St George Alluvium

Groundwater Background Paper

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Queensland Government

This publication has been compiled by Water Policy (South Region), Department of Natural Resources and Mines.

Contents

1 General information

This report provides general information on the St George Alluvium aquifer system, including location, climate, geology and hydrogeology and ecological profiles, history, use and current management.

The St George Alluvium is a formation of alluvial deposits associated with the Lower Balonne and the Moonie rivers and their tributaries. Its development over two time periods has resulted in a lower (deep) aquifer set down in an incised paleo-channel and a broad upper (shallow) aquifer deposited more recently. The shallow aquifer covers a much larger footprint.

The St George Alluvium aquifer system is identified in the Murray Darling Basin Plan (the Basin Plan) as several groundwater sustainable diversion limit resources units (SDL units). SDL units are identified in relation to the water resource plan areas they underlie as follows:

Table 1: St George Alluvium—Water Resource Plan areas and Basin Plan SDL units

Water resource plan Area	*Basin Plan SDL unit*	*SDL unit code*
Condamine and Balonne	St George Alluvium: Condamine and Balonne (shallow)	GS61
Condamine and Balonne	St George Alluvium: Condamine and Balonne (deep)	GS61
Moonie	St George Alluvium: Moonie	GS62
Warrego, Paroo, Bulloo and Nebine	St George Alluvium: Warrego-Paroo-Nebine	GS63

Unlike in the Condamine-Balonne plan area, the Warrego-Paroo-Nebine and Moonie SDL units do not differentiate between the deep and shallow St George Alluvium (table 1). It can be seen in figure 1 that both the deep and the shallow are located in these plan areas. The deep and shallow are considered separate groundwater management units under state management. Although under the Basin Plan the SDL applies to the combined deep and shallow units in the two plan areas, these are disconnected aquifers and the sustainable level of take from each aquifer may be significantly different to the SDL of the combined SDL resource unit.

