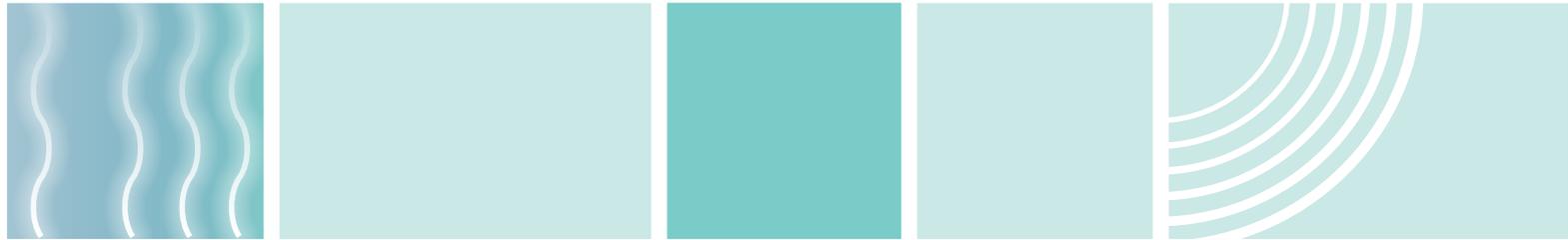


WATER SHARING PLAN

NSW Great Artesian Basin Groundwater Sources

Background Document



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***Water Sharing Plan:
NSW Great Artesian Basin Groundwater Sources
– Background document***

January 2009

ISBN 978 0 7347 5540 7

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Purpose of the Great Artesian Basin (GAB) Water Sharing Plan

Adequate fresh water is vital to sustain the natural ecosystems that support our communities. Agriculture, industries, transport, towns and cities have benefited from using water and as a result water use has continued to expand. It is essential to find a balance between the needs of the natural environment and other water users to ensure that the groundwater sources are managed sustainably for the benefit of future generations.

The Water Management Act 2000, provides better ways for the equitable sharing and management of the State's water resources. Under the Act, water sharing plans are being progressively developed for all water sources in the State, starting with the priority rivers and groundwater systems.

The NSW GAB water sources have been assessed as high risk particularly in relation to:

- the decline in artesian pressures due to over extraction and free-flowing discharge of the groundwater;
- stress to groundwater dependent ecosystems due to high levels of extraction; and
- threats to grazing industries in the catchment due to a reduction in access for both domestic and stock users and licensed users.

This Water Sharing Plan sets the rules that determine how water is to be shared between the environment and water users. It also establishes rules for sharing between different types of water users such as towns, domestic and stock users, and others. The Plan does not cover aspects of the use of water on land, such as water use efficiency, nor the other environmental aspects of specific land based activities or developments.

The Water Sharing Plan is a regulatory plan under the Water Management Act 2000, and is in effect for a 10-year period, thereby providing clarity of access for all water users during its term.

The objectives of the Plan are to:

- improve pressures and flows in the artesian portion of the groundwater sources through efficient water use and achieve sustainable extraction in their recharge areas;
- protect, maintain and where possible restore priority environmental assets;
- maintain and enhance cultural and heritage values affected by the use of water from the groundwater sources;
- enhance groundwater use for community benefit;
- adaptively manage these groundwater sources; and
- protect groundwater quality.

Intended Outcomes of the Plan

In the development of the Water Sharing Plan the intended environmental, economic, social and cultural outcomes that the Plan seeks to satisfy was determined by the NSW Great Artesian Basin Advisory Committee (GABAC). The GABAC was composed of representatives of State agencies, user groups and environmentalists and their terms of reference included the preparation of a groundwater management plan.

These outcomes are:

- partial restoration of GAB groundwater pressures and flows through provisions for the protection of environmental water;
- protection of groundwater dependent ecosystems by buffer zones;
- long-term security of access to water by establishing share components; and
- maximum access to, and utilisation of, available GAB water by allowing trade within and between the water sources.

Description of the Great Artesian Basin

The Physical System

Area of Application

This Plan applies to the sandstone aquifers of the Great Artesian Basin (GAB). These are described as geological formations 65 to 210 million years old belonging to the GAB and the intake beds of the GAB.

The NSW portion of the GAB covers an area of 207,000km², which represents about 20% of the area of NSW and about 12% of the total area of the GAB (Figure 1).

Groundwater associated with the GAB is also acknowledged to have interactions with river systems overlying the Basin. In NSW it is highly likely that GAB water is providing base-flow to rivers such as the Dumaresq, Macintyre, Castlereagh, Namoi, and Gwydir in their eastern reaches. These base flows are fed by 'rejected recharge,' which occurs where water is restricted from entering the aquifer, mainly due to geological reasons, and discharges at the surface.

The GAB in NSW is part of two sub-units of the larger Basin – these are the Surat Basin and the Eromanga Basin. The Surat Basin underlies much of north-eastern NSW, where it extends southward from Queensland and west of the Dividing Range taking in Brewarrina, Coonamble, Moree, Lightning Ridge and Walgett. The Eromanga Basin underlies the north-western part of the State, separated from the Surat Basin by the Nebine Ridge (a sub-surface geological structure oriented north-south in the Brewarrina area) and includes the town of Tibooburra.

The GAB consists of sedimentary sequences with layers of porous and permeable sandstones which alternate with low permeability shales, siltstones and mudstones. The Permian strata underlying the GAB and the Cretaceous shales overlying the GAB are excluded from the application of this Water Sharing Plan.

The productive aquifers of the GAB in NSW are sandstones, mostly less than 600 metres (m) thick and less than 500m from the surface. In the northern Surat Groundwater Source (Moree to Lightning Ridge) and the north west corner of the State, the thickness increases to between 600m and 1,200m, and the depth from the surface increases to between 500m and 1,000m. East of the Goondiwindi monocline, in the North Star-Croppa Creek area, the top of the productive aquifer is less than 100m from the surface and is typically less than 200m thick.

Groundwater supplies are obtained from the permeable sandstone aquifers, which are confined under sufficient pressure to make groundwater flow to the surface.

Groundwater recharge in NSW takes place chiefly along the eastern fringe of the GAB where the sandstone aquifers are exposed at the surface. Natural discharge from artesian springs takes place on the Bogan River-Carinda and Yantabulla-Bourke-Weilmoringle areas.

The groundwater development that has supported the pastoral industry in the GAB over the past 120 years has come at some cost to the Basin. There have been substantial groundwater pressure losses and only half the GAB bores in NSW continue to flow.

