

Water Accounting Methods Report
for the
Warrego-Paroo-Nebine Water Resource Plan

November 2016

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1 Introduction

Basin Plan sections addressed:

- | | | | | |
|------------|--------------|---------|---------|---------|
| ○ 10.08(1) | ○ 10.10(1-4) | ○ 10.12 | ○ 10.15 | ○ 10.44 |
|------------|--------------|---------|---------|---------|

Queensland has a number of obligations under the Murray–Darling Basin Plan (Basin Plan) and became a signatory to the Intergovernmental Agreement on Implementing Water Reform in the Murray–Darling Basin on 23 February 2014. Queensland also has obligations under the Commonwealth *Water Act 2007* to report on how much water is taken from the Queensland part of the Murray–Darling Basin.

This document details Queensland's water use accounting methods for the Warrego-Paroo-Nebine Water Resource Plan area (as identified in s.3.07 of the Basin Plan) and its purpose is to address Basin Plan sections 10.08(1), 10.10(1-4), 10.12, 10.15 and 10.44. The complete requirements of Chapter 10 of the Basin Plan are addressed in the Warrego-Paroo-Nebine Water Resource Plan.

In determining methods for water use accounting, the forms of take listed below have been adopted.

- a) take from a watercourse, excluding basic rights (supplemented & unsupplemented water);
- b) take by floodplain harvesting;
- c) take by runoff dams, including basic rights;
- d) take under basic rights from a watercourse;
- e) net take by commercial plantations;
- f) take from groundwater, including basic rights.

Different methods, with differing levels of complexity are used for each form of take. These methods reflect the different volumes of take associated with each form of take, and the degree of difficulty associated with cost-effectively measuring or estimating certain forms of take.

The methods used are different to those used to develop the Basin Plan 2012 estimates of baseline diversions. Hydrological models have been updated and new methods developed to improve estimates of water take. This has resulted in new estimates of the Baseline Diversion Limit for each SDL resource unit.

All estimates are current as of February 2016. These are subject to change as a result of revisions to entitlements (such as subdivision or amalgamation of allocations, which will affect the number of entitlements) or improvements in methods and data.

2 Queensland's water access rights

2.1 Legislative framework

In Queensland, consumptive take of water is managed under the *Water Act 2000* (Qld) and specifically the *Water Regulation 2002*, the water resource plan (Queensland WRP) and the resource operations plan (ROP) for the area¹. Environmental needs are met by managing access to natural flows under rules provided in the Queensland WRP and ROP. All Queensland Murray-Darling Basin catchments are covered by a Queensland WRP and ROP. More detail on the legislative framework is provided in Chapter 3 of the Warrego-Paroo-Nebine Water Resource Plan.

2.2 Key terminology

Queensland's water planning framework terms differ to those used by the Commonwealth, particularly in the *Water Act 2007* (Commonwealth). To avoid confusion arising from the differences, Table 1 compares the State and Commonwealth nomenclature. This document uses the State terminology.

Table 1 Comparison between Commonwealth and Queensland terminology

Commonwealth	Queensland	Description
Water access entitlement	Water allocation	Enduring legal title to a defined share of the water resources of a water management area. Tradeable separate to land.
Water allocation	Announced allocation	The portion of a water access entitlement (water allocation) that can be accessed in the water accounting period.
Regulated	Supplemented	A scheme or system where water supply reliability is enhanced by infrastructure such as a dam or weir (also refers to water entitlements in such a system).

In this document, 'the Queensland WRP' refers specifically to the Water Resource (Warrego, Paroo, Bulloo and Nebine) Plan 2016. 'The ROP' refers specifically to the Warrego, Paroo, Bulloo and Nebine Resource Operations Plan Amended February 2016. References to previous Queensland WRPs and ROPs will have the year of publication specified. The 'Water Resource Plan' refers to the Warrego-Paroo-Nebine Water Resource Plan accredited under the *Water Act 2007* (Cth).

2.3 Forms of water access right

The main types of water access right managed by Queensland's planning framework are:

- Water allocations

¹ Water resource plans identify 'water to which the plan applies' (within the plan area). Where there is a lack of information, low demand and/or risk to the resource, or no legislative requirement to apply management, a plan may not apply to a water resource within the plan area (e.g. a deep, poor quality, subartesian groundwater resource for which there is no current demand). Note that all QMDB water resource plans and resource operations plans currently apply to subartesian groundwater.

- Supplemented
- Unsupplemented
- Water licences
- Water permits
- General authorisations under s.20, 20A, 20B and 20C of the *Water Act 2000* (Qld) (including basic rights)
- Overland flow authorities (authorisations under s.20(2) of the *Water Act 2000* (Qld)) and s.26 of the Queensland WRP.

These are described in more detail in chapters 2.4 to 2.8.

2.4 Water allocations

Water allocations are a permanent entitlement to take surface water and may be traded separately to land. A water allocation's "nominal volume" represents its share of the water available to be taken. Allocations are granted under section 121 or 122 of the *Water Act 2000* (Qld) and are registered on the water allocations register.

There are two main types of water allocations:

- Supplemented water allocations - represent a share of a regulated system.
- Unsupplemented water allocations - represent a share of a natural run-of-the-river system.

2.4.1 Supplemented water allocations

Supplemented water allocations are entitlements where the reliability is supplemented or enhanced by infrastructure such as a dam or weir, which is managed under a resource operations licence. Under the *Water Act 2000* (Qld), the holder of a supplemented water allocation must have a supply contract with the holder of the resource operations licence who operates the infrastructure or water supply scheme.

Supplemented water allocations have stated elements including:

- Nominal volume—this is the indicative volume available under the entitlement. It is used to calculate the allocation's share of the water available to be taken by holders of water allocations in the same priority group in the water supply scheme. The nominal volume is the tradeable currency for the water allocation.
- Location—the zone within the water supply scheme from which water may be taken
- Purpose—the purpose for which water may be taken.

Supplemented water allocations are also subject to other rules or conditions, set out in the ROP:

- Water sharing rules—these cover rules regarding the taking of water and the calculation of announced allocations (the percentage of an allocation's nominal volume that can be taken during a water year).
- Water allocation change rules—these specify conditions on the trading of water allocations in conjunction with the objectives of the Queensland WRP.

2.4.2 Unsupplemented water allocations

In Queensland, unsupplemented water allocations are water entitlements representing a share of the access to natural run-of-the-river flows. Unsupplemented water allocations have stated elements

including:

- Nominal volume—this is the indicative volume available under the entitlement. It is used to calculate the allocation's share of the water available to be taken by holders of water allocations in all water allocation groups in a Queensland WRP area. The nominal volume is the tradeable currency for the water allocation. For unsupplemented water allocations, nominal volume does not limit the volume of water that can be taken.
- Volumetric limit—this is the maximum volume of water that may be taken under the allocation in the period of time, or in the circumstances, stated on the water allocation. The ability of a water allocation holder to take up to the volumetric limit is dependent on natural flow variations, the conditions stated on the water allocation, and any relevant water sharing rules in the ROP for the area.
- Location—the zone or the zone and place (i.e. the property description and/or point on the watercourse) from which water may be taken.
- Purpose—the purpose for which water may be taken.
- Maximum rate of take—the maximum rate at which water may be taken (in megalitres per day).
- Flow conditions—the rate of flow (in megalitres per day) in a watercourse at a specific place which must be met before water may be taken under the water allocation. Not all unsupplemented water allocations have flow conditions.
- Other conditions—any other requirements that must be met.

Unsupplemented water allocations are also subject to the rules in the ROP for the area, such as water sharing rules and water allocation change rules. They may be further split into two groups: those with flow conditions and those without flow conditions.

Unsupplemented water allocations with flow conditions

Water allocations with flow conditions are referred to as "water harvesters" and are typically set up to access water at high rates of take during times of moderate to high flows. Due to the ephemeral nature of watercourses in the Queensland Murray–Darling Basin, most water taken under water allocations with flow conditions is pumped into on-farm storage. Water cannot be taken under a "water harvesting" water allocation during times when flows do not meet the stated flow conditions.

Unsupplemented water allocations without flow conditions

Water allocations without flow conditions typically only entitle the holder to take water at low rates of take. Historically, these water allocations were often converted from water licences that were limited by area, and pumped water from the watercourse directly onto a crop. These water allocations are often located on natural waterholes or private 'in-stream' storages.

2.5 Water licences

Water licences are generally attached to land, and the water taken may be used only on the land to which the licence is attached. They are issued under Chapter 2, Part 6, Division 2 of the *Water Act 2000*. Water licences are water access rights for a specified resource issued for a defined period of time. They are not enduring entitlements as they can be amended or cancelled.

Water taken under the authority of the licence is generally either through authorised works or limited by a rate of take. A specific purpose, nominal entitlement and other conditions may apply. The nominal

entitlement is the maximum volume that can be taken under the licence in a water year.

2.6 Water permits

Water permits are short term authorities to take or interfere with water, and are granted for an activity with a reasonably foreseeable conclusion date, for example, the construction of a road, mineral exploration, or petroleum exploration. They are issued under Chapter 2, Part 6, Division 4 of the *Water Act 2000* (Qld). Decisions made in relation to water permits must be made in accordance with s.239 of the *Water Act 2000* (Qld). They are attached to land, and are not tradeable.

A water permit states the volume that may be taken and the conditions under which water may be taken (e.g. limits below which waterholes may not be drawn down.) There are generally only a small number of water permits in use each year and the number will vary from year to year.

2.7 General authorisations under the *Water Act 2000*

The *Water Act 2000* (Qld) authorises the take of water for a range of different purposes including basic rights (stock and domestic), firefighting, construction, camping and cultural activities. See Appendix A for a list of authorised activities and purposes. Authorisations under s.20A of the Act are authorisations for stock and domestic take. Authorisations under s.20, s. 20B, s.20C and s.20(2)(a) cover over 20 different activities as described in Appendix A. These activities can be grouped into those which occur on a highly irregular basis (e.g. emergency use), or those activities which take water in very small volumes (e.g. public toilets). All activities authorised by s.20(2)(a) have a 2 ML limit per person per year under the Queensland WRP.