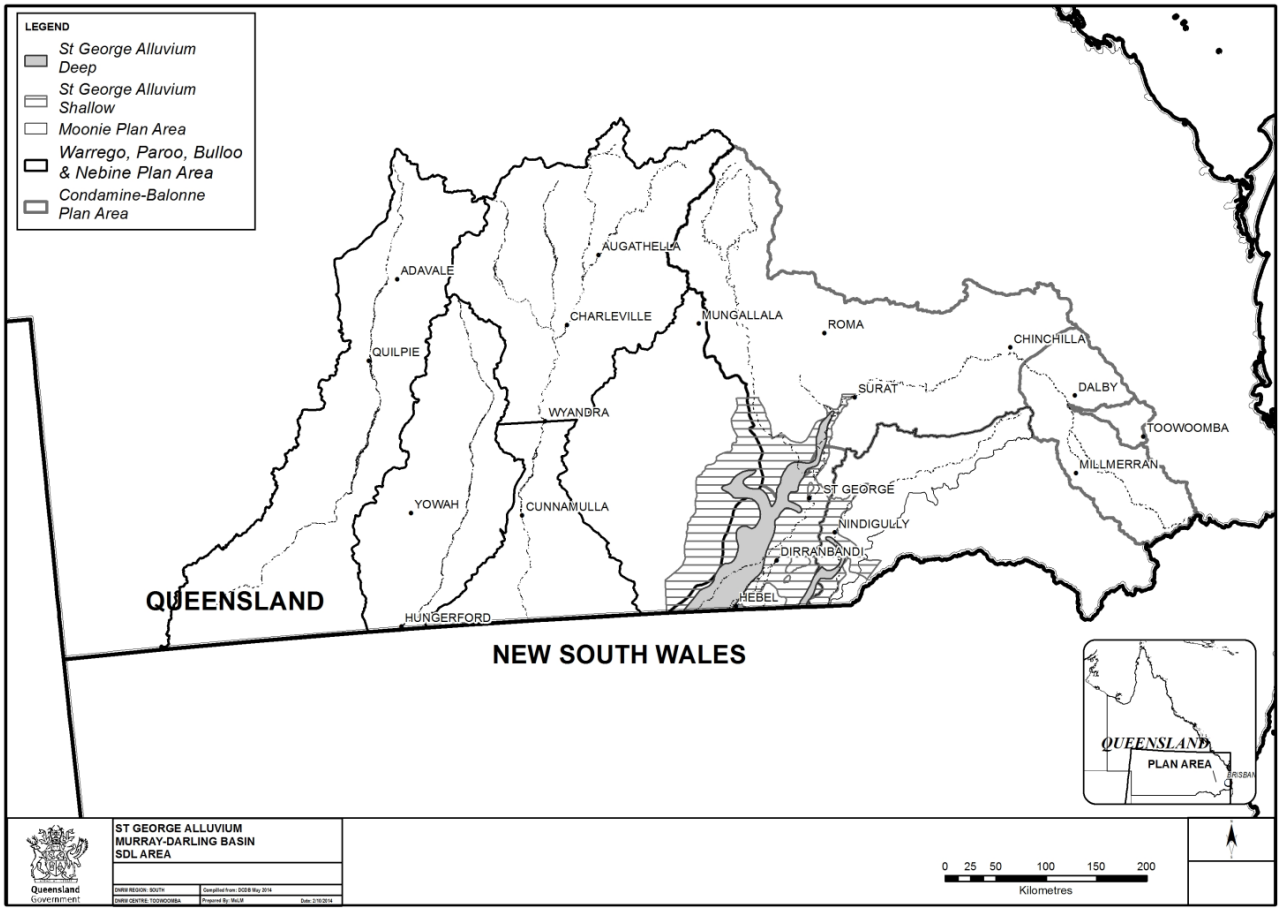

Figure 1: St George Alluvium and Qld water plan areas

1.1 Location

The St George Alluvium underlies three Qld State water plan areas; the Warrego, Paroo, Bulloo and Nebine, the Condamine and Balonne and the Moonie plan areas (see figure 1).

The alluvium extends northward from the New South Wales (NSW) border alongside the Moonie River in its eastern extent and along the Mungallala and Wallam Creeks to the west. The formation has a total area of approximately 25 580 km^2 (COA 2009). It underlies the floodplains of the Balonne/Culgoa, Lower Maranoa, Balonne Distributary and Lower Moonie Rivers.

1.1.1 Warrego, Paroo, Bulloo and Nebine

Within the Warrego, Paroo, Bulloo and Nebine water plan area, the St George Alluvium extends northwards from the NSW border to the northern extent of Wallum Creek. A band extends northwest to the confluence of Mungallala Creek and Tomoo Creek. The township of Bollon is the only major town in the plan area that overlies the aquifer. Bollon has an approximate population of 335 (ABS 2007).

1.1.2 Condamine and Balonne

Within the Condamine and Balonne water plan area, the St George Alluvium extends northwards from the NSW border, encompassing the towns of Dirranbandi and St George, and most of the southern portion of the Balonne catchment.

1.1.3 Moonie

The St George Alluvium extends northwards from the NSW border along the western boundary of the Moonie water plan area. The northern extent is roughly in line with the township of St George. Thallon is the only town of note overlying the aquifer, having a population of approximately 400 people.

1.2 Climate and rainfall

The Bureau of Metrology classifies the landscape overlying the St George Alluvium as grassland (BOM 2011). Figure 2 shows the climate classifications.