Hydrogeology

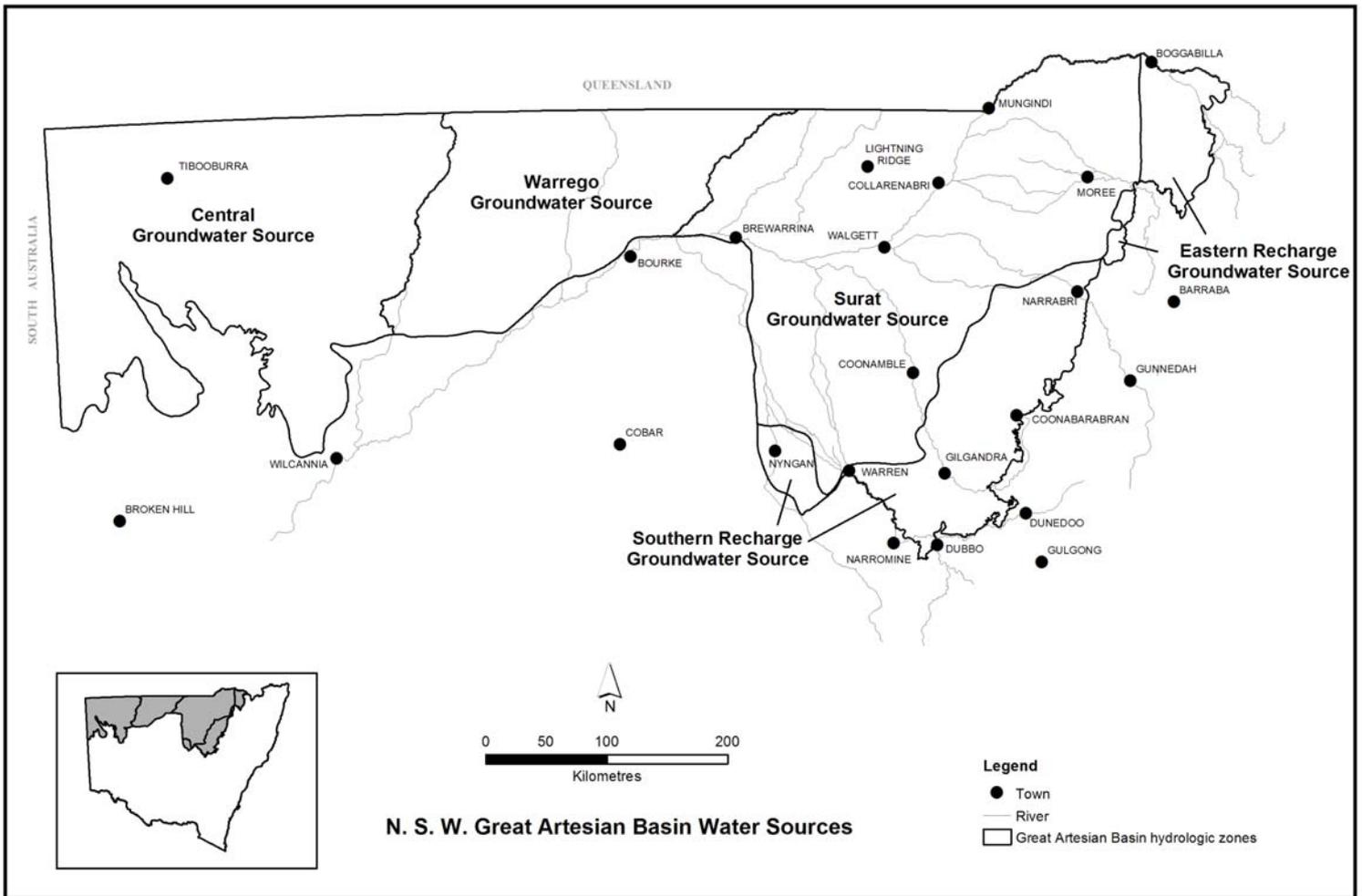
Recharge of the GAB is derived from rainfall and streamflow entering sandstones in the eastern recharge areas. The percentage of water entering the sandstones is estimated to be less than 2% of rainfall because of the limited capacity of the intake beds to transmit water. Most recharge occurs in higher rainfall areas in the east, from which groundwater generally flows westerly to southwesterly. A groundwater divide in the northern part of the GAB near Hughenden directs flow north toward the Gulf of Carpentaria and south toward Lake Eyre. Natural discharge occurs mostly through vertical leakage to springs and soaks in the south western area of the GAB. Discharge also occurs at spring groups in New South Wales and Queensland.

Water flow through the sandstone is extremely slow, ranging from 0.1 to 5 metres per year. Therefore it is estimated that the time taken for water to travel from the recharge areas to the western parts of the GAB can be up to two million years (Great Artesian Basin Consultative Council, 2000).

The volume of groundwater stored in the GAB is estimated to be 10,000 million megalitres. Assuming NSW holds 10% of the water, 1,000 million megalitres of groundwater is stored in the NSW portion of the GAB. The annual extraction and free-flowing discharge from the GAB in NSW is 0.02% of the estimated storage, which, although seeming low, has had a significant impact upon groundwater heads and flow rates of free flowing bores. More than 80% of the NSW portion of the GAB has witnessed pressure losses.

Falling groundwater pressure results in lower bore flow rates, which can cause the bore to cease to flow. The area of free flowing bores has continued to decrease in size since extraction began in the late 1800's. From 1920 to 1954 approximately 70,000ha/year were lost, whilst from 1954 to 1995 the rate of loss was 47,000ha/year (Brownbill, 2000).

Figure 1: NSW Great Artesian Basin Groundwater Sources



GAB Groundwater Sources

The GAB in NSW is managed as five groundwater sources (Figure 1). These are:

- Eastern Recharge Groundwater Source;
- Southern Recharge Groundwater Source;
- Surat Groundwater Source;
- Warrego Groundwater Source; and
- Central Groundwater Source.

Eastern and Southern Recharge Groundwater Sources

Groundwater recharge takes place chiefly along the south and eastern fringe of the GAB, in an area known as the “intake beds”. Groundwater enters the main Pilliga Sandstone aquifer directly through exposed outcrop, or at lesser rates, via overlying strata where there is potential for downward groundwater movement. This area is defined by the Eastern and Southern Recharge Groundwater Sources and covers an area of 29,731 km².

The Eastern and Southern Recharge Groundwater Sources are characterised by better quality groundwater than other zones. Parts of these areas have been developed for high volume irrigation extraction at two main locations: North Star – Croppa Creek at the northern end of the Eastern Recharge; and Narromine West at the southern end of the Southern Recharge Groundwater Source.

Free-flowing bores, where water rises up the bore column under pressure to a point above the land surface, are absent apart from the far north-western part of the Eastern Recharge Groundwater Source. The area contains no mound springs, but does contain significant numbers of springs fed by 'rejected recharge.' Rejected recharge occurs where water is restricted from entering the aquifer, mainly due to structural reasons, and discharges at the ground surface. These springs are particularly evident along Jardines Creek and Ottleys Creek which are both situated near the small village of Croppa Creek in northern NSW.

Further south, the outcrop of the Pilliga Sandstone narrows markedly coincident with the location of the Gwydir River, and where the Goondiwindi Fault is no longer present. At Narrabri, the western edge of the Southern Recharge Groundwater Source extends further into the Basin. The western boundary of the Groundwater Source is defined by a change in the direction of vertical groundwater movement.

Surat Groundwater Source

Within the Surat Groundwater Source flow and pressure is governed by recharge from the Eastern and Southern Recharge Groundwater Sources, driving flow toward the north and west. This flow meets south west flowing groundwater from Queensland in the north west of the Surat Groundwater Source. A hydraulic constriction caused by Nebine Ridge, combined with the convergence of these flows, has resulted in the development of mound springs in the Bogan River-Carinda area. The area is characterised by a high density of bores, particularly in the southern part, and high flowing bores with numerous bore drains in the north. Free-flowing conditions exist over a large portion of the area. The Surat Groundwater Source covers an area of 73,418 km² and the water is primarily used for stock, domestic, commercial purposes such as spa bath industries and the mining industry.

Warrego Groundwater Source

The Culgoa River forms the boundary between the Surat and Warrego Groundwater Sources. Groundwater dynamics in the Warrego Groundwater Source are driven by groundwater flow across the Queensland border from the north. The south flowing groundwater converges with the small amount of water leaving the Surat lobe and is channelled west. The Warrego Groundwater Source covers an area of 36,244 km² and the water is primarily used for domestic and stock purposes.

Clusters of high bore density occur in a wide area north of Bourke, extending to and across the Queensland border, and in an area south west of Bourke toward the southern edge of the GAB. The Yantabulla-Bourke-Weilmoringle mound springs occur in the areas of high bore density.

Central Groundwater Source

The Hungerford-Wanaaring-White Cliffs Road divides the Central Groundwater Source from the Warrego Groundwater Source. The boundary follows a south south-west direction, roughly parallel with the direction of groundwater flow. In relation to the other areas of the NSW portion of the GAB, bore density is low, and free-flowing bores are absent across a majority of the area. Hence groundwater utilisation is relatively limited, with very few bore drains. The area of the Central Groundwater Source is 63,421 km² and the water is primarily used for stock purposes.

Groundwater Dependent Ecosystems

In the context of the GAB in NSW, the term “groundwater dependent ecosystems” usually refers to artesian springs and their immediate environments, which are totally dependent on GAB groundwater for survival. In addition to the organisms living solely within the springs, these ecosystems originally included migratory species of animals and people. However, there are many broader ecosystems in the GAB, such as rangeland ecosystems and aquifer ecosystems, which are largely or partially dependent on groundwater. This degree of dependence may be constant, may vary over time with the change of seasons, or in response to longer-term natural drought cycles.

Groundwater associated with the GAB in the eastern margin is also acknowledged to have interactions with river systems overlying the Basin. Whilst the volumes involved are not yet known, it is highly likely that some eastern reaches of the Dumaresq, Macintyre, Castlereagh, Namoi, and Gwydir Rivers are receiving base-flow from the GAB. Management of the groundwater resource needs to ensure that these flows are not significantly impacted.

