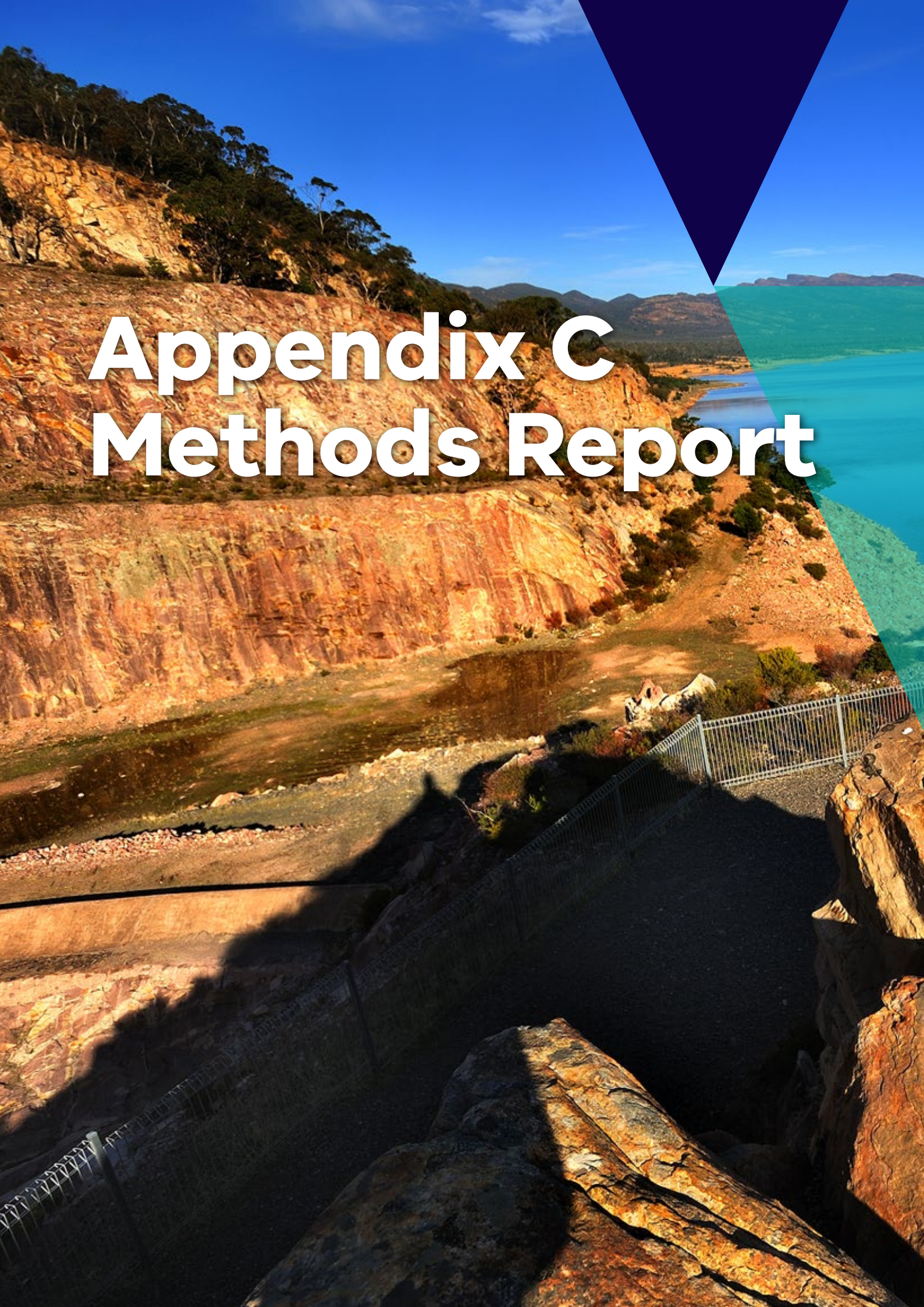

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Summary of methods

Permitted take in the Wimmera–Mallee (surface water) water resource plan area and the Wimmera–Mallee (groundwater) water resource plan area is either calculated or estimated based on the best available information for that form of take and the water resources in the water resource plan area.

Actual take is the volume of water actually taken from the system within an accounting period. At the end of each water accounting period, actual take is subtracted from the annual permitted take. The difference is recorded as either an annual debit or credit, as outlined in section 6.11 of the Basin Plan. To remain compliant with sustainable diversion limits (SDL), cumulative debit cannot be equal to or greater than 20 per cent of the SDL (Basin Plan section 6.12). A summary of whether permitted take and actual take is estimated or calculated is shown in **Table 1**.

Where the form of take relates to take under an entitlement, the method relies on information on entitlement volumes recorded in the Victorian Water Register (VWR). The VWR provides the most up-to-date information regarding entitlement volumes for an area or resource.

Where there is no recorded entitlement data or the water available in the resource unit is not fully allocated under entitlements, an estimate is required to determine the permitted take for the accounting period. Equally, where there is no recorded entitlement data for a form of take, an estimate will be required to determine actual take.

Table 1: Summary of permitted take and actual take methods

Form of take	Method	
	Permitted take	Actual take
Surface water		
Take from a regulated river (excluding basic rights)	Calculated using the water resource plan model	Calculated using usage data on the Victorian Water Register
Take from a regulated river under basic rights	Estimated based on best available hydrological model information	Estimated based on best available hydrological model information
Take from a watercourse (excluding basic rights)	Calculated using usage data on the Victorian Water Register	Calculated using usage data on the Victorian Water Register
Take from a watercourse under basic rights	Determined by actual take	Calculated using usage data on the Victorian Water Register
Take by runoff dams (excluding basic rights)	Calculated based entitlement data on the Victorian Water Register	Calculated based entitlement data on the Victorian Water Register
Take by runoff dams under basic rights	Estimated based on best available water user information	Estimated based on best available water user information
Net take by commercial plantations	Estimated using the SoilFlux model	Estimated using the SoilFlux model
Groundwater		
Take from groundwater (excluding basic rights)	Determined as the relevant SDL	Calculated using entitlement data on the VWR
Take from groundwater (basic rights)	Estimated	Estimated

1. Background Information

1.1 Basin Plan requirements

Division 2—Take for consumptive use

Note: This Division sets out the principal provisions for how a water resource plan incorporates and applies the SDL for each SDL resource unit. The SDLs take effect from 1 July 2019. Water resource plans may be accredited before then and ordinarily have effect for 10 years: see section 64 of the Commonwealth Water Act.

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 volume 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.

(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.

Note 1: Under the Basin Plan, the SDL is the same as the long-term annual diversion limit because the temporary diversion provision for each SDL resource unit is zero. Section 6.04 and Schedules 2 and 4 set out the SDLs for each SDL resource unit.

Note 2: Amendments under section 23B of the Act are made following proposals for adjustment under Chapter 7.

(5) If, as a result of an amendment under section 23B of the Act, the SDL for a surface water SDL resource unit is expressed as a formula that changes with time, the SDL for subsection (4) is taken to be:

(a) for a water accounting period beginning on or after 1 July 2019—the SDL as it stood on 30 June 2019; and

(b) for a water accounting period beginning on or after 1 July 2022—the SDL as it stood on 30 June 2022; and

(c) for a water accounting period beginning on or after 1 July 2024—the SDL as it stood on 30 June 2024.

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;

Note: Paragraph (g) includes what is commonly known as a growth-in-use strategy.

(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 under section 10.10.