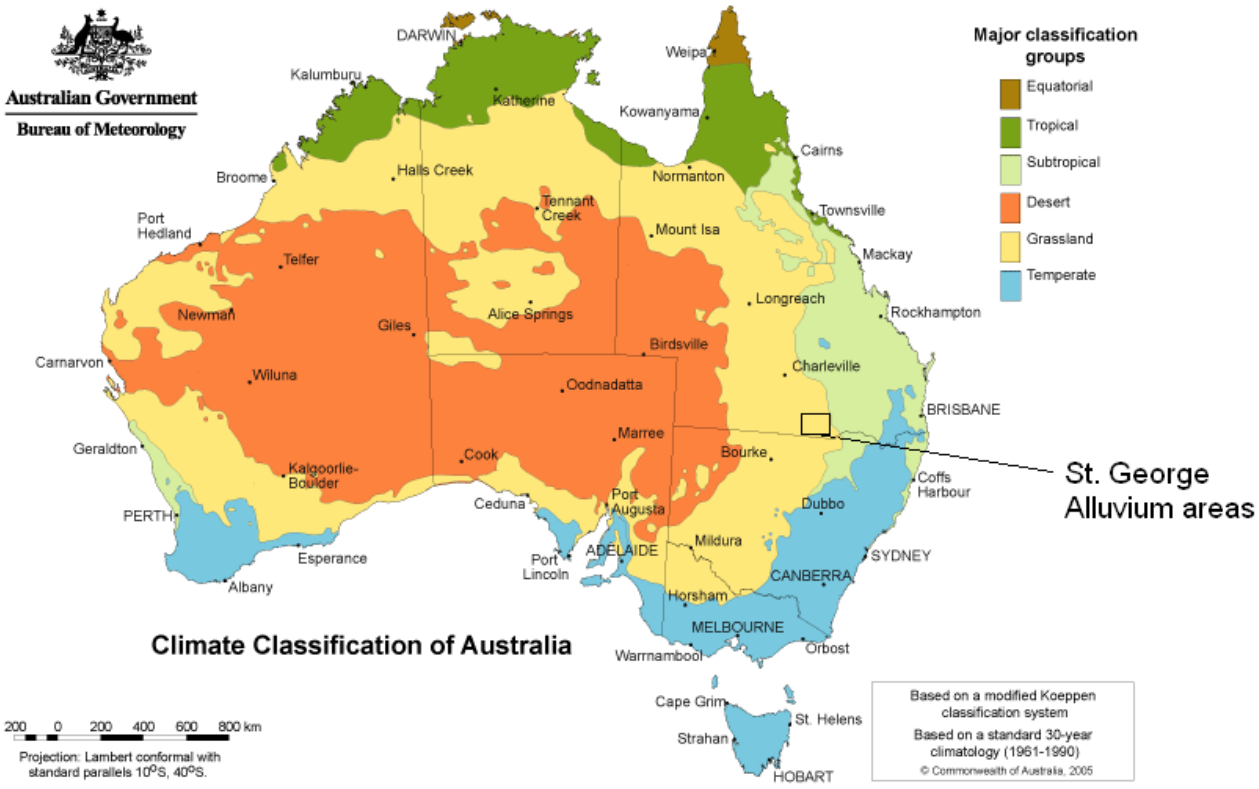

Figure 2: Climatic classifications particular to the St George Alluvium (BOM 2011)

Table 2 highlights rainfall trends by displaying a range of rainfall statistics for the major centres in the area with approximately 56% of precipitation occurring between the months of November and March, inclusive (COA 2009).

Table 2: Rainfall data at centres located over the extent of the St George Alluvium (BOM 2012)

Plan area	*Rain gauging station*	*Elevation (meters)*	*Mean annual rainfall (mm)*	*Median annual rainfall (mm)*
Condamine and Balonne	Weribone (043039)	231	545.8	535.6
Condamine and Balonne	St George (043053)	200	533.2	523.8
Condamine and Balonne	Whyenbah (044154)	175	462.2	432.2
Warrego, Paroo, Bulloo and Nebine	Bollon (044010)	183	466.7	446.7
Moonie	Nindigully (044194)	189	522.7	513.2

1.3 Geology and hydrogeology

1.3.1 Geology

The geology of the land underlain by the St George Alluvium is described as 'cretaceous marine and terrestrial sediments from the Surat Basin overlain by tertiary terrestrial sediments and a succession of quaternary sediments and alluvium' by Pearce (2006).

Conditions during the late cretaceous period resulted in a trizonal weathering profile in the cretaceous sedimentary formations. Three major geological formations developed in the area; an upper coarse grained sediment package, a middle fine grained sediment package and a lower coarse grained sediment package (Pearce 2006, Senior 1978).

Down-warping of the Surat Basin led to the development of a major subsurface trough, which in turn provided subsurface control on further erosion and led to the development of an incised paleovalley system, the Dirranbandi Trough. Sedimentation of the incised paleo-valley system by historic Balonne-Maranoa and Moonie paleo-river systems subsequently overlapped onto the surrounding outcrop.

A layer of Quaternary sediments, commonly recognised in the field by their lack of consolidation into rock, has been overlain by more modern river systems and provides a level of blanket cover. These sediments commonly consist of unconsolidated sand, silt, gravel, sandy loam and soil (Pearce 2006).

As a result of this layering, the system consists of a number of distinct but connected alluvial systems. The base of the incised valley constitutes a lower sand package and forms the lower aquifer. An upper sand-dominated package forms the upper alluvial aquifer and overlaps onto a relatively shallow shelf stretching east and west of the incised valley (Pearce 2006). Between these two formations, resides a middle leaky confining bed. The confining bed allows for a low level of interaction between the upper and lower aquifer formations.

1.3.2 Hydrogeology

The St George Alluvium consists of a series of clays, sandy clays, sand and gravel, occupying a deeply incised area. This is located within a large valley located over the Dirranbandi Trough (McAlister 1998; Pearce 2006). The progressive sedimentation of the contemporary Balonne, Balonne Distributary and lower Maranoa Rivers over a period of 5 to 10 million years has resulted in the principal aquifer systems (the unconfined upper alluvial aquifer, the semi-confined middle leaky confining bed and the semi-confined to confined lower alluvial aquifer).

The upper alluvial aquifer ranges from Bollon in the west to near Nindigully in the east. Occurring at depths of between 15 and 50 m, it maintains some connectivity to overlying streams, however, the level of connectivity is linked to the depth of the aquifer; deeper areas being less connected (Pearce 2006, DERM 2012).

The middle leaky confining bed underlies the upper alluvial aquifer. Largely consisting of clay, it connects the upper system with deeper storages in some areas. The spatial differences in sediment composition ensure that the degree of hydraulic connectivity between formations is complex and highly variable (Pearce 2006).

The lower alluvial aquifer extends northeast from the NSW border, passing near the town of Dirranbandi and ending around Weribone in the north. It is the most significant aquifer in terms of potential groundwater reserves and supplies a significant number of irrigation entitlements due to its better water quality, particularly around St George. The aquifer occurs at depths between 70 and 120 m and consists of a variety of high transmissivity, well sorted and highly permeable medium to coarse sands and gravels (Pearce 2006).

The depth and thickness of the formation increase from north to south. It attains its maximum channelisation in the area near the NSW border (DERM 2009a). In the northern section of the lower alluvium area between the Balonne highway and the Maranoa River thick sand successions exist causing limited confinement and minimal separation between the Upper and Lower Alluvial Aquifers (Pearce 2006).

