

Water Resources and Consumption

Discussion Paper 2



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Prepared for

REROC

Prepared by

AECOM Australia Pty Ltd

Level 2, 60 Marcus Clarke Street, Canberra ACT 2600, Australia

T +61 2 6201 3000 F +61 2 6201 3099 www.aecom.com

ABN 20 093 846 925

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Prepared by Kath Bannon, Marcus Sainsbury and Guillaume Prudent-Richard

Reviewed by Adam Fearnley

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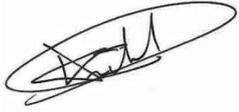
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Acronyms

AC	Asbestos Cement
ACT CSE	Australian Capital Territory Commissioner for Sustainability and Environment
AWD	Available Water Determination
DIPNR	Department of Infrastructure, Planning and Natural Resources
DICL	Ductile Iron Concrete Lined
ET	Equivalent Tenement
GSC	Gundagai Shire Council
GL	Gigalitre
GLWU	Gundagai Local Water Utility
GMU	Groundwater Management Unit
GWCC	Goldenfields Water County Council
kL	Kilolitres
L	Litres
LGA	Local Government Area
LTAEL	Long Term Average Extraction Limit
ML	Megalitres
ML/yr	Megalitres per annum (i.e. megalitres per year)
ML/d	Megalitres per day
MDB	Murray Darling Basin
DECCW	NSW Department of Environment, Climate Change and Water
NOW	NSW Office of Water
No.	Number
PVC	Polyvinyl chloride
REROC	Riverina Eastern Regional Organisation of Councils
RWCC	Riverina Water County Council
STP	Sewage Treatment Plant
SBC	Strengthening Basin Communities
SDL	Sustainable Diversion Limit
TDEL	Total Daily Extraction Limit
TSC	Tumut Shire Council
WAL	Water Access Licence
WMA 2000	Water Management Act 2000
WSP	Water Sharing Plan
WTP	Water Treatment Plant

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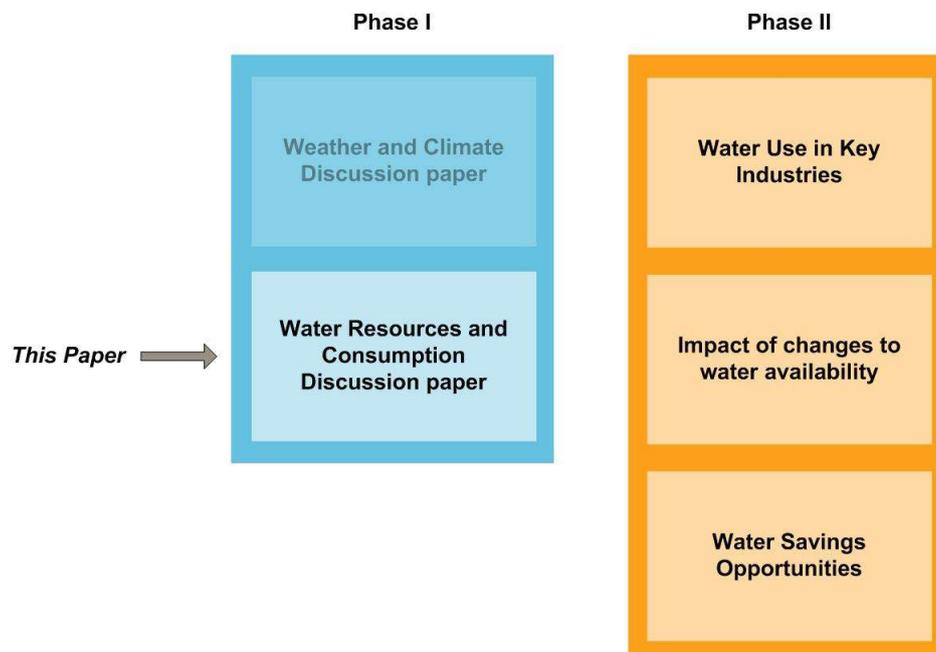
PART ONE

Water Management in NSW



Introduction

This paper describes the water resources available to the Riverina Eastern Regional Organisation of Councils (REROC) Local Government Areas (LGAs) participating in the Strengthening Basin Communities (SBC) study. A complementary paper describes the historical and future weather and climate. Both these papers provide the basis for Phase II of the SBC project.



This paper includes an assessment of surface water, groundwater and recycled water and summarises water use data for each of the REROC SBC LGAs. This document provides background and context-setting information relevant for effective future water management planning.

1.0 Water Management in NSW

1.1 Legislative Framework

The two pieces of legislation covering water licensing, trade and allocations in NSW are the *Water Management Act 2000* (*WMA 2000*) and the *Water Act 1912*.

The *WMA 2000* is progressively superseding the provisions of the *Water Act 1912*, but does not yet apply in all areas of NSW. A key feature of the *WMA 2000* is the development of Water Sharing Plans (WSPs) as a mechanism for defining and managing water sharing (including water trading) across the state.

The *WMA 2000* includes provisions for Basic Landholder Rights (sometimes referred to as 'Basic Water Rights') and Water Access Licences (WALs). Landholders can extract water under Basic Landholder Rights without an access licence, while WALs cover all other water extractions (including town water). Both Basic Landholder Rights and WALs are managed under WSPs.

Catchment or aquifer specific WSPs for the highest priority areas were developed first – these being the most significantly over-allocated catchments and regulated systems. Macro Water Sharing Plans are being developed for unregulated systems, which can cover a number of surface water sources or aquifers (NOW, 2010i).

The WSPs that apply to the REROC region (both urban and non urban water supplies) are shown in Figure 1 for surface water and Figure 2 for groundwater. The areas which are not covered by these WSPs are still subject to the *Water Act 1912*.



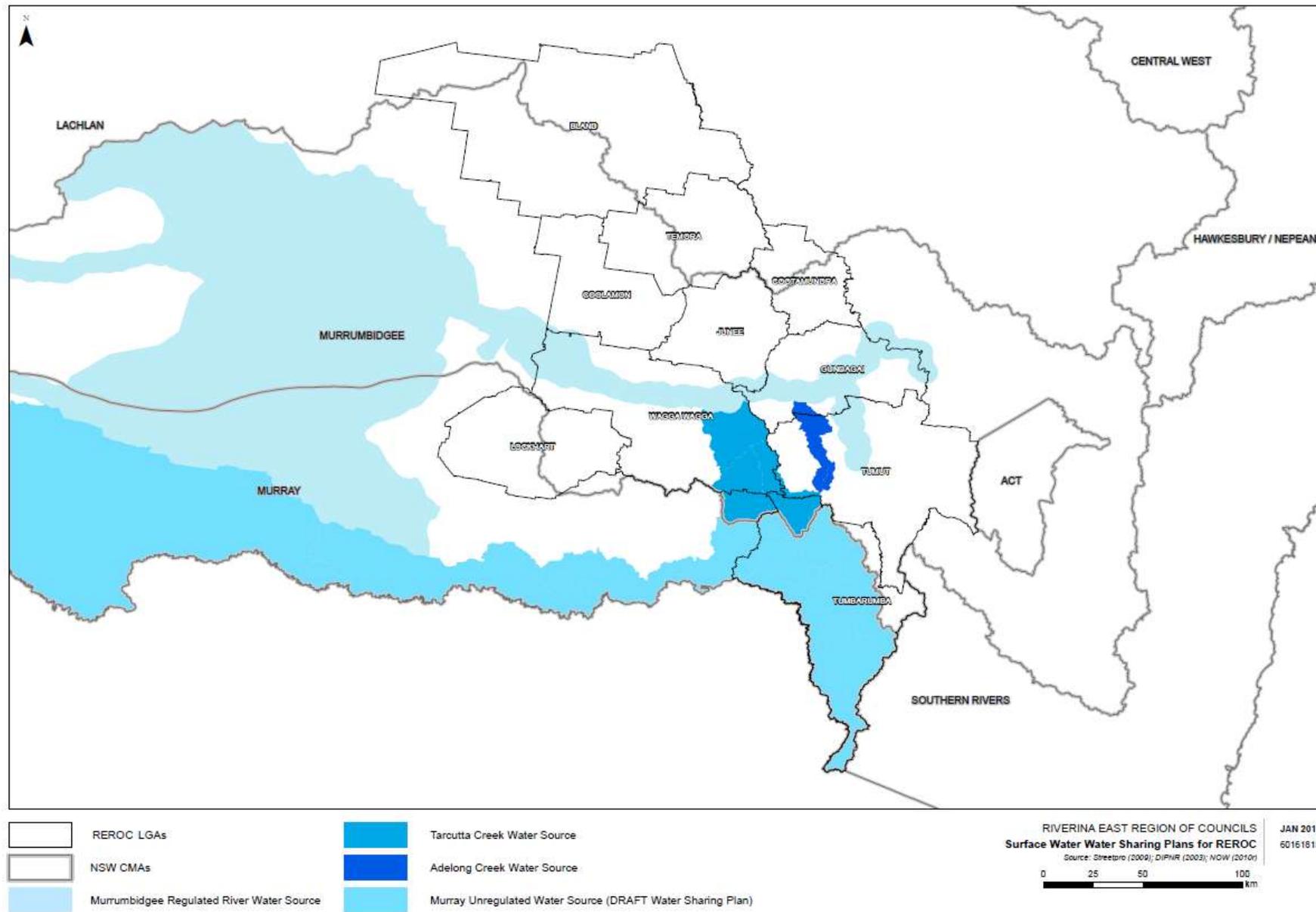
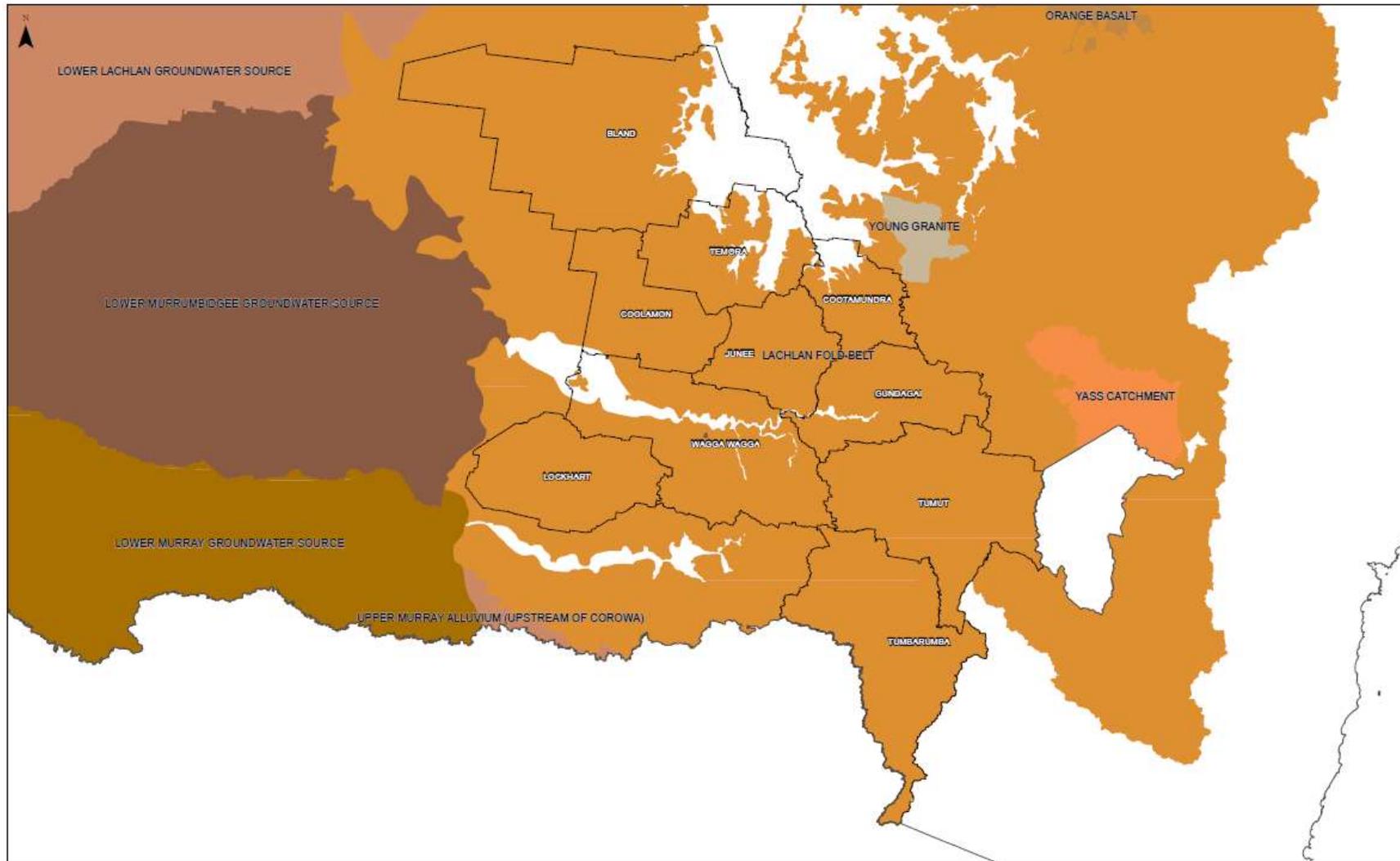


Figure 1 – Surface water WSPs applying to the REROC Region



Note: Some water sharing plan areas on this map are part of Draft Water Sharing Plans (at the time of writing).
 The Upper Murray Alluvium is part of the Draft Water Sharing Plan for the Murray Unregulated and Alluvial Water Source.
 The Lachlan Fold Belt, Young Granite, Yass Catchment and Orange Basalt groundwater management areas are part of the Draft Water Sharing Plan for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources.

Figure 2 – Groundwater WSPs applying to the REROC Region

1.2 Basic Landholder Rights

There are three types of Basic Landholder Rights under the *WMA 2000*:

- 1) Domestic and stock rights – For properties that overlie an aquifer or that have river, lake or estuary frontage, the landholder can take water for limited domestic and stock use without a licence. Landholders must obtain a water supply works approval from the NSW Office of Water (NOW) prior to undertaking any work. In areas that are still covered by the *Water Act 1912*, this will be a river or bore licence (NOW, 2010g).
- 2) Native title rights – Under the *Commonwealth Native Title Act 1993*, any person who holds native title with respect to water can take water for a range of personal, domestic and non-commercial uses (NOW, 2010g).
- 3) Harvestable rights (dams) – Harvestable rights dams are exempt from licensing and the need to gain approvals. These include:
 - Farm dams on minor streams that collect up to 10% of the regional rainfall runoff for their property;
 - Dams built before 1999 (including those that are over the harvestable right capacity) that are used for domestic and stock purposes only; and
 - Dams up to one megalitre on small properties where the land was approved for subdivision before 1 January 1999.
 - Where a landholder is planning to construct an additional harvestable rights dam, all existing dams must be taken into account. Some exemptions apply (e.g. dams for flood detention and mitigation) (NOW, 2010g).

Therefore, if a landholder in the REROC SBC region does not hold native title rights with respect to water or does not overlie an aquifer and does not have river, lake or estuary frontage, they may build a 'harvestable rights dam', but if they wish to extract water from an aquifer or surface water body, a WAL must be obtained (see Section 1.3). Water extraction for all urban (town) water supplies in REROC is managed under WALs (see Section 1.3).