Where this report refers to authorisations, these are either authorisations under s.20A for stock and domestic use, or authorisations under s.20(2) to take overland flow water (as discussed below in chapter 2.8). Given the irregular, low volume nature of the remaining activities, any estimate of the number of authorisations and the volume of that use would have a very high margin of error and be unreliable for accounting purposes.

2.8 Overland flow authorities

Overland flow in Queensland covers all water (other than in a watercourse or lake) that flows over land after falling as rain or rising to the surface from groundwater. It therefore incorporates floodplain harvesting and take by runoff dams. The *Water Act 2000* (Qld) (s.20(2)) provides a general authorisation for the take of overland flow water. However, section 20 also limits this right, making it subject to any relevant alteration or limitation prescribed under a moratorium notice or a Queensland WRP. Under the Act (s.38), a Queensland WRP must regulate overland flow take if there is a risk that a change in land use will impact on the take of overland flow water, or it is likely that overland flow take will impact on environmental outcomes, availability of water for other users, or beneficial flooding.

In some circumstances, a Queensland WRP may provide an authority to take overland flow. Section 26 of the Queensland WRP allows overland flow to be taken for stock and domestic use, under a licence, for prescribed activities under general authorisations in the Water Regulation 2002, to comply with an environmental authority or to address water quality contamination, or to hold in existing storage works. In the Water Resource Plan area, s.34 of the Water Resource (Warrego, Paroo, Bulloo and Nebine) Plan 2003 required that owners of land with existing storage works (as of 9 June 2001), used for purposes other than basic rights, must notify the department of those works. Once the works have been notified, the owner may continue to take overland flow water using those existing works, but cannot increase the average annual volume of water taken.

New overland flow works are either assessable or self-assessable development under the *Sustainable Planning Act 2009* (Qld), depending on their intended use. This is described in s.28 of the Queensland WRP. As previously noted however, overland flow take is only authorised for a limited range of purposes as described in s.26 of the Queensland WRP.

3 Water access rights in the plan area (s.10.08)

Basin Plan section 10.08 Water access rights must be identified

1) A water resource plan must identify the following:

(a) each form of take from each SDL resource unit in the water resource plan area;

(b) any classes of water access right that apply to the forms of take identified under paragraph (a);

(c) the characteristics of each class of right including, where appropriate, the number of rights and any conditions on the exercise of the rights.

3.1 Introduction

The following tables identify the forms of take from each sustainable diversion limit (SDL) resource unit in the water resource plan area, the classes of water access right that apply to those forms of take, and the characteristics of those rights. A description of the different classes of water access right in Queensland, and their associated characteristics, is given in Chapter 2. The number of each class of water access right may change over time due to subdivision and amalgamation of water allocations, the issuing of water permits and the conversion of overland flow authorities to water licences. All numbers are current as at February 2016. Any zero values mean that no water access rights are currently issued for that class of water access right. This should not be interpreted as that they will not be issued in future.

Supplemented water allocations are located in the Cunnamulla Water Supply Scheme, on the Warrego River. There are no commercial plantations in the plan area.

3.2 Surface water

Table 2 Warrego (SS28) water access rights

Form of take	Class of water access right	Number	Characteristics	
			Elements	Applicable management rules
Take from a watercourse (excluding take under basic rights)	Supplemented water allocations	28	Location (zone) Nominal volume Priority (class)	Announced allocations (ROP chapter 2) specifying the proportion of nominal volume that can be taken in a given accounting period.
	Unsupplemented water allocations (without flow conditions)	26	Location (zone) Location (place) Maximum rate of take Volumetric limit Nominal volume	Nil
	Unsupplemented water allocations (with flow conditions)	17 ²	Location (zone) Maximum rate of take Volumetric limit Nominal volume Flow conditions	Announced period water sharing rule (ROP s30), specifying that water can only be taken when the Department announces that the announced period has begun, taking into consideration specific flow conditions
	Water licences (volume limited)	5	Nominal entitlement Maximum rate of take Location (place)	Nil
	Water licences (non-volume limited)	1	Limited by specified works Location (place)	Nil
	Water permits	0	Nominal entitlement	Nil
Take by floodplain harvesting	Water licences	0	Purpose (any) At least one of: maximum rate at which water may be taken, maximum volume that may be stored, volumetric limit or average annual volume.	Nil
	Overland flow authorities	16	Nil.	Limited by specified works existing as of June 2001
Take by runoff dams (including take under basic rights)	Authorisation	3 notified works; see table 15 for dams taking under basic rights	-	-
Take under basic rights from a watercourse	Authorisation	See Appendix B	-	-
Net take by commercial plantations	N/A	0	-	-

² Includes two unsupplemented water allocations with flow conditions (numbers 84 and 86) held by the Commonwealth Environmental Water Holder (CEWH). These water allocations are subject to the same characteristics, rules, limitations and security as other water allocations in the Warrego catchment.

Table 3 Paroo (SS29) water access rights

Form of take	Class of water access right	Number	Characteristics	
			Elements	Applicable management rules
Take from a watercourse (excluding take under basic rights)	Supplemented water allocations	0	-	-
	Unsupplemented water allocations (without flow conditions)	2	Location (zone) Location (place) Maximum rate of take Volumetric limit Nominal volume	Nil
	Unsupplemented water allocations (with flow conditions)	0	-	-
	Water licences (volume limited)	1	Nominal entitlement Location (place)	Nil
	Water licences (non-volume limited)	0	-	-
	Water permits	0	Nominal entitlement	Nil
Take by floodplain harvesting	Water licences	0	Purpose (any) At least one of: maximum rate at which water may be taken, maximum volume that may be stored, volumetric limit or average annual volume.	Nil
	Overland flow authorities	1	Nil	Limited by works existing as of June 2001
Take by runoff dams (including take under basic rights)	Authorisation	See table 15 for dams taking under basic rights	-	-
Take under basic rights from a watercourse	Authorisation	See Appendix B	-	-
Net take by commercial plantations	N/A	0	-	-

Table 4 Nebine (SS27) water access rights

Form of take	Class of water access right	Number	Characteristics	
			Elements	Applicable management rules
Take from a watercourse (excluding take under basic rights)	Supplemented water allocations	0	-	-
	Unsupplemented water allocations (without flow conditions)	1	Location (zone) Maximum rate of take Volumetric limit Nominal volume	Nil
	Unsupplemented water allocations (with flow conditions)	4 ³	Location (zone) Maximum rate of take Volumetric limit Nominal volume Flow conditions	Nil
	Water licences (volume limited)	2	Nominal entitlement Maximum rate of take Location (place)	Nil
	Water licences (non-volume limited)	2	Limited by works Location (place)	Nil
	Water permits	0	Nominal entitlement	Nil
Take by floodplain harvesting	Water licences	0	Purpose (any) At least one of: maximum rate at which water may be taken, maximum volume that may be stored, volumetric limit or average annual volume.	Nil
	Overland flow authorities	0	Nil	Limited by works existing as of June 2001
Take by runoff dams (including take under basic rights)	Authorisation	See table 15 for dams taking under basic rights	-	-
Take under basic rights from a watercourse	Authorisation	See Appendix B	-	-
Net take by commercial plantations	N/A	0	-	-

³ Includes one unsupplemented water allocation with flow conditions held by the Commonwealth Environmental Water Holder (CEWH). This water allocation is subject to the same characteristics, rules, limitations and security as other water allocations in the Nebine catchment.

3.3 Groundwater

Table 5 Sediments above the Great Artesian Basin: Warrego–Paroo–Nebine (GS60) water access rights

Form of take	Class of water access right	Number	Characteristics
Take from groundwater	Groundwater licences (excludes basic rights)	6	Nominal entitlement
	Water permits	0	Nominal entitlement
	Basic rights from groundwater	202	Registered bores; no volumetric limit

Table 6 St George Alluvium: Warrego–Paroo–Nebine (GS63) water access rights

Form of take	Class of water access right	Number	Characteristics
Take from groundwater	Groundwater licences (excludes basic rights)	0	Nominal entitlement
	Water permits	0	Nominal entitlement
	Basic rights from groundwater	21	Registered bores; no volumetric limit

Table 7 Warrego Alluvium (GS66) water access rights

Form of take	Class of water access right	Number	Characteristics
Take from groundwater	Groundwater licences (excludes basic rights)	9	Nominal entitlement
	Water permits	0	Nominal entitlement
	Basic rights from groundwater	81	Registered bores; no volumetric limit

4 Information relating to measuring take (s.10.44)

Basin Plan section 10.44 Information relating to measuring take - water access entitlements

A water resource plan must include the following information in relation to each class of water access right relating to the water resources of the water resource plan area:

- a) the best estimate of the total long-term annual average quantity of water taken that is measured;*
- b) the best estimate of the total long-term annual average quantity of water taken that is not measured;*
- c) how the quantities under paragraphs (a) and (b) were calculated;*
- d) the proportion of the quantity referred to in paragraph (a) that is measured in accordance with standards for measuring agreed by the Basin States and the Commonwealth.*

The tables in chapter 4.1 below provide the best estimates of total long-term annual average quantity of water taken that is measured or not measured [section 10.44 (a) and (b)]. Chapter 4.2 describes the methods for calculating total long-term annual average quantity of water taken [section 10.44(c)] for each class of water access right. Refer to chapters 2 and 3 for the characteristics and number of each water access right.

The estimates of long-term annual average take presented here are different to those used in the Basin Plan 2012 to estimate a baseline diversion limit (BDL). This is due to improvements in water accounting methods, and also reflects that inactive ('sleeper' entitlements and entitlements held by the CEWH) have been excluded from the results.