Division 3—Actual take

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.

*Note: The **annual actual take** for the SDL resource unit is the sum of the quantity of water actually taken by each form of take for consumptive use: see subsection 6.10(2). Paragraph 71(1)(c) of the Act requires the annual actual take to be set out in a report to the Authority within 4 months after the end of the water accounting period.*

(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.

1.2 Best available information summary

In developing the models and methods in this report Victoria has used the best available information. The information is considered the best available on the following basis:

- it is the most current at the time at which the model or method must account for water taken from the system
- it is based on an updated model and more accurately reflects the management of Victoria's water resources
- it is obtained in a manner that is cost effective and fit for purpose
- the Victorian Water Register (VWR) holds the most accurate and up to date information regarding water entitlements.

It is not proposed to use methods of obtaining information to assess consumptive water take from the system where the cost and effort involved in obtaining the information is not commensurate to the benefit (or increased certainty) achieved by the inclusion of the data.

For the purposes of determining take by entitlement holders, the VWR is the most accurate means of determining the number of entitlements and the total volume authorised to be taken under those entitlements. All entitlements issued in Victoria are recorded on the VWR in accordance with the requirements in the Victorian Water Act.

1.3 Utilisation

The SDL represents the long-term average of the environmentally sustainable limit on the volume of water that can be taken from the Basin resource. In Victoria, water entitlements (water access rights) are not issued above the sustainable limit for the relevant resource. This sustainable limit will now be represented by the SDL in Victoria's water resource plan areas.

In determining whether entitlements can be issued, there is an assumption of full use of an entitlement. This means that in considering whether a new entitlement can be issued in respect of a resource or system, consideration is given to the total volume of water authorised to be taken from that resource or system under existing entitlements.

In circumstances where water users are not using the total volume of water allocated under their entitlement, it is not assumed that water is available to new water users. Victoria's commitment to secure entitlement to water is underpinned by water management decisions that promote (to the extent possible) continued availability of water under a user's entitlement.

As a result, there may be circumstances where the total volume of water allocated under entitlements is higher than the volume of water actually taken by the entitlement holders in a system. This, however, will not result in allocation of new entitlements to take up the unused water.

2. Baseline Diversion Limit and Sustainable Diversion Limit models

2.1 Surface water models

A Resource Allocation Model (REALM) computer simulation model has been developed for the Wimmera–Mallee system covering all take from a regulated river (excluding basic rights). The Wimmera–Mallee system model represents:

- system waterways
- historical recorded and estimated streamflow and climate data from January 1891 to June 2015
- system infrastructure including reservoirs, diversion weirs and transfer channels and the pipeline delivery network
- system operating rules as specified in the bulk entitlements and storage management rules as at 31 October 2010
- rural, urban and environmental demand groupings with climate-varying demands applied, including a mechanism to simulate entitlement carried over to another accounting period
- evaporation and transfer and delivery losses.

The REALM simulation model estimates allocations for entitlement holders throughout the accounting period. The storage manager uses identical rules to determine allocations in practice.

The Wimmera–Mallee Baseline Diversion Limit (BDL) and Sustainable Diversion Limit (SDL) models have been developed in the following manner:

- Wimmera–Mallee BDL Model—this model represents infrastructure, operational rules and entitlements to water as at 31 October 2010. This represents the point in time when entitlements were created to distribute the final water savings from the Wimmera–Mallee Pipeline.
- Wimmera–Mallee SDL Model—this model represents infrastructure, operational rules and entitlements to water as in the BDL model, with the exception of transfer of the 19 GL of former irrigation entitlement and the associated distribution losses of 9 GL to the Commonwealth Environmental Water Holder.

The BDL and SDL models were run over the Basin Plan historic climate period of July 1985 to June 2009 and estimated the long-term BDL and SDL (for take from a regulated river (excluding basic rights)) to be 66,874 ML per year and 43,842 ML per year. These values are broadly consistent with the corresponding Murray–Darling Basin caps (MDB caps) of 66,899 ML per year and 44,185 ML per year respectively. These MDB caps were estimated using the previously accredited Wimmera–Mallee post-pipeline and post-irrigation cap models. Importantly, the revised modelling has also confirmed the volume of water recovery achieved in the (surface water) water resource plan area as 23,032 ML (the difference between the BDL and SDL volumes).

The models used for estimating Victoria's SDLs are shown in **Table 2**.

Table 2: Model runs documented in the modelling technical report

Run description	Key files	Consumptive demands	Model run period	Analysis period
SDL model	HW04.sys SDL2.scn SDL2.log	Representative of full use of entitlements to water as at 11 April 2013	Jan 1891–June 2016	July 1895–June 2009
BDL model	HW05.sys BDL2.scn BDL2.log	Representative of full use of entitlements to water as at 31 October 2010	Jan 1891–June 2016	July 1895–June 2009

2.2 Comparison to Basin Plan estimates of BDL and SDL

This section provides a brief discussion and comparison of Victoria's estimates of BDL and SDL provided in **Table 3** and **Table 4**, compared to the estimates of these numbers provided in schedules 2–4 of the Basin Plan. In each case the revised estimated is based on the same level of development as specified in the Basin Plan, e.g. 30 June 2009 or 31 October 2010 as applicable. Refer to **Part 3** of this report for more detailed discussion of the method used to determine the SDL in each case. Overall, the total surface water BDL was estimated to be 129 GL in the Basin Plan compared to 99 GL in Victoria's estimate, while the corresponding SDL estimate was 106 GL in the Basin Plan compared to 76 GL by Victoria. The difference between the total surface water BDL and SDL is the same, 23 GL.

For take from a watercourse (excluding basic rights), early discussions with the MDBA identified a revised method of total entitlement volume as the method for determining BDL, SDL and permitted take. This would have increased the BDL and SDL to 5,790 ML. In late 2018 the MDBA advised that this would not be an acceptable method. Victoria proposes to use a similar method as that used for Basin Cap for determining BDL and SDL for take from a watercourse (excluding basic rights). The Basin Cap method used a proportion (1.9%) of the volume determined for take from a regulated river (excluding basic rights).

Therefore, the BDL for take from a watercourse (excluding basic rights) is equal to 1.9% of the BDL for take from a regulated (excluding basic rights) . This equates to a volume of 1.3 GL for the Wimmera-Mallee (surface water) SDL resource unit). As there is no water recovery in the unregulated system, the SDL equals BDL for this form of take.

Recognising there are flaws in this method, Victoria is proposing to revise the estimate within the next two years to determine a more accurate means of representing levels of take as at 2010 for this form of take.