1.3 Water Access Licences

WALs for surface water and groundwater are administered by NOW. As previously outlined in Section 1.1, the *Water Act 1912* still applies to areas of NSW and REROC that are not covered by a catchment or aquifer-specific WSP or a macro WSP under the *WMA 2000*. New surface and groundwater licences can be issued under the *Water Act 1912*, however in the REROC region, new groundwater licences cannot be issued due to an embargo order (see Section 1.4). In areas that are covered by WSPs, WALs may have been transferred from the *Water Act 1912*, or they may be newly issued licences under the *WMA 2000*.

The water entitlement included in a WAL is specified as either a share component (in ML) or unit shares (no.). The actual volume of water received under the WAL depends on the Available Water Determinations (AWDs). AWDs are made by the Minister for each WAL category at the start of the water year, which specify how much of the entitlement may be extracted throughout the year (that is, how much of the entitlement will be allocated) (DIPNR, 2004b). Further AWDs may be made throughout the water year if required.

For WAL entitlements that are specified as a share component (ML), the AWD is given as a percentage of the entitlement. For WAL entitlements that are specified as unit shares (no.), the AWD is given as megalitres per unit share. Water licence holders are then permitted to consume water up to their water allocation. In the event that a proportion of the water allocation is not used, this may be rolled over to the following water year (carry-over) for some classes of WAL. Specific conditions relating to this matter are specified in each WSP.

As specified by the *WMA 2000* and the *Water Management (General) Regulation 2004*, the following priority system applies when making AWDs (i.e. not all WALs receive the same AWD):

- 1) Local Water Utility access licences, major utility access licences and domestic and stock access licences have priority over all other access licences
- 2) Regulated river (high security) access licences have priority over all other access licences (except those referred to in item 1) above)
- 3) Regulated river (conveyance) access licences, Murrumbidgee Irrigation (conveyance) access licences and Colleambally Irrigation (conveyance) access licences have equal priority to each other; this group of licences has priority over Regulated River (General Security) and Supplementary access licences

4) Supplementary access licences have a lower priority than all other access licences

A similar priority system exists for groundwater supplies; local water utility and domestic and stock licences have priority over high and general security licences, while supplementary licences have the lowest priority. Therefore in graphical format, the priority system for surface water and groundwater WALs is as shown in Figure 3.

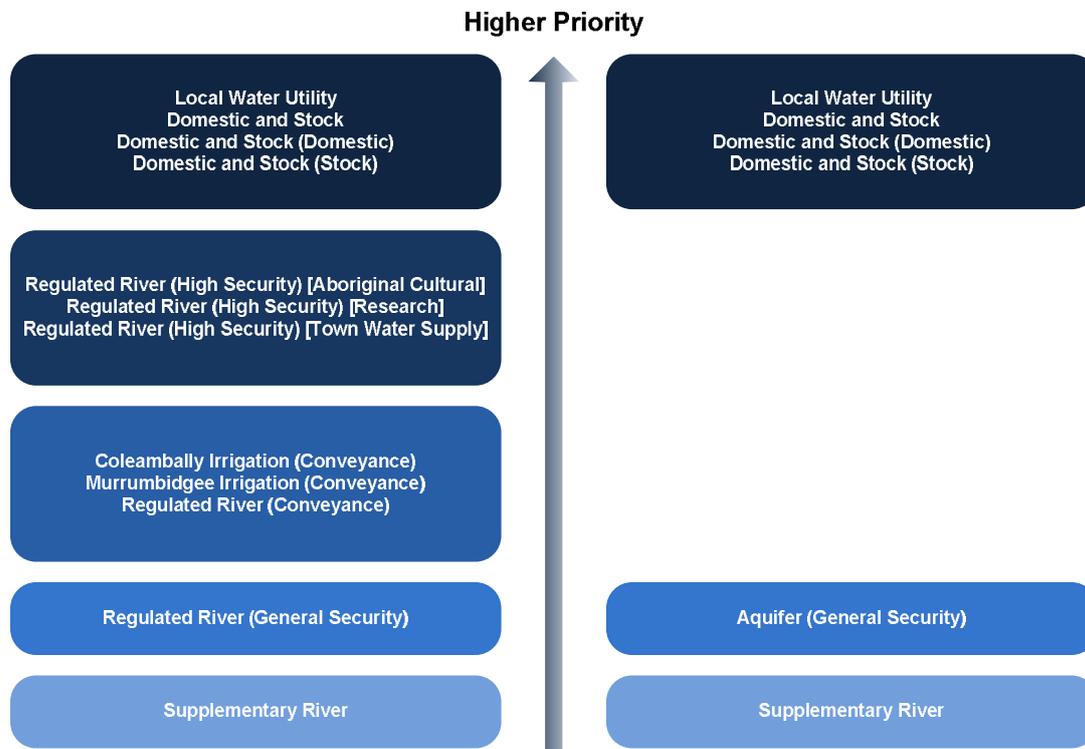


Figure 3 – WAL priority under the WMA 2000 for surface water resources (left) and groundwater resources (right)

Section 58 of the *WMA 2000* also specifies that the water allocations for a higher priority licence are to be reduced at a lesser rate than the licences that have lower priority.

New licences for commercial purposes are generally no longer available and must be sourced via trade for new or expanding activities that require a permanent source of water (NOW, 2010j); the rules/conditions for water trading are specified in the *WMA 2000* and associated WSPs. Alternatively, someone may apply for a WAL with zero share component, then purchase a water allocation on an annual basis (termed a 'water allocated assignment') or purchase a share component (entitlement) from another licence holder (termed an 'assignment of shares') (NOW, 2010j).

1.4 Embargo Orders

Embargo orders can be put in place under either the *Water Act 1912* or the *WMA 2000*.

If an embargo order is put in place under the *Water Act 1912*, new water licences cannot be issued unless they comply with the exemptions specified in the order or in the Act (NOW, 2010h). The embargo will remain in place until another embargo is made under the Act, or a WSP is made for that water source under the *WMA 2000* (NOW, 2010h).

Embargos are enforced under the *WMA 2000* by restricting the type of licences that may be applied for. This is announced via NSW Government Gazettes. For example, an embargo has been in place for new commercial access licences for the Murrumbidgee Regulated River Source since 1985.

Where an embargo is in place, this means that water for any new or expanding industries, enterprises or activities in that area can only be accessed through trading. Basic landholder rights are exempt from the embargo orders (NOW, 2010h).

Currently there is an embargo on all groundwater resources west of the Great Dividing Range (NOW, 2010h), which includes all of the REROC councils. The majority of groundwater resources in NSW is either under a WSP or is subject to an embargo order (NOW, 2010h).

Embargos can also be placed on water trade. An embargo was in place for all water trades from the Murrumbidgee Valley for much of 2010 (NOW, 2010k), however this has now been lifted due to recent above average rainfall (NOW, 2010n).

1.5 Floodplain Harvesting

The *Water Act 1912* provided power to the regulatory authority to licence floodplain harvesting, however there was no cap on overall water extractions and off-allocation diversions and therefore little imperative for licensing to go ahead (NSW Government, 2006b). Flood water was generally considered a free 'bonus' to a landholder's licensed entitlement (NSW Government, 2006b).

It is now recognised that flood water has an important environmental function in overall catchment, river and ecosystem health and the Murray Darling Basin cap applies to all extractions and diversions, including flood waters. Some existing flood harvesting infrastructure which was already in place when this reform took place, is being progressively licensed following an environmental impact assessment (NSW Government, 2006b).

All flood harvesting infrastructure will eventually be licensed under a new licence category and floodplain harvesting rights will not be tradeable (NSW Government, 2006b). These licences will be managed on a state-wide basis due to the difficulties associated with assigning flood waters to a particular river/WSP area (NSW Government, 2006b). Floodplain harvesting infrastructure in the REROC SBC region will be subject to these arrangements.



Section Summary

- 💧 **Water licences, trade and allocations within REROC are covered by the *Water Management Act 2000* and the *Water Act 1912***
- 💧 **Water extraction for all town water supplies in REROC is managed under Water Access Licences**
- 💧 **Local Water Utility and Domestic and Stock WALs have the highest priority**
- 💧 **There is currently an embargo on all groundwater resources West of the Great Dividing Range (which includes all of REROC)**
- 💧 **There was an embargo on water trades from the Murrumbidgee Valley for much of 2010, however at the time of writing, the embargo had been lifted due to above average rainfall**
- 💧 **In the future, floodplain harvesting will be subject to a new licence category and will be managed on a state-wide basis; floodplain harvesting rights will not be tradeable**

PART II

Regional Water Resources



2.0 Regional Water Resources

A matrix of the water resource boundaries that apply to the REROC region are illustrated in Table 1 and Table 2. The REROC LGAs cover the Lachlan, Murrumbidgee and Murray catchments (see Figure 4). Four surface WMAs apply to REROC: Upper Murray River, Murrumbidgee River Unregulated, Murrumbidgee River Regulated and Lachlan River Regulated (see Figure 5). REROC also covers three groundwater WMAs: Lachlan Fold Belt, Mid Murrumbidgee Alluvium (upstream of Narrandera) and the Upper Lachlan Alluvium (upstream of Lake Gargelligo), see Figure 6.

Table 1 – Matrix of LGAs, catchments and Water Management Areas in the REROC region

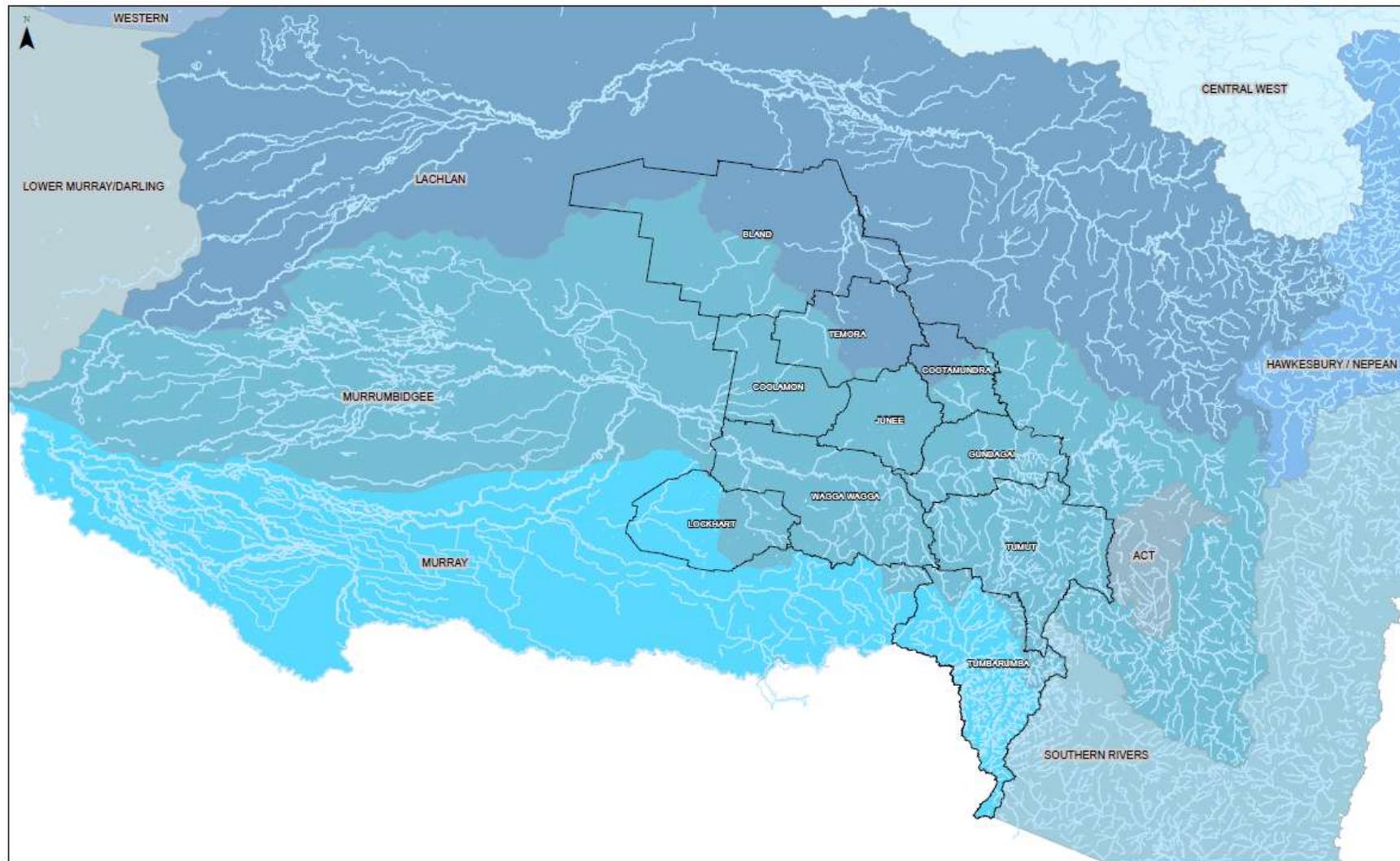
LGA	Catchment			Surface Water Management Area				Groundwater Management Area		
	UWS	Non UWS	Other	UWS	Non UWS	Other	UWS	Non UWS	Other	
Bland	-	-								
Temora	-	-								
Coolamon		-		-	-			-	-	-
Junee		-		-	-				-	
Cootamundra	-	-								
Gundagai		-		-	-			-	-	
Wagga Wagga		-		-	-			-	-	
Lockhart		-	-						-	
Tumut		-		-	-				-	
Tumbarumba		-	-					-	-	

Note: UWS = Urban Water Supply; Non UWS = Non Urban Water Supply (i.e. rainfall dependent and other WALs)

Table 2 – Matrix of water utilities, LGAs and Water Sharing Plans for the REROC region

Water Utility	LGA	Water Supply	Water Sharing Plan					
			Murrumbidgee			Lachlan	Murray	Murrumbidgee, Lachlan, Murray
			Murrumbidgee Reg. River Water Source	Adelong Creek Water Source	Tarcutta Creek Water Source	Lower Lachlan Groundwater Source	Water Sharing Plan for the Murray Unregulated and Alluvial Water Sources (DRAFT)	NSW MDB Fractured Rock Groundwater Sources (DRAFT)
Goldenfields Water County Council	Bland	UWS				-		
		Non UWS						-
	Temora	UWS	-					
		Non UWS						-
	Coolamon	UWS						-
		Non UWS	-					-
Junee	UWS							
	Non UWS	-					-	
Cootamundra Shire Council	Cootamundra	UWS	-					
		Non UWS						-
Gundagai Shire Council	Gundagai	UWS	-					
		Non UWS	-	-				-
Riverina Water County Council	Wagga Wagga	UWS	-					-
		Non UWS	-		-			-
	Lockhart	UWS	-					-
		Non UWS						-
Tumut Shire Council	Tumut	UWS	-	-				
		Non UWS	-	-	-			-
Tumbarumba	Tumbarumba	UWS					-	-