As at January 2016, agreed standards for measuring [section 10.44(d)] have yet to be developed. It is therefore not possible to estimate the proportion of take that is measured in accordance with standards for measuring agreed by the Basin States and the Commonwealth.

The methods for determining long-term annual average take apply in the same manner to each individual SDL resource unit, unless otherwise described in the relevant method.

4.1 Take by class of water access right

4.1.1 Surface water

Table 8 Warrego (SS28)—measured take, forms and classes

Form of take	Class of water access right	Long-term average annual volume taken (GL/yr)	
		Measured	Not measured
Take from a watercourse (excluding take under basic rights)	Supplemented water allocations	2.5	0.0
	Unsupplemented water allocations (without flow conditions)	0.7	0.0
	Unsupplemented water allocations (with flow conditions)	28.0	0.0
	Water licences (volume limited)	0.0	0.1
	Water licences (non-volume limited)	0.0	0.3
	Water permits	0.0	0.0
Take by floodplain harvesting	Water licences	0.0	0.0
	Overland flow authorities	0.0	2.8
Take by runoff dams (including take under basic rights)	Authorisations	0.0	14.2
Take under basic rights from a watercourse	Authorisations	0.0	0.2
Net take by commercial plantations	N/A	0.0	0.0
Total		31.2	17.6
Combined total long-term average annual take (measured and not measured)		48.8	

Table 9 Paroo (SS29)—measured take, forms and classes

Form of take	Class of water access right	Long-term average annual volume taken (GL/yr)	
		Measured	Not measured
Take from a watercourse (excluding take under basic rights)	Supplemented water allocations	0.0	0.0
	Unsupplemented water allocations (without flow conditions)	0.1	0.0
	Unsupplemented water allocations (with flow conditions)	0.0	0.0
	Water licences (volume limited)	0.01	0.0
	Water licences (non-volume limited)	0.0	0.0
	Water permits	0.0	0.0
Take by floodplain harvesting	Water licences	0.0	0.0
	Overland flow authorities	0.0	0.7
Take by runoff dams (including take under basic rights)	Authorisations	0.0	10.4
Take under basic rights from a watercourse	Authorisations	0.0	0.3
Net take by commercial plantations	N/A	0.0	0.0
Total		0.11	11.4
Combined total long-term average annual take (measured and not measured)		11.5	

Table 10 Nebine (SS27)—measured take, forms and classes

Form of take	Class of water access right	Long-term average annual volume taken (GL/yr)	
		Measured	Not measured
Take from a watercourse (excluding take under basic rights)	Supplemented water allocations	0.0	0.0
	Unsupplemented water allocations (without flow conditions)	0.2	0.0
	Unsupplemented water allocations (with flow conditions)	0.1	0.0
	Water licences (volume limited)	0.0	0.1
	Water licences (non-volume limited)	0.0	4.3
	Water permits	0.0	0.0
Take by floodplain harvesting	Water licences	0.0	0.0
	Overland flow authorities	0.0	0.0
Take by runoff dams (including take under basic rights)	Authorisations	0.0	11.0
Take under basic rights from a watercourse	Authorisations	0.0	0.1
Net take by commercial plantations	N/A	0.0	0.0
Total		0.3	15.5
Combined total long-term average annual take (measured and not measured)		15.87	

4.1.2 Groundwater

Table 11 Sediments above the Great Artesian Basin: Warrego–Paroo–Nebine (GS60)—measured take, forms and classes

Form of take	Class of take	Long-term average annual volume taken (GL/yr)	
		Measured	Not measured
Take from groundwater	Groundwater licences (excluding take under basic rights)	0.0	0.2
	Basic rights from groundwater	0.0	0.6
Total		0.0	0.8
Combined total long-term average annual take (measured and not measured)		0.8	

Table 12 St George Alluvium: Warrego–Paroo–Nebine (GS63)—measured take, forms and classes

Form of take	Class of take	Long-term average annual volume taken (GL/yr)	
		Measured	Not measured
Take from groundwater	Groundwater licences (excluding take under basic rights)	0.0	0.0
	Basic rights from groundwater	0.0	0.1
Total		0.0	0.1
Combined total long-term average annual take (measured and not measured)		0.1	

Table 13 Warrego Alluvium (GS66)—measured take, forms and classes

Form of take	Class of take	Long-term average annual volume taken (GL/yr)	
		Measured	Not measured
Take from groundwater	Groundwater licences (excluding take under basic rights)	0.0	0.2
	Basic rights from groundwater	0.0	0.5
Total		0.0	0.7
Combined total long-term average annual take (measured and not measured)		0.7	

4.2 Calculating long-term annual average take [10.44(c)]

4.2.1 Take that is measured

Take from a watercourse

Supplemented water allocations

For supplemented water allocations in the Cunnamulla Weir Water Supply Scheme, the resource operations licence holder is required to record the total volume of water taken annually by each user. All water taken under supplemented water allocations in the three SDL resource units is therefore measured.

Long-term annual average take was estimated using the hydrologic models reviewed by the Murray-Darling Basin Authority during the development of the Water Resource Plan. Version 6.75.34 of the IQQM program was used for the development of the new IQQM (model numbers WAR1601A – Warrego River, PAR1601A – Paroo Creek, and NEB1601A – Nebine Creek). Further information on the model developed for each Water Resource Plan catchment is available in the relevant model reports (DSITI, 2016a-2016f).

The long-term annual average take for these entitlements is taken to be the average annual volume determined by the model as being available to be taken over the simulation period between 1895 and 2009 when—

- 1) entitlements are modelled operating as per the water sharing rules and conditions in place
- 2) climatic conditions and flow data are taken into account.

It is assumed that each allocation takes the entire volume of water available to be taken under the allocation in any given year.

The model used to determine long-term annual average take is also used to simulate the annual permitted take.

Unsupplemented water allocations

Unsupplemented water allocations are metered entitlements under the *Water Regulation 2002*. Under s.808(3) of the *Water Act 2000*, the holder of a metered entitlement must not take water under the entitlement other than through works that have an approved meter attached. All water taken under unsupplemented water allocations in the three SDL resource units is therefore measured.

Long-term annual average take was estimated using the IQQM WAR1601A, PAR1601A and NEB1601A models reviewed by the Murray-Darling Basin Authority. The long-term annual average take for these entitlements is estimated using the same method as for supplemented water allocations. Long-term annual average take of unsupplemented water allocations does not include inactive entitlements (i.e. sleeper entitlements or entitlements held by the Commonwealth

Environmental Water Holder).

4.2.2 Take that is not measured

Take from a watercourse (excluding take under basic rights)

Water licences

The long-term annual average take under the authority of water licences is the volume estimated as able to be taken based on nominal entitlement, flows and capacity of works linked to the licences. This is determined using the IQQM models WAR1601A, PAR1601A and NEB1601A.

Water permits

There are no water permits, so a method for calculating this take has not been developed.

Take by floodplain harvesting

Water licences

There are no water licences for take by floodplain harvesting, so a method for calculating this take has not been developed.

Overland flow authorities

There are no overland flow authorities in the Nebine.

Long-term annual average volume of take under overland flow authorities in the Warrego and Paroo catchments was estimated as the average of historical annual actual take under overland flow authorities. The method for estimating annual actual take is described in chapter 6.2.

Estimates of annual actual take are available since 2004/05 for the Warrego and Paroo catchments. The climatic conditions over this time period were very variable, and this is reflected in the estimates of annual take (see table 14). The average take (in table 14) over this period is the best estimate of the total long term annual average take.

Table 14 Minimum, maximum and average take over the time period of available estimates

SDL resource unit	Minimum take (ML)	Maximum take (ML)	Average take (ML)
Warrego	0	11,000	2,773
Paroo	0	4,000	675

Take by runoff dams (including take under basic rights)

Authorisations

The majority of runoff dams are for basic rights (stock and domestic), which are not required to be notified. There are also three notified works for runoff dams in the Warrego, but there is little irrigation from these notified works due to low reliability of supply. There is very limited information available about these runoff dams.

Given these reasons, the best method available for estimating the long-term annual average take of water from all runoff dams (i.e. basic rights and notified works) is using capacity and demand data from the *Improved Assessment of the Impact of Stock and Domestic Farm Dams in Queensland*:

Report 1 (SKM, 2012a) as follows:

The long-term annual average take by runoff dams is the volume determined using the estimated volume of dam capacity in the catchments and a demand/opportunity factor of 0.5 from SKM 2012a as per the table below. Note that the total for each SDL resource unit was derived from the relevant combination of catchments (Table 10 Catchment area, number and volume of stock and domestic dams estimated or observed for each modelling catchment, SKM 2012a) and remnant areas (Table 23 Estimated farm dam volume from regionalisation, Appendix D, SKM 2012a). The Warrego SDL resource unit was defined as modelling catchment ID 423204A and remnant area Warrego River. The Paroo SDL resource unit was defined as modelling catchment ID 424202A and remnant area Paroo River. The Nebine SDL resource unit was defined as Wallam Creeks reporting area.

Table 15 Estimated take by runoff dams

SDL resource unit	Dam volume (GL)	Demand/opportunity factor	Estimated take (GL)
Warrego	26.9	0.5	13.5
Paroo	21.2	0.5	10.6
Nebine	21.9	0.5	11.0

Take under basic rights from a watercourse

Authorisations

Long-term annual average take under basic rights from a watercourse is estimated using the methodology described in Appendix B.

Take by commercial plantations

There are no commercial plantations in the Water Resource Plan area.

Take from groundwater

Groundwater licences

The long-term average annual quantity of groundwater taken under licence is estimated as the sum of the total volume of all nominal entitlements for the take of groundwater.