Table 3: Comparison of Victoria's and Basin Plan surface water BDL and SDL estimates for each form of take

	Form of take	Basin Plan		Victoria		Explanation
		BDL (GL)	SDL (GL)	BDL (GL)	SDL (GL)	
(a)	Take from a regulated river (excluding basic rights)	66	43	66.87	43.84	Changes in estimates is based on an updated model
(b)	Take from a watercourse (excluding basic rights)*	1	1	1.3	1.3	This volume was estimated based on a percentage of Take from a regulated river (excluding basic rights).*
(c)	Take from a waterway under basic rights	—	—	1.07	1.07	The volume is estimated based on a model of domestic and stock demand. This volume also includes a best estimate of take under section 8A by Traditional Owners
(c) (i)	Take from a regulated river under basic rights	—	—	—	—	This is not being estimated separately
(c) (ii)	Take from a watercourse under basic rights	—	—	—	—	This is not being estimated separately
(d)	Take by runoff dams**	61	61	24.10	24.10	Volume is based on more accurate data and comprises consumptive take and take for domestic and stock purposes by runoff dams
(d) (i)	Runoff dams (excluding domestic and stock)	—	—	13.10	13.10	This volume was estimated based on the sum of existing entitlements recorded on the VWR as of July 2016
(d) (ii)	Runoff dams (domestic and stock)	—	—	11.0	11.0	Estimate is based on modelling using the number and volume of dams shown in aerial imagery as at 2005 adjusted to account for the entitlements shown in item (d)(i)
(e)	Net take of water by commercial plantations	1	1	5.70	5.70	Estimate is based on modelling recently undertaken by DELWP
	TOTAL (GL)	**129**	**106**	**99.04**	**75.9**	

* The BDL and SDL for this form of take is subject to review as outlined above. Following the two year review the volume may change. Accreditation of this volume does not prohibit Victoria from providing a revised estimate of BDL and SDL for take from a watercourse, excluding basic rights that increases the volume.

** It is expected that the significant difference in these two estimates is due to the large number of dams in the region that were historically connected to the channel supply system but do not harvest surface runoff and hence have been excluded from Victoria's estimates of take via detailed analysis of the aerial imagery. Victoria's estimates are based on the best available information and a fit-for-purpose method.

For groundwater, the Basin Plan estimates of BDL and SDL have been adopted as shown in Table 4.

Table 4: Basin Plan groundwater BDL and SDL estimates for each form of take

Form of take		Basin Plan	
		BDL (ML)	SDL (ML)
Wimmera–Mallee: Highlands SDL Resource Unit			
1	Take from groundwater (excluding basic rights)	1,110	2,575
2	Take from groundwater under basic rights	150	175
Wimmera–Mallee: Sedimentary Plain SDL Resource Unit			
3	Take from groundwater (excluding basic rights)	67,770*	189,284*
4	Take from groundwater under basic rights	1,130	816
Wimmera–Mallee: deep SDL Resource Unit			
5	Take from groundwater (excluding basic rights)	0	20,000
6	Take from groundwater under basic rights	0	0

Note: For item 3 in the table volumes for the Wimmera–Mallee: Sedimentary Plain SDL resource unit currently include the volumes taken in West Wimmera; therefore the SDL volume is the volume identified minus West Wimmera take. The West Wimmera GMA entitlement portion in the Murray–Darling Basin is 3.2 GL (at 30 June 2018).

3. Surface water

3.1 Determination of permitted and actual take

10.10(4) The methods for determining permitted take for all forms of take are based on identical climate sequences to those used for determining SDL and therefore will result in meeting the SDL for the relevant SDL resource unit. **Table 7** of the Methods Report at **Appendix C** to the Wimmera-Mallee Comprehensive Report shows the volumes of SDL and permitted take for each form of take to demonstrate the methods.

See **Part 3.3** of the Methods Report for surface water at **Appendix C** to the Wimmera-Mallee Comprehensive Report for an explanation of the demonstration of the methods.

Under section 10.10 of the Basin Plan the Wimmera–Mallee Water Resource Plan is required to set out the method for determining permitted take for each form of take in the water resource plan area. The method for determining permitted take must be applied at the end of each accounting period (yearly). Actual take must be assessed against permitted take to ensure that the volume of water actually taken during the year does not exceed permitted take and therefore will not lead to exceeding the SDL.

The Basin Plan, section 6.10, defines permitted take to be the maximum volume of water permitted to be taken by each form of take for consumptive use from the SDL resource unit. Section 6.10 defines actual take as the sum of the volume of water actually taken by each form of take for the consumptive use from the SDL resource unit.

Permitted take is calculated for each form of take using the methods detailed below. Actual take is the water diverted or taken by water users from the resource or system to be stored or used. See Part 10.4 of this plan for more discussion on actual take.

3.1.1 Managing and determining take in the Wimmera–Mallee

In the Wimmera–Mallee (surface water) water resource plan area there are the following forms of take:

- take from a regulated river (excluding basic rights)
- take from a watercourse (excluding basic rights)
- take from a regulated river under basic rights
- take from a watercourse under basic right
- take by runoff dams (excluding basic rights)
- take by runoff dams under basic rights
- net take by commercial plantations.

Below is a summary of the water management framework and assessment tools used to determine actual take for the above forms of take.

Where the form of take relates to take under a Victorian entitlement (water access right) the Victorian water management framework has measures in place to ensure that actual take during the accounting period is responsive to water availability during that same period. These mechanisms are outlined below.

For forms of take that rely on the estimation of use because they are not actively monitored and take is not metered, the tools used to estimate the volume of actual use are outlined below. These forms of take relate to take under basic rights (domestic and stock right and right of Traditional Owners to take water under section 8 and section 8A of the Victorian Water Act

respectively) either directly from the river or by way of runoff dams and take by commercial plantations.

3.1.1.1 Take from regulated rivers (excluding under basic rights)

This form of take accounts for the largest proportion of total surface water take in the Wimmera–Mallee water resource plan area. The Wimmera–Mallee system includes all regulated rivers in the Wimmera–Mallee water resource plan area.

GWMWater's bulk entitlement (*Bulk Entitlement (Wimmera and Glenelg Rivers – Grampians Wimmera Mallee Water) Conversion Order 2010*) grants the corporation the right to harvest and store water flows in the Wimmera–Mallee system with a complementary obligation to supply all entitlement holders who have an entitlement to take water from the system.

- While this system primarily relates to take from regulated rivers, it also includes take from several small diversions on unregulated tributaries in the catchment that are part of the overall Wimmera–Mallee supply system and are covered under GWMWater's bulk entitlement. These include the Mt Cole, Langi Ghiran and Panrock Creek diversions in the upper reaches of the Wimmera Basin. For the purpose of this method the take from these small tributaries is considered part of the regulated take as the volume is negligible and it is managed as part of the regulated system under the same bulk entitlement.
- It also includes water taken from the Glenelg River catchment and used to supply the Wimmera–Mallee system. These flow diversions are physical transfers into the Murray–Darling Basin, not a natural surface water connection.

GWMWater, as the storage manager, is required to determine the available water that can be taken from the system during the accounting period and make the corresponding water allocations for all consumptive users and the environment. Schedule 2 of the storage manager instrument of appointment establishes the rules the storage manager must use when determining available water and making allocations on a monthly basis.[1] This is how water is managed during the season to ensure that water allocated to users and hence authorised for use under the Victorian framework will not lead to the permitted take for the year being exceeded.

These allocation rules are replicated in the water resource plan model, which is used as the method for determining permitted take at the end of each year and is how the method responds to water availability as required under section 10.10(2) of the Basin Plan. Refer to schedule 1 below for the relevant allocation rules from schedule 2 of the storage manager instrument of appointment.

The Wimmera–Mallee SDL model for take from regulated rivers (excluding basic rights) represents the infrastructure, policy, operational rules and full use of entitlements as for the BDL conditions (i.e as at 31 October 2010), except for transfer of former irrigation entitlement (19 GL) and the associated distribution losses (9 GL) to the Commonwealth Environmental Water Holder. The water resource plan model will be developed for take from regulated rivers (excluding basic rights) by:

- updating the SDL model to represent current infrastructure, policy, operational rules and full use of entitlements as required and defined by the currently published Bulk and Environmental Entitlements relevant to Wimmera–Mallee (surface water) water resource plan area (i.e. 2014 BEs and EEs)
- scaling the modelled diversions to ensure that average annual diversion over the historical climate conditions from 1895 to 2009 matches the SDL.

