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Office
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NSW Great Artesian Basin water market assessment pre and post auction

Tara Schalk, Christine Hill and Noel Flavel

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Abstract

The NSW Cap & Pipe the Bores Program is a jointly funded Commonwealth and State initiative that operates within the Australian Government's Great Artesian Basin Sustainability Initiative framework. Under the Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources 2008, 70 per cent of the water savings made since 1999 shall be retained in the aquifers of the Basin to improve pressures and provide for groundwater dependent ecosystems. The remaining 30 per cent of the water savings may be released to extractive users over the term of the Water Sharing Plan to facilitate the continued economic and social welfare of regional western NSW.

As the first step in this water release, part of the water savings from the Cap & Pipe the Bores program were auctioned in July 2009 in the western NSW town of Walgett. All lots offered at auction were sold.

The study reviews the pre auction analysis of demand, and outlines the auction process and outcomes as well as the implications for future water sales. The outcomes of the auction will inform ongoing water allocation policy.

Keywords; water auction, economics, Great Artesian Basin, groundwater, Cap & Pipe the Bores, Water Sharing Plan.

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Introduction

On November 2008 the Minister for Water, Hon. Phillip Costa MP, signed the Controlled Allocation of Access Licences Order for the NSW Great Artesian Basin Groundwater Sources. Under the controlled allocation order for the NSW Great Artesian Basin, interested parties were given the right to apply for the acquisition of 24 access licences in the Central, Warrego and Surat groundwater sources. These access licences were made possible through the water savings gained from the Cap & Pipe the Bores Program.

The auction was held in July 2009 in the western NSW town of Walgett, and was conducted by Real Estate auctioneers.

An estimated 150 people were in attendance, and in a process that was the first for NSW and Australia, all 24 lots (access licences) were sold within 75 minutes. The auction yielded \$870,000 which will be reinvested in the Cap & Pipe the Bores Program.

This paper outlines the pre auction assessment of the factors influencing market values and a range of possible values achieved at auction. It then outlines the results of the auction held in July 2009.

Background

The Cap & Pipe the Bores Program was introduced in 1990 by the NSW Government to replace wasteful artesian bore drains in the Great Artesian Basin (GAB). In 1999 the Commonwealth and States overlying the Basin entered into a joint program titled the Great Artesian Basin Sustainability Initiative (GABSI) to accelerate the rate of capping and piping of free flowing bores.

The first phase of the Cap & Pipe the Bores Program operated between 1990 and 1999 and saved approximately 8,600 megalitres (ML) of water, which was retained in the aquifers of the Basin to improve pressures and provide for groundwater dependent ecosystems.

In 1999 an embargo was placed on the NSW GAB, which prevented further applications for access licences. At the time, the then NSW Great Artesian Basin Advisory Committee (GABAC) was preparing a management plan for the NSW GAB. In developing a draft plan for the Minister's consideration the committee sought to apply the objectives of the Water Management Act 2000, and to balance the applying principles of ecologically sustainable development, and to foster social and economic benefits to the region and the State.