1.4 Ecological profile

Vegetation cover in the Lower Balonne is fairly sparse and has resulted from the semi-arid climate and high rate of clearing, particularly in recent years. Most remnant vegetation is confined to isolated areas along major river systems and within several small established conservation areas. Native vegetation makes up the majority of remaining cover in the area and is considered 'near-natural', having some of the lowest rates of introduced exotic species (MDBA 2012, Pearce 2006).

Parts of the Balonne River floodplain, located south of St George, are listed as nationally significant wetlands (DSEWPC 2011). An environmental assessment process undertaken as part of the first generation of water resource plans (WRPs) covering the area found that all assets were classed as at low or no risk from flow management (DERM 2011).

The Culgoa Floodplain National Park partly overlies the area and is managed by the Department of National Parks, Recreation, Sport and Racing. There is no current evidence that the park is reliant on groundwater. The Bureau of Metrology's Groundwater Dependant Ecosystems Atlas (2012) does not list any groundwater dependent ecosystems as having significant reliance on the St George Alluvium (see section 2.1.2).

1.5 Resource history and current condition

The potential of aquifer systems in the Lower Balonne to provide water supplies for industry and agriculture was first recognised in the early 1900s following the drilling of artesian and subartesian stock bores. Until the mid-1990s, interest in gaining access to groundwater supplies was minimal, however, a rapid escalation in the number of applications resulted after the first 'proven' high capacity bore was completed on a property near St George in 1995.

The need for quantification of the resource and the implementation of an effective management framework was recognised in light of unprecedented prospective groundwater development. In 1997, following a decision by the Land Court and sales of property, the Deepwater aggregation was formed and resulted in a groundwater entitlement of 4656 ML/annum, one of the largest in Queensland (DERM 2009a).

In response to this development, the current ambient monitoring network for the St George Alluvium was constructed and consists of 59 observation bores. The majority of these were installed as part of the National Land and Water Resources Audit (1999/2000) and the subsequent Queensland Murray-Darling Basin (QMDB) Shallow Groundwater Salinity Program (2001/2002). As such, most of the available data ranges from this period to the present day.

An exception is a cluster of monitoring bores located south east of St George, mostly accessing the Upper Alluvial Formation. This was used for a range of purposes from the mid-1970s and provides some data relating to this period (DERM 2009a).

The quality of groundwater in the St George Alluvium is generally poor and considered most suitable for stock and domestic purposes. Quantification of the resource following a comprehensive chemistry analysis undertaken for many monitoring bores in 1999 found very limited availability of water suitable for irrigation.

Groundwater chemistry in the St George Alluvium is highly variable and ranges from relatively fresh, low salinity water (1000 mg/L) to highly saline water (4000 mg/L) (Pearce 2006, p.80). In general, the development potential of the St George Alluvium may be considered low, with the majority of available groundwater being of quality unsuitable for irrigation (COA 2009).

1.5.1 Existing licences and licence applications

There are 23 current water licences to take water from the St George Alluvium with a combined volume of 11970 ML/a. All are located within the Condamine and Balonne catchment. It should be noted that existing licences don't specify take from either the deep or shallow formation, however it is understood that most of the existing licences take water from the deep formation. Further work to delineate the licenced take into either the shallow or deep aquifer is required.

2 Shallow alluvium

2.1 Groundwater conditions

2.1.1 Recharge

Recharge to the upper alluvial aquifer is thought to occur through 'direct infiltration including infiltration through channels after heavy rainfall, leakage from rivers and flow at the northern extent of the aquifer' (Pearce 2006). Recharge to the upper alluvial aquifer is estimated at approximately 6 250 ML/annum by measuring chloride mass balance and median groundwater chloride concentrations (DERM 2009a). Table 3 details other known recharge processes.

Table 3: Other known recharge processes for the shallow alluvium include (DERM 2009a)

Known recharge process for water plan area	*Warrego, Paroo, Bulloo and Nebine*	*Condamine and Balonne*	*Moonie*
flood events	✓	✓	✓
infiltrations of surface water via bed and banks of natural and artificial instream storages	✓	✓	×
deep drainage of applied irrigation water from non-groundwater sources such as river and overland flow water harvesting, regulated supply and from associated water distribution systems and	✓	✓	×
increased deep drainage accessions of rainfall, overland flow and ponded storage infiltrations into the alluvium surfaces as a result of land use changes and associated clearing.	✓	✓	×
reduced groundwater outflows via the channel and bed deposits of the Maranoa and Balonne Rivers due to variable head conditions resulting from enhanced artificial water levels in these storages.	×	✓	×

2.1.2 Discharge

There is no significant connection between the St George Alluvium aquifers and surface water or other identified groundwater resources. However, some discharge from the formation is thought to occur at the southern extent including baseflow into rivers and groundwater extraction for irrigation (Pearce et al. 2006 p.70). This also includes losses due to:

- evapotranspiration; and
- groundwater throughflow into the middle leaky bed and deep alluvium formations – localised connections to the deep alluvium do exist throughout the alluvium area but their spatial occurrence and the volume of water discharged is extremely difficult to quantify.

