/publications/agriculture/video-great-artesian-basin.html>

EPBCA: <http://www.environment.gov.au/biodiversity/threatened/recovery.html>

Interstate Governments GAB Water Plans:

New South Wales: http://www.water.nsw.gov.au/Water-Management/Water-sharing/plans_commenced/default.aspx

Queensland: <http://www.derm.qld.gov.au/water/gab/>

South Australia: http://www.saalnm.sa.gov.au/Our_Work/Water.aspx

Reports:

Matthews, I, 1997. Hydrogeology of the Great Artesian Basin in the Northern Territory, Water Resources Branch, DLPE. WRA96052