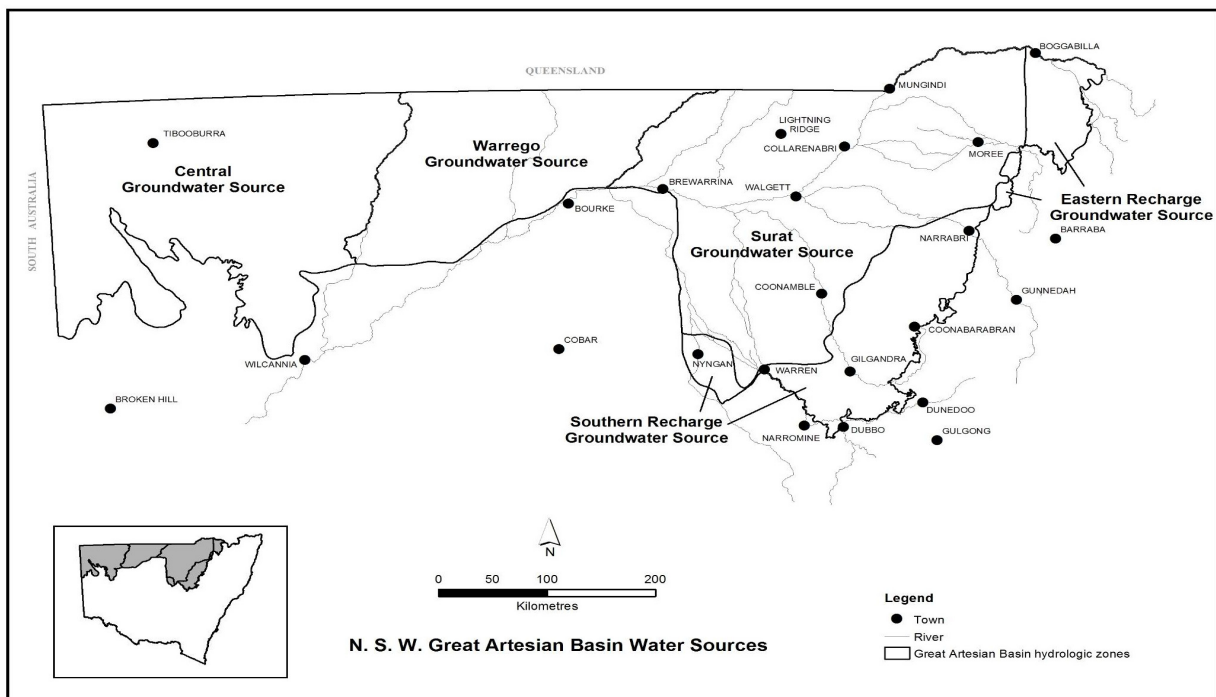
Under the GABSI initiative 1999–2014, the Cap & Pipe the Bores Program will save approximately 47,000 ML of water. Under the *Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources 2008* (the WSP), 70 per cent of the water savings made since 1999 shall be retained in the aquifers of the Basin to improve pressures and provide for groundwater dependent ecosystems such as the unique mound springs of NSW. The remaining 30 per cent of the water savings may be released to extractive users over the term of the Plan to facilitate the continued economic and social welfare of regional western NSW.

The decision to make 30% of the savings resulting from the capping and piping of bores under the GABSI Program available to new or existing users was presented to the community during public consultation of the draft WSP in information sessions held in Moree, Walgett and Bourke in December 2007.

The release of a portion of the water savings was recommended to encourage economic and social development of western regional NSW in the face of hardships suffered by struggling communities through drought, to provide a means for existing users to obtain sufficient water to maintain viable businesses, and to address community expectations, generated through the water management committee process and the Department, that water savings would be released.

With up to 14,000 megalitres to be released from the 47,000 megalitres saved under the GABSI Program, the average volume to be released each year of the 10 years of the WSP is 1,400 megalitres. After consideration of the likely demand at the time of the auction the former Department of Water and Energy agreed to release 1,200 megalitres in 2009.

Figure 1 NSW Great Artesian Basin



20/05/2008

Source: NSW Office of Water (2009)

Pre Auction -objectives

The objectives of the auction were to;

- Make available access licences to new or existing water users under the provisions of the Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources,
- Stimulate trade in the NSW Great Artesian Basin Groundwater Sources,
- Establish a market value (\$) for entitlements in the NSW Great Artesian Basin Groundwater Sources, and
- Provide equitable opportunity to potential purchasers of the water.

Issues

The value of water is an ongoing complex question. This report addresses the question of estimating water values for trading water within the GAB in NSW.

This section considers the variables influencing the potential market price of water for entitlements in the Surat, Warrego and Central water sources of the NSW GAB (Figure 1). It concludes with a discussion of factors that influence the development of a market for GAB water.

If the current resource was not fully utilised and trading in entitlements had only just become available following the gazettal of the GAB WSP, then there would appear to be an opportunity to encourage the market to develop of its own accord without the active engagement (and possible influence) of the Government.