Springs and Aquifer Ecosystems

Natural artesian springs in the GAB are probably among the rarest habitats in Australia, and are geologically, geomorphologically and biologically important (Pickard, 1992). The availability of GAB water from these springs has played a major role in determining the natural and cultural history of the Basin. Artesian springs are generally referred to as “mound springs” but some are depressions in the surface, and others are more accurately called “mud springs” as the flow rate is only enough to maintain a muddy patch at the surface (Pickard, 1992).

There are approximately 45 sets of artesian springs associated with the GAB in NSW. The decline in artesian flows and pressures over the last century has led to a substantial reduction in these ecosystems, and only some 30 of these still have permanent seeps or retain slight flows (Pickard, 1992).

Many of these springs are unique and endangered. Their high biodiversity values are recognised through their listing under the *Commonwealth’s Environment Protection and Biodiversity Conservation Act 1999* (EPBC).

The Artesian springs have also been listed as an Endangered Ecological Community under the NSW Threatened Species Conservation Act 1995 (TSC), and this requires that a Recovery Plan be prepared for them. A key feature of their recovery will be increased flows and protection from livestock and feral animal damage, however each spring will need to be individually assessed. The emphasis on provision of environmental water under the Water Management Act 2000 also affords the spring communities strong legislative protection.

In the GAB Intake Beds much of the rainfall infiltrating into the soil does not enter the main GAB aquifer and is discharged into shallow aquifers and streams. Particular examples are reaches of Jardines Creek and Ottleys Creek, which flow into the Macintyre River from the Coolatai-Yetman area. These two creeks have been identified as receiving strong base-flow contributions from springs and seeps along their banks. The majority of this water appears to be rejected recharge from the GAB.

Research from other groundwater systems around the world and in Australia is providing important information about organisms living within aquifers. In some instances, organisms living between the particles of the aquifer actually play a role in maintaining porosity, which affects storage and through-flow of water. These organisms can also play a role in maintaining water quality, by removing

sediment and organic matter from water recharging the aquifer, and by removing nutrients from base-flow entering streams.

In other situations, organisms living in aquifers have been shown to have existed unchanged since before geological processes formed the separate continents of Australia, Antarctica and Africa. As our knowledge of the GAB is far from complete, management decisions must err on the side of caution until we can be sure of the consequences of any actions that may damage or destroy these aquifer ecosystems.

Flows from natural artesian springs have sustained important natural ecosystems in areas that are otherwise without any permanent water. These ecosystems include the unique mound springs, mud springs and soaks, and also the rejected recharge springs in the intake areas, which provide a component of base-flow in some streams. Any significant alteration to the quantity and/or quality of the discharging groundwater is likely to have a detrimental impact on the reliant ecosystems.

Rangeland Ecosystems

The land over the NSW GAB is mostly arid or semi-arid plains with few natural sources of permanent water. Average annual rainfall ranges from about 600mm in the east to less than 150mm in the far west, but is significantly variable. Vegetation types vary according to climatic and soil characteristics. Tussock grasslands and woodlands predominate in the eastern half of the Basin, with some patches of forest in the south east. The western half of the Basin is characterised by low woodland and shrubland.

Pastoral development of the GAB has involved installation of thousands of ground tanks harvesting surface runoff, and the installation of bores. More than 1,500 of these are artesian bores allowing the naturally pressurised artesian water to flow freely to the surface. In other areas of the Basin water from bores is pumped to the surface. This groundwater is directly responsible for the agricultural development of the area and is the main supply for stock, domestic and town water over much of the area. This provision of watering points has meant that there is almost nowhere in western NSW that is beyond the daily walking range of sheep and cattle, from a tank or a bore.

Significant changes in GAB ecosystems have occurred as a direct result of the use of artesian water on pastoral properties, and particularly as a result of the distribution of this water via open bore drains. These changes include increased total grazing pressure, elevated native herbivore levels, maintenance of high numbers of feral species, and changes to the general native species composition. Much GAB water has a high Sodium Absorption Ratio (SAR) and this can have significant negative impacts on soil structure and salinity. This is particularly important when it comes to irrigating with GAB groundwater.

Whilst the impacts of GAB water use in the rangelands is beyond the scope of this Water Sharing Plan, it is considered by the Committee to be a significant issue in the broader catchment management processes and will need to be addressed in later planning modules.

Water Quality

Generally low salinity groundwater occurs in the most widely used aquifers of the Lower Cretaceous - Jurassic sequences (Pilliga Sandstone in the east, Hooray Sandstone in the west). Groundwater quality in the lower artesian aquifers is more variable, but salinity is generally lower than that found in the confining sequences of the GAB. Groundwater salinity generally increases away from the recharge areas (200mg/L Total Dissolved Salts, TDS) along the groundwater flow path toward the north and west (over 2,000mg/L TDS). The level of total dissolved solids remains low in the main aquifers owing to the inert nature of the aquifer material (GABCC, 1998).

GAB groundwater has high levels of sodium (Na), which renders the water unusable for irrigation in most places. Water with a high percentage of sodium (expressed as the sodium absorption ratio - SAR) is chemically incompatible with clayey soils, destroying soil structure. A combination of lower SAR groundwater and sandy soils allow irrigation to occur in the recharge areas on the eastern margin of the Basin. Sodium concentrations as low as 25mg/L occur in the recharge areas, increasing progressively to over 1,000mg/L in the far west (GABCC, 1998).

Alkalinity (as HCO₃⁻) is the dominant anion, however chloride concentrations relative to HCO₃⁻ increase westward. Chloride concentrations are very low in the eastern recharge areas and the Coonamble Embayment (<50mg/L), but increase steadily to over 1,000mg/L near the South Australian border (GABCC, 1998).

Groundwater with salinity less than 1,000mg/L is suitable for human consumption, although salinity of less than 500mg/L is desirable. The salinity of GAB groundwater is mostly below 1,000mg/L and is generally suitable for domestic and town water supply. Elevated fluoride levels need to be considered in some areas (GABCC, 1998).

Stock can tolerate relatively saline drinking water. The quality of GAB water drawn from the most widely used GAB aquifers is ideal for stock watering. The more saline groundwater (>10,000mg/L) from the shallower aquifers is generally only suitable for short-term stock use. However, elevated fluoride levels in some areas of the Basin (mainly Queensland) pose hazards for stock consumption (GABCC, 1998).

Water quality in the intake beds may also be affected by sources of point source pollution such as feedlots, chemical contamination from garbage tips, and diffuse source pollution from grazing, chemical sprays and fertilisers.

Landuse activities

Agriculture is the largest user of GAB groundwater. Surface water sources in the semi-arid landscape of the GAB are not reliable and the development of the pastoral industry has been made possible by the permanent supply of GAB groundwater. Agricultural use can be sub-divided into two categories: pastoral (stock) and irrigation. The pastoral industry presently accounts for approximately 85% of the total GAB water use, however this figure is gradually declining as free-flowing bores are capped and open bore drains are replaced with polyethylene piping supplying tanks and troughs under the Cap and Pipe the Bores Program.

In the past two decades an irrigation industry reliant on GAB water has also developed in the Eastern and Southern Recharge Groundwater Sources, where water quality is suitable. Irrigation entitlements in the Eastern Recharge Groundwater Source are in excess of the estimated sustainable yield, and in some areas water use is causing falling water levels.

The Plan provides for the share components (entitlements) of aquifer access licences to be reduced in the Eastern and Southern Recharge Groundwater Sources to the sustainable yield of the water source. Where entitlements are reduced supplementary water access licences will be issued to those with a history of use greater than the amended share component of their aquifer access licence. Supplementary licences are issued to assist adjustment to reduced water availability. These changes are likely to have some short-term negative effects on the irrigation industry but will provide long-term security of access to water, and a resultant long-term maintenance of the industry. Licence holders not using their full entitlements will also benefit from the option of trading water to other users. The impacts are likely to be hardest felt by those users currently accessing the majority of their entitlements.

Cap and Pipe the Bores Program

Historical approaches to use and distribution via open bore drains have resulted in excessive levels of extraction and wastage. As much as 95% of the water that comes from a bore can be lost due to seepage and evaporation along the bore drains. The Cap and Pipe the Bores Program has been developed to address this wastage and improve land management capabilities and options.