Water Utility	LGA	Water Supply	Water Sharing Plan					
			Murrumbidgee			Lachlan	Murray	Murrumbidgee, Lachlan, Murray
			Murrumbidgee Reg. River Water Source	Adelong Creek Water Source	Tarcutta Creek Water Source	Lower Lachlan Groundwater Source	Water Sharing Plan for the Murray Unregulated and Alluvial Water Sources (DRAFT)	NSW MDB Fractured Rock Groundwater Sources (DRAFT)
Shire Council		Non UWS			-		-	-



- REROC LGAs
- NSW Catchment Management Authorities

RIVERINA EAST REGION OF COUNCILS
Regional Catchment Management Areas
Source: Streetpro (2009); DIPNR (2003); Geoscience Australia (2004)
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Figure 4 – Catchments within the LGA participating in the REROC Study

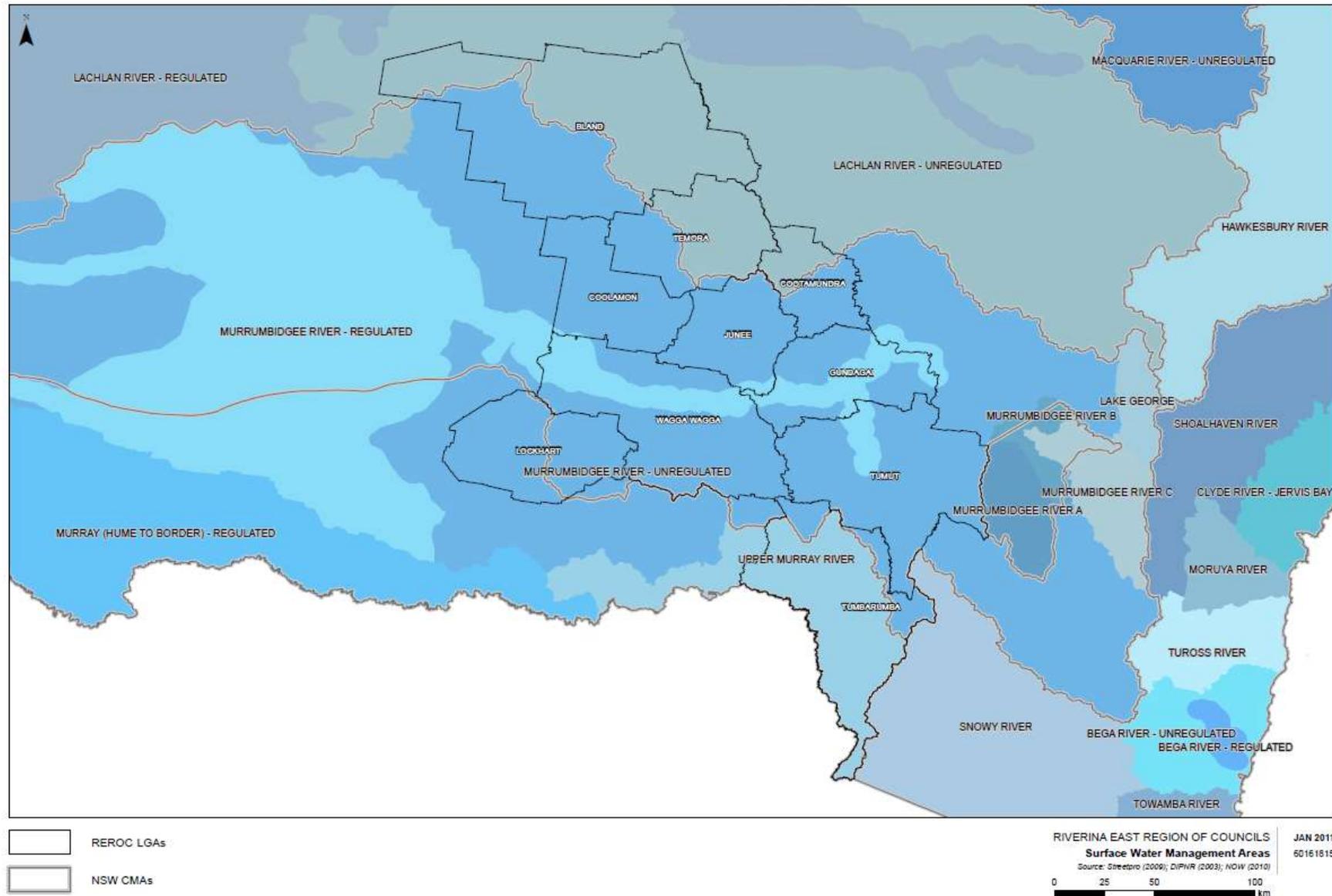
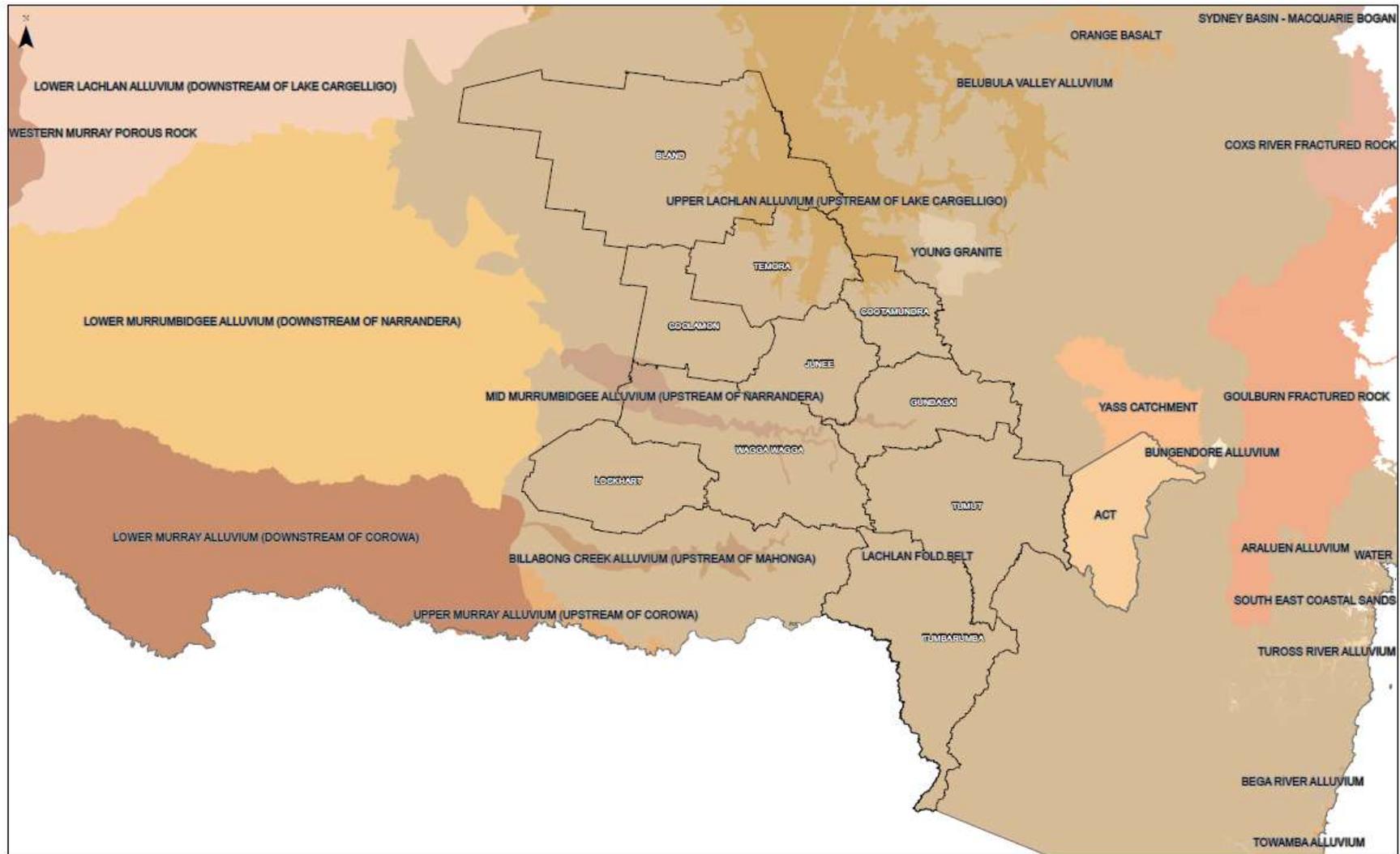


Figure 5 – WMA for surface water relevant to REROC Study



□ REROC LGAs

RIVERINA EAST REGION OF COUNCILS
Groundwater Management Areas
JAN 2011
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Source: Map Data (2005 and 2010); NSW (2010)
0 25 50 100

Figure 6 – WMA for groundwater relevant to REROC Study

2.1 Murrumbidgee Catchment

All of the REROC councils are located either wholly or partially within the Murrumbidgee catchment, predominantly in the mid reaches of the catchment (see Figure 4). A detailed description of the Murrumbidgee catchment is provided in the Appendices Report.

Surface Water Management

The WSP for the Murrumbidgee Regulated River Source (NSW Government, 2008b) that commenced on the 1st July 2004, sets out the water sharing arrangements for the regulated portion of the Murrumbidgee River catchment. The WSP applies to the banks of all rivers in the catchment from the upper limit of Burrinjuck Dam and Blowering Dam to the junction of the Murrumbidgee and Murray Rivers.

The cap on surface water diversions in the NSW Murrumbidgee is currently 2,341 GL (DIPNR, 2004b). At the time of gazettal, the WSP indicated that local water utilities had surface water access licences in the Murrumbidgee totalling 23,403 ML/yr. The management of water resources in Tarcutta Creek and Adelong Creek are subject to different arrangements (further detail on both Creeks are shown in the Appendices Report).

Locations outside the water sharing plan areas of Murrumbidgee River Regulated, Adelong Creek and Tarcutta Creek may extract water under basic landholder rights and licensed users will be subject to the Murrumbidgee River Unregulated Water Sharing Plan, which is currently being developed (NOW, 2010o).

The water sharing arrangements for the Murrumbidgee River Regulated water source are detailed in the Appendices Report.

The NSW Government Gazette of Friday 10th November 2006, suspended the rules of water distribution for the Murrumbidgee Regulated River Water Source that are specified under section 60 (1) of the *WMA 2000*. Instead of the priority system that was outlined in Section 1.3, the rules of section 60 (3) of the Act now apply (NSW Government, 2006). Some of the key changes are that priority is given to domestic users under basic landholder rights or a WAL and second priority is to be given to water for the environment.

As part of the Sustainable Yields Project, the CSIRO presented an average annual river water balance for the Murrumbidgee catchment. The modelling suggests that total inflows to the Murrumbidgee system could decrease by up to 27%. Under the best estimate future scenario (Dmid), total inflows are expected to reduce by approximately 9% (see Appendices Report for detailed modelling).

At the time of writing, the Murray Darling Basin Guide to the draft Basin Plan is under development and the Guide to the Proposed Basin Plan has been released for public comment (The Guide). The Guide includes proposed changes to the amount of water that is diverted in the Murrumbidgee catchment. This may change with the publication of the final Basin Plan, however the proposed changes are outlined in Table 3. The changes are between 26% and 35% of the current sustainable diversion limit (SDL).

Table 3 – Proposed changes to surface water diversions in the Murrumbidgee catchment (MDBA, 2010a)

Murrumbidgee NSW	
Current diversion limit	2,562 GL/yr
SDL proposal	From 1897 GL/yr to 1670 GL/yr
Reduction	From 665 GL/yr (26%) to 892 GL/yr (35%)
Murrumbidgee ACT	
Current diversion limit	51 GL/yr
SDL proposal	From 38 GL/yr to 24 GL/yr
Reduction	From 13 GL/yr (26%) to 18 GL/yr (34%)

Groundwater Management

A Draft WSP for the NSW Murray Darling Basin Fractured Rock Groundwater Sources was released for public exhibition on the 6th December 2010. The WSP covers ten groundwater management zones, including the Lachlan Fold Belt. The Draft WSP includes proposed arrangements for the following key items: environmental water provisions; requirements for water; limit on the availability of water; rules for granting and managing WALs and work approvals; and access licence dealing rules.

The proposed water allocations in the plan are shown in Table 4.

Table 4 – Proposed water allocations under the Draft WSP for the MDB Fractured Rock Groundwater Source (NOW, 2010p)

Component	Volume
Recharge	3,896 GL/yr
Planned Environmental Water	2,979 GL/yr
Long-term average annual extraction limit	917 GL/yr
Groundwater basic landholder rights	74 GL/yr
Total licensed groundwater entitlement	74 GL/yr
Unassigned water	769 GL/yr

For the Lachlan Fold Belt GMU, environmental water provisions are 75% of the long term average annual recharge from non-high environmental value areas and 100% for high environmental value areas. The proposed share components for WALs within the Lachlan Fold Belt GMU are shown in Table 5.

Table 5 – Proposed share components for the Lachlan Fold Belt GMU (NOW, 2010p)

WAL	Share Component
Domestic and stock	0 ML/yr
Local Water Utility	4,290 ML/yr
Aquifer	69,619 unit shares

Note: At the time of publication of the Draft WSP, there were no native title rights with respect to water for the Lachlan Fold Belt GMU.

The groundwater resources of the Mid Murrumbidgee GMU are not yet covered by a WSP. Extraction of groundwater may be achieved under basic landholder rights. For licensed water users, extraction will be managed under the Murrumbidgee Alluvial Macro WSP, which is currently being developed (Table 6).

Table 6 – Groundwater Management Arrangements in the Murrumbidgee (CSIRO, 2008b)

Description	GMUs outside the Lower Murrumbidgee GMU
Name of plan	Murrumbidgee Alluvial Macro Groundwater Sharing Plan
Year of plan	Currently under development *
Environmental Provisions	
Planned share	30-50% of rainfall recharge
Adaptive provisions	None as yet
Basic Rights	
Domestic and stock rights	28.3 GL/yr
Native title	None identified
Access licences	
Urban	27.97 GL/yr
Planned share	73.00 GL/yr
Supplementary	-
Announced allocation	None

* Source: NOW, 2010o

The Guide includes proposed changes to the amount of water that is diverted/extracted in the Murrumbidgee catchment. This may change with the publication of the final Basin Plan, however the details for the groundwater resources relevant to the REROC councils are outlined in Table 7.

Table 7 – Proposed changes to groundwater diversions in the Murrumbidgee catchment (MDBA, 2010a)

Mid Murrumbidgee Alluvium	
Current diversion limit	44 GL/yr
SDL proposal	44 GL/yr
Reduction	Nil
Lachlan Fold Belt: Murrumbidgee	
Current diversion limit	30.9 GL/yr
SDL proposal	30.9 GL/yr
Reduction	Nil



2.2 Lachlan Catchment

Parts of the REROC LGAs of Bland, Temora and Cootamundra, including the major centre of West Wyalong fall within the Lachlan catchment. However, most of the REROC towns within the Lachlan, including West Wyalong, are supplied with urban water from the Murrumbidgee catchment. The exception is customers in the rural areas and villages of Naradhan, Weethalle and Tallimba (all located in the Bland LGA), which are supplied from a borefield adjacent to the Lachlan River near Lake Brewster (GWCC, 2010c). The borefield is jointly operated by Goldenfields Water County Council (GWCC) and Carrathool Shire Council (GWCC, 2010c).

The REROC towns/villages are located in the mid reaches of the catchment, along the southern catchment boundary. More details on the Lachlan Catchment are shown in the Appendices Report.