Minor discharge within the Condamine and Balonne plan area is possible through baseflow into river channels, though this has not been identified (Pearce, 2006). While the aquifer is typically present around 12 m to 42 m below the ground surface, river systems in the area have a typical channel depth of less than 10 m.

Discharge of baseflow from the shallow aquifer system is most likely where there is a significant rise in the water table. The Balonne River in the area near the St George Irrigation Area is the only place where this is likely. A trend of rising water tables in the area has resulted in water levels being similar to the depths of irrigation supply channels. If the trend continues, the possibility of discharge occurring from the aquifer in the future is increased.

2.1.3 Groundwater chemistry

Groundwater chemistry and quality assessment was undertaken by Pearce (2006), based on 42 samples collected from monitoring bores located over the extent of the aquifer between 1995 and 2003. However, insufficient data was collected to accurately demonstrate complexity of the aquifer due to spatial variability in water quality. Table 4 displays a number of key characteristics of the upper and lower aquifers.

A range of total dissolved solids (TDS) and electrical conductivity (EC) measures taken at monitoring bores across the aquifer area shows no relationship to depth but highlights some regions of particularly high salinity including an area near the NSW border around the Culgoa River. Freshwater was found to occur sporadically across the Upper Alluvial Aquifer but was generally confined to areas adjacent to major rivers.

Table 4: Water chemistry of groundwater (shallow aquifer)

Criteria	*Upper Alluvial Aquifer*	*Middle leaky bed formation*
Range of total dissolved solids (TDS) (mg/L)	375 - 30 017 mg/L	430 - 11 716 mg/L
Median TDS (mg/L)	5010 mg/L	3366 mg/L
Mean TDS (mg/L)	9148 mg/L	4590 mg/L
TDS related to depth	No	Some relationship exists
pH range	6.2 - 8.7	7.8 - 8.1
Median pH	7.9	8.0
Mean pH	7.82	7.96
EC range (µS/cm)	560 - 57 000	666 - 16 900
Median EC (µS/cm)	8820	5620
Mean EC (µS/cm)	15 642	7067
Overall water quality	Moderate to high salinity water. Trend of increasing salinity from north to south.	Mostly saline Na-Cl type water similar to that in the Upper Alluvial Aquifer
Areas identified as having high salinity	-	-

2.1.4 Potentiometric surface

The potentiometric surface of the shallow aquifer exhibits a moderate vertical head difference from northeast to southwest. Based on data from monitoring bores, this vertical head difference is up to 100m.

2.1.5 Transmissivity and specific yield estimates

The fine to medium silty, and clayey, sands making up the shallow aquifer are of relatively low transmissivity. A study conducted in near the property of Barrackdale showed transmissivity values of approximately 42.5 m^2/day using pumping tests Huxley (1991).

Huxley (1991) estimated inflows from the Maranoa, Balonne and Moonie rivers at 3318m^3/day, and combined outflows to the Culgoa and Moonie rivers at 1043m^3/day. Without surface water irrigation, evapotranspiration or natural losses by way of leakage into underlying sediments, the total water balance would be 2275m^3/day.

2.1.6 Resource condition

Historically, there has been limited groundwater extraction from the shallow alluvium. Use has been associated with stock and domestic purposes.

Across the three water resource plan areas (Warrego, Paroo, Bulloo and Nebine, Condamine and Balonne, and Moonie), there are 25 monitoring bores installed in the shallow alluvium. Twenty of these are located in the Condamine and Balonne plan area and the remaining 5 are located in the Warrego, Paroo, Bulloo and Nebine plan area.

The rate of extraction from the shallow alluvium is relatively low when compared with estimated recharge rates.

The proximity of several creeks running through the region may also influence standing groundwater levels in some areas. However, the lack of monitoring bores makes this hard to quantify. It must be noted that part of the shallow aquifer underlies the St George Irrigation Area, which is an irrigation development of relatively high intensity. See figures 3, 4 and 5 for hydrographs showing aquifer level over time.