Basic rights from groundwater

Long term annual average take for basic rights from groundwater is estimated using the methodology outlined in *Queensland Murray Darling Basin Methodology for Estimating the Take of Groundwater for Stock and Domestic Purposes* (Parsons Brinckerhoff, 2011). This methodology was developed specifically to improve estimation of groundwater take under basic rights. The report was completed after the Basin Plan BDL estimates were finalised; therefore, there is a slight discrepancy between Basin Plan BDL estimates and those reported here.

As Parsons Brinckerhoff (2011) estimates take on a per aquifer basis, take per SDL resource unit was estimated by adjusting the total volume of take by the proportion of stock and domestic bores within the SDL resource unit, as shown in Table 16.

Table 16 Estimates of stock and domestic groundwater take⁴

Aquifer	Sediments above the Great Artesian Basin				Warrego Alluvium	St George Alluvium (deep and shallow)		
	WPN	CB	M	BR	WPN	WPN	CB	M
SDL resource unit								
No. stock and domestic bores	202	134	19	8	81	21	176	2
Parsons Brinckerhoff estimate of total stock and domestic take for aquifer (ML)	1,053				468	778		
Estimated stock and domestic take by SDL resource unit (ML)	586	389	55	23	468	82	688	8

⁴ WPN = Warrego-Paroo-Nebine; CB = Condamine-Balonne; M = Moonie; BR = Border Rivers.

5 Methods—annual permitted take (s.10.10)

Basin Plan section 10.10 Annual determinations of water permitted to be taken

1) For each SDL resource unit in a water resource plan area, and for each form of take, the water resource plan must set out the method for determining the maximum quantity of water that the plan permits to be taken for consumptive use during a water accounting period.

2) The method for subsection (1) may include modelling, and must be designed to be applied after the end of the relevant water accounting period, having regard to the water resources available during the period.

3) The method must: (a) account for the matters in subsection 10.12(1); and (b) be consistent with the other provisions of the water resource plan.

Chapters 5.1 to 5.6 describe the methods used to determine the maximum quantity of water permitted to be taken for consumptive use in the water resource plan area. These are set out by form of take and type of water access right. Please see chapters 2 and 3 for the characteristics of each water access right.

Chapter 5.7 addresses the methods to account for the matters in subsection 10.12(1). The methods used are consistent with the other provisions of the water resource plan. Chapter 5.8 provides a demonstration of how annual permitted take, under historical climate conditions, relates to the SDL.

The methods for determining annual permitted take apply in the same manner to each individual SDL resource unit, unless otherwise described in the relevant method.

5.1 Permitted take from a watercourse (excluding take under basic rights)

Permitted take from a watercourse is calculated using the following formula:

$$\begin{aligned} & \textit{Annual permitted take from a watercourse} \\ & = \textit{annual permitted take under supplemented water allocations} \\ & + \textit{annual permitted take under unsupplemented water allocations} \\ & + \textit{annual permitted take under water licences} \\ & + \textit{annual permitted take under water permits} \end{aligned}$$

5.1.1 Supplemented water allocations

Supplemented water allocations are included in the IQQM model reviewed by the Murray-Darling Basin Authority as part of the preparation of the Warrego-Paroo-Nebine Water Resource Plan. Version 6.75.34 of the IQQM program was used for the development of the new IQQM (model numbers WAR1601A – Warrego River, PAR1601A – Paroo Creek, and NEB1601A – Nebine Creek). Further information is available in the relevant model reports (DSITI, 2016a-2016f).

The annual permitted take for these entitlements is taken to be the volume determined by the model as being available to be taken for the water year when—

- 1) entitlements are modelled operating as per water sharing rules and conditions in place
- 2) climatic conditions and flow data are taken into account.

The model used to determine annual permitted take (following extension to include climatic and flow

data for the previous water year) is also used to simulate the long term average annual quantity of water taken under entitlements (BDL plus environmental water entitlements). Annual permitted take is calculated retrospectively for the previous water year, whereas long-term annual average take is calculated over the period from 1895 to 2009.

5.1.2 Unsupplemented water allocations

Unsupplemented water allocations are also included in IQQM WAR1601A, PAR1601A and NEB1601A submitted for accreditation under the Basin Plan. The annual permitted take for these entitlements is estimated using the same method as for supplemented water allocations. Further information is available in the relevant model reports (DSITI, 2016a-2016f).

5.1.3 Water licences

The volume permitted to be taken under a water licence is determined using the IQQM models WAR1601A, PAR1601A and NEB1601A. Further information is available in the relevant model reports (DSITI, 2016a – 2016f).

The annual permitted take for these entitlements is taken to be the volume determined by the model as being available to be taken for the water year when—

- 1) entitlements are modelled operating as per water sharing rules and conditions in place
- 2) climatic conditions and flow data are taken into account.

The model used to determine annual permitted take (following extension to include climatic and flow data for the previous water year) is also used to simulate the long term average annual quantity of water taken under entitlements (BDL plus environmental water entitlements). Annual permitted take is calculated retrospectively for the previous water year, whereas long-term annual average take is calculated over the period from 1895 to 2009.

5.1.4 Water permits

The volume permitted to be taken under the authority of water permits is the sum of the volumes specified on the permits.

5.2 Permitted take by floodplain harvesting

5.2.1 Water licences

There are no licences for take by floodplain harvesting in the Water Resource Plan area. No method has therefore been developed to account for this take.

5.2.2 Authorisations

In Queensland, floodplain harvesting is defined as overland flow, which is limited by Queensland WRP provisions (see chapter 2.8).

Annual permitted take by floodplain harvesting is limited to the taking of overland flow water by existing overland flow works (s26 of the Queensland WRP). This limit was originally put in place under Queensland law in 2001, and thus the long-term annual average limit for this form of take is the same as the one set out in the BDL for each SDL resource unit. The maximum quantity of water that this plan permits to be taken by existing overland flow works is therefore determined by the capacity of those works and climate conditions during the relevant watering accounting period (e.g. rainfall on the local catchment, flows in the watercourse which result in overbank flow events, the storage capacity of

the works and how much water is held by those works from time to time). Given the highly variable and uncertain nature of climate conditions in the area covered by this plan, there is much uncertainty in estimating the volume of permitted take by existing overland flow works. In light of these considerations, annual permitted take by floodplain harvesting is determined in the same way as annual actual take by floodplain harvesting (see chapter 6.2 of this report).

5.3 Permitted take by runoff dams (including take under basic rights)

Permitted take by runoff dams is assumed to be equal to annual actual take (as determined under chapter 6.3).

The long-term annual average quantity of water in the Paroo, Warrego and Nebine that can be taken for consumptive use under basic rights from runoff dams is the level specified respectively in Items 1, 2 and 3 of column 2 of Schedule 3 of the Basin Plan.

5.4 Permitted take under basic rights from a watercourse

Permitted take under basic rights from a watercourse is assumed to be equal to annual actual take (as determined under chapter 6.4). In these catchments, basic rights from watercourses are only taken from permanent waterholes. In such waterholes, there is little change in water availability from year to year, therefore the method assumes that the water availability does not vary.

The long-term annual average quantity of water in the Paroo, Warrego and Nebine that can be taken for consumptive use under basic rights from a watercourse is the level specified respectively in Items 1, 2 and 3 of column 2 of Schedule 3 of the Basin Plan.

5.5 Permitted net take by commercial plantations

There are currently no commercial plantations in the Warrego-Paroo-Nebine Water Resource Plan area. There is no legislation restricting the development of plantations; however, Queensland's Agricultural Land Audit did not identify any areas within the Water Resource Plan area suitable for hardwood or softwood plantation forestry⁵. A risk assessment will be conducted prior to the expiry of the Queensland WRP, and an appropriate method to quantify net take by commercial plantations will be developed if there is deemed to be a risk of increase in net take by commercial plantations.

The long-term annual average quantity of water in the Paroo, Warrego and Nebine that can be taken for consumptive use as net take by commercial plantations is the level specified respectively in Items 1, 2 and 3 of column 2 of Schedule 3 of the Basin Plan.

5.6 Permitted take from groundwater

Permitted take from a groundwater SDL unit is take from groundwater under licence plus take under basic rights.

⁵ Department of Agriculture, Fisheries and Forestry (2013), *Queensland Agricultural Land Audit*, May 2013, available: <https://www.daf.qld.gov.au/environment/ag-land-audit>, accessed 30 July 2015.

5.6.1 Groundwater licences

There are no water sharing rules which apply to groundwater resources in the Water Resource Plan area. Consequently, the annual permitted take for groundwater in the area can be calculated by summing the nominal entitlement for each groundwater entitlement.

5.6.2 Basic rights from groundwater

Permitted take for basic rights is estimated using the methodology for estimating long term annual average take, as described in chapter 4.2.2. There is little change in water availability from this resource from year to year and this is not considered to be a determining factor for inclusion in the method.

5.7 Matters relating to accounting for water [s.10.10(3),10.12]

Basin Plan section 10.12 Matters relating to accounting for water

1) For paragraph 10.10(3)(a), the following matters must be accounted for:

- a) all forms of take from the SDL resource unit and all classes of water access right;
- b) water allocations that are determined in one water accounting period and used in another, including water allocations that are carried over from one water accounting period to the next;
- c) for a surface water SDL resource unit - return flows, in a way that is consistent with arrangements under the Agreement immediately before the commencement of the Basin Plan;
- d) subject to subsection (3) - trade of water access rights;
- e) water resources which have a significant hydrological connection to the water resources of the SDL resource unit;
- f) circumstances in which there is a change in the way water is taken or held under a water access right;
- g) changes over time in the extent to which water allocations in the unit are utilised;
- h) water sourced from the Great Artesian Basin and released into a Basin water resource, by excluding that water;
- i) water resources which are used for the purpose of managed aquifer recharge

2) Subject to this section, the method may account for other matters.

3) For paragraph (1)(d), the water resource plan must account for the disposal and acquisition of held environmental water separately and in a way that does not affect the method used under section 10.10.