Surface Water Management

A WSP is in place for all rivers within the Lachlan catchment from the upper limits of Wyangala Dam to the junction of the Lachlan and Murrumbidgee Rivers (DIPNR, 2004a). The WSP also includes Bumbergan Creek, parts of Goobang and Island Creeks and Willandra Creek from its offtake to Willandra Homestead Weir (DIPNR, 2004a). A separate WSP applies to the Mandagery Creek Water Source.

The REROC LGAs fall within the unregulated area of the Lachlan River catchment. Surface water extraction in this region may be achieved under basic landholder rights or for licensed water users, extractions will be managed under the Lachlan River Unregulated Macro Water Sharing Plan, which is currently being developed (NOW, 2010o).

The Guide includes proposed changes to the amount of water that is diverted in the Lachlan catchment. This may change with the publication of the final Basin Plan, however the proposed changes are outlined in Table 8. The changes are between 7% and 11% of the current SDL.

Table 8 – Proposed changes to surface water diversions in the Lachlan catchment (MDBA, 2010b)

Lachlan River Catchment	
Current diversion limit	618 GL/yr
SDL proposal	From 574 GL/yr to 549 GL/yr
Reduction	From 44 GL/yr (7%) to 69 GL/yr (11%)

Groundwater Management

Groundwater extraction in the Lower Lachlan GMU is covered by the Water Sharing Plan for the Lower Lachlan Groundwater Source, which commenced on the 1st February 2008. The WSP applies to all groundwater in the unconsolidated alluvial aquifers and sets the long term extraction limit at 108 GL/year (CSIRO, 2008c).

Under the WSP, Carrathool Shire Council is authorised to extract up to 2,247 ML/yr from the Lower Lachlan GMU, which includes groundwater from the borefield near Lake Brewster. The other WALs in the Lower Lachlan GMU are summarised in Table 9.

Table 9 - WALs in the Lower Lachlan GMU, 2009/10 (NOW, 2010m)

WAL	No. of WALs	Total Share Component
Aquifer	82	105,678 Unit Shares
Domestic and Stock	0	0 ML
Local Water Utility	4	2,322 ML
Supplementary Water	45	21,238 Unit Shares
Total	131	

Extraction of groundwater in other GMUs may be achieved under basic landholder rights (see Section 1.2). For licensed water users who extract from the Upper Lachlan GMU, extraction will be managed under the Lachlan Alluvial Macro Groundwater Sharing Plan, which is currently being developed (NOW, 2010o).

For licensed water users who extract from the Lachlan Fold Belt GMU, extraction will soon be managed under the WSP for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources, which at the time of writing was in draft format and open for public comment.

The proposed changes to groundwater diversions in the Lachlan catchment under the Murray Darling Basin Plan, for the GMUs relevant to the REROC LGAs are presented in Table 10. This may change with the publication of the final Basin Plan.

Table 10 – Proposed changes to groundwater diversions in the Lachlan catchment (MDBA, 2010b)

Lower Lachlan Alluvium	
Current diversion limit	108 GL/yr
SDL proposal	64.8 GL/yr
Reduction	43.2 GL/yr or 40%
Lachlan Fold Belt: Lachlan	
Current diversion limit	23.1 GL/yr
SDL proposal	23.1 GL/yr
Reduction	Nil
Upper Lachlan Alluvium	
Current diversion limit	77.1 GL/yr
SDL proposal	63 GL/yr
Reduction	14.1 GL/yr or 18%



2.3 Murray Catchment

The LGAs of Tumbarumba, Lockhart and Urana have land area within the Murray River catchment. More details on the Murray catchment is provided in the Appendices Report.

Surface Water Management

A surface WSP exists for the NSW Murray and Lower Darling. The WSP applies to the Murray River water source, which includes all rivers from the upper limit of Hume Dam downstream to the South Australian border and the Lower Darling water source, which includes all rivers from the upper limit of Lake Wetherall downstream to the upper limit of the Wentworth weir pool (CSIRO, 2008c).

A surface WSP also exists for the Upper Billabong water source, which is located to the east of the township of Holbrook.

The REROC LGAs do not fall within the extent of either surface WSP. The extraction of surface water in the Murray River catchment can be achieved under basic landholder rights (refer to Section 1.2). For some licensed water users, extraction will soon be managed under the WSP for the Murray Unregulated and Alluvial Water Sources, which at the time of writing, was in draft format and open for public comment.

The WSP applies to Khancoban Pondage and Swampy River Plain downstream of the pondage. It also applies to Indi Blackwater and to the Murray River downstream to the full supply limit of Hume Dam (NOW, 2010q) (Figure 5, Appendix A). Tumbarumba LGA is the REROC LGA who will be subject to this WSP.

The Draft WSP includes proposed arrangements for the following key items: environmental water provisions; requirements for water; limit on the availability of water; rules for granting and managing WALs and work approvals; and access licence dealing rules.

The proposed water allocations in the plan for the Tumbarumba water source are shown in Table 11.

Table 11 – Proposed share components for surface water within the Tumbarumba water source (NOW, 2010q)

Component	Share Component
Basic landholder rights, domestic and stock	0.4 ML/d
Basic landholder rights, Native title rights	0
Domestic and stock	53 ML/yr
Local Water Utility	499 ML/yr
Unregulated river	1,009 unit shares
Unregulated river (high flow) access licenses	0

At the time of publication of the draft WSP there were 26 surface water licenses with a total entitlement of 1,561 ML/yr in the Tumbarumba water source (NOW, 2010q). Of this entitlement, 69.2% is for irrigation and 32% for town water supply (NOW, 2010q).

The Guide includes proposed changes to the amount of water that is diverted in the Murray catchment. This may change with the publication of the final Basin Plan, however the proposed changes are outlined in Table 12. The changes are between 26% and 35% of the current SDL.

Table 12 – Proposed changes to surface water diversions in the Murray catchment (MDBA, 2010c)

NSW Murray	
Current diversion limit	1,825 GL/yr
SDL proposal	From 1,351 GL/yr to 1,190 GL/yr
Reduction	From 474 GL/yr (26%) to 635 GL/yr (35%)

Groundwater Management

The extraction of groundwater in the Lachlan Fold Belt within the Murray catchment may be achieved under basic landholder rights (see Section 1.2). For licensed water users, extraction will soon be managed under the WSP for

the NSW Murray-Darling Basin Fractured Rock Groundwater Sources, which at the time of writing was in draft format and open for public comment.

The proposed changes to groundwater diversions in the Murray catchment under the Murray Darling Basin Plan, for the GMU relevant to the REROC LGAs are presented in Table 13. This may change with the publication of the final Basin Plan.

Table 13 - Proposed changes to groundwater diversions within the Lachlan Fold Belt (Murray) Alluvium (MDBA, 2010c)

Lachlan Fold Belt: Murray	
Current diversion limit	5.1 GL/yr
SDL proposal	5.1 GL/yr
Reduction	Nil



2.4 Recycled Water

Recycled water for the REROC urban water supply schemes is sourced from the wastewater treatment plants that are operated by the councils. The standard of treatment that is achieved by the REROC councils varies from secondary standard to advanced tertiary (see Appendices Report for details on the different recycled water treatments).

In 2008/09, the volume of water recycled by the REROC councils ranged from zero (Tumbarumba) to 572 ML (Wagga Wagga) (Table 14). Temora, Gundagai and Coolamon recycled the greatest proportion of their effluent in the 2008/09 period (Table 14). The total volume of recycled water used for the REROC area for the 2008/09 period was 167GL (Table 14). The estimated volume of water recycled via decentralised systems was not available for the REROC SBC councils.

Table 14 – Recycled water statistics for the REROC SBC councils (NOW, 2010a)

Utility	% of Effluent Recycled			Total Recycled Water (ML)
	2006/07	2007/08	2008/09	2008/09
Wagga Wagga			11	572
Tumut		4	4	33
Cootamundra	37	51	52	202
Temora	91	28	100	113
Bland	45	45	45	104
Junee	60	54	65	166
Tumbarumba			0	0
Gundagai	99	100	100	117
Coolamon	74	89	90	88
Lockhart	41	40	1	2
Total				167,231

Some of these figures should be considered with care as it became apparent during the project that there is a lack of consistency in the way that recycled water volumes are reported. Some LGA's report volumes that include evaporated recycled water, while others do not, making it difficult to compare figures across the REROC region. Furthermore, the feasibility and effectiveness of recycled water schemes is unique for each of the LGAs, due to site-specific constraints and opportunities.

Section Summary

- 💧 **The REROC LGAs cover the Lachlan, Murrumbidgee and Murray Catchments**
- 💧 **Most of REROC LGAs fall under the Murrumbidgee Regulated River Water Source Water Sharing Plan for surface water and the NSW MDB Fractured Rock Groundwater Source Water Sharing Plan for groundwater**
- 💧 **CSIRO modelling suggests that total inflows in the Murrumbidgee could decrease between 9% and 27%**
- 💧 **Proposed changes (reductions) under the Guide to the draft Basin Plan to surface water diversions in the Murrumbidgee catchment range between 26% and 35%**
- 💧 **There are no proposed changes under the Guide to the draft Basin Plan to groundwater extraction in the Murrumbidgee catchment**
- 💧 **Proposed changes (reductions) under the Guide to the draft Basin Plan to surface water diversions in the Lachlan catchment range between 7% and 11%**
- 💧 **Proposed changes (reductions) under the Guide to the draft Basin Plan to groundwater extraction in the Lachlan catchment are 40% for the Lower Lachlan Alluvium**
- 💧 **Proposed changes (reductions) under the Guide to the draft Basin Plan to surface water diversions in the Murray catchment range between 26% and 35%**
- 💧 **There are no proposed changes under the Guide to the draft Basin Plan to groundwater extraction in the Murray catchment**
- 💧 **All these proposed changes will be updated when the Final Basin Plan is published**

PART III

Climate change and runoff



3.0 Historical and Future Changes to Runoff within REROC

Data from the South Eastern Australian Climate Initiative (SEACI) project were sourced to map historical and projected runoff in the REROC region.

3.1 Historical Runoff

The historical runoff (period 1895-2006) follows relatively closely the rainfall pattern in the REROC region. The highest runoff values (between 560 mm/yr and 1200 mm/yr) are found in the south-eastern parts of the region where rainfall is also the highest; conversely runoff is the lowest in the north-west with runoff values below 20 mm/yr (see Figure 7).

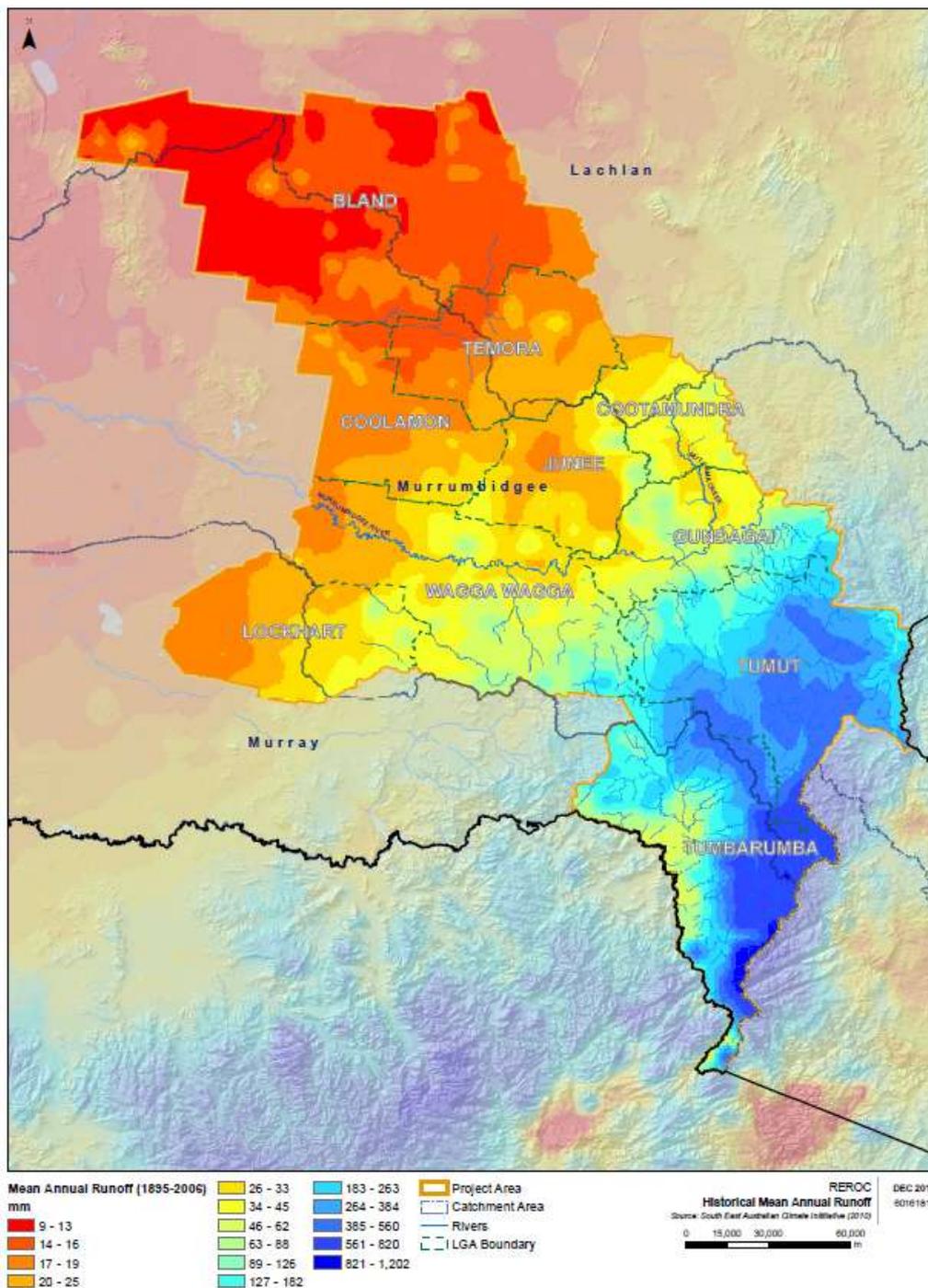


Figure 7 – Mean annual runoff – historical period (1895-2006)

3.2 Future Runoff

Figure 7, Figure 8 and Figure 9 show project runoff for the median, second driest and second wettest scenario respectively. A comparison of these changes to historical values is provided in Section 3.3.