It is Victoria's position that permitted take equals the sustainable diversion limit to allow Victorian water users the ability to fully use all water available under the prescribed SDL.

The water resource plan model incorporates changes between 2009 and 31 December 2017 to account for changes since setting SDLs for the Wimmera–Mallee relevant at the time of accreditation. Any changes to infrastructure or operational rules that impact on the application

1 http://www.gwmwater.org.au/about-the-storage-manager/instrument-of-appointment

of the water resource plan model to adequately determine permitted take during the life of the Wimmera–Mallee Water Resource Plan will be considered in accordance with the review process outlined at Part 1.2 of the plan.

The water resource plan model will be used for determining the annual permitted take and assessing annual compliance in the Wimmera–Mallee (surface water) water resource plan area for take from regulated rivers as follows:

1. extend the Wimmera–Mallee water resource plan model input data (inflows, rainfall, evaporation, demands) to 30 June, being the end of the last water accounting year
2. run the model from 1 July 2019 to the end of the last water accounting year by initialising the simulation with recorded storage volumes at the end of June 2019
3. determine the annual permitted take using the consumptive diversions calculated by the model
4. determine the difference between the annual actual take and annual permitted take
5. determine the new cumulative balance of the difference between annual permitted take and annual actual take for the water accounting years commencing 1 July 2019
6. assess the compliance with the annual SDL by comparing the new cumulative balance with the agreed noncompliance trigger volume.

3.1.1.2 Take from watercourses that are not regulated rivers (excluding basic rights)

This category includes take by small urban water supply systems and take and use licensees. The total volume authorised to be taken under bulk entitlements and take and use licences (outlined below) for this form of take equals 5,790 ML per year.

A number of very small towns have their water supplies in the headwaters of the Wimmera and Avoca catchments:

- Amphitheatre, Avoca, and Redbank are supplied by Central Highlands Water from small reservoirs on tributary streams in the upper Avoca catchment under three bulk entitlements:
  - *Bulk Entitlement (Amphitheatre) Conversion Order 2003*
  - *Bulk Entitlement (Avoca) Conversion Order 2003*
  - *Bulk Entitlement (Redbank) Conversion Order 2003*
- Landsborough and Navarre are supplied by Central Highlands Water from tributary streams in the upper Wimmera catchment under *Bulk Entitlement (Landsborough–Navarre) Conversion Order 2003*
- Elmhurst, Buangor, Moyston, Wickliffe and Lake Bolac are supplied by GWMWater, and Glenthompson is supplied by Wannon Water with water sourced partly from GWMWater's diversion weirs on small tributary streams in the upper Wimmera and Wannon catchments under:
  - *Bulk Entitlement (Willaura, Elmhurst and Buangor systems—Grampians Wimmera Mallee Water) Conversion Order 2012*
  - *Bulk Entitlement (Willaura System—Wannon Water) Conversion Order 2012*

These small water supply systems are independent of the nearby Wimmera–Mallee system and are classified as diversions from watercourses that are not regulated. They have a combined upper limit take of 862 ML per year. The authorisation to take water under bulk entitlement is based on full utilisation of each entitlement, however these instruments do specify rules that limit take that can respond to water availability year to year, including:

- minimum passing flows to be met before diversions can occur, and in some cases the months of the year when no diversion is permitted
- capacity of on-stream storage

- maximum rates of diversion
- volumetric limits on take

Take and use licences are used to authorise the take and of water by individual water users from the system. A total of 4,928 ML is authorised to be taken under take and use licences issued to individuals on various unregulated watercourses in the Wimmera-Mallee water resource plan area. These licences comprise of:

- 2,239 ML of licences on the Wimmera River and its tributaries
- 2,689 ML of licences on the Avoca River and its tributaries.

Similar to bulk entitlements, while full utilisation is assumed when authorising take under these instruments, take and use licence holders are required to comply with rosters, bans or restrictions. These rosters, bans and restrictions are articulated in either local management plans or water supply protection area water management plans.

The interim method for determining permitted take and actual take is outlined in **Part 3.1.2**. The existing simulation model for the Wimmera–Mallee system does not include take on these unregulated streams. Victoria does not support the development of a new simulation model suitable for determining annual SDL compliance for this component of take because of the high cost for a very limited return. Incorporating rules that apply to bulk entitlements and take and use licences that affect the rate and volume of water that can be diverted in response to water availability is difficult due to the varied nature in which they are applied. In late 2018 the MDBA advised that Victoria's proposed method of using entitlements to determine permitted take was not appropriate. Therefore alternative approaches must be investigated to determine the most appropriate method for determining permitted take.

Until Victoria can determine a more appropriate and cost-effective method for determining permitted for take from a watercourse (excluding basic rights) that recognises adjustments under bans and restrictions it is proposed that the permitted take method is the same as the annual actual take determination in the water accounting period. By setting permitted take equal to actual take Victoria will not be able to accumulate credits under SDL reporting for water not taken under the SDLs year to year until the method is updated. This is appropriate given the alternative method of using total entitlement volume is not reflective adjustments that are made during the year to respond to water availability and therefore may result in the accumulation of credits in years of low availability when the water could not actually be taken. This approach also reflects that the BDL and SDL methods also need to be revised to determine a more accurate means of representing levels of take as at 2010 for this form of take.

Accreditation of this method does not prejudice Victoria from identifying a method on review that would enable the accumulation of credits if actual take is below what would be permitted in a given year.

This method will be reviewed in 2 years. The review will allow for the permitted take method to be an annual representation of the sustainable diversion limit. The SDL will equal the BDL, and the BDL will be revised to determine the best representation of water available under unregulated bulk entitlements and take and use licences.

3.1.1.3 Take from a regulated river and watercourses under basic rights

Basic rights are defined under the Basin Plan to include rights to take water for domestic and stock purposes and a native title right. Under Victorian legislation basic rights are prescribed in section 8 and Traditional Owner's rights are described in section 8A of the Victorian Water Act.

Under section 8, waters users have a right to take water, free of charge, from a waterway for domestic and stock purposes under prescribed circumstances (see **Part 6.2** of the Wimmera–Mallee Water Resource Plan for more detail on basic rights). In general terms, people or

businesses can exercise that right if they own the land over which the water is flowing, or their land is next to a waterway of which the bed and banks remain the property of the Crown. The rights do not apply where there is Crown frontage between the waterway and freehold land.

The right of Traditional Owners to take water under section 8A aligns with the requirements under section 8 regarding the circumstances in which the right to take can be exercised. Traditional Owner rights to take water under section 8A are outlined in more detail at **Part 6.2.2** of the plan. At the time of making this report there are no circumstances of Traditional Owner groups exercising this right in the Wimmera–Mallee water resource plan area. However, this may change as a result of the implementation of the Aboriginal Water policy outlined in Water for Victoria.

Take under basic rights is generally not metered and the volume of take is difficult to estimate precisely. Take under this right may be metered in circumstances where bores or pumps are used to take water for other purposes under an entitlement in addition to water taken under domestic and stock rights. In these cases, a meter may be attached to the works. However, where the works provide only for take for domestic and stock rights there is no requirement to install a meter to monitor volumes of take.