Chapters 5.7.1 to 5.7.10 describe the methods for accounting for the matters identified in Basin Plan section 10.12. One additional matter (accounting for unallocated water) is discussed in chapter 5.7.10.

5.7.1 Accounting for all forms of take [s.10.12(1)(a)]

1) For paragraph 10.10(3)(a), the following matters must be accounted for:

- a) all forms of take from the SDL resource unit and all classes of water access right;

Permitted take from a surface water SDL unit is calculated using the following formula:

Permitted take = Permitted take from a watercourse (excl. take under basic rights)
+ permitted take by floodplain harvesting
+ permitted take by runoff dams (incl. take under basic rights)
+ permitted take under basic rights from a watercourse
+ permitted net take by commercial plantations

Permitted take under general authorisations other than basic rights has not been estimated, as discussed in chapter 2.7.

Permitted take from a groundwater SDL unit is take from groundwater under licence plus take under basic rights. No other forms of take are relevant to groundwater SDL units in the Water Resource Plan area.

5.7.2 Carry over and forward draw [s.10.12(1)(b)]

1) For paragraph 10.10(3)(a), the following matters must be accounted for:
 b) water allocations that are determined in one water accounting period and used in another, including water allocations that are carried over from one water accounting period to the next;

There are no carry over or forward draw provisions for surface water or groundwater in the Water Resource Plan area.

5.7.3 Return flows [s.10.12(1)(c)]

1) For paragraph 10.10(3)(a), the following matters must be accounted for:
 c) for a surface water SDL resource unit - return flows, in a way that is consistent with arrangements under the Agreement immediately before the commencement of the Basin Plan;

Return flows are not applicable to the Queensland part of the Murray–Darling Basin.

5.7.4 Trade of water access rights [s.10.12(1)(d) and s.10.12(3)]

1) For paragraph 10.10(3)(a), the following matters must be accounted for:
 d) subject to subsection (3) - trade of water access rights;
 3) For paragraph (1)(d), the water resource plan must account for the disposal and acquisition of held environmental water separately and in a way that does not affect the method used under section 10.10.

There is no trade of water into or out of an SDL resource unit within the Water Resource Plan area. Trades within the SDL resource unit are assessed to ensure that there is no net increase in take and no negative impact on Environmental Flow Objectives as specified in the Queensland WRP.

Any permanent disposal or acquisition of held environmental water will be accounted for using the following formula:

$$\begin{aligned}
 \text{Annual permitted take} &= \text{Annual target under BDL} \\
 &- \text{Annual expression of the long term volume of environmental water recovered}
 \end{aligned}$$

Essentially this is the BDL less any held environmental water, expressed on an annual basis. This formula establishes the volume remaining to be taken for consumptive use once held environmental water is removed. Any temporary disposal or acquisition of held environmental water will be accounted for after annual permitted take is determined.

Details are given in Queensland's methodology for accounting for environmental water (Appendix C).

5.7.5 Hydrologic connection to other water resources [s.10.12(1)(e)]

1) For paragraph 10.10(3)(a), the following matters must be accounted for:

e) water resources which have a significant hydrological connection to the water resources of the SDL resource unit;

Within Queensland, the St George Alluvium: Warrego-Paroo-Nebine (GS63) has a significant hydrological connection to the St George Alluvium: Condamine-Balonne (shallow) (GS61) and the St George Alluvium: Moonie (GS62). All existing groundwater licences are located in the Condamine-Balonne part of the aquifer. The Queensland WRP does not permit any new take from the St George Alluvium: Warrego-Paroo-Nebine (GS63), and the BDL of all of these SDL resource units is well below SDL.

Proportionally small areas of the Warrego Alluvium, the St George Alluvium and the Sediments above the Great Artesian Basin SDL resource units extend into NSW GAB Warrego Shallow (GS35) and NSW GAB Central Shallow (GS36). Both the NSW GAB Warrego Shallow and NSW GAB Central Shallow have BDL significantly lower than SDL.

There is no need for a water accounting method to be developed as take can be accounted for within each SDL resource unit.

There are no other groundwater resources that have a significant hydrological connection to the water resources of the SDL resource unit.

There is no surface water outside an SDL resource unit that could impact on either the water permitted to be taken or actually taken within the resource unit.

5.7.6 Changes in the way water is taken or held [s.10.12(1)(f)]

1) For paragraph 10.10(3)(a), the following matters must be accounted for:

f) circumstances in which there is a change in the way water is taken or held under a water access right;

The Queensland WRP (s.19) does not allow for any increase in the amount of water taken by water allocations or water licences, unless there is water available in the unallocated water reserve. Any changes to the conditions of an entitlement will not change the long-term annual average volume of water available under the entitlement.

If an entitlement is changed such that it falls into a different class of water access right, this will be accounted for by reporting on its annual permitted take within the appropriate class of water access right. For instance, if a water allocation is changed from an unsupplemented water allocation with flow conditions to an overland flow authority, this would be reported under overland flow authorities, rather than unsupplemented water allocations as previously.

Entitlement holders are free to take and hold water in accordance with the conditions on their entitlements. On an annual basis, a change in how an entitlement holder chooses to take or hold water within the conditions on their entitlement does not change the annual permitted take of that entitlement. No revision to methods for accounting is required.

5.7.7 Changes over time in the level of use of water allocations [s.10.12(1)(g)]

1) For paragraph 10.10(3)(a), the following matters must be accounted for:

g) changes over time in the extent to which water allocations in the unit are utilised;

In general, Queensland's IQQM models assume full utilisation of water allocations when determining permitted use, so changes in level of use do not affect the volume permitted to be taken.

5.7.8 Water sourced from the Great Artesian Basin and released into a Basin water resource [s.10.12(1)(h)]

1) For paragraph 10.10(3)(a), the following matters must be accounted for:

h) water sourced from the Great Artesian Basin and released into a Basin water resource, by excluding that water;

No water sourced from the Great Artesian Basin is released into water resources in the Water Resource Plan SDL water resource units.

5.7.9 Managed aquifer recharge [s.10.12(1)(i)]

1) For paragraph 10.10(3)(a), the following matters must be accounted for:

i) water resources which are used for the purpose of managed aquifer recharge

There is no managed aquifer recharge in the groundwater SDL resource units in the Water Resource Plan area.

5.7.10 Accounting for other matters [s.10.12(2)]—unallocated water

The Queensland WRP has set aside the following volumes of water to be made available for consumptive use. For surface water SDL resource units, this unallocated water was available in 2009 under the previous plan, and therefore is counted as part of BDL. For groundwater SDL resource units, this unallocated water is new and is additional to the Basin Plan 2012 BDL (whilst still remaining within SDL).

Table 17 Volumes of unallocated water available

Catchment/groundwater unit	Volume of unallocated water	Purpose
Warrego	100 ML	For community or Indigenous purposes ⁶
Paroo	100 ML	For community or Indigenous purposes
Nebine	100 ML	For community or Indigenous purposes
Sediments above the Great Artesian Basin	8000 ML	Any
Warrego Alluvium	2000 ML	Any

For the purposes of this chapter 5.7.10, it is assumed that all unallocated water will be fully utilised for consumptive use. These have been identified separately in the demonstration in chapter 5.8. Once the entitlement has been granted, permitted and actual use will be accounted for in the appropriate

⁶ Community purpose is defined in the Water Resource (Warrego, Paroo, Bulloo and Nebine) Plan 2016 as town water supply; or supporting ecotourism. Indigenous purpose is defined as helping an Indigenous community achieve its economic and social aspirations.

entitlement category.

5.8 Demonstration of how method relates to the SDL

Basin Plan section 10.10 Annual determinations of water permitted to be taken

4) The plan must also set out a demonstration that the method relates to the SDL of each resource unit in such a way that, if applied over a repeat of the historical climate conditions, it would result in meeting the SDL for the resource unit, including as amended under section 23B of the Act.

5.8.1 How the methods relate to limits on take

There are a number of limits that prevent take from increasing above the levels that are described in Schedule 3 of the Basin Plan (2009 levels). The Queensland WRP does not permit any additional water to be taken from watercourses by water allocations and water licences, beyond that specifically released as unallocated water. Growth in floodplain harvesting is prevented by a ban on issuing overland flow authorities for any structure built after 2001 for purposes other than those permitted under s.26 of the Queensland WRP. No growth is expected in take by runoff dams or under basic rights from a watercourse, as the area's population is projected to remain stable for the life of the plan. See table 18 for a summary of the means of ensuring annual permitted take applied over a repeat of historical climate conditions does not exceed 2009 levels.

Both permitted and actual take of groundwater for all groundwater resource units in the Water Resource Plan area are below the SDL. Permitted take in these units is limited to licensed entitlements and basic rights. This difference is not an increase or decrease in permitted or actual take but simply an improvement in the estimation of this take. There is no growth expected in take by basic rights from groundwater in the plan area as the area's population and stock requirements is projected to remain stable for the life of the plan. Any increase in licensed entitlements can only be made from the unallocated water identified in the plan. The unallocated water volumes (table 17 above) are included within the SDLs for the resource units.