The Cap and Pipe the Bores Program is a jointly funded initiative of the NSW and Commonwealth Governments which aims to achieve sustainable land and water management in the GAB. In the first five years, from 1999 to 2004 the program saved approximately 26,000ML each year. The program is administered in NSW by the Department of Water and Energy. Over the five years from 2004 to 2009, \$32 million will be available to landholders in NSW to take part in the scheme. Artesian bores will be rehabilitated and wasteful bore drains will be replaced with efficient piped systems, so that water can be controlled and used only when and where required. Implementation of the Cap and Pipe the Bores Program will reduce waste, reduce artesian pressure decline, improve water use efficiency, decrease salinity, conserve biodiversity, control feral animals and encourage sustainable land and stock management practices. The conversion from bore drains to pipelines also presents landholders with an excellent opportunity to review their property infrastructure and management.

Table 1. Cap and Pipe the Bores Program Achievements and Projections

	Recharge Groundwater Sources	Surat Groundwater Source	Warrego Groundwater Source	Central Groundwater Source	Total
Bores controlled (1990-1999 pre-GABSI)	5	63	16	7	91
Schemes piped	2	52	5	6	63
Bore drains deleted (km)	0	1,376	9	6	1391
Water saved (ML/yr)	0	5,708	1,167	2,176	9,051
Bores controlled (1993-2003 GABSI)	0	62	27	12	101
Schemes piped	0	35	15	6	56
Bore drains deleted (km)	0	2,268	261	44	2,573
Water saved (ML/yr)	0	12,864	6,053	3,226	22,143
Bores to be controlled (2003-2004 GABSI)	0	25	25	3	53
Schemes piped	0	15	15	1	31
Bore drains deleted*	0	1,000	130	10	1,140
Water saved* (ML/yr)	0	16,900	5,900	800	23,600

* Estimates based on projected works using current information and indications of landholder interest. Implementation is also subject to weather and access constraints.

Groundwater bores, entitlements and usage

Licensed Water Entitlements and Usage by Category of Licence

In the GAB Eastern Recharge Groundwater Source entitlement exceeds the sustainable yield by approximately 300%. While annual extraction has in the past exceeded the sustainable yield, it has been reduced to around the sustainable yield by restricting annual allocations to 80% of entitlements.

In the remaining groundwater sources in the GAB licensed entitlement is less than or similar to the sustainable yield. Usage is significantly less than entitlement.

Extraction for domestic and stock purposes is the major use of water in the artesian zones. Approximately 90% of this extraction is lost through leakage and evaporation from bore drains. As free-flowing bores are progressively capped and piped, the volume of water extracted for domestic and stock usage will reduce significantly. Details of the bores in the GAB water sources are provided in Table 2.

Table 2. Summary of NSW GAB Bore Status

	Eastern and Southern Recharge Groundwater Sources	Surat Groundwater Source	Warrego Groundwater Source	Central Groundwater Source	Total
Total Bores	265	613	468	71	1,417
Free Flowing Bores	4	372	208	17	601
Non Flowing Bores	261	241	260	54	816
Domestic and Stock Bores	194	607	468	71	1,341
Irrigation, Industrial, Recreational Bores	70	6	0	0	76
Free Flowing Extraction (ML/yr)*	1,100	72,600	20,800	7,600	102,100
Total Extraction (ML/yr)	18,200	75,000	22,400	7,900	123,500

* Estimated minimum flows for groundwater source. Data is taken from latest available flow record post 1986.

Notes: Not all flowing bores will have appropriate data and therefore are not included.

Domestic and Stock Access

The total volume of water currently extracted for domestic and stock usage will decline as progressive capping and piping increases the efficiency of water use and distribution. The stock component of this will be calculated according to the details outlined in Table 3.

The stock requirements from Table 3 have been added to the domestic requirements calculated in Table 4 to estimate usage in each Groundwater Source in the GAB in NSW as shown in Table 5.

Table 3. Calculation of Estimated Stock Use

	Intake Beds	Surat East	Surat West	Warrego	Central
Stocking Rate (DSE*/Ha)	5	2.5	1.75	0.8	0.3
Estimated Water Consumption (L/head/day)	5	5	6.75	9	9
Estimated Water Consumption (ML/ha/yr)	0.009	0.0045	0.0043	0.0027	0.001
Estimated Water Consumption (ML/1,000ha/yr)	9	4.5	4.3	2.7	1

- DSE (dry sheep equivalent) = a unit of measurement used to assess the carrying capacity and potential productivity of a given farm or area of grazing land

Table 4. Calculation of Estimated Domestic Use

	Intake Beds	Surat East	Surat West	Warrego	Central
Domestic requirements (ML/yr/household) - assume 5 people	0.32	0.32	0.32	0.32	0.32
House garden (ML/yr/household) - assume 0.1ha	0.2	0.2	0.4	0.6	0.8
Domestic and Garden (ML/yr/household)	0.52	0.52	0.72	0.92	1.12

Table 5. Total Estimated Domestic and Stock Volume

	Intake Beds	Surat East	Surat West	Warrego	Central
Volumetric conversion (ML/1,000ha)	10	5.5	5.5	3	1

Local Water Utility Access

At least 42 communities currently source GAB water for town water and domestic supplies. Domestic supplies include drinking water, bathing, washing, watering gardens and other external uses. Town water includes domestic uses as well as limited commercial and specified industrial uses. Towns using GAB water are outlined in Table 6 below:

Table 6. Current Licence Volumes for Local Water Utilities Access Licences in the NSW Great Artesian Basin

Town	Shire	Water Supply Scheme Operator	Allocation (ML/yr)
Eastern Recharge Groundwater Source			
North Star	Yallaroι Shire Council	Yallaroι SC	40
Toomelah	Moree Plains Shire Council	Water Supply	44
Warialda	Yallaroι Shire Council	Yallaroι SC	400
Southern Recharge Groundwater Source			
Bugaldie	Coonabarabran Shire Council	Coonabarabran SC	7
Collie	Warren Shire Council	Warren SC	25
Gilgandra	Gilgandra Shire Council	Gilgandra SC	1,500
Kenebri	Coonabarabran Shire Council	Coonabarabran SC	8
Surat Groundwater Source			
Baradine	Coonabarabran Shire Council	Coonabarabran SC	221
Bellata	Narrabri Shire Council	Narrabri SC	65
Boomi	Moree Plains Shire Council	Moree Plains SC	55
Carinda	Walgett Shire Council	Walgett SC	31
Coonamble	Coonamble Shire Council	Coonamble SC	1,200
Cumborah	Walgett Shire Council	Walgett SC	50
Goodooga	Brewarrina Shire Council	Brewarrina SC	121
Garah	Moree Plains Shire Council	Moree Plains SC	50
Gulgargambone	Coonamble Shire Council	Coonamble SC	273
Gurley	Moree Plains Shire Council	Moree Plains SC	11
Gwabegar	Narrabri Shire Council	Narrabri SC	136
Lightning Ridge	Walgett Shire Council	Walgett SC	714
Mungindi	Moree Plains Shire Council	Moree Plains SC	50
Nevertire	Warren Shire Council	Warren SC	40
Pilliga	Narrabri Shire Council	Narrabri SC	80
Quambone	Coonamble Shire Council	Coonamble SC	68
Walgett	Walgett Shire Council	Walgett SC	300
Warrego Groundwater Source			
Enngonia	Bourke Shire Council	Bourke SC	150
Fords Bridge	Bourke Shire Council	Bourke SC	2
Central Groundwater Source			
Tibooburra	Tibooburra Water Trust	Tibooburra Water	146
Wanaaring	Bourke Shire Council	Bourke SC	15

It should be noted that some towns/communities have not been included in Table 6 as they are not recognised as local water utilities. Other towns may be added to this list if schemes are installed to provide town water supply.

Industrial Activity

Current industrial uses of GAB groundwater include mining and a commercial feedlot in the Eastern Recharge Groundwater Source. Mining is currently a modest user of artesian water in NSW and this is primarily associated with the opal mining in the Lightning Ridge and White Cliffs areas. It is possible that this activity may see an expansion and therefore an increase in water usage. According to the Department of Primary Industries, extraction of heavy mineral sands is also a potential activity which would have high water demands that would need to be sourced from existing license holders or from a portion of water savings generated through capping and piping free flowing bores.

Other types of mining are unlikely to occur within the Basin due to the substantial depth of artesian sediments. There is however, potential for the development of petroleum resources in rock strata below the water bearing formations of the GAB. According to the Department of Primary Industries, there is also potential for aquaculture ventures suited to the slightly saline waters. Any significant industrial developments are required to undertake a full Environmental Impact Statement to ensure minimal impacts associated with extraction and disposal of GAB water into the landscape.