While take under this right is not metered, total take is relatively small because water taken under this right cannot be used for commercial purposes and the majority of the regulated parts of the Wimmera and Avoca Rivers and their tributaries are covered by a Crown Reserve. Further, the unregulated rivers in this area dry up regularly and the majority of the unregulated parts of the Wimmera and Avoca Rivers and their tributaries are bordered by Crown Reserve. Therefore, the landowners who are separated from the waterway by Crown land are not eligible to exercise the right under section 8.

In addition, due to irregular seasonal flows in this region, the majority of stock and domestic take in these circumstances is likely to be harvested and stored in runoff dams. These dams are already included as a separate form of take.

The method for determining permitted and actual take is outlined in **Part 3.1.2**. The method uses the upper limit estimates due to the uncertainty around domestic and stock estimates and therefore opting to take the most conservative approach.

3.1.1.4 Take by runoff dams (excluding basic rights)

Runoff dams (often referred to in Victoria as small catchment dams) are small dams not located on a defined watercourse. Runoff dams used for commercial and irrigation purposes are required to be licensed or registered in Victoria. Refer to **Part 10** for further details on runoff dams.

The volume of water authorised to be taken by these runoff dams by individuals is estimated to be 13,100 ML in the Wimmera–Avon and Avoca Basins. The estimate was obtained from the VWR as of July 2016.

3.1.1.5 Take by runoff dams under basic rights

Under section 8 of the Victorian Water Act, landholders may take water free of charge for domestic and stock use under prescribed circumstances. As with other section 8 rights, the take is not required to be metered.

Victoria has estimated the number and volume of runoff dams used for domestic and stock purposes in the Wimmera–Mallee (surface water) water resource plan area and also the total annual extraction, which varies with climatic conditions. These estimates were made from desktop studies using maps and aerial photographs.

Many dams identified in aerial photographs were already licensed and so were already counted as a different form of take. These licensed dams were separated, based on the data available, to avoid double counting of take.

The volume of water authorised to be taken by unlicensed runoff dams used for stock and domestic (basic rights) purposes within the Wimmera–Mallee (surface water) water resource plan area is 11,000 ML.

When estimating the volume of permitted take and actual take for runoff dams under basic rights the volume determined does not represent a legislative limit for take under section 8 rights. The Victorian Water Act does not set a volumetric limit on the right to take water under section 8. The right to take water under section 8 is limited by the method of access and the purposes for which the water may be used.

3.1.1.6 Net take by commercial plantation

The effect of commercial forestry plantations on the water balance in the Wimmera–Mallee (surface water) water resource plan area is not accurately monitored and good data is not readily available.

The annual permitted take of water by commercial plantations will be estimated as the difference between the long-term average rate of evapotranspiration from plantations that were present in 2009 and from the vegetation type that was thought to be present before the plantation was established. The long-term average rate of evapotranspiration will be estimated using the SoilFlux model. Commercial plantations cover an area of 42 km^2 within the Wimmera–Mallee water resource plan area and take an estimated 5,700 ML per year.

3.1.2 Methods for permitted and actual take

Section 10.10(1) of the Basin Plan requires that for each SDL resource unit in the Wimmera–Mallee water resource plan area the plan set out the methods for determining the maximum volume of water that the plan permits to be taken for consumptive use during a water accounting period.

The determination of permitted take in the Wimmera–Mallee (surface water) water resource plan area varies depending on the form of take. **Table 5** outlines the methods used for determining permitted take for each form of take in the Wimmera–Mallee (surface water) water resource plan area.

Section 10.15 of the Basin Plan requires that the Wimmera–Mallee Water Resource Plan sets out how the volume of water actually taken for consumptive use will be determined for each form of take within each SDL resource unit. This will be completed at the end of each water accounting period using the best available information at the time. The methods for determining actual take for each form of take in the SDL resource unit Wimmera–Mallee (surface water) water resource plan area is outlined in **Table 5**.

3.1.2.1 How water availability is considered

Section 10.10(2) of the Basin Plan requires the method to be designed to be applied after the end of the relevant water accounting period, having regard to the water resources available during that period.

In respect of take from a regulated river excluding basic rights, the impact of water availability is managed in practice throughout the accounting period on a monthly basis. Water available during the period is accounted for in the water resource plan model at the end of the period based on seasonal conditions in the preceding year and the allocation rules detailed in **Part 3.1.1** and **Schedule 1** of this report.

For take from watercourses (excluding take under basic rights) the method for determining permitted take is linked to actual take (discussed above at **Part 3.1.1.2**). As actual take adjusts to water availability it is considered the most appropriate method until a more appropriate method is developed that recognises adjustments under bans and restrictions. Actual take in this

circumstance will be adjusted by measures that respond to water availability (see **Part 6.7** of the Comprehensive Report) or water shortages during extreme dry periods (see **Part 9.3** of the Comprehensive Report).

For all other forms of take, there is no mechanism to allocate or restrict water take on an annual basis and the estimates are based on long-term averages hence the method for permitted take does not take into account water availability on an annual basis.

10.10(2) The method is applied at the end of each accounting period having regard to the water resources available during that period.

3.1.2.2 Consistency with permitted take method

Section 10.15(3) of the Basin Plan also requires that the determination of actual take where it is estimated is done consistently with the method used to determine permitted take. **Table 5** identifies the methods for actual and permitted take. For all forms of take where actual take is estimated, the same method is used to determine permitted take.

10.15(3) In the Wimmera–Mallee water resource plan area, where the determination of actual take is estimated, the method is the same as the method used to determine permitted take under 10.10(1) of the Basin Plan.

Table 5: Methods for determining permitted take—surface water

Form of take	Method		Best available information
	Permitted take (accredited text for 10.10(1))	Actual take (accredited text for 10.15(1))	
Take from a regulated river (excluding basic rights)	The method used for determining permitted take for take from a regulated river (excluding basic rights) in the Wimmera–Mallee (surface water) water resource plan area is the scaled water resource plan model which was developed by: • updating the SDL model to represent infrastructure, policy, operational rules and full use of entitlements as required and defined by the currently published Bulk and Environmental Entitlements relevant to Wimmera–Mallee (surface water) water resource plan area (i.e. 2014 BEs and EEs) as at 31 December 2017 • scaling the modelled diversions to ensure that average annual diversion over the historical climate conditions from 1895 to 2009 matches the SDL. The scaled water resource plan model will be used at the end of each year as follows: • extend the inputs (inflows, rainfall, evaporation and demands) to 30 June, being the end of the last water accounting year • run the model from 1 July 2019 to the end of the last water accounting year by initialising the simulation with recorded storage volumes at the end of June 2019 • determine the annual permitted take using the consumptive diversions calculated by the model • less any incomplete recovery for the Wimmera-Mallee (surface water) SDL resource unit. The model version is from 16 May 2018 and the key model files are: • WP01.sys • WP01.scn • WP01.log The disposal and acquisition of held environmental water is accounted for separately and in a manner that does not affect the permitted take method.	The actual take for the Wimmera–Mallee (surface water) water resource plan area is the sum of all diversions taken under an entitlement from a regulated river excluding take of environmental water held (or HEW) by VEWH and CEWH as recorded in the VWR as of 30 June in each year.	The water resource plan model was run over the historic record and results show that the method results in the SDL being achieved. This scaling is done to ensure that permitted take reflects the SDL, on an annual basis for the resources in the Wimmera–Mallee water resource plan area. Victoria's position is that permitted take equals the SDL to allow Victorian water users the ability to fully use all water available under the prescribed SDL. The water resource plan model incorporates changes between 2009 and 31 December 2017 to account for changes since setting SDLs for the Wimmera–Mallee relevant at the time of accreditation. Any changes to infrastructure or operational rules that impact on the application of the water resource plan model to adequately determine permitted take during the life of the Wimmera–Mallee Water Resource Plan will be considered in accordance with the review process outlined at Part 1.2 of the plan. The method includes reference to any incomplete recovery to ensure that any outstanding recovery can be accounted for in the method. It is not expected that there will be incomplete recovery in the Wimmera-Mallee water resource plan area at the time of accreditation of the Wimmera-Mallee Water Resource Plan.