Figure 3: Monitoring bore 42240033—located near St George

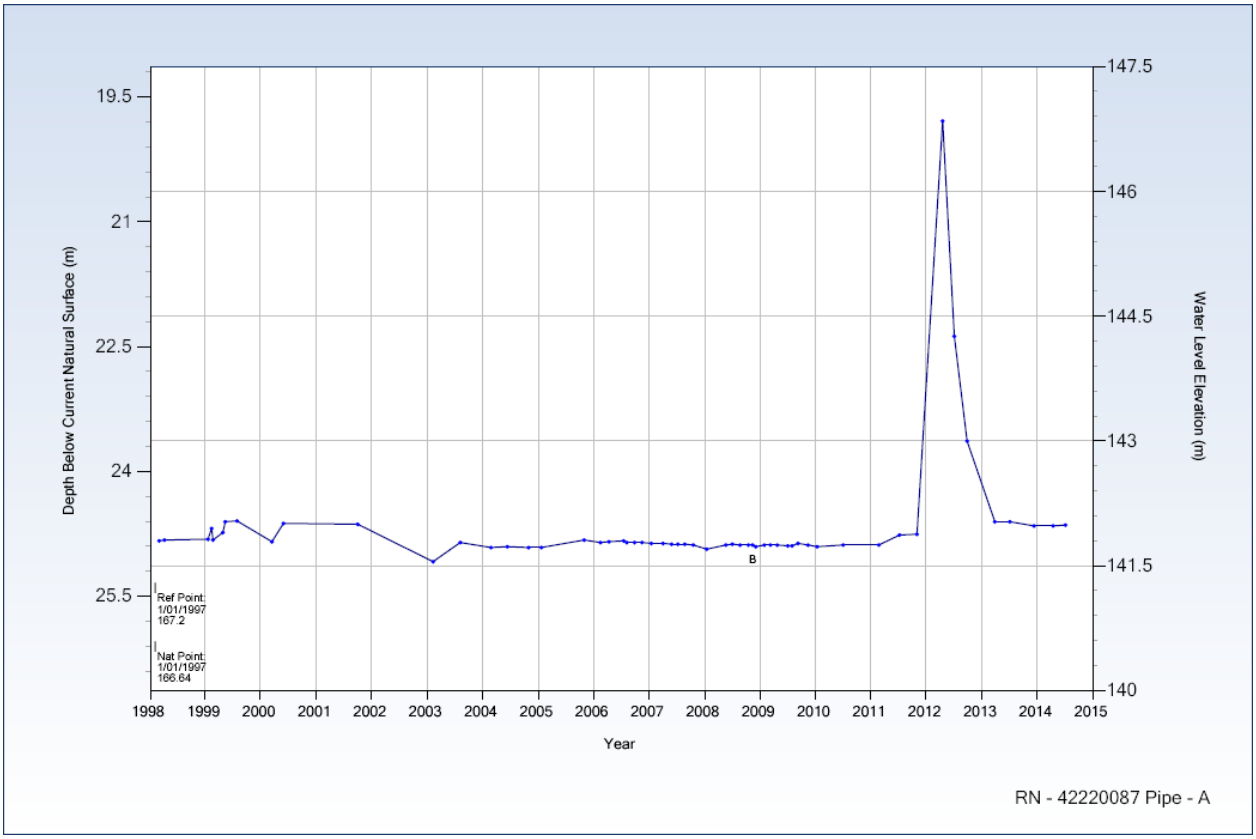

Figure 4: Monitoring bore 42220087—located near Dirranbandi

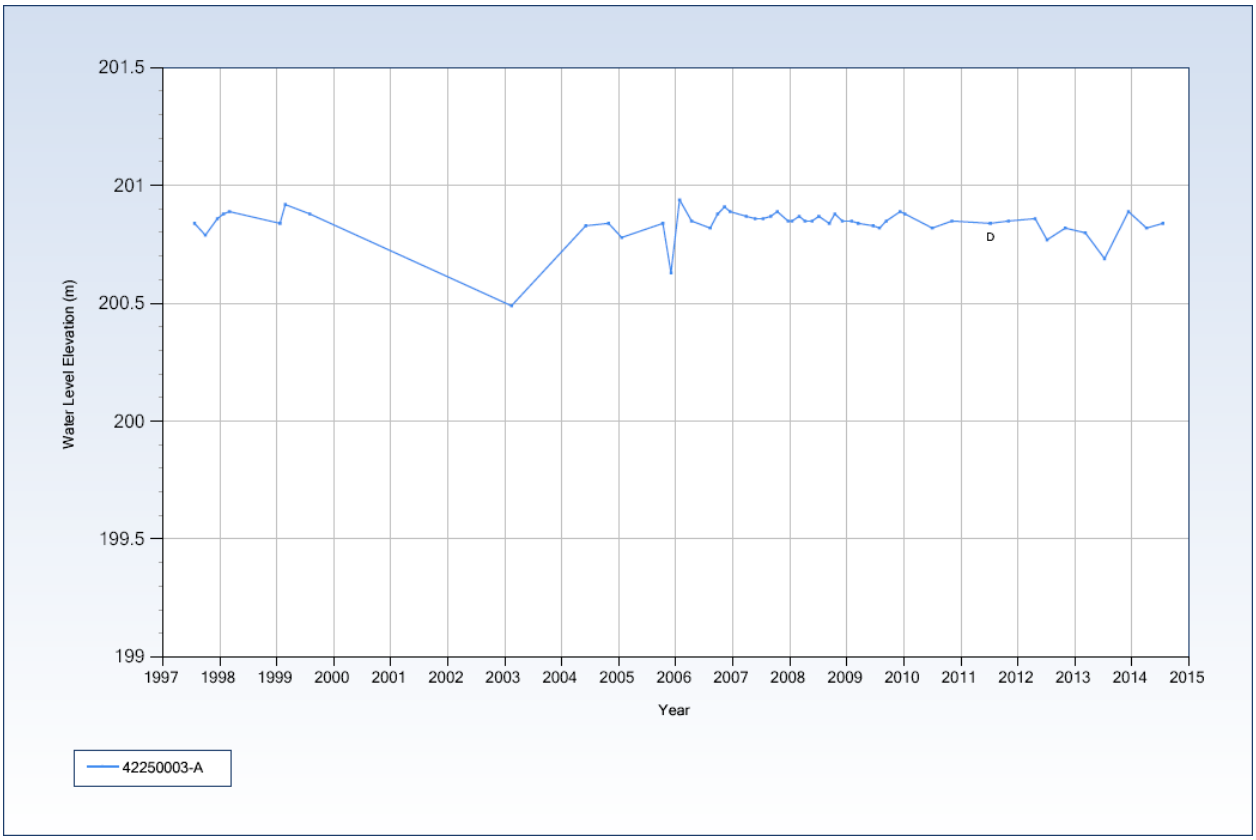

Figure 5: Monitoring bore 42250003—located north of Bollon

3 Deep alluvium

3.1 Groundwater conditions

3.1.1 Recharge and baseflow

Recharge to the lower aquifer is attributed to a process of flows moving from the shallow alluvial aquifer through the middle leaky bed to the deep formation. Toward the northern extent of the formation, where there is an absence of an intervening clay layer, limited recharge may be permitted by the direct exchange of water from river channels and the shallow alluvial aquifer (Pearce 2006).

Annual recharge to the deep formation is based on estimates provided by Pearce (2006). Overall recharge to the deep formation was estimated to amount to approximately 2500 ML/annum by measuring chloride mass balance and median groundwater chloride concentrations (DERM 2009a).

3.1.2 Discharge and baseflow

As it is a semi-confined to confined formation, discharge is unlikely.

3.1.3 Groundwater chemistry

Samples taken by Pearce (2006) demonstrate a typically saline, slightly alkaline profile. Some areas of very high salinity were also identified. Unlike the shallow formation, some relationship between depth, EC and TDS exists.

Water quality is the greatest limiting factor for future development of the resource. Infrastructure maintenance costs and lower crop yields associated with the use of saline water limits potential. Groundwater chemistry data relating to the deep alluvium is provided in table 5.

Table 5: Water chemistry of the deep aquifer

Criteria	*Status*
Range of TDS (mg/L)	1771 - 13 226 mg/L
Median TDS (mg/L)	3165 mg/L
Mean TDS (mg/L)	4042 mg/L
TDS related to depth?	Some relationship between TDS and depth observed
pH range	7.0 - 8.6
Median pH	7.9
Mean pH	7.94
EC range (µS/cm)	3090 - 19 100
Median EC (µS/cm)	5280
Mean EC (µS/cm)	6700
Overall water quality	Mostly high to very high Sodium (Na) content and unsuitable for irrigation. Some localised areas of good water quality exist; however, these are vulnerable to deterioration. Some trends towards gradational increases of salinity when moving north from the NSW border.