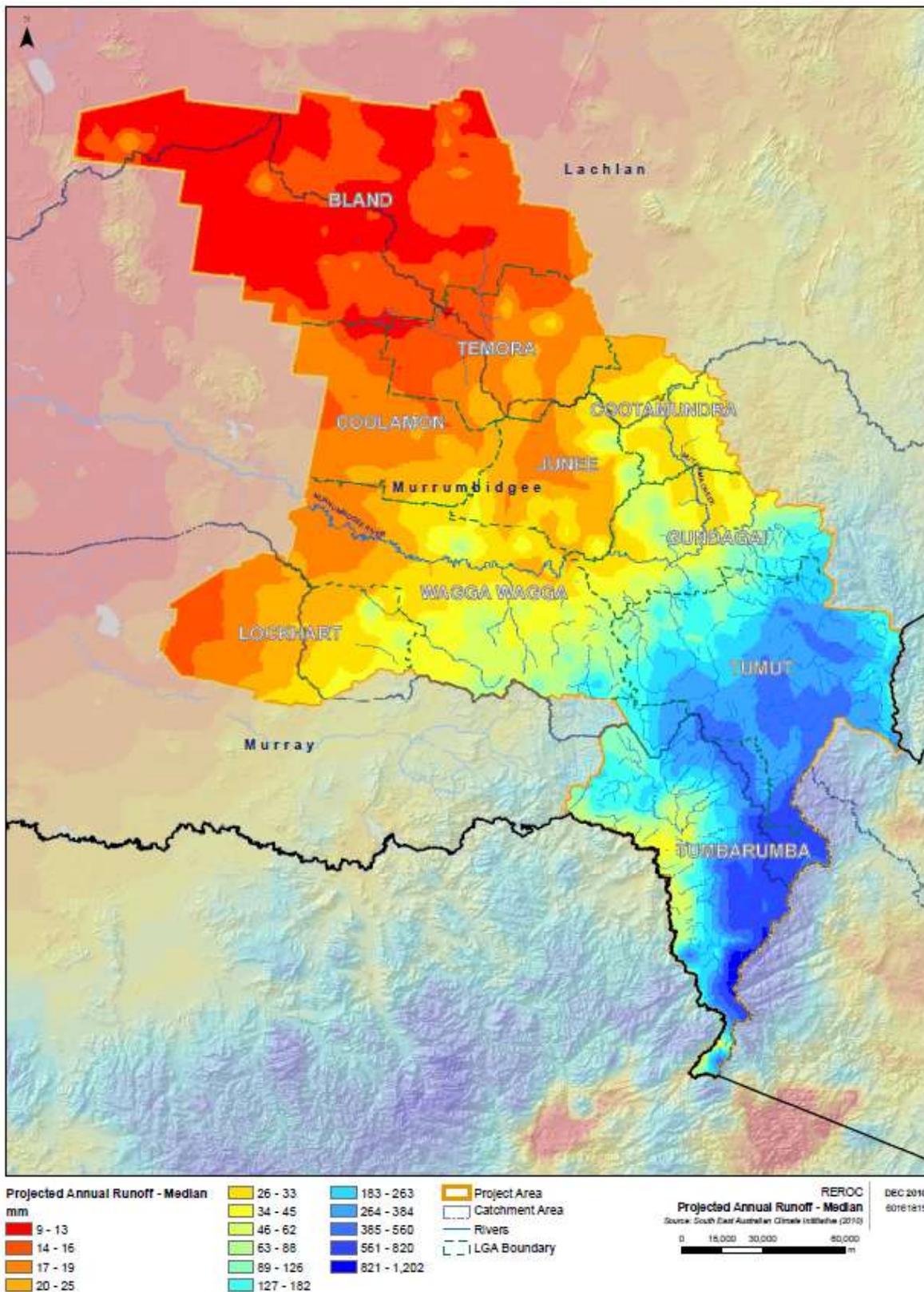


Figure 8 – Mean annual runoff – Projected for median scenario

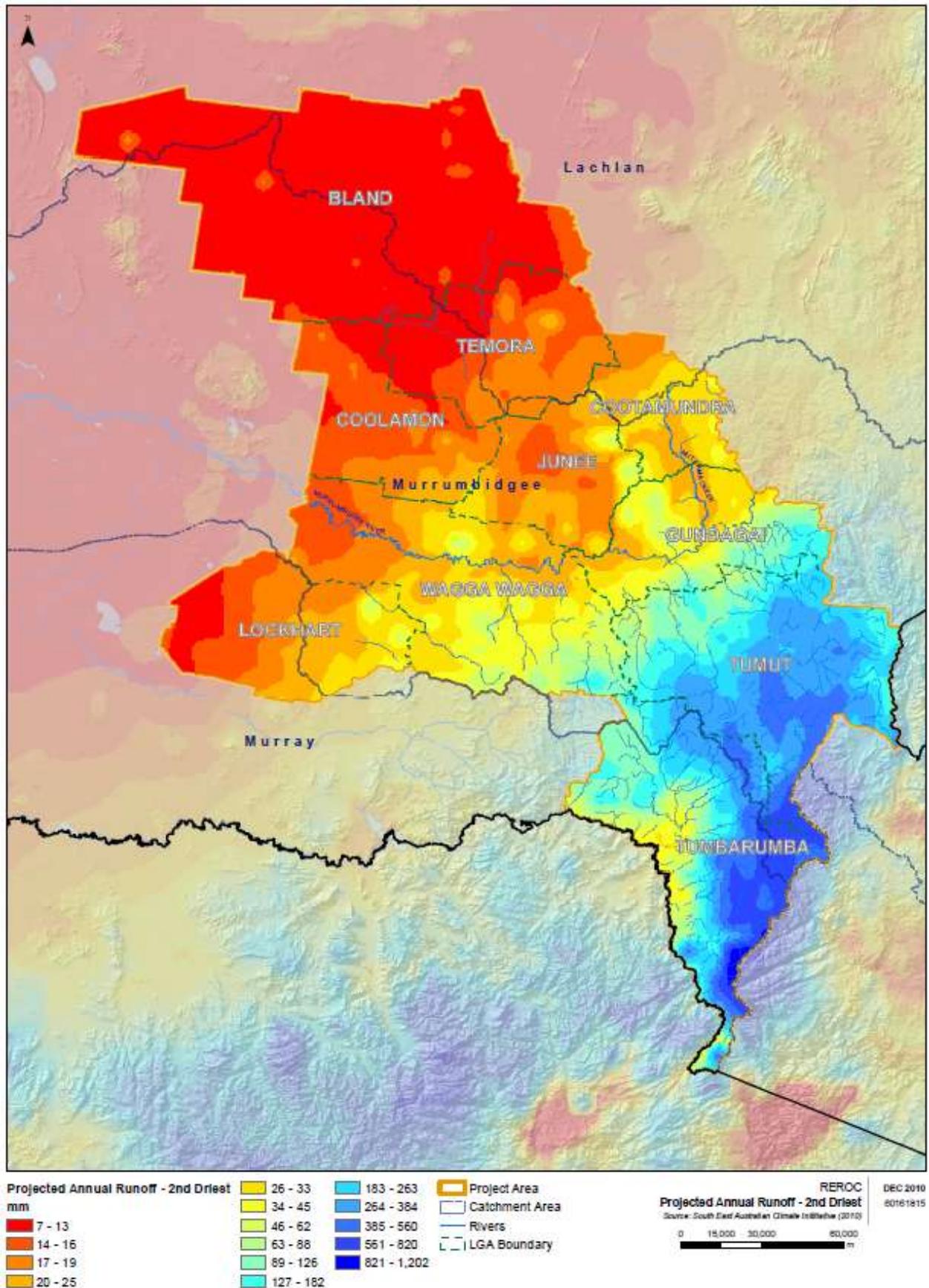


Figure 9 – Mean annual runoff – Projected for 2nd driest scenario

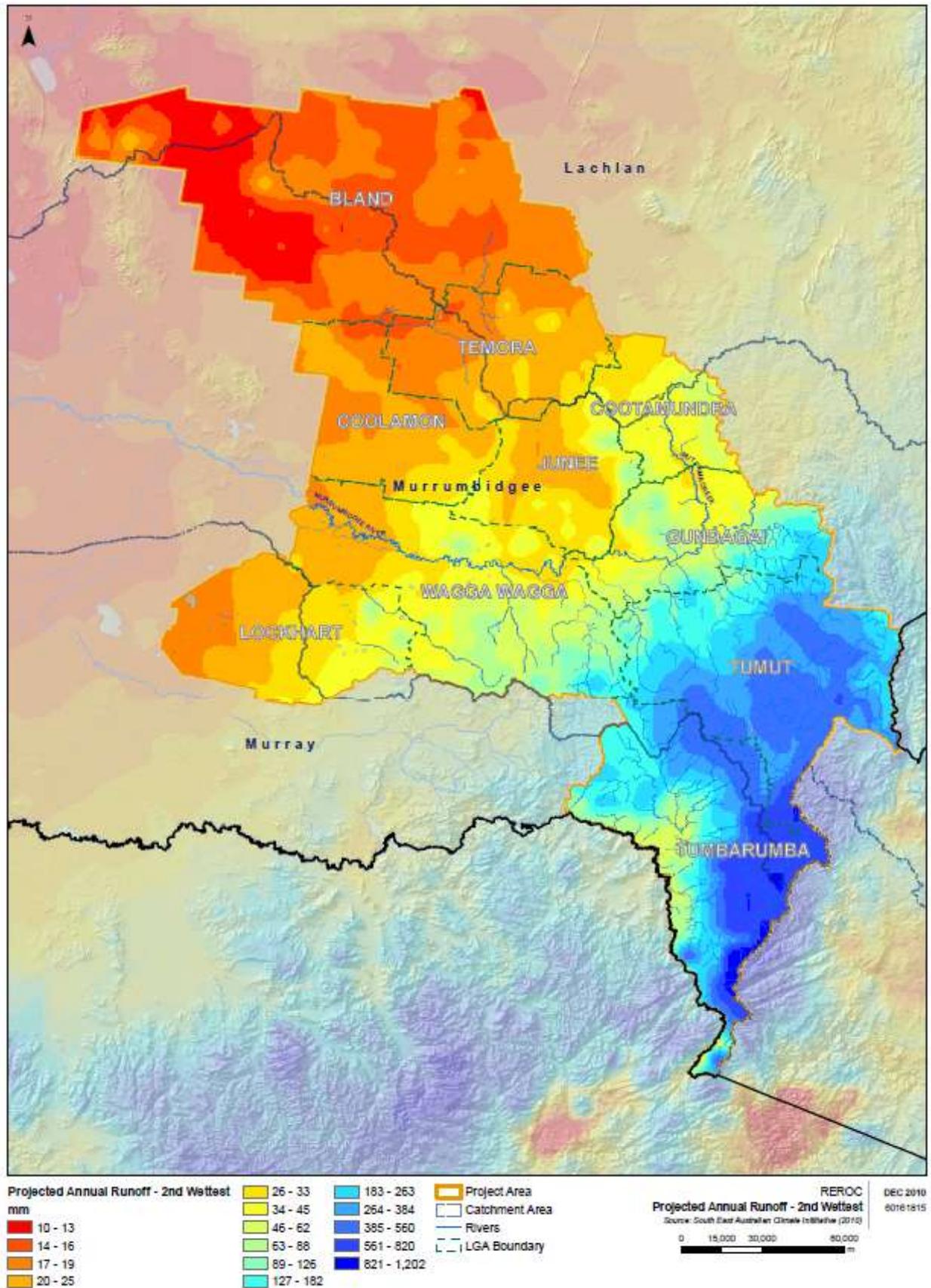


Figure 10 – Mean annual runoff – Projected for 2nd wettest scenario

3.3 Historical vs. Future runoff

Under the median scenario, the entire REROC region would experience a reduction in runoff in comparison to historical runoff. The greatest decrease would be found in the LGAs of Cootamundra, Gundagai and some areas of Wagga Wagga. The south-east corner of REROC is the area least affected in relative terms (see Figure 11).

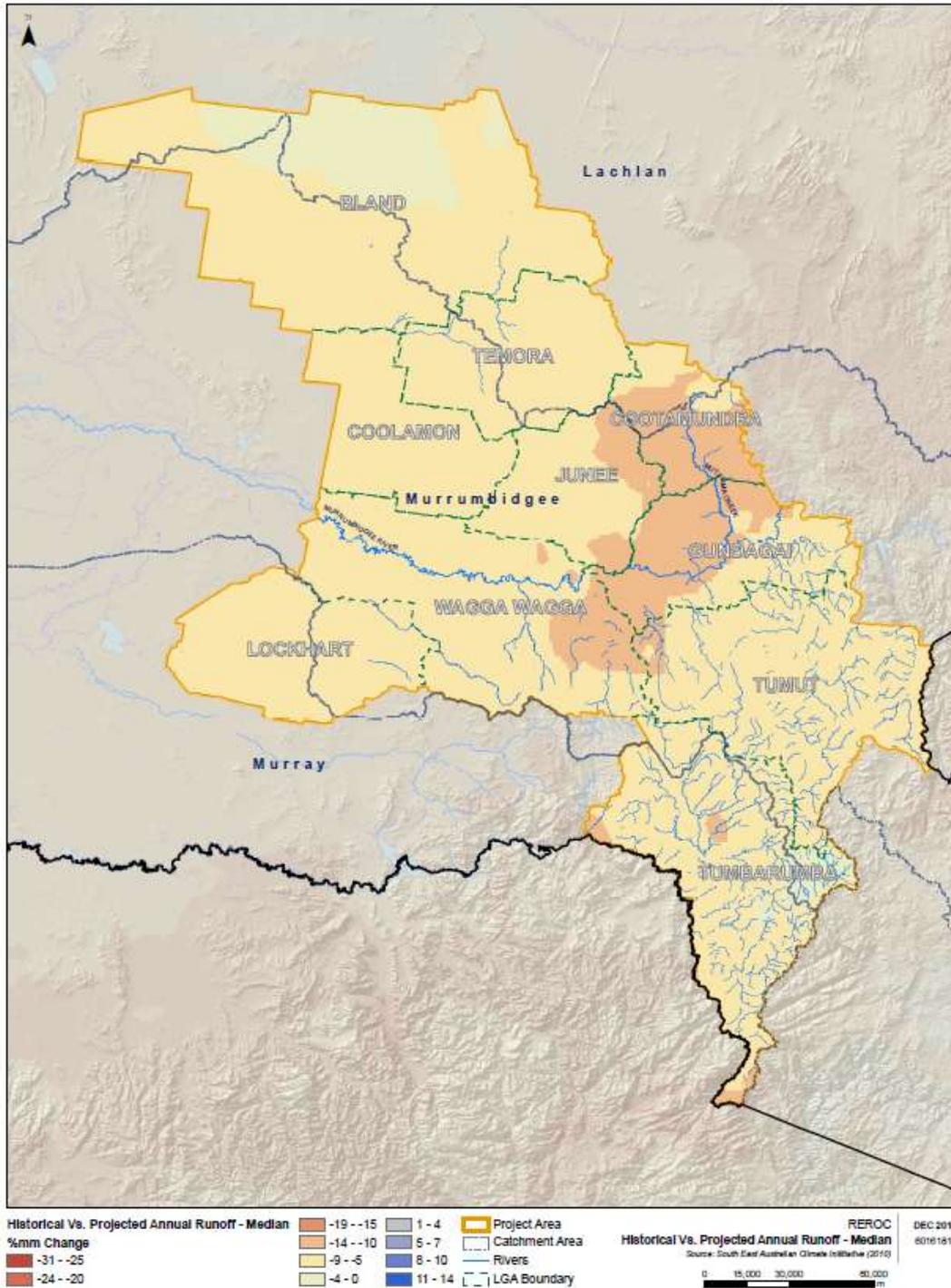


Figure 11 – Mean annual runoff – Historical vs. Projected for median scenario

Under the second driest scenario the entire REROC region would experience a marked decrease in runoff relative to historical runoff. The LGAs of Cootamundra, Gundagai, Wagga Wagga and Tumbarumba would experience the greatest reduction, as much as one third less runoff than historical averages (see Figure 12).