Groundwater related cultural and heritage features

Aboriginal Groundwater Related Cultural and Heritage Features

There is evidence of the existence of Aboriginal use of the land above the GAB for many thousands of years. The water from natural discharges in the GAB supported plants and animals that were harvested by Aboriginal people, and enabled settlement in some areas. Flowing springs were especially important when surface water was not available. The natural heritage of this land was also incorporated into the spiritual and cultural beliefs of some of the indigenous communities that inhabited the area (GABCC, 1998).

Access to traditional sources of GAB water may be necessary for continuing indigenous cultural practices. Increasing flows to mound springs will support this value. Bore drains now occupy some historical flow lines, and landscape features with indigenous cultural significance may potentially be disturbed by the installation of the piping schemes replacing bore drains. The Cap and Pipe the Bores Program involves indigenous communities in assessment of schemes at the planning stage for a cultural impacts assessment.

The Plan protects Aboriginal cultural values by allowing an area to be declared as a local impact area. The Minister may set out local impact rules that are to apply to that area which will protect its pressures, water levels, water quality and groundwater dependent ecosystems.

European Groundwater Related Cultural and Heritage Features

Artesian water was first used in 1878 when a shallow bore was sunk near Bourke in NSW. By 1915 over 1,500 flowing artesian bores had been drilled throughout Australia. Now assured of reliable water supplies, settlers drove their stock westward. Thousands of square kilometres of grazing land was opened up, and the western areas of NSW witnessed the beginnings of a pastoral industry.

Since the turn of the 20th century, GAB water has been essential for the development and maintenance of pastoral enterprises. There are many sites associated with this historical development that may be of cultural importance to indigenous and non-indigenous Australians alike.

The water from the GAB continues to be of vital importance today, delivering water for agriculture, towns and industries. The heritage that this water source has provided should be maintained and protected.

There are recognised social values associated with water in an arid landscape and the Cap and Pipe the Bores Program is working to balance these social values with the resource management gains that come through the removal of bore pools and drains. In instances where landholders' social values are associated with ecological features that have developed with the provision of bore water, they will be considered in the environmental assessment. Where the value of a feature, such as a bore pool, is primarily a social one, the Cap and Pipe the Bores Committee will make a case by case assessment and negotiate an acceptable solution.

Spa Bath Uses

Flowing and non-flowing artesian bores are used for spa-bath tourist facilities in places such as Moree, Lightning Ridge, Boomi and Burren Junction. Quality considerations similar to drinking supplies apply to such recreational use, with the additional quality requirement of heated water. Remote communities, landholders and outback tourists also utilise warm artesian water for swimming and bathing in numerous other locations.

The facilities associated with these bores play an important role in the local economy and management decisions affecting them must reflect this. The localised pressure declines associated with their high volume use may be deemed by the community to be an acceptable trade-off (Moree Plains Shire Council, 2001).

Many users of GAB water for spa bath purposes use significantly more than their licence allocation. However, the Plan provides the potential for additional allocation under the controlled allocation provisions. These provisions allow up to 30% of water saved through the Cap and Pipe the Bores program to be re-released for extractive use.

Water Sharing Rules

The rules that govern water sharing in the GAB are explained in detail in the companion to this report, the Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources – Guide. The Guide should be read in conjunction with this report. Specifically, the Guide explains:

- how the Plan manages trade;
- how the Plan manages the sustainable yield (long term average annual extraction limit);
- the entitlement reduction strategy;
- how the Plan protects groundwater dependent ecosystems;
- the rules for granting new licences; and
- how the Plan manages growth.

Policy Considerations

This Plan was developed incorporating the principles of the State Groundwater Policy. This Policy is a framework designed to establish objectives and principles for groundwater management; a coordinated program for policy development, reporting and review; tools for policy implementation; and opportunities for information sharing. It influences the type and selection of management activities and resource development opportunities, and, where these actions conflict with economic development, it considers the full costs and benefits of the social, economic and environmental implications.

The principles on which the Policy is based include:

- an ethos for the sustainable management of groundwater resources should be encouraged in all agencies, communities and individuals who own, manage or use these resources, and its practical application facilitated;
- non-sustainable resource uses should be phased out;
- significant environmental and/or social values dependent on groundwater should be accorded special protection;
- environmentally degrading processes and practices should be replaced with more efficient and ecologically sustainable alternatives;
- where possible, environmentally degraded areas should be rehabilitated and their ecosystem support functions restored;
- where appropriate, the management of surface and groundwater resources should be integrated;
- groundwater management should be adaptive to account for both increasing understanding of resource dynamics and changing community attitudes and needs; and
- groundwater management should be integrated with the wider environmental and resource management framework, and also with other policies dealing with human activities and land use, such as urban development, agriculture, industry, mining, energy, transport and tourism.

The State Groundwater Policy encompasses three component policies: Quality Protection Policy, Quality Management Policy and Dependent Ecosystems Policy.

The Groundwater Quality Protection Policy is specifically designed to protect our valuable groundwater resources against pollution. Adoption of this policy means that the sustainability of groundwater resources and their ecosystem support functions will be given explicit consideration in resource management decision making.

The Groundwater Dependent Ecosystem (GDE) Policy is specifically designed to protect our valuable ecosystems which rely on groundwater for survival so that, wherever possible, the ecological processes and biodiversity of the dependent ecosystems are maintained or restored, for the benefit of present and future generations. It provides guidance on how to protect and manage these systems in a practical sense.

Plan Preparation

This Plan was prepared by the Department of Water and Energy (DWE) based on the advice and recommendations of the NSW Great Artesian Basin Advisory Committee (GABAC). The Committee had members whose skills and knowledge allowed them to consider a wide range of issues and interests including those of the grazing, irrigation, and industry groups, land and water management plan areas, environmental concerns, the local Indigenous community, the Border Rivers-Gwydir, Namoi, Central West and Western Catchment Management Authorities (CMA), local councils and government agencies. The Committee's Independent Chairman and members consulted with water users and other groups in the development of its recommendations.

As the GAB underlies parts of New South Wales, Queensland, South Australia and the Northern Territory each state and territory has developed legislative frameworks, policies and resource management approaches for its management. Queensland has developed a Water Resource Plan and a Resource Operations Plan for the management of the Queensland GAB, while both South Australia and the Northern Territory have state natural resource management plans which incorporate GAB management. In addition to management plans, each state and territory has advisory bodies which have the responsibility to facilitate exchange of information between stakeholders, government and technical specialists.

To facilitate consistent policy and management between the states and territory the Great Artesian Basin Coordinating Committee (GABCC) has been established. The role of this body is to provide advice from community organisations and agencies to State, Territory and Australian Government Ministers on efficient, effective and sustainable whole-of-Basin resource management and to coordinate activity between stakeholders.

Consultation

During the Plan's development, the Department and the GABAC consulted with water users and other groups in a number of ways. This section details the consultation processes that have taken place following the finalisation of the draft Plan that was submitted to the Minister in early 2007.

Public Meetings

There were three public meetings held during the public exhibition period: 4 December 2007 in Moree, 5 December 2007 in Walgett and 6 December 2007 in Bourke. The main issues that were raised during the public meetings include:

- reasonable use guidelines;
- growth of town water supplies;
- access fees for stock and domestic (conveyance) access licences;
- changes to allocations before embargo exemptions for Moree spa users;
- application of State significant development status for Moree spa industry;
- controlled allocation policy/order;
- Great Artesian Basin Sustainability Initiative (GABSI);
- monitoring and metering;

- environmental water;
- accuracy of available data;
- trusts; and
- local impact management.

Public Exhibition

The draft Plan was placed on public exhibition between 15 October and 21 December 2007 under the provisions of section 38 of the Water Management Act 2000. It was on public display on the Department's website and at Moree Plains and Walgett Shire Council offices; Border Rivers Gwydir, Namoi and Western CMA offices and Tamworth, Moree, Dubbo and Armidale DWE offices. Details of the exhibition were put in both the North Western Magazine and Western Magazine.

Nineteen submissions and two late submissions were received. The two late submissions were received well after the closing date and were not considered.