3.1.4 Potentiometric surface

The potentiometric surface displays a vertical hydraulic head variation of approximately 60 to 70m (DERM 2009b). Bore 4220034 in the northern area has a standing groundwater level of around

178m AHD while bore number 42220183 in the south, close to the NSW border, is approximately 130m AHD.

3.1.5 Transmissivity and specific yield estimates

The deep alluvium exhibits a range of well sorted medium and coarse grade permeable sands and gravels, permitting a high level of transmissivity. An average transmissivity figure of 233m^2/day was obtained from pumping tests carried out by McAlister (1998) in the Prickle Farm area north-west of St George.

3.1.6 Resource conditions

Groundwater level contours for the deep alluvium show a marked drawdown feature (depression) in the area of highest extraction such as Prickle Farm north of St George (Pearce 2006). Cones of depression of up to 10km in diameter are apparent from pumping cycles of between 10 to 20 days. Particularly evident are distinct water level trends corresponding to periods of heavy extraction such as between 1996 and 2005 when water use peaked—this is evident in bore 42240029 in figure 7. While some recovery has been noted, standing water levels failed to return to pre-development levels, highlighting a likely gradual and permanent decline of the resource, and the need to exercise caution when granting entitlements.

The cones of depression are also likely to drive change in water quality, posing risks to users who are have been able to extract water suitable for irrigation of crops. The mobilisation of higher salinity groundwater may render these activities unviable if changes to quality are severe (DERM 2009a). In addition, the potential exists for large salt stores, historically developed in clay soils under native vegetation, to be mobilised due to changes in land use associated with clearing. This may pose further threats to isolated areas of better water quality currently used for irrigation.