However, given that the GAB WSP restricts trade across water sources, and that there is very little entitlement against access licences in the Warrego and Central water sources, the opportunity to trade is limited except in the Surat water source.

A general communication plan to encourage market activity in GAB water entitlements could include;

- Market information to facilitate trading,
- Information on water trading opportunities and procedures,
- Targeted education campaign to current and future water users,
- Information dissemination through water broker opportunities,
- An option to auction water in the future, for example, in 12 months time when the market had some time to establish itself, and further information was available as to its depth and demand on GAB water.

After gazettal of the GAB WSP on 1 July 2008, potential trading in Aquifer Access Licences (AAL) became possible. Pre auction there were no trades recorded and to meet its commitment, the former Department of Water and Energy (DWE) was considering an auction of unallocated aquifer access licences in the Surat, Warrego and Central water sources of the GAB. Under the proposed auction, there were to be limitations on the;

- Transferability of water within and between zones
- Volume (ML) being auctioned.

There was uncertainty as to the future policy towards selling water, in terms of;

- Frequency of future auctions,
- Volume being sold and
- Future demand for water.

Factors influencing water value

Influences on price

The price that purchasers of AAL may be willing to pay for water could be a function of;

- Trading limitations on quantity,
- Geographic trading limitations,
- Extraction limits to prevent impacts on the environment and other users,
- Range of end use possibilities,
- Current pressure on resources, that is, the demand for water and available supply,
- Cost of alternative water supplies/access to alternative water supplies, and
- Climatic conditions.

Purpose of trading in access licences

The end goals of facilitating trading in GAB AAL could include;

- Utilising unassigned water,
- Facilitating water being used for highest return /efficiency,
- Contributing to structural adjustment, if this were required,
- Fulfilling requirements/agreements of the WSP and Cap & Pipe the Bores program,
- Reducing demand pressure on other resources,
- Encouraging specific development of an industry, town or region, (employment, social welfare),
- Increasing water supply reliability,
- Capital maximisation for consolidated revenue,
- Resolving current entitlement anomalies if any.

Identifying demand

At the time, trading in GAB water could occur, although most water in the NSW GAB was used for stock and domestic supplies. Demand for AAL water was expected from;

- Spa industry in Moree- estimated a few hundred ML per annum,
- Coonamble Shire Council – spa water and feedlot water,
- Mining:
 - Opal mining in Lightning Ridge (ML unknown),
 - Gypsum mining near Bourke (500-1000 ML pa),
- Feedlots, other industrial users, and
- Fish farming.

In general, demand for GAB water would be affected by;

- Availability of other water supplies such as caps on surface water extraction/trading,
- Willingness to purchase low security water (GAB water is equivalent to high security), and
- Ability of user to relocate (mining is geographically inflexible, feedlots more flexible).

The identified demand for aquifer access licences was estimated at approximately 1200-1700 ML (Hill and Flavel 2008).

The GAB auction prospectus identified aquifer access licences that could be traded and the extent of entitlements in the current trading environment. The following table provides a summary of the then current number of aquifer access licences, local water utility access licences and allocations in the Surat, Central and Warrego water sources. Note that trade in water utility licences is restricted to temporary, only for a 12 month period and requiring ministerial approval.

Table 1 NSW GAB Aquifer access licences and shares

water Source	licence type	number of licences*	entitlement (ML)	average ML/licence
Surat	AAL	23	3,665	159
	WU	10	2,566	256
Central	AAL	3	12	4
	WU	0	0	0
Warrego	AAL	4	346	86
	WU	2	152	76
Total	AAL	28	4,023	143
	WU	14	2,718	194

Licence Type: AAL is Aquifer Access Licence. WU is Water Utility Access Licence

Source: Hill and Flavel (2008)

* as at August 2008

Information not to hand related to the current level of use of the above entitlements; whether the current entitlements were fully utilised or not. Initial inquiries indicated that there were some entitlement holders who were seeking additional entitlement while others may have had entitlement surplus to current use.