Details of interests from which submission were received are listed in Table 7:

Table 7. Public submissions by interest group

Interest Group	Number of submissions
Independent landowners	6
User associations	5
Moree spa industry	4
Government	3
Other	1
Total	19

The main issues that were raised in the submissions include:

- the need for monitoring of water levels and pressures and making provisions for these results to be published on the Department's website;
- concern by licence holders that the methodology of history of use for determining entitlement reductions would not be equitable for all licence holders;
- the allocation of additional licences and the process for determining impacts on the environment and current water users;
- concern that licence holders would not have long-term water security;
- whether the Water Sharing Plan had provision which allowed for Aboriginal commercial licences to be traded;
- the need for a mechanism to facilitate interstate trading;
- the requirement for the extraction limit for the Moree Spa Bath industry to be identified; and
- the need for a mechanism which would make the savings from the Cap and Pipe the Bores Program available to current and new water users.

Review panel

A Review Panel consisting of the Great Artesian Basin Advisory Group (consisting of an independent chairperson, landowners and representatives of the Border Rivers Gwydir, Namoi, Central West and Western CMAs), the Department of Water and Energy, the Department of Environment and Climate Change and the Department of Primary Industries reviewed public submissions and made recommendations in regard to key issues. The Review Panel prepared the public exhibition report attached in Appendix A.

It should be noted that the submission report does not contain responses to comments that do not relate to provisions in the Plan. These comments were considered in a separate, more thorough analysis of issues raised. The are mainly related to the allocation of a portion of the water savings.

Adaptive Management

Adaptive management is an important part of a water sharing plan. The term refers to making provision within the plan to change the access or trading rules in response to new information obtained during the 10 year life of the plan. Adaptive management is a requirement of both the Water Management Act and the National Water Initiative.

This Plan provides for the following specified amendments during the term of the Plan:

- An increase in basic rights usage;
- An increase in local water utility entitlements;
- Additional conditions imposed on transfers where there may be the potential of unacceptable local impacts on other users or the environment, or unacceptable changes to groundwater quality.
- Change in the extraction limit as a result of further studies into groundwater recharge.

Implementation

Implementation programs

An Implementation Program is to be established that sets out the means by which the provisions of this Plan are to be achieved. The process for monitoring of the performance indicators will be outlined in the Implementation Program. An annual review of the Implementation Program will be conducted to determine whether the program is being effective in implementing the water sharing provisions. The results of this review will be included in DWE's Annual Report.

Monitoring water extractions

Each water sharing plan indicates the relevant mandatory conditions for extraction, including that all licences undertake measurement of use. DWE will develop a measurement of use strategy to meet the objectives of the NSW Water Extraction Monitoring Policy.

Measurement of use may be via meters or other forms of monitoring devices fitted to approved works, or via alternative monitoring systems, in order to provide water extraction estimates.

In relation to monitoring devices, different types of devices will be required depending on the nature of the water supply work installation, the size of the work, and the effect that the operation of the work may have on the water source and other water users.

It is anticipated that assessment of water sources will be undertaken across the State to identify priority areas of measurement of use and to determine the most suitable measurement options. It is likely that this will be implemented in high priority areas initially, with roll out to all water sources over time, as appropriate.

Note: Decisions regarding the timetable for introduction of measurement of use are still under consideration. In the interim, water users are encouraged to use other forms of self-measurement to assist them to extract water in line with Plan provisions.

Compliance

DWE will undertake compliance activities as necessary to enforce the provisions of the Plan once it is implemented. Some reliance is placed on local water users to identify inappropriate or unlawful behaviour and report this to the Department.

Monitoring

The Plan includes a number of performance indicators that will be monitored over the 10 year life of the Plan.

DWE is currently developing a Monitoring Evaluation Reporting (MER) Framework. This framework will be developed in collaboration with key stakeholders, and be consistent with the MER needs of the Natural Resource Commission and the National Water Commission. The intention is that the framework can be applied to existing water sharing plans to enable the development of specific MER plans for water sources.

It is not practicable to monitor all issues in all water sources. The performance indicators identify that monitoring will be undertaken for specific issues in key water sources. A risk assessment approach will be used to identify specific issues and high risk water sources where detailed MER needs to occur.

An Implementation Program is to be established that sets out the means by which the provisions of this Plan are to be achieved. The monitoring of the performance indicators will be detailed in the Implementation Program.

The need for continuous water level recorders

Continuous water level recorders have been used over a three year period in the North Star (Eastern Recharge Groundwater Source) area. These recorders have proved to be invaluable in determining the impact of abstraction on the area. The recorders demonstrate the effect from specific bores pumping schedules and their effect over time and space allowing easy and clear interpretation of abstraction impacts and trends in water levels over time. It is recommended that six continuous water level recorders be permanently installed in the North Star-Croppa Creek and Yetman area to monitor water levels within the irrigation area providing a cost effective and accurate approach to managing water abstraction, and for use in setting and triggering water impact/drawdown levels.

The Department will continue to monitor artesian pressures and water levels in the Eastern and Southern Recharge Groundwater Sources, through the established monitoring network, as detailed below in Table 8.

Table 8. Summary of Great Artesian Basin Monitoring Network for NSW

Monitoring	Number of Bores			Frequency
	Flowing	Non Flowing	Total	
Keysites	41	17	58	Annual
Eastern Recharge and Irrigation	20	26 (irrigation) 67 (d&s) 93 total	113	Non flowing (six monthly) Flowing (annual)
Southern Recharge	-	13	13	Annual
Spa Industry	7	16	23	Annual
Springs	23	9	32	Once every 3 years
Lightning Ridge	11	-	11	Once every 3 years
Town water Supply	21	8	29	Once every 3 years
Cap and Pipe	49	11	60	Once every 3 years
Flow/no Flow	55	24	79	As required
Water Quality	41	17	58	As required

Plan review

The Natural Resources Commission will undertake a review of this Plan prior to any decision to extend its term or to make a new plan.

The MER framework developed will consider the statutory requirements for the different types of evaluation:

- The Plan will be audited at intervals of no more than five years, for the purpose of ascertaining whether its provisions are being given effect. This audit is to be carried out by an audit panel appointed by the Minister for Water.
- The Plan will be audited by the Natural Resource Commission to assess to what extent the water sharing provisions have contributed to the relevant state wide targets, and natural resource standards and targets in the relevant catchment management area. The Natural Resource Commission will call for public submissions when undertaking its review.
- The Implementation Program will be reviewed annually.
- In addition, information from the relevant monitoring and evaluation programs should inform progress against the relevant Statewide targets and requirements of the National Water Commission under the National Water Initiative.

Plan amendment

The Plan makes provisions for change during its term. Unlike other water sharing plans, the Plan does not have a specific section devoted to plan amendments. Amendment provisions are instead detailed in the section of the Plan that considers the related topic. For example, Clause 11 lists the performance indicators of the Plan and allows the Minister to assess the performance of the Plan against those indicators at five year intervals.

Other amendment provisions include:

- a variation in long-term average annual net recharge estimate for each groundwater source following further recharge studies;
- a variation in the sustainable pressure estimate equivalent for each groundwater source following further pressure studies;
- a variation in the proportion of long-term average annual net recharge and/or the percentage of water savings made through the capping and piping of any water bores that is reserved as planned environmental water following further studies of groundwater ecosystem dependency;
- a reduction in the share component of each aquifer access licence in the Eastern and Southern Recharge Groundwater Sources in accordance with a process to be determined by the Minister;
- a variation in the distance restrictions in granting water supply works approvals to minimise potential impacts on groundwater dependent ecosystems, the aquifer or neighbouring water bores;
- a variation in Groundwater Dependent Ecosystems (GDEs) based on further groundwater ecosystem dependency studies;
- a variation in the contaminated sources list;
- a variation in the local impact rules to such an extent as to allow recovered groundwater pressure or groundwater levels to operate within the normal bounds of climate variability;
- a variation in the mandatory conditions that must be imposed on access licences; and
- a variation in the mandatory conditions that must be imposed on water supply works approvals.

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Appendix A

Public Exhibition Draft Water Sharing Plan for the Great Artesian Basin Groundwater Sources

Submission period

The Draft Water Sharing Plan for the Great Artesian Basin Groundwater Sources (the Plan) was placed on public exhibition on 15 October 2007 with submissions closing on 21 December 2007.

Submissions received

Nineteen submissions and two supplementary submissions were received. The two supplementary submissions were received well after the closing date and were not considered. Details of interests from which submission were received are listed below.

Independent landowners	6
User associations	5
Moree spa industry	4
Government	3
Other	1
Total	19

A list of submitters and their affiliations is shown in Table 1.