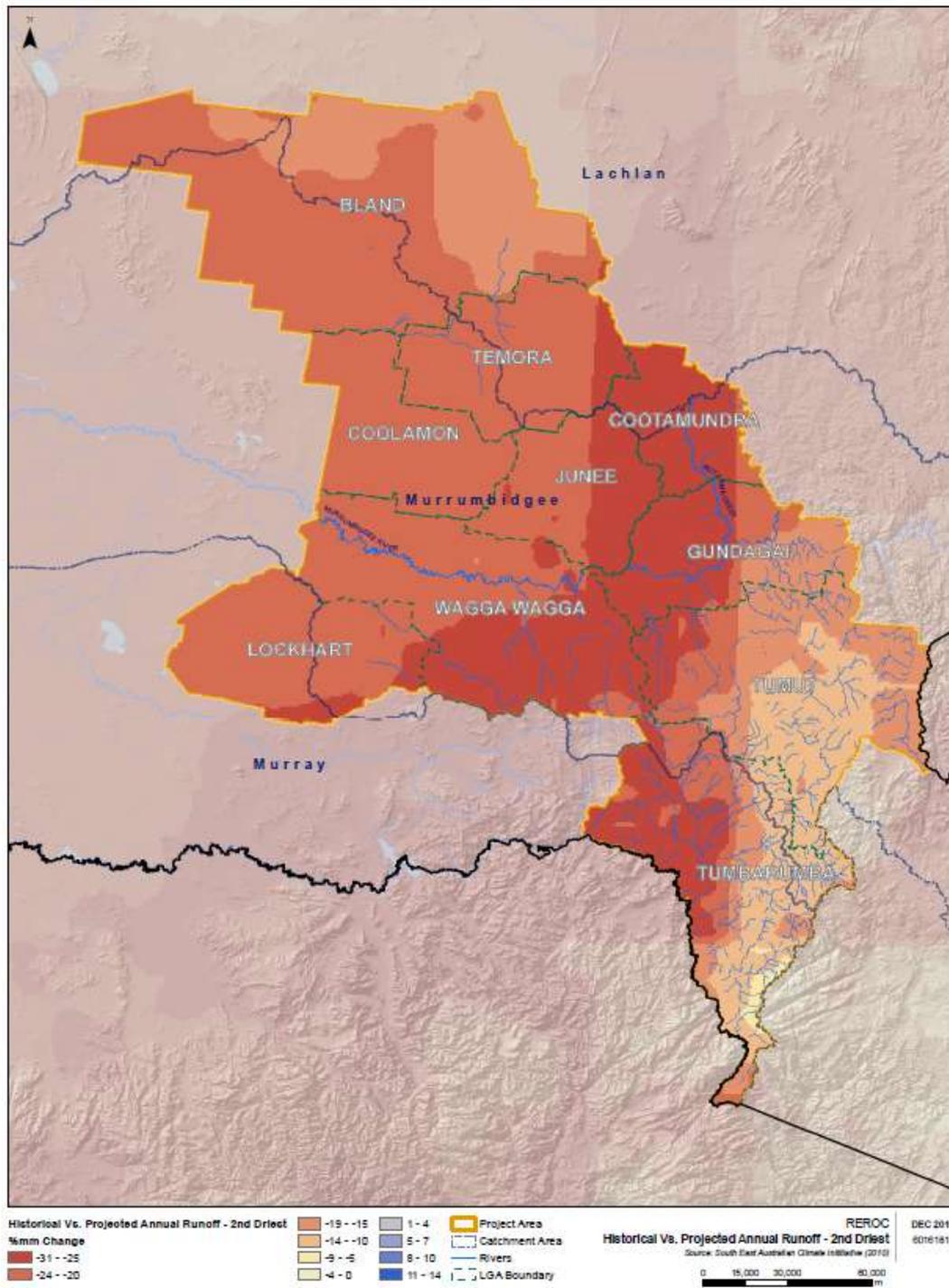


Figure 12 – Mean annual runoff – Historical vs. Projected for 2nd driest scenario

Under the second wettest scenario, the south east corner of the Region would experience minor increases in runoff (between 1% and 7%). The north western parts of the region and more specifically the Bland LGA are projected to experience the greatest increase in runoff, (up to 14%) as shown in Figure 13.

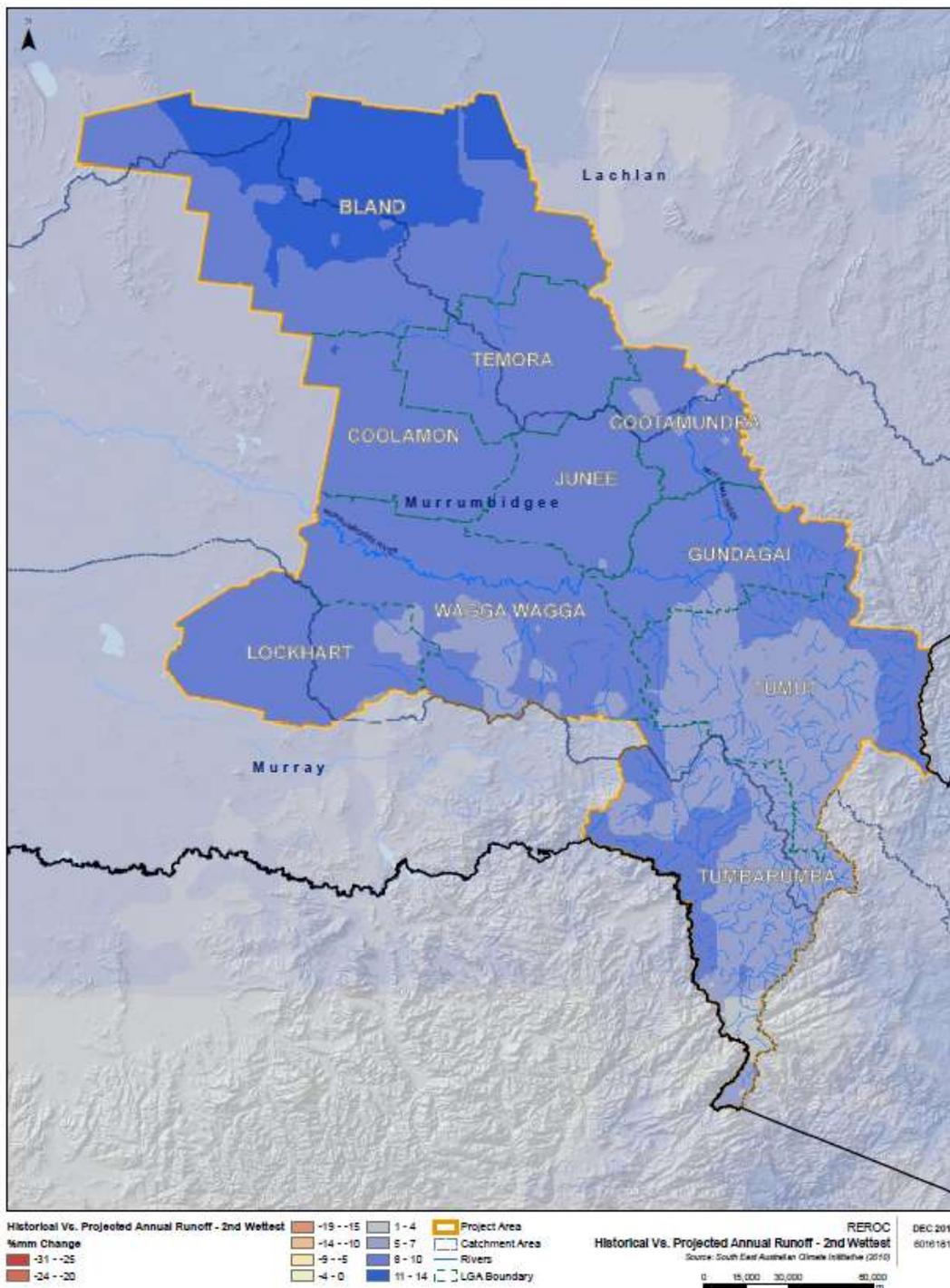


Figure 13 – Mean annual runoff – Historical vs. Projected for 2nd wettest scenario

PART IV

Regional Water Use



4.0 Urban Water Use

4.1 Introduction

This section contains a summary of historical urban water use for the REROC region as reported by each REROC LGA. Urban water use refers to water that is used within the urban/town water supply system. The access to water for urban use is controlled under WALs that are administered by NOW. A Local Water Utility may gain access under the following WALs:

- Local Water Utility (surface or groundwater).
- Regulated River (High Security) (Local Water Utility).
- Aquifer (Local Water Utility).

This section also contains a comparative summary of water use by key sectors for each LGA, including recycled water use, and overall water use per capita. More detailed information on water consumption for each LGA is provided in the Appendices Report.

4.2 Bland

Bland Shire Council has five low (general) security recreation surface water WALs with a combined entitlement of 94ML. All of the WALs are unregulated river licenses so consumption is yet not recorded annually by NOW. Bland Shire Council does not hold any WALs for groundwater. The balance of water used in Bland comes from GWCC.

The residential sector is by far the largest water user in the Bland LGA. In general, water use has fluctuated over time, with a peak in 2008-09 and a trough in 2009-10. Commercial and industrial water use in the LGA has declined steadily, while rural, community and institutional water use have all fluctuated. The average annual residential water supplied in 2009-10 was 249kL/connected property.

4.3 Temora

Temora Shire Council holds one surface water WAL in the Temora LGA. The licence is a general security irrigation WAL for the Lachlan River Unregulated WMA, with a licensed entitlement of 10 ML. The balance of water used in Temora comes from GWCC.

The residential sector is the largest water user in the Temora LGA, with rural water use the second largest. Residential water use increased in 2008-09 and fell again for the 2009-10 water year. Rural water use has declined since 2007. For all other sectors, water use has fluctuated over time with a peak in 2008-09. The commercial standpipes are used for drought relief and a peak was observed in 2007-08. The average annual residential water supplied in 2009-10 was 241kL/connected property.

4.4 Coolamon

The Coolamon LGA is supplied with potable water from GWCC's Oura and Mt Arthur water supply schemes. Both of these schemes are 100% groundwater. There are no WALs for town water supply use in the Coolamon LGA.

The residential and rural sectors are by far the largest water users in the Coolamon LGA. For almost all sectors, water use has fluctuated over time with a peak in 2008-09. The average annual residential water supplied in 2009-10 was 257kL/connected property.

4.5 Cootamundra

The supply for Cootamundra is the Jugiong water supply scheme, comprising of raw water from the Murrumbidgee River and treatment at the Jugiong Water Treatment Plant. GWCC provides water supply and reticulation services directly to a portion of the LGA and these are:

- Urban customers in Stockinbingal and Wallendbeen.
- Rural customers in Frampton.
- Rural customers between Cootamundra and Bauloora.

- Rural customers between Cootamundra and Cowangs.

Cootamundra Shire Council reticulates bulk water from GWCC to the remainder of the shire, specifically customers in the Cootamundra town area. Cootamundra Shire Council also holds two general security recreation groundwater WALs with a total licensed entitlement of 40ML. The licenses are for the Lachlan Fold Belt GMU.

For those parts of the Cootamundra LGA supplied directly by GWCC, the majority of the water supplied is for rural and commercial use. Rural water use has fluctuated over time with a peak in 2007-08. The commercial, residential and community sector have all remained relatively constant. The average annual residential water use for the 2009-10 period was 161 kL/connected property.

Cootamundra Shire Council purchased 705 ML of potable water from GWCC during the 2008-09 period. Overall, the volume has been decreasing since 2006-07. Of this volume of water supplied directly by Cootamundra Shire Council, residential consumption is clearly the greatest component of total water use and has been steadily declining since 2002-03. This is consistent with the fact that water restrictions have been in place 100% of the time for the past three water years in the Cootamundra Shire (NOW, 2010a). Industrial water use has also declined while commercial and rural/irrigation water use has generally increased. The average annual residential water use for Cootamundra Shire Council customers for the 2008-09 period was 198 kL per connected property.

Overall (taking into account water supplied directly by GWCC and water supplied by Cootamundra Shire Council), the residential sector is the largest water user for the Cootamundra LGA, with commercial and rural sectors following second.

4.6 Junee

The Junee LGA receives potable water from GWCC's Oura and Jugiong water supply schemes. The Oura scheme is groundwater and the Jugiong source is the Murrumbidgee River. There are no WALs for urban/town water supply use in the Junee LGA.

The rural sector is the largest water user in the Junee LGA, with residential water use the second largest. Rural water use has remained fairly steady over the past three years, while residential peaked in 2008-09. Institutional and community water use has remained relatively steady and commercial water use has steadily increased. The average annual residential water supplied in 2009-10 was 245kL/connected property.

4.7 Gundagai

The raw water source for the Gundagai water supply system is the Murrumbidgee River (GSC, 2009d) and the extraction point is downstream of Burrinjuck Dam and the junction with the Tumut River. The Gundagai Local Water Utility (GLWU) has a high security town water supply licence for 1,250ML/yr (GSC, 2009c) and the expected usage must be 'ordered' each month. The licence volume is generally the governing factor for the supply rather than the river flow (ACT CSE, 2009c).

The total volume of revenue water use was 502 ML, with 160 ML of non-revenue water. The largest volume is attributable to the residential sector, with commercial also consuming a relatively large volume (approximately 50% of total residential consumption). Reticulated water use by the rural sector increased from zero in 2000-01 to 50 ML/yr in 2006-07 (ACT CSE, 2009c).

The commercial and industrial sector's water use dropped from 150 ML/yr in 2000-01 to 125 ML/yr in 2007-08 (ACT CSE, 2009c). According to NOW this rose again to 185 ML/yr in 2008-09. One of the major industries in this category is the Gundagai Meat Processors (ACT CSE, 2009c). Total water use in the Gundagai Shire has remained relatively constant from the year 2000 to 2009, at around 600 to 650 ML/yr (ACT CSE, 2009c). The reduction in residential water use through water restrictions has been balanced out by the overall rise in consumption in the rural, commercial and industrial sectors.

The average annual residential water supplied during the 2008-09 period was 281 kL per connected property (NOW, 2010a). Residential water use has generally declined since 2003-04, with a minimum in 2007-08. This is consistent with the fact that Gundagai LGA has been on water restrictions 100% of the time since 2005 (NOW, 2010a). Residential water use increased in 2008-09.

4.8 Tumbarumba

Tumbarumba Shire Council maintains two water supply systems; Tumbarumba and Khancoban. The raw water source for the Tumbarumba water supply system is Burra Creek, with additional supply sourced from Tumbarumba Creek and a groundwater bore (McMeekin Bore) (GHD, 2008). To meet increasing demand and manage decreasing water availability, a system upgrade is currently underway. The Tumbarumba Reservoir is being enlarged and additional groundwater bores are being developed. The raw water source for the Khancoban water supply system is Khancoban Creek (ACT CSE, 2009c).

Since 2001/2002, there is a steady decline in water consumption. The greatest reduction was achieved in the Tumbarumba system. Notwithstanding this, there is a clear increase in consumption over the summer months, however the monthly consumption has been highly variable from year to year. There was a peak in consumption from August to December during 2001, which is also reflected in the total annual consumption statistics for that year.