The largest users of groundwater in the GAB are pastoralists who use the water for stock and domestic purposes. The proposed release of 1,200 ML of share entitlement per annum was equal to an increase of 30 per cent in the current issued (aquifer) entitlement share of the water source. Over the proposed 10 years of auctions, the volume of shares in the water source would increase by 450% over the combined water source share of 4,023 ML in the Surat, Central and Warrego water sources.

Estimating water values

There are a range of methods to establish values of water, however not all are appropriate for every situation. Each method is limited by the extent of information available.

The cost to the government of releasing the water, while it has no bearing on actual market prices, can be used to underpin a reserve price in an auction or tender.

To determine what the market may pay for an AAL, the returns from the end use of the water are an indicator of the prospective industries' capacity to pay, such as agricultural gross margins. Other indicators include the current price of alternate water supplies (with adjustments for: location, reliability, quality, quantity, water treatment, desalination), such as surface water entitlements and prices for traded water in other markets.

Estimated costs of saving water

The cost of actually enabling the supply of water, including the administration costs can be used to set a minimum value / reserve price for water sales by Government. These costs should also include the transaction costs of selling the water, that is, marketing and auction costs. Ongoing monitoring costs could also be included. However, ongoing monitoring and management costs incurred by DWE (now NSW Office of Water) for the GAB are included by IPART in the prices set for holding a licence and use charges.

There is an economic argument that the costs of saving the water (for example, through the Cap & Pipe the Bores Program) are considered 'sunk' costs as they have been already incurred. The expenditure of the Cap & Pipe the Bores Program progressed without expectation of recovering costs by selling the saved water.

The incurred costs to the Department of the controlled release are the actual selling costs (fixed advertising and auction fees and a variable percentage of sales fees) and the cost of the dealings (licence administration fees).

The following are costs, which could be recouped fully or partially;

- Capital cost of saving water,
- Ongoing capital maintenance costs (although these have been transferred to the bore holder),
- Transaction costs,
- Cost of actually selling water (i.e. auction costs),
- Ongoing costs of record keeping/administration (i.e. IPART pricing),
- Future costs of supply, management and monitoring (i.e. IPART pricing).

The following table outlines the current dollar contribution to GABSI by the NSW State and Commonwealth Governments. As an example of capital costs per megalitre to be recouped, this cost was discounted over 30 years and the cost per megalitre calculated.

Table 2 Estimated costs of GABSI and \$/ML

cost	expenditure over 3 years of GABSI phase 2 \$	ML saved p.a.	\$/ML over 30 yrs**
NSW State Govt	9,229,000	10,695	60.83
Commonwealth	9,229,000		60.83
total	18,458,000*		121.66***

*Source: SKM (2008)

Note —** data discounted at 7% over 30 years

***Equivalent to an up front payment of \$1500/ML

A value of \$122 per megalitre in this example equates to an initial purchase price per megalitre of \$1500.

Cost of accessing alternative water supplies

Often the value of a resource is established by a substitute good, in this case another water source. If an alternative water source could supply sufficient water in adequate quality for the potential users, then the cost of accessing that water would provide an indication of the market value of water required. Alternatively the industry such as a feedlot could locate elsewhere to purchase water from an alternative water source. Water trading statistics as listed on <http://www.wma.naturalresources.nsw.gov.au> in NSW do not identify the end use of the water; therefore it is not possible from this data source to identify the prices paid for water to be used for irrigation or industry. Trading data from a variety of water sources is listed in the following table. This does not necessarily indicate a value for GAB water, but does provide some value parameters for background information.

Table 3 Market price indications

water source	licence type	2008/09 \$/ML	2007/08 \$/ML	2006/07 \$/ML
Groundwater				
Lower Namoi	Aquifer	-	1200	-
Lower Gwydir	Aquifer	-	2500-2700	-
Lower Lachlan	Aquifer	-	880	-
Lower Macquarie	Aquifer	-	600	-
<i>Regulated water source</i>				
Namoi	GS	-	-	-
Gwydir	GS	-	500-2500	-
Lachlan	HS	1400	1400	750-1400
	GS	650	500-3000	250-800
Hunter	HS	-	4000-9000	3000
	GS	3500	2000-3700	1000-8000*
	Sup	-	3000-3700	5000

Source: <http://www.wma.naturalresources.nsw.gov.au> September 2008

*mostly \$2000-\$4000/ML

GS= general security, HS = high security, Sup= supplementary.