Form of take	Method		Best available information
	Permitted take (accredited text for 10.10(1))	Actual take (accredited text for 10.15(1))	
Take from a watercourse (excluding take under basic rights)	Permitted take equals actual take, where actual take equals is the sum of all diversions taken under an entitlement from a watercourse that is not a regulated river minus environmental water held (or HEW) by VEWH and CEWH as recorded in the VWR as at 30 June in the relevant year.	Actual take is the sum of all diversions taken under an entitlement from a watercourse that is not a regulated river minus environmental water held (or HEW) by VEWH and CEWH as recorded in the Victorian Water Register as at 30 June in the relevant year.	The method will be used for 2 years whilst Victoria undertakes a review of a more accurate method of determining permitted take from a watercourse (excluding basic rights). It is not cost effective or fit for purpose to develop a simulation model for the small volume of the SDL that applies to this form of take. Until Victoria can determine a more appropriate and cost-effective method for determining permitted for take from a watercourse (excluding basic rights) that recognises adjustments under bans and restrictions it is proposed that the permitted take method is the same as the annual actual take determination in the water accounting period. By setting permitted take equal to actual take Victoria will not be able to accumulate credits under SDL reporting for water not taken under the SDLs year to year until the method is updated. This is appropriate given the alternative method of using total entitlement volume is not reflective adjustments that are made during the year to respond to water availability and therefore may result in the accumulation of credits in years of low availability when the water could not actually be taken. This approach also reflects that the BDL and SDL methods also need to be revised to determine a more accurate means of representing levels of take as at 2010 for this form of take. Accreditation of this method does not prejudice Victoria from identifying a method on review that would enable the accumulation of credits if actual take is below what would be permitted in a given year. Using this method eliminates Victoria's ability to accumulate credits against SDL reporting where permitted take has not responded to low water availability in the same way as actual take does. Given that advice from MDBA regarding the appropriateness of the method was not provided until late 2018 Victoria has agreed to a 2 year review period within which a new more appropriate method will be developed. The application of the method proposed in this Table does not prejudice Victoria from adopting a method in 2 years which could result in the accumulation of credits under SDL reporting.

continued

Form of take	Method		Best available information
	Permitted take **(accredited text for 10.10(1))**	**Actual take** **(accredited text for 10.15(1))**	
Take from a regulated river under basic rights Take from a watercourse under basic rights	Estimated as the sum of: • a modelled estimate of the volume of water taken from freehold land and Crown frontage based on estimated domestic demand of 0.3 ML/house/year and stock drinking water of 0.03ML/year/per ha of land grazed. • an estimate of the volume of expected water demand under section 8A of the Victorian Water Act where the Traditional Owners have a natural resource agreement under the *Traditional Owner Settlement Act 2010*		This is the baseline diversion limit (BDL) method. Water taken under this form of take can only be used for stock and domestic or in accordance with a section 8A right and represents a relatively consistent pattern of use compared to commercial uses of water. As such, the volume of water taken is not expected to vary greatly from year to year. The method to determine annual permitted take is based on estimates of the long-term average of water taken each year having regard to the water resources available in the water accounting period. This is explained in Stock and Domestic Water Use Modelling Resource Manager's Handbook (RMCG, 2011) and is based on best available information. The modelled estimate uses the upper limit to account for the uncertainty in domestic and stock estimates. The method for determining permitted take and actual take is fit-for-purpose for this form of take. The number of properties with access to a main waterway is determined in accordance with GIS modelling. A review of the number of properties will be conducted five yearly, to account for any subdivisions. To date there has been no water taken under section 8A of the Victorian Water Act in the Wimmera-Mallee (surface water) water resource plan area. For this reason, an estimate has been made of the expected demand for the Wimmera-Mallee (surface water) water resource plan area. Further work is being undertaken in response to Part 14 of Chapter 10 of Basin Plan to build capacity of Aboriginal communities and explore how section 8A can be utilised. As the level of take increases the method will be reviewed to consider whether it needs to be amended. Where take under basic rights increases to a level that may impact on compliance with sustainable diversion limits, section 10.13 of the Basin Plan applies (for more information see Part 8).

continued

Form of take	Method		Best available information
	Permitted take (accredited text for 10.10(1))	Actual take (accredited text for 10.15(1))	
Take by runoff dams (excluding basic rights)	To be determined from the total volume of licences and registrations based on a fixed annual volume in the VWR as at 30 June in the relevant year (being the water accounting period). Note: Total volume of licences and registrations refers to the maximum volume authorised to be taken under take and use licences and registration licences..		This is the BDL method. The method for determining permitted take and actual take is fit-for-purpose for this form of take, and has appropriate regard to the water resources available in the water accounting period for this form of take. This is the volume of existing entitlements based on data from the VWR as at 30 June in the relevant year. Information on the VWR is considered to be the best available information regarding entitlements in Victoria. Bulk entitlements are not included as no bulk entitlements have been issued for this form of take in the Wimmera-Mallee water resource plan.
Take by runoff dams (basic rights)	Estimate is based on modelling using the number and volume of dams shown in aerial imagery as at 2005, adjusted to ensure that dams which are associated with entitlements which are not basic rights are fully excluded. Entitlement information was adopted as given in the Victorian Water Register as at July 2016.		As forecast information is not reliable at the present time and introduces additional uncertainty into the estimate, the 2005 aerial imagery is considered to be the best available information for the BDL estimate. Changes in the extent of runoff dams within the Wimmera–Mallee (surface water) water resource plan area will be determined using aerial imagery periodically at least every 10 years. This information is proposed to be reviewed at least every 10 years as part of the review of sustainable water strategies and the plan will be amended as required to reflect any update in the method. Water taken under this form of take can only be used for stock and domestic or cultural purposes and represents a relatively consistent pattern of use compared to commercial uses of water. As such, the volume of water taken is not expected to vary greatly from year to year, and the method for permitted take uses the long-term averages taken. The method for determining permitted take and actual take is fit-for-purpose for this form of take.

continued

Form of take	Method		Best available information
	Permitted take (accredited text for 10.10(1))	Actual take (accredited text for 10.15(1))	
Net take by commercial plantations	Net take is estimated as the difference between the long-term average rate of evapotranspiration from commercial plantations that were present as at 30 June 2009 and from the vegetation type that was thought to be present before the commercial plantations were established. The long-term average rate of evapotranspiration is estimated using the SoilFlux model. The long-term average rate of evapotranspiration from commercial plantations present in 2009 was estimated by using the SoilFlux model with the following inputs: • areas of plantations present as at 2009 using data from the Victorian Land Use Information System (VLUIS) dataset 2009 and improved using aerial imagery and plantation industry data. This is considered the best available data of current commercial plantation conditions and best available evidence suggests that this has not changed between June 2009 and June 2016. • climate data between 1961 and 2016 from the Bureau of Meteorology The long-term average rate of evapotranspiration from plantations present before the commercial plantations were established was estimated by using the SoilFlux model with the following inputs: • Estimated land use types present prior to establishment of plantations present in 2009 using nearby land use data from the Victorian Land Use Information System (VLUIS) dataset and expert judgement. • climate data between 1961 and 2016 from the Bureau of Meteorology.		Victoria's estimate is based on modelling recently undertaken by DELWP, whereas the Basin Plan volume was an estimate prepared by the MDBA. The method is based on the SoilFlux model, which is considered to be the best available information. Changes in the extent of plantations within the Wimmera–Mallee (surface water) water resource plan area will be determined using information that is provided on an annual basis by the managers and owners of large plantation estates for bushfire and emergency management purposes. This information will be reviewed every ten years subject to any significant changes in the industry which would cause a review to occur earlier Take by this form is relatively consistent year to year, and the method uses the long-term average rate of evapotranspiration to calculate take. The method has appropriate regard to the water resources available in the water accounting period.