The NSW Office of Water reports that the average annual residential water supplied for the 2008-2009 period was 221kL/connected property (NOW, 2010a).

Based on the Tumbarumba Drought Mitigation Strategy (GHD, 2008) and the Regional State of the Environment Report (ACT CSE, 2009c), there does not appear to be a water recycling system in place for Tumbarumba Shire. Information on non-potable water use was not included for the Tumbarumba Shire in the NSW Water Utility Performance Monitoring reports, supporting this observation (NOW, 2010a).

4.9 Wagga Wagga

Wagga Wagga receives water from the RWCC. The proportion of water for the Wagga Wagga supply system that was extracted from surface and groundwater resources is shown in Table 15. Annual water consumption in the Wagga supply system has fluctuated over time between 11,700ML and 14,227ML.

Table 15 – Proportion of raw water sourced from surface and groundwater for the Wagga Wagga water supply system (RWCC, 2010)

Period	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009
% from River	16%	24%	39%	29%	35%
% from Groundwater	84%	76%	61%	71%	65%

The total water use for the LGA has fluctuated over time. The total water use and water use per capita was at a minimum in 2007-08, which is likely to be in response to the drought that was felt most severely in the 2006-07 period. Although a specific breakdown of usage is not available by sector for the Wagga Wagga LGA, the breakdown of water use across RWCC provides the best indication available. On this basis, residential water use is consistently the greatest proportion of total water use, with commercial consisting of approximately 15%.

4.10 Lockhart

The potable water supply for the Lockhart LGA includes both surface and groundwater from RWCC. The proportion of potable water sourced from groundwater is estimated to be approximately 75%.

Due to the format of data collection, these figures include a small proportion of water consumption from residents in Milbrulong (population 45 people, as of 2007), which is in the Urana Shire. Water consumption has generally reduced over time, apart from a peak in the 2006/07 water year.

4.11 Tumut

Tumut Shire Council is in charge of five water supply systems in the LGA; Adelong, Batlow, Brungle, Talbingo and Tumut. Raw water for the Adelong scheme is sourced from Adelong Creek (ACT CSE, 2009b). Adelong Creek is subject to low flows during drought. In 2008-2009 the creek did not meet the demand of the scheme. To supplement the creek supply, four bores were commissioned. The groundwater bores can meet the demand of the scheme under stage 4 restrictions. The raw water source for the Batlow water supply scheme is Kunama Dam, which is fed by Little Gilmore Creek. The security of the Batlow supply source is currently a concern (TSC, 2005). The raw water source for the Brungle scheme is Nimbo Creek, which is a branch of the Nimbo River. The raw water source for the Talbingo scheme is a small loose rock wall dam on Jounama Creek (TSC, 2005). The

raw water for the Tumut scheme is drawn from the Tumut River. The Tumut River transfers water from the Snowy Mountains Hydroelectricity Scheme to irrigation areas on the Murrumbidgee River. The flow in the river is therefore dependant on electricity demand and irrigation requirements. Flow is particularly high in the summer months when irrigation demand is at a maximum. The Tumut reticulation system supplies the towns of Tumut and Cloverdale.

The total volume of potable water used in 2008-09 for the Tumut Shire was approximately 1,500 ML (minor discrepancies exist between the volume reported by NOW and the ACT CSE). Surface water usage has declined over the past five years, in conjunction with a decline in reticulated water usage, a reflection perhaps of an overall decrease in water availability across the five supply schemes. Bore water consumption that was reported for the 2006-07 and 2007-08 period would correspond to the groundwater bores that were installed in Adelong supply scheme.

It is clear that the largest proportion of revenue water is used for residential purposes, with the industrial sector consuming the second largest amount of revenue water. Water losses for the Tumut Shire in 2008-09 were increased by the NSW Office of Water to 10% of the total urban water supplied, which is assumed to be the minimum loss in a system unless proven by evidence (e.g. a reservoir drop test, detailed waste metering or night flow analysis of district meter areas). According to the NSW Office of Water, the average annual residential water supplied for the 2008-2009 period was 219 kL per connected property (NOW, 2010a). Residential water use has fluctuated over time, with a clear minimum during the 2006-07 water year. Since that time, residential water usage has remained at around 220 kL/connected property.

4.12 Summary

Based on the information available for water use as reported by each LGA, summary maps have been prepared detailing the breakdown of water use across the following sectors:

- Residential.
- Commercial.
- Industrial.
- Institutional.
- Rural.
- Community.
- Recycled water use.

Figure 14 illustrates the reported water use for each LGA, and Figure 15 presents the same water use information on a per capita basis. For both Figures, water use data has been derived from 2008/09 data. Although more recent water use information was available for the 2009/10 water year, this information was not consistently available across all LGAs.

Section Summary

-  **The LGAs who are serviced by the larger and more complex water supply schemes of GWCC and RWCC appear to experience challenges in overcoming organisational barriers to integrated water management.**
-  **RWCC services both Wagga Wagga and Lockhart as well as other non REROC SBC LGAs. RWCC has the responsibility of reporting to NOW on the whole water supply system, therefore some water consumption trends such as water use by sector will be average/regional and may not be wholly representative of LGA scale trends.**
-  **Generally, water usage under WALs held by Councils who aren't water utilities is not freely available; usage is not monitored by NSW Office of Water databases and is not collected in annual performance reporting.**

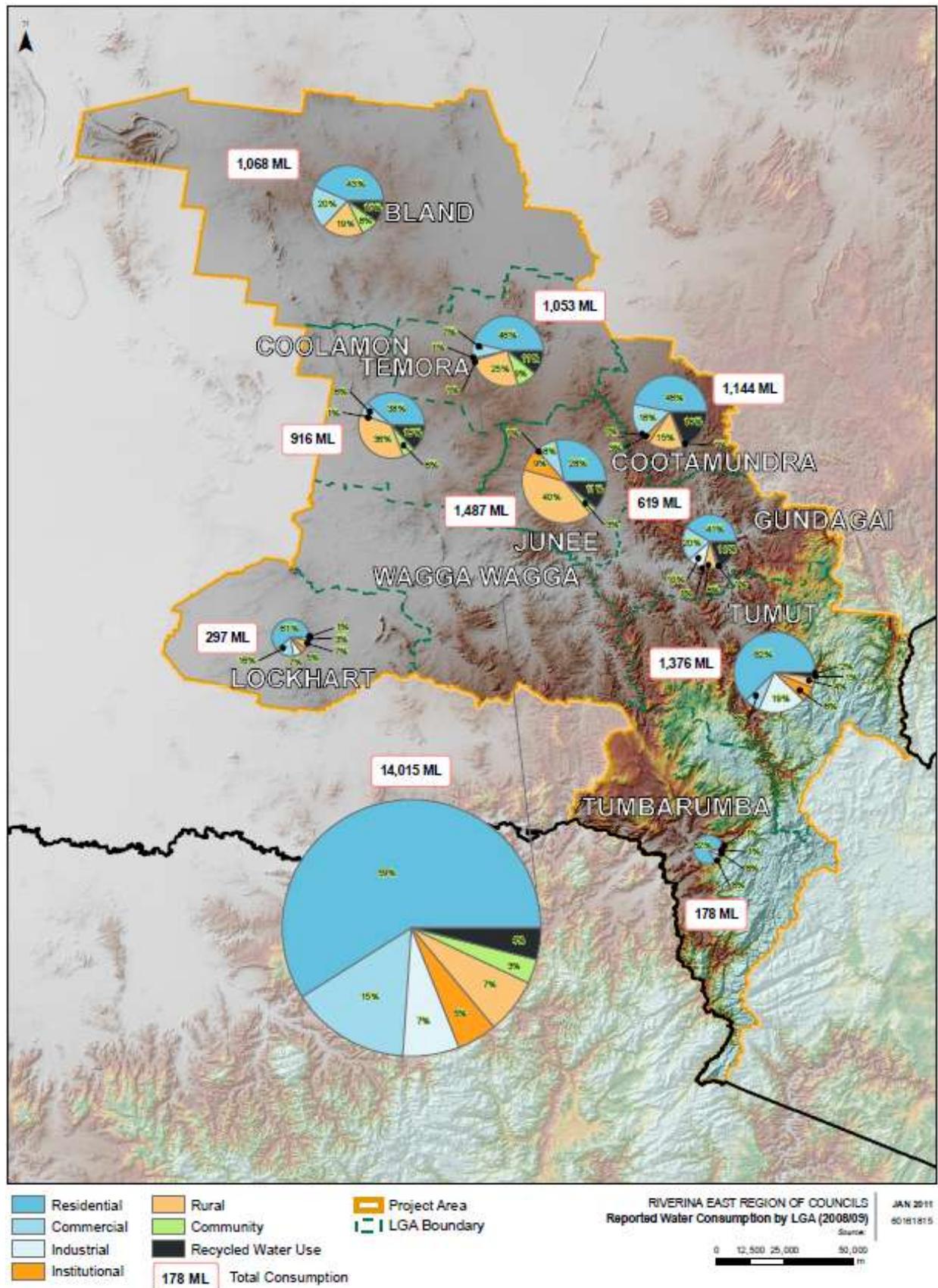


Figure 14 Reported Water Consumption by LGA

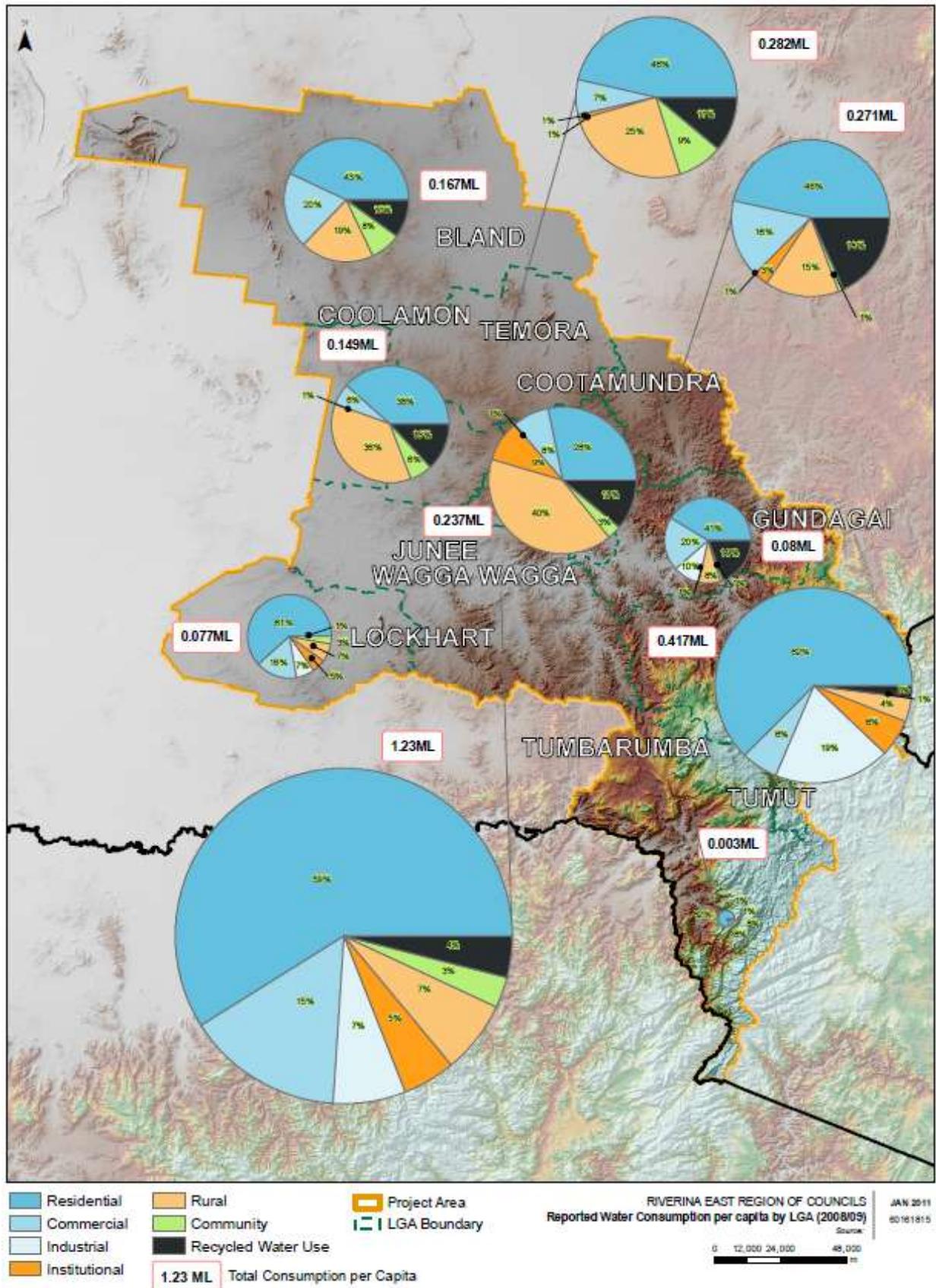


Figure 15 Reported Water Consumption per capita by LGA

5.0 Non-urban Water Use

5.1 Introduction

Non-Urban water consumption refers to water that is consumed outside the water supply system that is provided by a local water utility. This may include water that is consumed via the following mechanisms:

- WALs other than Local Water Utility or Town Water Supply (e.g. stock and domestic, regulated river, aquifer etc).
- WALs made under the *Water Act 1912* that have not been transferred into the NOW database of licences (i.e. those that are not covered by a WSP or those that will be covered by a macro WSP).
- Basic Landholder Rights/Dryland agriculture.

Water use under some non-urban WALs that are within active WSP areas can be estimated, as they are monitored by NOW. For WALs outside of WSP areas, water consumption is not actively monitored or reported by NOW, so water use cannot be accurately determined. Water use can only be estimated by making some assumptions about how much of an allocation would be used in a particular year.

Water consumption under WALs that were made under the *Water Act 1912* that do not yet appear on NOW databases cannot be estimated. These licences will either be in hard copy format or they may still yet to be defined/captured in a formal licence.

Similarly, the volume of water consumed under basic landholder rights cannot be accurately estimated. For the areas that are covered by WSPs, there may be an estimated allocation for basic landholder rights in the plan. The only other mechanism of estimating water use in this category is by tracking water supply works approvals in the NOW database. This type of analysis is considered beyond the scope of this project.

The following information on WALs within each LGA was current at the time of writing. More detailed information on non-urban water consumption for each LGA is provided in the Appendices Report.

5.2 Bland

There are 20 surface water WALs in the Bland LGA and the majority are high security. Eleven WALs have zero listed entitlement and these are domestic and stock basic landholder rights (which are not recorded by NOW). Of these WALs, three are for the Murrumbidgee River Unregulated WMA and the remainder are for the Lachlan River Unregulated WMA. Both of these areas are not yet subject to a WSP, so water use is not published by NOW.

In addition, there are 161 groundwater WALs in the Bland LGA with the vast majority being high security. A large proportion of the licenses have zero listed entitlement and as with the surface water WALs, these are mainly domestic and stock basic landholder rights (which are not recorded by NOW). Of these licenses, 75 extract water from the Lachlan Fold Belt GMU and 86 extract water from the Upper Lachlan Alluvium GMU. Both of these areas are not yet subject to a WSP, so water use is not published by NOW.