Other market value indications

In September 2007 the Queensland Government called for expressions of interest for GAB water available under its Water Resource Plan in the Surat, Surat East and Surat North management areas. From this expression of interest process, the market place indicated a strong demand of four times the proposed sale volumes.

Another indicator for QLD GAB water values was the amount paid of \$2000 ML in a relocation of licences through agreements between landholders. Relocation of a water licence was a means of permanently trading or transferring water licences to another location within the same management unit of the QLD GAB.

Similarly to NSW, the QLD demand for water is expected to come from mining and feedlots.

SKM (2008) identified that the trading value of Murray Darling Basin (MDB) water of \$1200-\$2000 ML was consistent with their calculations of the per ML cost of saving GAB water under GABSI. Note that the report comments that MDB water would be of higher value than GAB water, as in the former it is used for irrigation but the GAB water was only considered available for stock and domestic purposes.

This observation by SKM did not recognise the significance of GAB water to the mining, tourism and feedlot industries.

The National Water Commission (2007) identified the range of values of water based on various industry sectors. As indicated in the following table, the return per ML of water is relatively higher to the mining sectors than to the agricultural sectors. These calculations are only indicative of the value of water to the different sectors, and do not necessarily represent purchase prices or quantities required.

Table 4 Value added per ML water used

Industry	\$ per ML
Coal mining	86,000
Metal mining	50,000
Other mining	25,000
Wood and paper	71,000
Electricity and gas	52,000
Oil and petroleum	1,000,000
Agriculture - rice	162
Agriculture - vegetables	3,870
Agriculture- horticulture	15,000

Source: National Water Commission (2007). From 2004-05 ABS data -

Estimated returns from auction

At an auction price of \$750 ML the returns of the sale of 1,400 ML for 10 years would cover the costs to the State Government for the first three years of GABSI phase 2 (which is a five year program). An auction price of \$1,500 ML would cover similar costs for both the State and Commonwealth contributions. While the balance of shares is not yet determined, possible returns are shown below.

Table 5 Estimated dollar returns of GAB aquifer access licence sale 1200ML

quantity traded per annum ML	average auction price \$/ML	proceeds of annual auction \$
1200	200	240,000
1200	500	600,000
1200	750	900,000
1200	2,000	2,400,000
1200	3,000	3,600,000
1200	5,000	6,000,000

Source: DWE (2009)

Note- data not discounted

Risk

There are risks in entering the market with a 450% volume increase and a 10 year annual auction program without adequate market knowledge. These risks include;

- Influencing market perceptions upwards or downwards of price per megalitre,
- Influencing market expectations of megalitres and prices through continued availability of water,
- Distorting market prices, and
- Future impacts of changes in scientific knowledge.

There is also the risk of accusations of either price gouging or dumping in the activity of selling water. Price gouging could appear to occur if the reserve price was set at such a level as to extract super normal profits through the government exercising its strong market power position (monopoly).

The dumping, or selling at less than 'fair value' situation could appear to occur if the reserve price was set at such a low level that the price and large volume offered contributed to future market failure.

The proposal to auction water was intended to minimise risks of distorting the market by;

- Fully informing the market of the current and future size of the resource,
- Setting a reserve that did not force the price while at the same time minimising the opportunity for a buyer to purchase all the available water from the savings pool and selling it at an inflated price in the future, and
- Avoiding initially placing more water on the market than current demand. The assumption was that the current entitlement and 30% of the savings would constitute the total resource by 2018 providing there are people prepared to use the resource (Hill and Flavel 2008).

The auction

Prior to the auction, opposition to the sale of entitlement was expressed by landholders in the NSW GAB. This opposition resulted from concerns regarding the management of the resource and the incomplete knowledge of the hydrology and pressure responses with respect to the Cap & Pipe the Bores Program. There was significant media coverage of the proposed auction of GAB water, and in some cases the media were not well informed, which resulted in negative publicity and confusion within the community.