Issues raised

The main issues that were raised in the submissions included:

- monitoring and performance indicators;
- process for determining entitlement reductions;
- granting access licences;
- long-term water security;
- Aboriginal commercial licences;
- trading;
- extraction limit for Moree spa industry; and
- Controlled Allocation Policy

Issues raised and recommended responses

This submission report contains summary tables of the views expressed and the Department's response. It should be read in conjunction with the thorough analysis (attached spreadsheet), which details the issues raised, the section in the Plan to which they relate, the Department's recommendations and the bases behind the Department's recommendation.

It should be noted that the summary does not contain the Department's responses to comments that do not relate to a specific section of the Plan. The Department's responses to these comments are provided, however, in the thorough analysis. These are mainly in relation to a Controlled Allocation Policy. It also includes minor administrative changes.

Public Exhibition

Draft Water Sharing Plan for the Great Artesian Basin Groundwater Sources

Public Exhibition Submissions Register

No.	Submitter	Independent landowner	User association	Spa industry	Government	Other
1	Wendy Bunce	✓				
2	Gwydir Carapark			✓		
3	Croppa Creek Sandstone Bore Advisory Association		✓			
4	Dragon and Phoenix Motel			✓		
5	Private Bore Owners Association		✓			
6	Sundowner Motor Inn			✓		
7	Golden Triangle Property Ltd.	✓				
8	Graham Schramm, Ian Radford and Ian Uebergang	✓				
9	Coonamble Shire Council				✓	
10	Lightening Ridge Miners' Association		✓			
11	Urungie Partnership	✓				
12	Namoi Catchment Management Authority				✓	
13	Sue Currey	✓				
14	Coonamble Bore Baths			✓		
15	James Moore	✓				
16	Border Rivers Food and Fibre		✓			
17	Croppa Creek Sandstone Bore Advisory Association		✓			
18	Great Artesian Basin Coordinating Committee					✓
19	Central West Catchment Management Authority				✓	
		6	5	4	3	1

Plan Section	Part 2 – Vision, objectives, strategies and performance indicators	
Issue	Objectives	
Submission	1, 19	
Views Expressed	<ul style="list-style-type: none"> One submission suggested that continuous groundwater extraction should be prohibited for any economic exploitation. It also suggested that users' expectations needed to be reduced by the Department. The reasons given for these suggestions were due to biodiversity depletion and unsustainable use. Another submission was supportive of the Plan's objectives and strategies. 	
Relevant Plan Clause	Clause 9	
Comment	<ul style="list-style-type: none"> In accordance with the objectives of the Plan, water is allocated to both the environment and commercial use. The objectives of the Plan provide for enhanced groundwater use for community development. 	
Recommendation	No change to the objectives of the Plan.	

Plan Section	Part 2 – Vision, objectives, strategies and performance indicators	
Issue	Monitoring and Performance Indicators	
Submission	8, 10, 17-19	
Views Expressed	<ul style="list-style-type: none"> Most submissions suggested that the Department should closely monitor water levels and the results should be freely available to the public. The monitoring should be accurate and often. Monitoring results should cause annual entitlements to be reduced to maintain 2004 water levels. The Performance Indicators were well supported, but it was noted that monitoring was critical in delivering them. One submission suggested standardisation of spring and bore monitoring. 	
Relevant Plan Clause	Clause 11, Clause 31 – 33, Clause 37 – 38	
Comment	<ul style="list-style-type: none"> The Plan requires the monitoring of groundwater levels and pressures. It is the intent of the Department to make this information available through the Internet. Extraction is monitored and the extraction limit adjusted if it is exceeded. The Plan does not apply water level management unless a local impact management area is declared. It is noted that the Performance Indicators will be evaluated against the standards and targets in the catchment action plans of the relevant CMAs. The Plan requires the monitoring of groundwater levels and pressures adjacent to springs. The desirability of enhanced and standardised monitoring of springs is noted. 	

Plan Section	Part 2 – Vision, objectives, strategies and performance indicators
Recommendation	No change to the monitoring and performance indicator provisions of the Plan.

Plan Section	Part 3 – Basis for water sharing
Issue	Recharge
Submission	1, 17
Views Expressed	<ul style="list-style-type: none"> One submission suggested that it is impossible to know the average annual recharge. It stated that total extraction should be limited to one quarter the amount of rainfall measured from the driest year during the past five years. Another submission stated that more research should be done on the amount of sandstone water that contributes to the ecosystem.
Relevant Plan Clause	Clause 12(2) – Clause 12(4)
Comment	<ul style="list-style-type: none"> The average annual recharge has been determined using the best available science which will be reviewed in Year 5 of the Plan.
Recommendation	No change to the recharge provisions of the Plan.

Plan Section	Part 3 – Basis for water sharing
Issue	Water Savings
Submission	18
Views Expressed	<ul style="list-style-type: none"> Concerns were expressed regarding stratification of the entitlement system. Over time a more unified approach should be explored for allocation of water separately from aquifers that are vertically disconnected.
Relevant Plan Clause	Clause 12
Comment	<ul style="list-style-type: none"> There is currently insufficient scientific basis to allow allocation of water from the various aquifers within the GAB. Development of the hydrogeological model for the Basin is continuing and this may be possible in the term of the next plan.
Recommendation	No change to the water savings provisions of the Plan.

Plan Section	Part 4 – Environmental water
Issue	Environmental water
Submission	4, 19

Plan Section	Part 4 – Environmental water
Views Expressed	<ul style="list-style-type: none"> All submissions were supportive of environmental water provisions.
Relevant Plan Clause	Part 4
Comment	<ul style="list-style-type: none"> Noted.
Recommendation	No change to the environmental water provisions of the Plan.

Plan Section	Part 7 – Requirements for water under access licences
Issue	Entitlement reductions
Submission	2, 3, 7, 16
Views Expressed	<ul style="list-style-type: none"> One submission stated that any entitlement reduction would make a recently established industry unsustainable. History of use as a method for determining entitlement reductions was a major issue. There were numerous suggestions for determining history of use, including submissions that proposed methods are not equitable. One submission suggested that supplementary access licences should not be determined by history of use because it puts recent developers at a disadvantage. One submission suggested that history of use should be determined by the highest use in one year during the five years ending 30 June 2007. A user group offered to play an integral role (methodology and practicalities) in determining how cuts are to be made to existing entitlements.
Relevant Plan Clause	Clause 27
Comment	<ul style="list-style-type: none"> Current licensees in the artesian water sources will receive a new secure entitlement equivalent to the current substantive entitlement. Supplementary Water Access Licences are provided to allow licensees time to adjust by improving water use efficiency, growing crops with a lower water requirement, purchasing additional entitlement or switching to non irrigation enterprises. They are not provided for licensees to recoup their investment. There is scope to incorporate consideration for late developers in the entitlement reduction process following consultation on the entitlement reduction process. The entitlement reduction methodology is likely to result in a reduction in entitlement causing some degree of hardship for all entitlement holders. It is not possible accurately recognise the degree of hardship for each individual entitlement holder. The Departments recommendation will ensure all relevant stakeholder in the water source(s) in which entitlement reductions are to occur will have input into the entitlement reduction process.
Recommendation	Amend the Plan Incorporate the following requirement into the Plan: “The entitlement reduction process will recognise water-dependent

Plan Section	Part 7 – Requirements for water under access licences
	<p>investment made by licence holders prior to 1 July 2007, and will also recognise that all groundwater entitlements, whether extracted or not, have a value.”</p> <p>Amend the Plan Incorporate the following requirement into the Plan: 1. “The Minister will establish a committee to advise on the process for entitlement reduction which will include: a. representatives of the Great Artesian Basin Advisory Group and water utilities, and b. representatives of the irrigation industry and domestic and stock rights groundwater users in each water source in which entitlement reductions are required under subclause 29(2) 2. In determining the process for entitlement reduction the Minister will consider the advice of the committee established in subclause 1”</p>

Plan Section	Part 8 – Rules for granting access licences and approvals
Issue	Works approvals
Submission	9, 18
Views Expressed	<ul style="list-style-type: none"> Both submissions brought up issues regarding set back distances from high priority groundwater dependent ecosystems. They stated that the provisions may cause administrative difficulties.
Relevant Plan Clause	Clause 29
Comment	<ul style="list-style-type: none"> The Plan provides that this distance may be reduced, subject to conditions, if a hydrological study demonstrates minimal impact. As suggested, the potential of the variation between NSW and QLD in set back distances from springs can be addressed by the jurisdictions.
Recommendation	No change to the works approvals provisions of the Plan.