3.2 Matters accounted for in the permitted take method (10.12)

The matters identified in section 10.12 of the Basin Plan are accounted for in the methods proposed for determining the maximum volume of water that the plan permits to be taken for consumptive use during a water accounting period. **Table 6** outlines how the matters were taken into account (the alphabetical numbering corresponds to the paragraph numbering in Basin Plan 10.12).

10.12(1)(a) For the Wimmera-Mallee (surface water) water resource plan area and the Wimmera-Mallee (groundwater) water resource plan area, all forms of take from the SDL resource unit and all classes of water access rights are accounted for by the methods specified for the purposes of section 10.10(1) of the Basin Plan.

Table 6: Matters relating to accounting for water

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(a)	All forms of take from the SDL resource unit and all classes of water access right.	For the Wimmera–Mallee (surface water) water resource plan area all forms of take from the SDL resource unit and all classes of water access rights are accounted for by the methods specified for the purposes of 10.10(1), as detailed in Part 3.1 of this report. The classes of water access right accounted for by the methods are: • bulk entitlement, environmental entitlement and take and use licence (take from a regulated river and a watercourse) • take and use licence (runoff dams excluding basic rights) • section 8 and section 8A rights to take water (basic rights)
(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 (also referred to as carryover).	Carryover applies to take from a regulated river (excluding basic rights). Carryover is accurately accounted for in the model for the form of take being taken from a regulated river. Under Victorian instruments carryover is accounted for and included in the equation used by the storage manager to determine water available for take from a regulated river (excluding basic rights) for the season and set allocations as detailed in **Schedule 1** of this report. Carryover is not relevant to other forms of take.
(c)	For a surface water SDL resource unit, return flows must be taken into account in a way that is consistent with arrangements under the Murray–Darling Basin Agreement immediately before the beginning of the Basin Plan.	There are no identified return flows in the Wimmera–Mallee water resource plan area as at the time of preparing this plan. Therefore, return flows are not accounted for in the methods for determining permitted take for any forms of take.

continued

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(d)	Trade of water access rights	Trade of entitlements and allocation is only permitted in the Wimmera–Mallee system for take from a regulated river (excluding basic rights) and take from watercourses that are not regulated (excluding basic rights) within their relevant supply systems. Therefore, trade from one consumptive user to another has no impact on the volume of permitted take. The only trade that impacts on the permitted take volume for any form of take is where there is trade between consumptive use and environmental use. Any change to entitlement volumes or allocation as a result of trade is recorded in the VWR and is taken into account in the method used to determine permitted take for both forms of take, including separate accounting of held environmental water (10.12(3)). The trade of water from consumptive use to HEW or from HEW to consumptive use will not impact on the methods used to determine permitted take under section 10.10 of the Basin Plan. The net balance of any disposals or acquisitions of HEW will be used to adjust the cumulative balance.
(e)	Water resources which have a significant hydrological connection to the water resources of the SDL resource unit	Surface water transfers via infrastructure from the Glenelg system to the Wimmera–Mallee system are included in the SDL and the method for determining permitted take for regulated systems (excluding basic rights). There are no other significant hydrological connections to the water resources of the Wimmera–Mallee (surface water) water resource plan area - the Basin Plan considers this area to be disconnected from the River Murray.
(f)	Circumstances in which there is a change in the way water is taken or held under a water access right	The method used to determine permitted take for regulated rivers (excluding basic rights), includes simulation of environmental demand patterns that differ from previous consumptive demand patterns. The impacts of changes in consumptive demand patterns, e.g. as a result of any future trade or conversion of additional water savings to HEW, will be taken into account. This will be done by adjusting permitted take for trade of allocation in a single year or in updates to the method and water resource plan as a result of any permanent changes.

continued

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(g)	Changes over time in the extent to which water allocations in the unit are used. Note: Paragraph (g) includes what is commonly known as a growth-in-use strategy	Changes over time in the extent to which water allocations in the unit are utilised will be addressed through the related provisions provided for in relation to section 10.11(1) which will ensure SDL compliance. Changes to the permitted take method will be given effect consistent with the responses implemented by Victoria.
(h)	Water sourced from the Great Artesian Basin and released into a Basin water resource, by excluding that water.	This matter is not relevant to the Wimmera–Mallee (surface water) water resource plan area.
(i)	Water resources which are used to manage aquifer recharge	This matter is not relevant to the Wimmera–Mallee (surface water) water resource plan area.

3.3 Demonstration of method

Section 10.10(4) of the Basin Plan requires that the Wimmera–Mallee water resource plan 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 the meeting of the SDL for the resource unit, including as amended under section 23B of the Commonwealth Water Act.

For regulated rivers (excluding basic rights), as outlined above, the average annual diversion from the scaled water resource plan model over the historical climate period from 1895 to 2009 is equivalent to the SDL, i.e. the average annual diversion from the SDL model over the same historical climate period. Therefore, the scaled water resource plan model as a method for determining permitted take for the Wimmera–Mallee (surface water) water resource plan area demonstrates that if applied for a repeat of the historical climate conditions, the method meets the SDL, see Table 2 of the Wimmera-Mallee Water Resource Plan Model report (DELWP, 2018).

In Victoria, the method for determining permitted take is the same method used for determining the SDL for all other forms of take. This means that methods are based on the same climate sequences and therefore the permitted take method would always produce the same result as the SDL model. Therefore, the requirement under section 10.10(4) of the Basin Plan is considered satisfied for all forms of surface water take.

Given that Victoria is required to run the method for permitted take on an annual basis, only the long-term average of permitted take can be compared to the SDL to demonstrate compliance with SDLs over the life of the plan. **Table 7** identifies the same volumes for SDL and long-term average permitted take on the basis that the methods for calculating permitted take and SDL are identified and are based on identical climate sequences and therefore always provide the same result.

Table 7: SDL Volume and Permitted Take Volume (10.10(4) Basin Plan)

Form of take	SDL (ML)	Long-term average permitted take (ML)
Take from a regulated river (excluding basic rights)	43,842	43,842
Take from a watercourse (excluding basic rights)	1,299	1,299
Take from a waterway under basic rights which includes: • take from a regulated river under basic rights • take from a watercourse under basic rights	1,065	1,065
Take by runoff dams (excluding basic rights)	13,100	13,100
Take by runoff dams under basic rights	11,000	11,000
Net take by commercial plantations	5,700	5,700

4. Groundwater

4.1 Determination of permitted take and actual take

4.1.1 Permitted take

10.10(4) The methods for determining permitted take for all forms of take are identical to the method for determining SDL and are based on identical climate sequences and therefore always provide the same result. **Table 10** of the Methods Report at **Appendix C** to the Wimmera-Mallee Comprehensive Report shows the volumes of SDL and permitted take to demonstrate the methods.