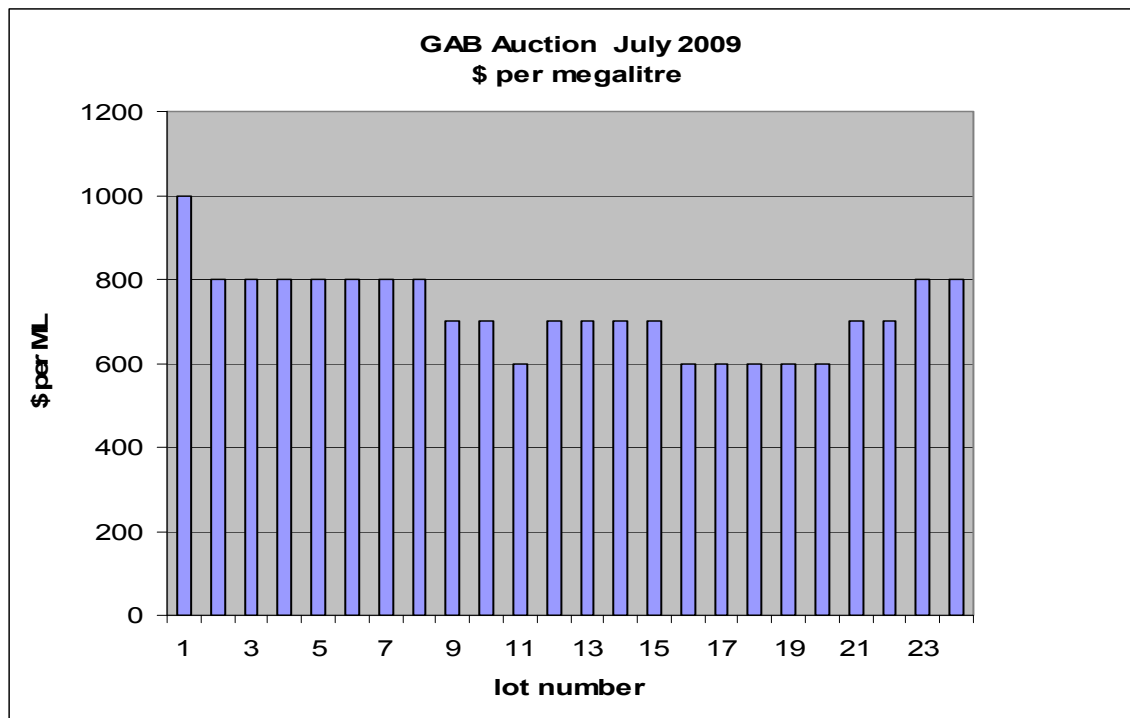
The morning of the auction, 21 July 2009, commenced with a rally of concerned individuals who opposed the further allocation of access licences in the NSW GAB. The rally was attended by approximately 150 people, along with several State and Federal politicians. The rally participants allowed the auction to go ahead uninterrupted on the condition that the NSW government would monitor the impacts on pressure recovery and guarantee that the proceeds of the sale would be reinvested into the capping and piping of free-flowing bores.

Outcomes of the auction

Following addresses by Departmental personnel, the auction commenced at 11.45am and was conducted in a non-confrontational manner. The bidding was consistent and within 75 minutes all 24 lots (1,200ML) had been sold. The highest price paid was \$1000/megalitre (lot 1), the lowest price paid was \$600/megalitre (lots 11, 16-20), and the average price paid was \$725/megalitre.

Indicative results from the auction suggest that 60% to 70% of the water purchased will be used to support tourism, and the balance to support intensive industries such as feed lotting.

The below table provides the results of the auction for the 24 lots.

Figure 2 Great Artesian Basin water auction results

Source: Schalk (2009)

The auction satisfied an estimated 90% of the demand for additional entitlement in the NSW GAB. It was considered that an extra 200ML could have been sold. The auction established a value for entitlement in the Central, Warrego and Surat groundwater sources of the GAB of \$700 to \$800/ML. This is expected to facilitate the development of a trading market in the NSW GAB water sources.