Table 18 Links between the method for determining annual permitted take and the means of ensuring annual permitted take applied over a repeat of historical climate conditions does not exceed 2009 levels

Form of take	Class of water access right	Method for determining annual permitted take	Means of ensuring annual permitted take applied over a repeat of historical climate conditions does not exceed 2009 levels
Take from a watercourse (excluding take under basic rights)	Supplemented water allocations	Modelled by extension of the IQOM (model numbers WAR1601A, PAR1601A and NEB1601A). Entitlements are modelled operating as per water sharing rules and conditions in place and taking into account climatic conditions and flow data for	In developing the 2003 Queensland WRP, models were used to identify the volume of water available to be taken in the WRP area (based on a desired end of system flow) and to develop the water sharing rules and access conditions on water allocations which would limit permitted take to the volume of water available to be taken. Section 19 of the Queensland WRP does not permit any additional water to be taken from
	Unsupplemented water allocations (without flow conditions)		
	Unsupplemented water allocations (with flow conditions)		

Form of take	Class of water access right	Method for determining annual permitted take	Means of ensuring annual permitted take applied over a repeat of historical climate conditions does not exceed 2009 levels
	Water licences (volume limited)	the reporting year. Information on the models is available in the relevant model reports (DSITI 2016a, 2016b and 2016c).	watercourses by water allocations or water licences (beyond that specifically released as unallocated water). This rule was first put in place in the Queensland WRP 2003.
	Water licences (non-volume limited)		
	Unallocated water	Not applicable until it is allocated to one of the above classes of water access right.	Unallocated water was available in 2009 under the Queensland WRP 2003, so is counted as part of BDL. The Queensland WRP specifies the long-term average annual volume available as unallocated water. Conditions on any entitlements granted will ensure that water taken does not exceed the volume specified in the Queensland WRP.
	Water permits	The sum of the volumes specified on the permits.	Water permits are short term authorities, generally for small volumes.
Take by floodplain harvesting	Water licences	No method developed as there are no licences in the Warrego-Paroo-Nebine WRP area	Not applicable
	Overland flow authorities	Annual actual take (based on available storage capacity (as notified under section 34 of the Water Resource (Warrego, Paroo, Bulloo and Nebine) Plan 2003), rainfall and flows during the water year, and information from water users).	Growth in floodplain harvesting is prevented by not allowing overland flow works built after 2001 to be used for purposes other than those permitted under s.26 of the Queensland WRP. This rule was first put in place by a moratorium in 2001 and subsequently in the Queensland WRP in 2003.
Take by runoff dams (including take under basic rights)	Authorisations	Annual actual take (based on take by runoff dams for basic rights as estimated using capacity and demand data from the <i>Improved Assessment of the Impact of Stock and Domestic Farm Dams in Queensland: Report 1</i> (SKM, 2012)).	Growth in take by runoff dams under basic rights is limited by population growth. The area's population has been stable since 2001 and is projected to remain stable for the life of the plan (DNRM 2014d).
Take under basic rights from a watercourse	Authorisations	The estimate of annual actual take is a fixed number based on access to a	Growth in take under basic rights from a watercourse is limited by population growth. The area's population has been stable since

Form of take	Class of water access right	Method for determining annual permitted take	Means of ensuring annual permitted take applied over a repeat of historical climate conditions does not exceed 2009 levels
		watercourse.	2001 and is projected to remain stable for the life of the plan (DNRM 2014d).
Net take by commercial plantations	Not applicable	No method developed as there are no commercial plantations in the Warrego-Paroo-Nebine WRP area.	Not applicable

5.8.2 **Amendment under section 23B of the Water Act 2007 (Cth)**

Queensland has no notified supply, efficiency or constraint measures that may result in an amendment to the SDL under section 23B of the *Water Act 2007* which pertains to the SDL adjustment mechanism. However, the apportionment of the shared reduction for the Northern Basin zone is being reviewed and could possibly be changed. If this occurs, the revised SDL would be met through a change in the quantity of held environmental water to be acquired by 30 June 2019. This would be addressed as discussed in Appendix C.

5.8.3 **Calculation of SDL**

As there are no surface water SDL adjustment measures proposed in the plan area, the SDL for each surface water SDL resource unit is calculated using the formula:

$$SDL = BDL - local\ reduction\ amount - SDL\ resource\ unit\ shared\ reduction\ amount$$

The local reduction amount and SDL resource unit shared reduction amount are those identified in the Basin Plan current two years prior to handing the Water Resource Plan to the Minister for accreditation, as required under s. 56 of the *Water Act 2007* (Cth). The shared reduction is calculated in accordance with s.6.05(4) of the Basin Plan. Section 6.05(4) provides that the shared reduction amount is to be calculated as at 31 December 2016. As this plan will be submitted for accreditation prior to this date, the shared reduction amount cannot yet be accounted for precisely.

As the SDL for each surface water SDL resource unit cannot yet be calculated, the following demonstration shows that the methods set out in Chapter 5, if applied over a repeat of the historical climate conditions, result in meeting the BDL for each SDL resource unit.

Once the shared reduction amount has been calculated, the SDL will be met by the Australian Government acquiring any additional held environmental water by 30 June 2019. This held environmental water would be accounted for using the method set out in Appendix C. This assumption is consistent with the Australian Government's commitment to 'Bridge the Gap' between BDLs and SDLs in the Basin Plan (e.g. paragraph 2.2 and section 3 of the Intergovernmental Agreement on Implementing Water Reform in the Murray Darling Basin).

The SDL for each groundwater SDL resource unit is the volume set out in Column 4 of Schedule 4 of the Basin Plan.

5.8.4 **Demonstration of the method for each SDL resource unit**

The following tables 20 to 25 set out, for each SDL resource unit, a demonstration of the method for annual permitted take applied over a repeat of historical climate conditions (1895 to 2009) for that unit. The demonstration for annual permitted take by floodplain harvesting over the historical climate conditions in tables 20 and 21 is calculated using the method for determining long-term annual average take described in chapter 4.2.2 (take by floodplain harvesting: overland flow authorities). Although these estimates are based on a limited time period, they are the best available information for long term annual permitted take over historical climate conditions.

Under s.6.04 of the Basin Plan 2012, SDLs take effect on 1 July 2019. This demonstration therefore includes the held environmental water currently held by the CEWH as of December 2015, however further held environmental water may remain to be recovered to achieve the total reduction required by 2019.

For surface water SDL resource units (tables 20-22), this demonstration illustrates how the different methods combined will result in meeting the BDL of each SDL resource unit as described in Column 2 of Schedule 3 of the Basin Plan over a repeat of the historical climate conditions. By limiting take for consumptive use in each SDL resource unit to the BDL in accordance with these methods, and accounting for held environmental water consistently with Appendix C, once the Australian Government has recovered the water necessary to “Bridge the Gap”, the methods combined will meet the SDL in each SDL resource unit.

For groundwater SDL resource units, (tables 23-25), the demonstration shows that the method for annual permitted take, when applied over the historical climate conditions, results in a level of take for consumptive use that is far lower than the SDL for each SDL resource unit.

Table 20 Warrego (SS28)

Form of take	Class of water access right	Annual permitted take method applied over a repeat of historical climate conditions (GL/year)
Take from a watercourse (excluding take under basic rights)	Supplemented water allocations	2.5
	Unsupplemented water allocations (without flow conditions)	3.7
	Unsupplemented water allocations (with flow conditions)	52.4
	Water licences (volume limited)	0.1
	Water licences (non-volume limited)	0.3
	Water permits	0.0
	Unallocated water	0.1
Take by floodplain harvesting	Water licences	0.0
	Overland flow authorities	2.8
Take by runoff dams (including take under basic rights)	Authorisations	13.5
Take under basic rights from a watercourse	Authorisations	0.2
Net take by commercial plantations	N/A	0.0
BDL		75.6
Modelled take of held environmental water entitlements over the historical climate conditions as of December 2015		9.5

Table 21 Paroo (SS29)

Form of take	Class of water access right	Annual permitted take method applied over a repeat of historical climate conditions (GL/year)
Take from a watercourse (excluding take under basic rights)	Supplemented water allocations	0.0
	Unsupplemented water allocations (without flow conditions)	0.1
	Unsupplemented water allocations (with flow conditions)	0.0
	Water licences (volume limited)	0.0
	Water licences (non-volume limited)	0.0
	Water permits	0.0
	Unallocated water	0.1
Take by floodplain harvesting	Water licences	0.0
	Overland flow authorities	0.7
Take by runoff dams (including take under basic rights)	Authorisations	10.6
Take under basic rights from a watercourse	Authorisations	0.3
Net take by commercial plantations	N/A	0.0
BDL		11.8
Modelled take of held environmental water entitlements over the historical climate conditions as of December 2015		0.0

Table 22 Nebine (SS27)

Form of take	Class of water access right	Annual permitted take method applied over a repeat of historical climate conditions (GL/year)
Take from a watercourse (excluding take under basic rights)	Supplemented water allocations	0.0
	Unsupplemented water allocations (without flow conditions)	0.2
	Unsupplemented water allocations (with flow conditions)	5.1
	Water licences (volume limited)	0.1
	Water licences (non-volume limited)	4.3
	Water permits	0.0
	Unallocated water	0.1
Take by floodplain harvesting	Water licences	0.0
	Overland flow authorities	0.0
Take by runoff dams (including take under basic rights)	Authorisations	11.0
Take under basic rights from a watercourse	Authorisations	0.1
Net take by commercial plantations	N/A	0.0
BDL		20.9
Modelled take of held environmental water entitlements over the historical climate conditions as of December 2015		3.9

Table 23 Sediments above the Great Artesian Basin (GS60)

Form of take	Class of water access right	Annual permitted take method applied over a repeat of historical climate conditions (GL/year)
Take from groundwater	Groundwater licences (excluding take under basic rights)	0.2
	Basic rights from groundwater	0.6
Total take		0.8
Unallocated water		8.0
SDL		99.2

Table 24 St George Alluvium (GS63)

Form of take	Class of water access right	Annual permitted take method applied over a repeat of historical climate conditions (GL/year)
Take from groundwater	Groundwater licences (excluding take under basic rights)	0.0
	Basic rights from groundwater	0.1
Total take		0.1
Unallocated water		0.0
SDL		24.6

Table 25 Warrego Alluvium (GS66)

Form of take	Class of water access right	Annual permitted take method applied over a repeat of historical climate conditions (GL/year)
Take from groundwater	Groundwater licences (excluding take under basic rights)	0.2
	Basic rights from groundwater	0.5
Total take		0.7
Unallocated water		2.0
SDL		10.2

6 Methods—annual actual take (s.10.15)

Basin Plan section 10.15 Determination of actual take must be specified

- 1) A water resource plan must set out how the quantity of water actually taken for consumptive use by each form of take from each SDL resource unit will be determined after the end of a water accounting period using the best information available at the time.
- 2) For a particular form of take, and subject to the requirement that a determination use the best information available at the time, a determination may be made by: (a) measuring the quantity of water actually taken; or (b) estimating the quantity of water actually taken; or (c) a combination of the above.
- 3) Where a determination for a form of take is made by estimating the quantity of water actually taken, the water resource plan must provide for the estimate to be done consistently with the method under subsection 10.10(1) that relates to that form of take.
- 4) The quantity of water actually taken must: (a) include water that was held environmental water which was disposed of and then used in the SDL resource unit for consumptive use; and (b) exclude water sourced from the Great Artesian Basin and released into and taken from a Basin water resource.