Figure 6: Monitoring bore 42220089—located west of Dirranbandi

Figure 7: Monitoring bore 42220095—located in the north part of the deep formation

4 Entitlements and management arrangements

4.1 Entitlements

Queensland's Water Regulation 2002 requires water licences for taking subartesian water from the within the Great Artesian Basin Declared Subartesian Area for any purpose other than stock or domestic use.

In addition, all works installed to access water for any reason requires a development permit. Water licences state:

- an authorisation number, license holder and expiry date
- authorised activity ('the taking of subartesian water from the St George Alluvium' for instance)
- purpose ('irrigation' for instance)
- description of land (land parcel where water is taken and where water is used)
- nominal entitlement (in ML)
- any other conditions

All entitlements are located within Condamine and Balonne water plan area and most take water from the deep aquifer. There are 23 licences authorising 11 970 ML/annum of groundwater take (table 6). Much of this demand is located within the footprint of the St George Irrigation Area (surface water) where a pocket of good quality groundwater exists.

Table 6: Summary of licensing details for the St George Alluvium

Resource	*Number of licences*	*Total nominal entitlement volume (ML/annum)*
St George Alluvium	23	11 970

Extraction for stock and domestic supply does not require a licence as it is given general authorisation under the Water Act 2000. Stock and domestic use is a minor component of total use from the St George Alluvium and is limited by water quality issues (Pearce 2006, PB 2011).

4.2 Management arrangements

Table 7 provides a summary of management arrangements for the St George Alluvium.

Table 7: Management arrangements

Management arrangement	*St George Alluvium (all plan areas)*
Moratorium	No
Declared Subartesian Area	GAB Subartesian Area (prior to 2015)
Water licences	Required for all purposes other than stock and domestic
Development permit for works	Required for all purposes
Qld State water plan	Yes (from 2015) – State water plans for each applicable catchment area include the management of subartesian groundwater.
Groundwater Management Area	No
Metering for entitlements	Not required. Some bores accessing the deep aquifer are metered on a

	voluntary basis and provide limited ‘ad-hoc’ data.
Water sharing rules	n/a
Announced entitlements (range last 3 years)	There are no water sharing rules relating to entitlements in the St George Alluvium. A licence holder may take up to the nominal entitlement (volume) stated on the licence each water year.
Carry over	n/a
Forward draw	n/a
Seasonal water assignments	n/a
Qld Water Act limitation (section 25)	Water Act 2000
Limitations on take (range last 3 years)	No
Pumping hours restrictions	No
Monitoring	41 bores monitored according to the Groundwater Water Level Network framework (DNRM 2014).

5 Overall status

The St George Alluvium contains areas of relatively unutilised groundwater supplies, constrained by access and quality issues. The exception, a concentration of groundwater north-west of St George, is subject to demand for additional groundwater and the potential for salt intrusion from surrounding aquifer areas.

The prevalence for groundwater to display high EC and TDS values in the Upper Alluvial Aquifer units makes it unsuitable for irrigated agriculture except in isolated pockets within the region.

Current management arrangements, as part of the declared Great Artesian Basin Subartesian Area, exempt the need for licences for stock and domestic purposes but require development approval for all works. While most active entitlements have meters installed, the lack of metering requirements means that water use throughout the St George Alluvium cannot be accurately quantified.

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Appendix A Summary of management and use

Existing management arrangements	Y (✓)/N (×)	Comments
WRP	×	
Declared Subartesian Area	✓	Great Artesian Basin Subartesian Area
Moratorium	×	
Groundwater Management Area	×	
Section 25 Limitations[1]	×	
Metering (Schedule 11 Water Regulation)	×	
Existing authorised water use:	***Volume (ML)***	**Number of entitlements**
Water licences	11 970	23
Estimated S&D use[2]	778	N/A
Anticipated Growth	***Volume (ML)***	**Number**
S&D (total)	9[3]	
Basin Plan implications	***Volume (ML)***	**Comments**
St George Alluvium: Warrego-Paroo-Nebine		
BDL	0.12	
SDL	24.6	
Unassigned Water	24.48	
St George Alluvium: Moonie		
BDL	0.01	
SDL	0.69	
Unassigned Water	0.68	
St George Alluvium: Condamine-Balonne (shallow)		
BDL	0.77	
SDL	27.7	
Unassigned Water	26.93	
St George Alluvium: Condamine-Balonne (deep)		
BDL	12.6	
SDL	12.6	
Unassigned Water	0.0	

[1] Water Act 2000 section 25 provides power to impose restrictions on the take of water by public notification.
[2] Estimates determined by PB. Refer to report: Methodology for estimating the take of groundwater for stock and domestic purposes in the QMDB.
[3] Assessed as the average number of bores drilled in a year based on the bores drilled between 2001 and 2010, this figure has been converted to ML using the usage figures in the final PB Stock and Domestic report (December 2011)