Future sales of water

The information provided to prospective buyers outlined the following water release schedule.

Table 6 Water release schedule

Water Year	Share Units
2008-2009	1200
2009-2010	1400
2010-2011	1400
2011-2012 to 2017-2018	Balance of Savings

Source: Schalk (2009)

In light of some stakeholders' concern regarding the auction and the allocation of new access licences the Department undertook to:

- Monitor and review pressure recovery, water savings, water demand and economic benefits before announcing any further controlled allocations, and
- Not announce any further controlled allocations for the next 2 to 3 years.

Discussion

Determining the value of water is not straightforward, particularly when there is imperfect market knowledge.

The Great Artesian Basin Water Sharing Plan commenced in July 2008. Lack of information by potential buyers and sellers may lead to a substantial failure of the water market. Given the short timeframe for a water trading market to develop, there had been little opportunity to inform the market of the implications of the WSP for licence transactions or potential values of entitlements. An informed market will encourage water use efficiency and trading.

Several knowledge areas need to be addressed. The extent of current utilisation of entitlements is uncertain. This will influence demand and therefore price of water. The proposed megalitres of unallocated water are significant in terms of current water shares.

Education on GAB water access rights and trading will strengthen the market and reduce the possibility of market failure, whether the market is encouraged to develop itself or a catalyst such as an auction is introduced.

Establishing the reserve price for an auction depends on which costs need to be recouped and prior assessments of the market price, as well as the philosophy underlying the sale. Reserve prices could be set too high and therefore reduce potential sales and opportunity to specific industry sectors. If the reserve price is appropriate, there will still be the opportunity for water trading among the other market participants. Whatever price is realised will influence the ongoing market price.

A strong demand for GAB water and good knowledge within the market for aquifer licences will support an auction. The outcomes will influence future water trading through price, expectation of future prices and releases of available water.

The goals of providing market education in order to facilitate and encourage market activity could be reached through an extension program and a longer timeframe for results without the risk of influencing expectations and price. Meeting the commitment to disseminate water savings to new and existing enterprises within the GAB can be facilitated through ongoing flexibility in water quantities, frequency and methods of sale.

The auction sold 1,200 ML of water for an average price of \$750/ML, with a range from \$600/ML to \$1,000/ML. In the press and on the day the auction drew angst from a range of stakeholders, although this was not considered to have affected the bid values. The auction outcomes indicated the importance of an education and communications strategy. Bidding was strong and consistent and the auction achieved its purpose.

References

- Hill C, Flavel N (2008) NSW Great Artesian basin groundwater establishing a market value. Final report NSW Department of Water and Energy Wagga Wagga
- Qld Dept of Natural Resources, Mines and Energy (2004) Information Sheet- Unallocated Water Principles for release. April
- DWE (2009) Water trading statistics <http://www.wma.naturalresources.nsw.gov.au>
- Mathews K, National Water Commission (2007) Water Reform and the Mining industry presentation at the NSW Minerals Council 2007 Environment and Community Conference August
<http://www.nwc.gov.au/resources/documents/Water-Reform-Mining-PRES-160807.pdf>
accessed 10 Sept 2008
- NSW Office of Water (2009) NSW Great Artesian Basin Report NSW Office of Water Armidale
- NSW Treasury (2007) NSW Government Guidelines for Economic Appraisal NSW July
- Schalk T (2009) NSW Great Artesian basin water auction 2009 Final report NSW Department of Water and Energy Armidale
- Schalk T (2008) NSW Great Artesian Basin – Controlled allocation of water savings prospectus 2008 NSW Department of Water and Energy Armidale
- SKM (2008) Great Artesian Basin Sustainability Initiative Mid term review of Phase 2 report for the Australian Govt Dept of the Environment and Water Resources February
- WSP (2008) Water Sharing Plan for the NSW Great Artesian Basin Groundwater Sources 2008 Order(2008) Govt Gazette of the State of NSW number 74 23 June 2008 Special Supplement.