Chapters 6.1 to 6.6 set out how the quantity of water actually taken for consumptive use by each form of take and water access right is determined. Please see chapters 2 and 3 for the characteristics of each water access right.

All estimates of actual water take are consistent with the method under subsection 10.10(1) that relates to that form of take.

Chapters 6.7 and 6.8 address the inclusion of held environmental water used for consumptive use, and water from the Great Artesian Basin released into and taken from a Basin water resource.

Actual take is estimated using the following formula:

$$\begin{aligned} \text{Actual take from surface water SDL unit} \\ &= \text{actual take from a watercourse (excl. take under basic rights)} \\ &+ \text{actual take by floodplain harvesting} \\ &+ \text{actual take by runoff dams (incl. take under basic rights)} \\ &+ \text{take under basic rights from a watercourse} \\ &+ \text{actual net take by commercial plantations} \end{aligned}$$

Actual take under general authorisations other than basic rights has not been estimated, as discussed in chapter 2.7.

Actual take from a groundwater SDL unit is the take from groundwater under licence plus take under basic rights.

The methods for determining annual actual take apply in the same manner to each individual SDL resource unit, unless otherwise described in the relevant method. If the information for a method improves, the better information will be used, subject to 'fit for purpose' considerations such as costs.

6.1 Annual actual take from a watercourse (excluding take under basic rights)

Annual actual take from a watercourse (excluding take under basic rights) is estimated using the following formula:

$$\begin{aligned} & \textit{Annual actual take from a watercourse} \\ & = \textit{annual actual take under supplemented water allocations} \\ & + \textit{annual actual take under unsupplemented water allocations (excl. urban)} \\ & + \textit{annual actual take under water licences (excl. urban)} \\ & + \textit{annual actual take under water permits} \\ & + \textit{annual actual take of unsupplemented water for urban purposes} \end{aligned}$$

6.1.1 Supplemented water allocations

Supplemented water use data are taken from the water infrastructure operator's annual reports, which are submitted to the department. These data include supplemented urban use. All supplemented water allocations are metered, and water taken is based on meter readings.

6.1.2 Unsupplemented water allocations (excluding urban use)

Water taken is based on meter readings. All water allocations with installed works in the Water Resource Plan area are metered. Meters are self-read at the end of the water year. A meter reading notice is sent to each client with metered works at the end of June. The majority of responses are received by the end of August. Penalties apply for failure to provide a meter reading on request (*Water Regulation 2002*, s.78).

6.1.3 Water licences (excluding urban use)

The annual actual take under the authority of water licences with a nominal entitlement is estimated as the volume specified on the licence. The annual actual take under other types of water licence is the volume estimated by the local departmental officer based on opportunity, taking into consideration flows and capacity of works linked to the licence, and water use assessments.

6.1.4 Water permits

The annual actual take under the authority of water permits is estimated to be the volume specified on the permit unless, in the relevant water accounting period, there is better information about the water actually taken under the permit, in which case that better information will be used.

6.1.5 Unsupplemented water entitlements for urban purposes

Unsupplemented water for urban purposes may be taken under the authority of a volume-limited water licence or an unsupplemented water allocation. Urban water use data are provided to the department through SWIM (Statewide Water Information Management: www.swim.qldwater.com.au). SWIM collects urban water use information directly from local governments. To date this has been in the form of meter readings.

6.2 Annual actual take by floodplain harvesting

Licences

There are no licences issued for floodplain harvesting in the Water Resource Plan area.

Authorisations

In Queensland, floodplain harvesting is defined as overland flow, which is limited by Queensland WRP provisions (see chapter 2.8). These provisions prevent an increase in overland flow take for uses other than those permitted under s.26 of the Queensland WRP.

Annual actual take by floodplain harvesting is determined by a local departmental officer estimating the quantity of water taken by existing overland flow works in the water accounting period having regard to the storage capacity of those works, rainfall and flow data, and available information from owners of those works relating to the water collected by those works.

6.3 Annual actual take by runoff dams (including take under basic rights)

Growth in take by runoff dams for stock and domestic use is expected to be related to population growth and/or an increase in stock numbers. There is a low risk of population growth in the Water Resource Plan area. The Office of Economic and Statistical Research (2011) has forecast that the population is not expected to grow significantly, projecting a population change of between -0.37 per cent and 0.35 per cent by 2031.

Queensland WRP provisions prevent an increase in overland flow take for uses other than basic rights (s26).

Chapter 4.2.2 sets out the method for determining long-term annual average take of water from all runoff dams (i.e. basic rights and notified works). Annual actual take by runoff dams is assumed to be equal to the long-term annual average take, as described in chapter 4.2.2.

This is estimated using capacity and demand data from the *Improved Assessment of the Impact of Stock and Domestic Farm Dams in Queensland: Report 1* (SKM, 2012a). This method is considered to be the best available for estimating annual actual take from runoff dams by basic rights given the low risk of increase in this take due to stable population, and lack of drivers for increased take for stock and domestic purposes. This method is also considered to be the best available for estimating annual actual take by runoff dams that are notified works due to the limited number of works, limitations on growth in take (s26 of the Queensland WRP), limited opportunity to take and lack of historical take data.

Queensland will undertake a risk assessment on a ten-yearly basis to determine whether a detailed assessment of growth in take is required. The detailed assessment could, for example, assess growth in farm dams using aerial photos or LIDAR and the method outlined in the *Improved Assessment of the Impact of Stock and Domestic Farm Dams in Queensland: Report 1* (SKM, 2012a).

6.4 Annual actual take under basic rights from a watercourse

Actual take under basic rights from a watercourse is estimated using the methodology described in Appendix B. This does not specifically consider water use on an annual basis, due to a lack of information. Take under basic rights from a watercourse is limited by access to the watercourse and is restricted to landholders with riparian land. Growth in take could occur with subdivision and sale of lots but is low risk in the Water Resource Plan area due to the low risk of population growth as noted under chapter 6.3.

6.5 Annual actual net take by commercial plantations

As there are no commercial plantations in the Water Resource Plan area, there is no methodology to estimate annual actual take. A methodology for estimating annual actual net take by commercial plantations will be developed if this situation changes.

6.6 Annual actual take from groundwater

6.6.1 Groundwater licences

No groundwater entitlements in the SDL resource units in the Water Resource Plan area are metered. Annual actual take is estimated as the total annual volumetric entitlement.

6.6.2 Basic rights from groundwater

Take of basic rights from groundwater is estimated as the volume permitted to be taken as per chapter 4.2.2. This does not specifically consider water use on an annual basis, due to a lack of information.

6.7 Held environmental water used for consumption

The Commonwealth Environmental Water Holder (CEWH) is the only holder of environmental water in the Warrego and Nebine. The held environmental water consists of unsupplemented entitlements which have never been extracted. There is no held environmental water in the Paroo. It is not expected that CEWH will sell any of its entitlements for consumptive use or use them itself for consumptive purposes. However if this does occur, the actual take associated with those entitlements will be determined through meter readings as per chapter 6.1.

The hydrological models used by Queensland calculate the annual permitted take for all water entitlements including the held environmental water.

6.8 Water from the Great Artesian Basin released into and taken from a Basin water resource

No water from the Great Artesian Basin is released into Basin water resources in the Water Resource Plan area, and then subsequently taken from that resource for consumptive use. The requirement in section 10.15(4)(b) of the Basin Plan does not apply.

7 References

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<http://www.dpi.nsw.gov.au/agriculture/livestock/beef/feed/publications/water-requirements-sheep-cattle>, accessed 8/9/15.

Appendix A: General authorisations in the QMDB under Queensland legislation

Authorising legislation	Section	Authorised entity	Water source	Purpose	Circumstances
Water Act 2000	20	a person	any	a public purpose in an emergency situation	
Water Act 2000	20	a person	any	fighting a fire	
Water Act 2000	20	a person	any	undertaking routine testing of fire fighting equipment	
Water Act 2000	20	a person	watercourse, lake or spring	camping purposes	
Water Act 2000	20	a person	watercourse, lake or spring	watering travelling stock	
Water Act 2000	20A	an owner of land	water collected in a dam	stock or domestic purposes ⁷	
Water Act 2000	20A	owner of land adjoining a watercourse, lake or spring	the adjoining watercourse, lake or spring	stock or domestic purposes ⁷	
Water Act 2000	20B	An Aboriginal party or Torres Strait Islander party	any	traditional activities or cultural purposes	in the area of the State for which the person is an Aboriginal or Torres Strait Islander party
Water Act 2000	20C	a constructing authority ⁸ or water service provider	any	to operate public showers or toilets	
Water Act 2000 Water Regulation 2002	20C 52AAB	a constructing authority	any	to construct or maintain infrastructure	<ul style="list-style-type: none"> • the construction or maintenance is lawful • DNRM is notified of details of the proposed take • the constructing authority records details of the actual take • where there is a flow in the watercourse - take of water stops if take causes the flow immediately downstream of the point of take to cease • where take is from a waterhole or lake (no flow occurring) - take does not reduce the depth to the greater of: <ul style="list-style-type: none"> ◦ less than 0.5 m depth; or ◦ less than 75% of its full supply level
Water Act 2000 Water Regulation 2002 Water Resource (Warrego, Paroo,	Water Act s.20(2)(a), Water Regulation s.3B and	a person	any	<ol style="list-style-type: none"> 1 washing down a dairy 2 washing down agricultural equipment 3 washing down a vehicle— <ol style="list-style-type: none"> (a) used for agriculture; or (b) in accordance with best practice to prevent 	the total volume that may be taken is limited to 2 ML/year

⁷ domestic purposes includes irrigating a garden, not exceeding .25ha, being a garden cultivated for domestic use and not for the sale, barter or exchange of goods produced in the garden.