5.3 Temora

There are 13 surface water WALs in the Temora LGA and there is a relatively even balance between high and general security licenses. Four WALs have zero listed entitlement and these are domestic and stock basic landholder rights (which are not recorded by NOW). Three of the WALs are for the Murrumbidgee River Unregulated WMA and the remainder of the WALs are for the Lachlan River Unregulated WMA. Both of these areas are not yet subject to a WSP, so water use is not published by NOW.

There are 68 groundwater WALs in the Temora LGA with nearly all of the WALs being high security. Entitlements are not listed for any of the WALs as they are mainly domestic and stock basic landholder rights (which are not recorded by NOW). 50 of the WALs are for the Lachlan Fold Belt GMU and 12 are for the Upper Lachlan Alluvium. Six of the WALs could not be attributed to a GMU.

5.4 Coolamon

There are eight surface water WALs in the Coolamon LGA and the majority are high security. Four WALs have zero listed entitlement and these are domestic and stock basic landholder rights (which are not recorded by NOW). All of these WALs are for the Murrumbidgee River Unregulated WMA, which is not yet subject to a WSP, so water use is not published by NOW.

There are 115 groundwater WALs in the Coolamon LGA and the vast majority are high security. All of the licenses have zero listed entitlement and as with the surface water WALs, these are mainly domestic and stock basic landholder rights (which are not recorded by NOW). Of these licenses, 112 extract water from the Lachlan Fold Belt GMU and three extract water from the Mid Murrumbidgee Alluvium GMU. Both of these areas are not yet subject to a WSP, so water use is not published by NOW.

5.5 Cootamundra

There are 11 surface water WALs in the Cootamundra LGA and the majority of the licenses are high security. Three WALs have zero listed entitlement and these are domestic and stock basic landholder rights (which are not recorded by NOW). Four of the WALs are for the Lachlan River Unregulated WMA and seven are for the Murrumbidgee River Unregulated WMA. Both of these WMAs are not yet subject to a WSP, so water use is not published by NOW.

There are 593 groundwater WALs in the Cootamundra LGA with nearly all of the WALs being high security. Entitlements are not listed for a large proportion of the WALs as they are mainly domestic and stock basic landholder rights (which are not recorded by NOW). 559 of the WALs are within the Lachlan Fold Belt GMU and 31 are for the Upper Lachlan Alluvium GMU. Both of these GMUs are not yet subject to a WSP, so water use is not published by NOW.

5.6 Junee

There are 21 surface water WALs in the Junee LGA and there is a relatively even balance between high and general security licenses. Four WALs have zero listed entitlement and these are domestic and stock basic landholder rights (which are not recorded by NOW). Eight of the WALs are for the Murrumbidgee River Unregulated WMA and thirteen of the WALs are for the Murrumbidgee Regulated River WMA. The Murrumbidgee River Unregulated WMA is not yet subject to a WSP, so water use is not published by NOW. Water consumption statistics for the WALs within the Murrumbidgee Regulated River WMA were not available for the project.

There are 223 groundwater WALs in the LGA with nearly all of the WALs being high security. Entitlements are not listed for a large proportion of the WALs as they are mainly domestic and stock basic landholder rights (which are not recorded by NOW). Seven of the WALs are for the Mid Murrumbidgee Alluvium GMU and 216 are for the Lachlan Fold Belt GMU. Both of these GMUs are not yet subject to a WSP, so water use is not published by NOW.

5.7 Gundagai

There are 120 surface water WALs in the Gundagai LGA and the majority are general security. Five WALs have zero listed entitlement and three of these are domestic and stock basic landholder rights (which are not recorded by NOW). Of the WALs, fourteen are for the Murrumbidgee River Unregulated WMA, and the remainder are for the Murrumbidgee River Regulated WMA.

There are 429 groundwater WALs in the Gundagai LGA and the majority are high security. Four hundred WALs have zero listed entitlement and 396 of these are domestic and stock basic landholder rights (which are not recorded by NOW). Of the WALs, 46 are for the Mid Murrumbidgee Alluvium WMA, and the remainder are for the Lachlan Fold Belt.

5.8 Tumbarumba

There are 139 surface water WALs in the Tumbarumba LGA and the majority are general security. Eight WALs have zero listed entitlement and nearly all of these are domestic and stock basic landholder rights (which are not recorded by NOW). All of the WALs in are for the Upper Murray River WMA.

There are 384 groundwater WALs in the LGA and the vast majority are high security. Three hundred and twenty eight WALs have zero listed entitlement and 313 of these are domestic and stock basic landholder rights (which are not recorded by NOW). All of the WALs are for the Lachlan Fold Belt WMA.

5.9 Wagga Wagga

There are 240 surface water WALs in the Wagga Wagga LGA and the majority of licenses are general security. Twenty six WALs have zero listed entitlement and the majority of these are domestic and stock basic landholder rights (which are not recorded by NOW).

There are 1,073 groundwater WALs in the Wagga Wagga LGA and the vast majority are high security. A large proportion of the licenses have zero listed entitlement and as with the surface water WALs, these are mainly domestic and stock basic landholder rights (which are not recorded by NOW).

5.10 Lockhart

There are 10 surface water WALs in the Lockhart LGA and the majority are high security. Five WALs have zero listed entitlement and most of these are domestic and stock basic landholder rights (which are not recorded by NOW). All of the WALs are for the Murrumbidgee River Unregulated WMA.

There are 75 groundwater WALs in the LGA and the vast majority are high security. A large proportion of the licenses have zero listed entitlement and as with the surface water WALs, these are mainly domestic and stock basic landholder rights (which are not recorded by NOW). All of the licenses listed are for the Lachlan Fold Belt WMA.

5.11 Tumut

There are 289 surface water WALs in the Tumut LGA and the majority are general security. Fourteen WALs have zero listed entitlement and three of these are domestic and stock basic landholder rights (which are not recorded by NOW). Of the WALs, 34 are for the Murrumbidgee River Regulated WMA, and the remainder are for the Murrumbidgee River Unregulated WMA.

There are 367 groundwater WALs in the Tumut LGA and the majority are high security. Three hundred and twelve WALs have zero listed entitlement and 306 of these are domestic and stock basic landholder rights (which are not recorded by NOW). All of the WALs are for the Lachlan Fold Belt WMA.

5.12 Summary

Based on the information available on WALs for each LGA, summary maps have been prepared detailing the total volume of entitlements for both groundwater and surface water WALs (high and general security). These entitlements represent only a small component of what is likely being used in reality, as the majority of licences are listed by NOW with no entitlement information. Of the licences listed with no entitlement information, the majority are identified as being for stock or domestic purposes, for which generalised assumptions can be made regarding annual water usage. Figure 16 illustrates the volume (ML) of WAL entitlements for each LGA, and

Figure 17 presents the number of WALs for each LGA, including those WALs with no information on entitlements.

Section Summary

-  WAL data provides only a loose proxy for non-urban water consumption in the absence of monitoring and reporting of consumption for each licence.
-  The majority of WALs for the REROC region are listed with no information on entitlement, making analysis of WALs as a proxy, problematic.
-  Where water access licences exist within an area that is not subject to a WSP, water use is not published by NOW.
-  There is an inconsistent register of the purpose for each WAL. Conclusions regarding water use in different industries or sectors across the REROC region are therefore difficult.
-  Cross correlation of licensed entitlements, the level of security and the associated Available Water Determinations is required in order to estimate annual water usage. Actual water usage is impossible to estimate as water metering is patchy.

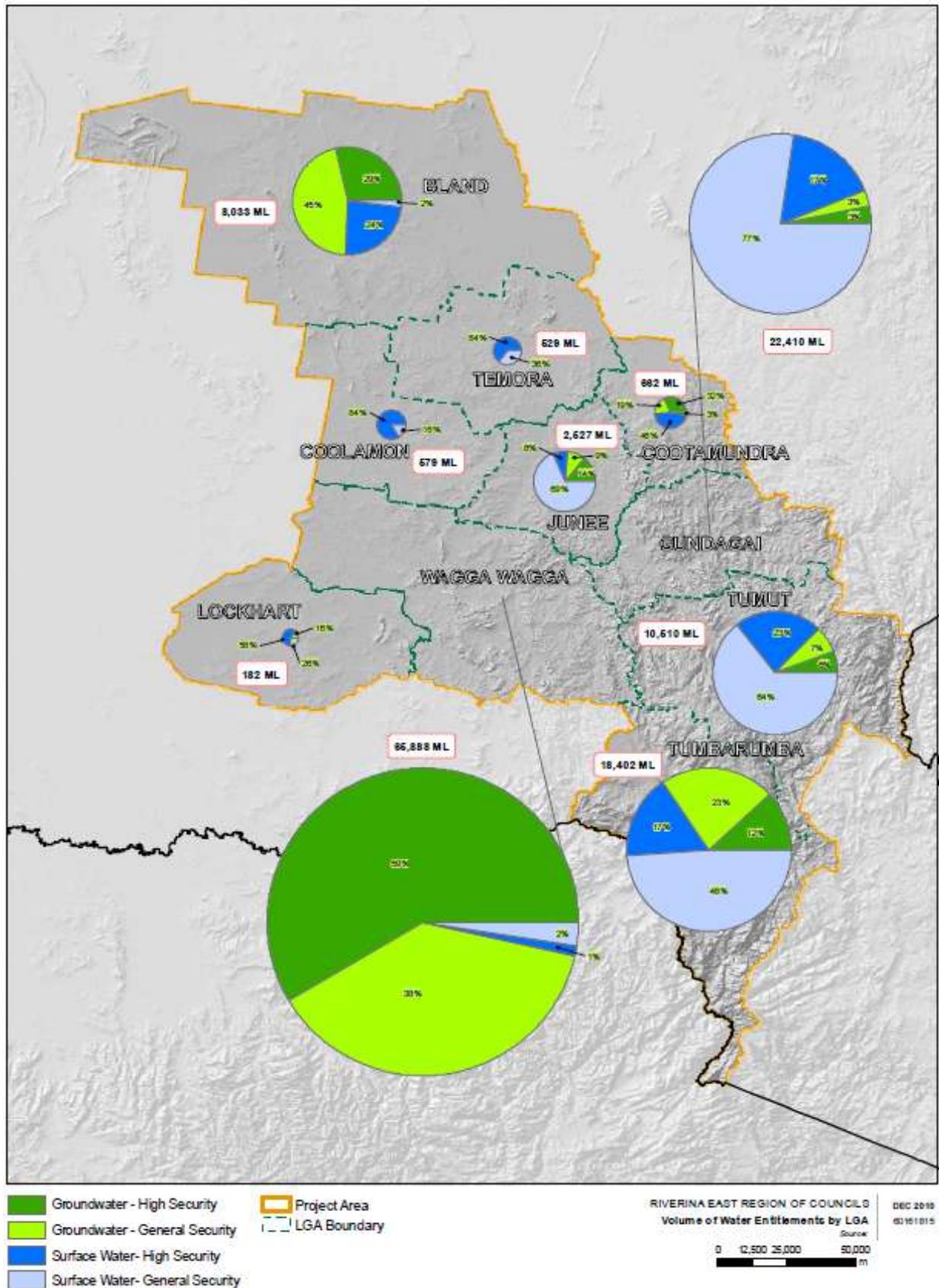


Figure 16 Volume of Water Entitlements by LGA

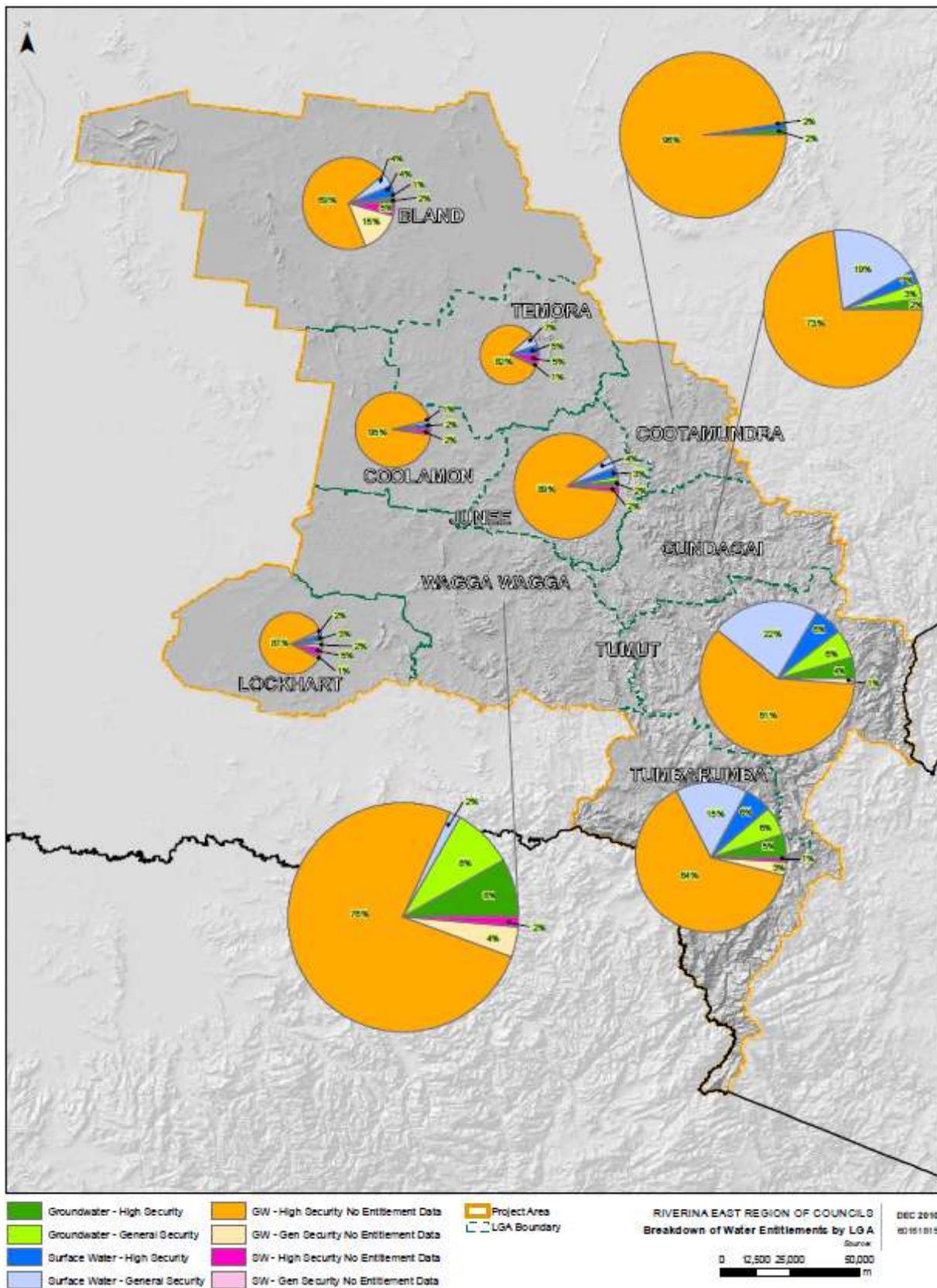


Figure 17 Breakdown of Water Entitlements by LGA

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