Plan Section	Part 8 – Rules for granting access licences and approvals
Issue	New allocation
Submission	1, 2, 4, 8, 9, 16
Views Expressed	<ul style="list-style-type: none"> Submissions stated that the actual figures for new licences are unclear. There were submissions that were for and against water savings from Cap and Pipe the Bores schemes being offered to future users. New allocation applications should be determined based on length of time since application. Older applications should be given preference.
Relevant Plan Clause	Clause 28

Comment	<ul style="list-style-type: none"> • Thirty percent of the savings from CaPtB will be made available for commercial use through a Controlled Allocation Policy. The Minister will determine the allocation of these savings. • Current licensees will receive shares in the water source numerically equivalent to their current substantive entitlement. In the recharge zones entitlements may be reduced after Year 5 of the Plan. • The Plan provides for new access licences to be issued in the Eastern Recharge Water Source. However as the water source is currently over allocated no additional entitlement for non-specific purpose access licences can be issued.
Recommendation	No change to the allocation provisions of the Plan.

Plan Section	Part 8 – Rules for granting access licences and approvals	
Issue	Granting access licences	
Submission	5, 7, 9, 11, 14, 15	
Views Expressed	<ul style="list-style-type: none"> • The suggestion was raised to release back to landholders 50% of water saved through privately-funded capping and piping of bores through an aquifer access licence. • Another submission stated that any general access licence to extract water should only be allocated in the groundwater source where the savings are captured. • The Plan needs to give some indication of what may be considered "significant" in terms of the volume of water or give some indication of the circumstances where this would come into effect. • Two submissions also brought up the issue of new developments and future allocations. 	
Relevant Plan Clause	Clause 28, Clause 44	
Comment	<ul style="list-style-type: none"> • The Plan [Cl.30(3)] provides for the allocation of additional shares of the resource by the Minister where the government has contributed to the cost of capping and or piping the bore. The suggested change extends this principle to entities who privately cap and or pipe a bore. • The Plan limits the allocation of additional entitlements to the water source in which the savings were made. However, Cl.48 of the Plan allows for extraction of allocations to be moved between the Central Warrego and Surat Water Sources. Due to the connectivity between these water sources, this is not considered a problem. • The Plan details the requirements for granting new access licences. Note Cl.30(8) to Cl.30(11) relate to use approvals. 	
Recommendation	<p>Amend the Plan Delete Cl.30(9) to Cl.30(11). Change Clause 30(8) to a non-statutory note. Check consistency with other plans.</p> <p>Amend the Plan Provide for the issue of share components to entities who cap a bore and or pipe bore drains equal to 30% of the water savings achieved after commencement of the Cap and Pipe the Bores program from 1999, provided the original licence for the bore was issued prior to 19??.</p>	

Plan Section	Part 9 – Rules for managing access licences
Issue	Account rules
Submission	1, 5, 17
Views Expressed	<ul style="list-style-type: none"> The view was expressed that water allocation should not be held indefinitely in trading accounts and extraction should not exceed 130% of the allocation. The view was expressed that carry over of unused allocation would be good only to the amount of 10% of original allocation.
Relevant Plan Clause	Clause 36
Comment	<ul style="list-style-type: none"> Aquifers have a high storage to sustainable yield ratio, allowing the averaging of extraction over successive years with minimal impact on the aquifer or other users. Carry over provisions for aquifer access licences are provided to allow licensees to manage their water accounts through variable climatic seasons. Cl.40(7) and Cl.40(8) limit the maximum volume of water that may be held in an account and the maximum volume that may be used in any water year.
Recommendation	No change to the account rules provisions in the Plan.

Plan Section	Part 9 – Rules for managing access licences
Issue	Impact management
Submission	7, 8
Views Expressed	<ul style="list-style-type: none"> One submission suggested that in trading or transferring of water, it would only be acceptable if there were strong protection from any further water level declines below 2004 levels through prompt local impact management. The issue of declining water levels was raised and it was asked what the specified trigger level to incur additional restricted pumping is.
Relevant Plan Clause	Clause 37, Clause 38, Dealing Principles
Comment	<ul style="list-style-type: none"> The Plan and the Dealing Principles protect users and the environment from adverse impacts resulting from increased right to extract water at any location. The visions in the Plan in relation to the Eastern Recharge Water Source are designed to prevent further decline in water levels. Where water level or pressure declines impact on other users or the environment, the Plan provide for the identification of such areas and the implementation of rules to mitigate and eliminate those impacts. Cl.42 and Cl.43 provides mechanisms to restrict extraction if further declines in water levels occur.
Recommendation	No change to the impact management provisions in the Plan.

Plan Section	Part 9 – Rules for managing access licences	
Issue	Licensing	
Submission	2, 4, 6, 8, 9, 12, 16	
Views Expressed	<ul style="list-style-type: none"> Numerous submissions expressed the view that the security of water for the Moree spa industry was uncertain. Submitters felt that the classification of non-specific aquifer access licence did not give security and a specific aquifer access licence should be created. One submission brought up the issue of Aboriginal commercial licences and their tradability. It also queried why an Aboriginal commercial licence is capped at 100 ML. One submission stated that if the Plan were to charge for domestic and stock (conveyance) access licences, licence holders should have access to the current and future GABSI programs. Also future GABSI programs should be aligned with this provision or the provision should only apply to those who are eligible to the GABSI funds. One submission queried if embargoes are to be lifted in relation to all new categories of licence. 	
Relevant Plan Clause	Water Management Act 2000, Clause 28	
Comment	<ul style="list-style-type: none"> In relation to the Moree spa industry, the Act does not provide for any industry to have a higher priority access to water than other industries. In relation to Aboriginal commercial licences, the Department's view is to be advised. The Plan provides for the charging of domestic and stock (conveyance) access licences (water loss from bore drains). It is not intended this provision will be implemented until after all licensees have had the opportunity to avail themselves of the provisions of the GABSI program to cap free-flowing bores and to pipe open bore drains. Target 5 of Schedule 4 is incorrect. 	
Recommendation	Amend the Plan Remove dot point "This Plan embargoes new licence allocations" from Target 5 of Schedule 4.	

Plan Section	Part 11 – Access licence dealing rules	
Issue	Dealings	
Submission	1, 3, 5, 7, 15-18	
Views Expressed	<ul style="list-style-type: none"> GAB water should not be tradable independently of land or licensed works. Water trading must be restricted in the early stages. Work needs to commence on the market rules and administrative arrangements to support interstate trade. 	
Relevant Plan Clause	Clauses 9, 43, 44, 46, Water Management Act 2000	
Comment	<ul style="list-style-type: none"> The Plan is in accordance with the 1994 COAG Agreement in Water Management in Australia and with the 2004 National Water Initiative. 	

Plan Section	Part 11 – Access licence dealing rules
	<ul style="list-style-type: none"> It has been the policy of the Department not to allow trading or the construction of new bores until entitlements have been reduced to the extraction limit. To do so could result in increased extraction by some users impacting on the viability of existing users. At this time, there is no identified demand for interstate trade. NSW will, in due course, consult with the QLD and SA gov'ts to formalise an agreement for the interstate trade of water in these water sources.
Recommendation	<p>Amend the Plan Prohibit temporary and permanent trading and the construction of new bores in the Eastern Recharge Water Source until entitlements have been reduced to a sustainable yield.</p>

Plan Section	Part 11 – Access licence dealing rules
Issue	Moree Spa Industry
Submission	2, 4, 6
Views Expressed	<ul style="list-style-type: none"> All submission suggested that the allocation for the Moree spa industry should be between 1300 and 1400 ML/year.
Relevant Plan Clause	Clause 27, Dealing Principles
Comment	<ul style="list-style-type: none"> Current licensees in the artesian water sources will receive new secure entitlement equivalent to the current substantive entitlement.
Recommendation	No change to the provisions in the Plan relating specifically to the Moree spa industry.

Plan Section	Other parts of the Plan
Issue	Schedules
Submission	9, 10, 13
Views Expressed	<ul style="list-style-type: none"> Views were expressed on the accuracy of the list of high priority groundwater dependent ecosystems.
Relevant Plan Clause	Schedule 4
Comment	<ul style="list-style-type: none"> Further checks will be performed on the list of high priority groundwater dependent ecosystems.
Recommendation	<p>Amend the Plan. Remove Cuddie Springs and Cumborah Springs. Remove the description column.</p>