⁸ constructing authority means—

- (a) the State; or
- (b) a local government; or
- (c) a person authorised by an Act to take land for any purpose.

Authorising legislation	Section	Authorised entity	Water source	Purpose	Circumstances
Bulloo and Nebine) Plan 2016	Schedule 1 WRP s.25			<p>the spread of weed seeds</p> <p>4 washing down a place used to house domestic animals, including enclosures at a shelter for animals operated by a charitable organisation</p> <p>5 filling spray units used to apply herbicides or pesticides</p> <p>6 managing a public recreation area—</p> <p>(a) including operating public toilets and showers; but</p> <p>(b) other than irrigating land with an area of more than 0.25 ha</p> <p>7 operating toilets, showers, kitchens and laundries that are part of the living quarters for staff on a farm</p> <p>8 the following activities in relation to pumps and bores—</p> <p>(a) proving supply;</p> <p>(b) testing water quality;</p> <p>(c) flushing out;</p> <p>(d) carrying out research</p> <p>9 supplying non-potable water to premises used solely for education or training purposes—</p> <p>(a) including for use in buildings; but</p> <p>(b) other than irrigating land with an area of more than 0.25ha</p> <p>10 constructing infrastructure on a farm</p> <p>11 constructing and maintaining infrastructure approved under a resource operations licence or distribution operations licence, other than irrigating land with an area of 0.25ha</p> <p>12 washing, for processing and packaging, produce produced from a single farming enterprise</p> <p>13 rehabilitating riparian land</p>	

Appendix B: Method for estimating take from watercourses under basic rights

Introduction

This method was developed specifically to estimate take from watercourses under basic rights for the Basin Plan. For the method to estimate groundwater take under basic rights, see chapter 4.2.2.

There are no existing data on average take of surface water for basic rights. To obtain an estimate, existing data on groundwater stock and domestic take per square kilometre are used as a proxy for surface water take. Take of water for stock and domestic use is primarily driven by how much water the household or livestock requires, not the source of that water. In the absence of other information, using available groundwater data in this way is a reasonable approach to estimating surface water take.

Method

Step 1: Identify average rural/peri-urban take per bore (ML/year) for the combination of aquifers in the sub-area.

Volumes of take under basic rights from groundwater bores were estimated by Parsons Brinckerhoff (2011)⁹. For the Water Resource Plan area, average rural/peri-urban take per bore was estimated at 3.6 ML per year. Urban take was not considered as towns in the plan area rely upon water from the Great Artesian Basin. These volume estimates were obtained by Parsons Brinckerhoff by estimating total stock and domestic water use per property, multiplying by the proportion obtained through groundwater bores, and then calculating average use per bore.

Step 2: Determine average number of bores per km² of non-riparian land.

Riparian land is defined as land adjoining the major watercourse in the catchment. This excludes minor tributaries and most creeks. Riparian land parcels and their land area are identified using GIS. Only non-riparian land is considered, to avoid potential underestimation of take where a property may have access to both surface and groundwater.

Step 3: Determine average take of groundwater per km² of non-riparian land.

Average number of bores per km² is multiplied by average take per bore per year (3.6ML).

Step 4: On riparian land parcels, identify existing/active groundwater bores within 5 km of major watercourse, using GIS.

This step identifies riparian properties with reasonable access to both groundwater and surface water. NSW DPI advises that the average grazing distance from a watering point is 5 km for cattle¹⁰. Cattle are the most common form of stock kept in the plan area. It is assumed that take from groundwater is preferred over take from surface water, as groundwater provides a more reliable supply.

Step 5: Subtract the km² area of riparian land with existing/active groundwater bores from the total area of riparian land.

⁹ Parsons Brinckerhoff (2011), *Queensland Murray Darling Basin: Methodology for estimating the take of groundwater for stock and domestic purposes*, report to Queensland Department of Environment and Resource Management, December 2011.

¹⁰ NSW Department of Primary Industries (2014), 'Water Requirements for sheep and cattle', available: <http://www.dpi.nsw.gov.au/agriculture/livestock/beef/feed/publications/water-requirements-sheep-cattle>, accessed 8/9/15.

To avoid double counting of take, land with access to both surface water and groundwater within 5km of the watercourse is assumed to utilise groundwater only. This land is removed from consideration.

Step 6: Multiply the result by the average take of groundwater per km² of non-riparian land.

This gives average take of surface water under basic rights in ML/year. This assumes that average water usage per km² for stock and domestic purposes is the same regardless of the water source.

Limitations of this approach

Riparian land has been restricted to major watercourses only to simplify the GIS component. This may underestimate take under basic rights from minor watercourses, however as the minor watercourses are even less reliable than major watercourses, this is not expected to be significant. Conversely, this method may slightly overestimate take as it includes some groundwater bores which are not used for basic rights.

Results

The table below sets out the estimates of take from the SDL resource units of the plan area and are based on current 2016 property lots. Note that these estimates are not expected to change over time unless there is a significant increase in property subdivisions.

SDL Resource unit	Basic rights surface water take (ML/year)
Warrego	245
Paroo	256
Nebine	108

Appendix C: Methodology for accounting for environmental water

Adjusting annual permitted take to exclude diversions for environmental entitlements and uses

Purpose

This paper describes Queensland's method for adjusting the annual permitted take to exclude held environmental water.

Background

The Basin Plan [s.10.12(3)] requires that the disposal and acquisition of held environmental water be accounted for separately.

In Queensland, water resource planning incorporates provisions for sharing water between human consumptive needs and the environment. Consequently, held environmental water is restricted to water allocations gifted by the Queensland Government to the Commonwealth of Australia (the Commonwealth) from unallocated water in the water resource plan area or recovered by the Commonwealth from water entitlement holders. This includes water entitlements transferred to the Commonwealth as the result of water savings made under the Healthy HeadWaters Program.

Environmental entitlements may be for supplemented water (a water supply where the reliability is enhanced by releases of stored water from infrastructure) or unsupplemented water (a water supply where the reliability is not enhanced by the operation of water storage infrastructure). Entitlements for unsupplemented water include water licences to take overland flow and unsupplemented water allocations.

The Commonwealth is not obligated to use environmental water holdings for environmental purposes under the *Water Act 2007*. Under the Basin Plan trade rules, the Commonwealth must be able to trade its water holdings under the same conditions as any other entitlement holder.

Annual permitted take excluding held environmental water

Queensland will determine the annual permitted take excluding held environmental water using the following formula:

$$\begin{aligned} \text{Annual permitted take} \\ &= \text{Annual target under BDL} \\ &\quad - \text{annual expression of the long term volume of environmental water recovered}^{11} \end{aligned}$$

This formula establishes the volume remaining to be taken for consumptive use once held environmental water is removed. Queensland will estimate the annual expression of the long-term volume of environmental water recovered as the volume of water available under held environmental water (HEW) entitlements and the water sharing rules of the relevant resource operations plans for the water year, as estimated using the relevant IQQM computer program¹².

In the demonstration of how the methods used result in meeting the SDL for each SDL resource unit [as required under Basin Plan s.10.10(4)], the annual expression of the long term volume of HEW entitlements is included in the BDL for the resource unit, but then identified separately and deducted

¹¹ From 1 July 2019, this volume will equal the annual expression of the total volume of environmental water required to meet the SDL

¹² The relevant BDL model for the catchment will be used. This model calculates the long-term diversions of all entitlements for a defined period of simulation. Held environmental water entitlements will be represented separately in the IQQM and it will be assumed that they are fully utilised under the conditions on the allocation.

from BDL to achieve SDL.

Adjustment for temporary trade between consumptive and environmental pools

Temporary trades (seasonal assignments) of consumptive water to HEW holders will be accounted for as follows:

1. The volume of supplemented water entitled to be taken under HEW through temporary trade will be the total volume of supplemented water that is seasonally assigned (that is, the volume of water shown on the seasonal water assignment notice).
2. The volume of unsupplemented water entitled to be taken under HEW entitlements through temporary trade will be:
 - a. estimated using the relevant IQQM computer program where the take of water being seasonally assigned is subject to flow conditions; or
 - b. the total volume of unsupplemented water that is seasonally assigned, where the take of water being seasonally assigned is not subject to flow conditions.

Temporary trades of HEW entitlements for consumptive use will be estimated using the relevant IQQM computer program or the volume of water traded, as appropriate. The HEW holder will need to provide details to the Department of Natural Resources and Mines (DNRM) of the water entitlements and volumes involved.

A register of HEW entitlements has already been developed for internal departmental use. A communication/reporting protocol will need to be developed with the HEW holder to identify any environmental entitlements which have been used for non-environmental purposes and vice versa in the water year.

The volumes of water temporarily traded into and out of the environmental pool will be reported individually for each SDL resource unit in the section 71 report.

Adjustment for permanent trade between consumptive and environmental pools

Permanent trade of entitlements into or out of the environmental pool will change the volume of water available under HEW entitlements. The annual expression of the long-term volume of environmental water recovered will therefore be adjusted accordingly.