See **Part 4.3** of the Methods Report for groundwater at **Appendix C** to the Wimmera-Mallee Comprehensive Report for an explanation of the demonstration of the methods.

Under section 10.10 of the Basin Plan the Wimmera–Mallee Water Resource Plan is required to set out the method for determining permitted take for each form of take in the water resource plan area. The method for determining permitted take must be applied at the end of each accounting period (yearly). Actual take must be assessed against permitted take to ensure that in the long term the volume of water actually taken during the year does not exceed permitted take and therefore will not exceed the SDL.

The Basin Plan, at section 6.10, defines permitted take to be the maximum volume of water permitted to be taken by each form of take for consumptive use from the SDL resource unit. Section 6.10 defines actual take as the sum of the volume of water actually taken by each form of take for the consumptive use from the SDL resource unit.

The determination of permitted take in the Wimmera–Mallee (groundwater) water resource plan area varies depending on the form of take. **Table 8** outlines the methods used for determining permitted take for each form of take in the Wimmera–Mallee (groundwater) water resource plan area.

4.1.2 Actual take

The Basin Plan (section 10.15) requires that a water resource plan set out how the volume of water actually taken will be determined after the end of the water accounting period using the best information available.

Actual take of groundwater incorporates entitlement use as recorded in the VWR and estimates of domestic and stock use (basic rights). The method incorporates information from the VWR, which is considered to have the most accurate information regarding the inputs into the method.

Water used as part of a Managed Aquifer Recharge Scheme is not relevant to the Wimmera–Mallee (groundwater) water resource plan area.

4.1.3 Managing and determining take in the Wimmera–Mallee

In the Wimmera–Mallee (groundwater) water resource plan area there are the following forms of take:

- take from an aquifer (excluding basic rights)
- take from an aquifer under basic rights.

These forms of take are prescribed as "take from groundwater" under the Basin Plan. For this reason, the tables in this report refer to take from groundwater when providing the methods and volumes for SDL and permitted take to meet Basin Plan requirements.

4.1.3.1 Take from an aquifer (excluding basic rights)

Take from an aquifer, excluding where it is under a basic right, is managed through Victoria's entitlement framework. A water user must hold a take and use licence and a works licence to take water from an aquifer. The works licence regulates the construction, use, maintenance and alteration of the bore used to extract groundwater. The take and use licence is the water access right that authorises the maximum volume the user is permitted to take in a year. The take and use licence also prescribes the place at which groundwater may be taken, the time and rate. These conditions protect other users and the aquifer by regulating how water is extracted overall by all users to prevent third party impacts from extraction and also protect the resource and environment.

In the Wimmera–Mallee: Sedimentary Plain SDL resource unit, the water taken from Basin resources in the West Wimmera is excluded from the water resource plan and from the SDL maximum volume. The limit on the taking of groundwater from the Wimmera–Mallee: Sedimentary Plain SDL resource unit excludes groundwater taken from the component of the West Wimmera Groundwater Management Area within the Murray–Darling Basin (see **Figure 1**). This volume is estimated to be 3.2 GL. (Victoria's section 71 report for 2017-18) The amount may vary due to trade within the West Wimmera Groundwater Management Area but is not expected to increase markedly, due to the poor quality of groundwater in the area.[2]

4.1.3.2 Take from an aquifer under basic rights.

Basic rights are defined under the Basin Plan to include rights to take water for domestic and stock purposes and a native title right. Basic rights are prescribed in section 8 and 8A of the Victorian Water Act.

Under section 8, water users have a right to take water, free of charge, from a bore for domestic and stock purposes under prescribed circumstances (see **Part 6.2** of the Wimmera-Mallee Water Resource Plan for detail on basic rights). In general terms, people or businesses can exercise that right if they own the land on which the bore is located.

Take under section 8 is generally not metered and the volume of take is unknown. Take under this right may be metered in circumstances where bores are used to take water for other purposes under an entitlement in addition to water taken under section 8. In these cases, a meter may be attached to the works; however, where the works only provide for take for domestic and stock rights there is no requirement to install a meter to monitor volumes of take. Take under basic rights is relatively small because water taken under this right cannot be used for commercial purposes including irrigation.

The right of Traditional Owners to take water under section 8A aligns with the requirements under section 8 regarding the circumstances in which the right to take can be exercised. Traditional Owner rights to take water under section 8A are outlined in more detail at **Part 6.2.2** of the Comprehensive Report. At the time of making this report there are no circumstances of Traditional Owner groups exercising this right in the Wimmera–Mallee water resource plan area. However, this may change as a result of the implementation of the Aboriginal Water Policy outlined in *Water for Victoria*.

2 *CSIRO and SKM, 2010, Sustainable extraction limits derived from the Recharge Risk Assessment Method – Victoria. CSIRO:Water for a Healthy Country National Research Flagship*

4.1.4 Methods

The methods for determining permitted take and actual take of groundwater in the Wimmera–Mallee water resource plan area apply to the following forms of take in the following SDL resource units:

- Wimmera–Mallee: Highlands
- Wimmera–Mallee: Sedimentary
- Wimmera–Mallee: deep

Table 8: Methods for determining permitted take and actual take—groundwater

Form of take	Method		Best available information
	Permitted take 10.10(1) Basin Plan	Actual take 10.15(1) Basin Plan	
Wimmera–Mallee: Highlands SDL resource unit			
Take from groundwater (excluding basic rights)	Permitted take is equal to the SDL for the Wimmera–Mallee: Highlands SDL resource unit as prescribed in schedule 4 of the Basin Plan minus the annual permitted take volume for take from groundwater under basic rights.[1]	Determined using entitlement data from all forms of take except basic rights use, on the VWR, based on the location of licensed and registered bores in the water resource plan SDL reporting area.	Permitted take for groundwater SDL resource units is determined by the SDL prescribed for the SDL resource unit. This method is considered the most appropriate method for the Wimmera–Mallee water resource plan as further work is required to determine the most appropriate and cost-effective means for determining permitted take for groundwater. The SDL volume for take from groundwater under basic rights is determined in accordance with the method described in this Table. The method reflects the volume specified in Table 4 of this Report. The method is fixed as at 30 June 2010. Further consultation is occurring between Basin states and the MDBA to progress the development of permitted take methods. In the absence of these methods, it has been agreed between Victoria and the MDBA to rely on SDL volumes for the respective SDL resource unit for setting permitted take. Actual take reflects entitlements in Victoria as this is how a user is authorised to take water in a given accounting period. Therefore, the water actually taken is equal to the water taken under entitlement for this form of take. The best available information in relation to entitlement use that is metered and recorded in the VWR.

continued

Form of take	Method		Best available information
	Permitted take 10.10(1) Basin Plan	Actual take 10.15(1) Basin Plan	
Take from groundwater under basic rights	Estimated based on the number of bores in the SDL resource unit less than 30 years old[2] with a rate of 2 ML/year[3] calculated as at 30 June 2010. The volumetric output from this method is outlined in Table 4 of this Report.		The method to determine permitted take and actual take is the same method used to determine the SDL for take from groundwater under basic rights for the Wimmera-Mallee: Highlands SDL resource unit. The volumetric output from this method is outlined in Table 4 of this Report. This estimate is considered to be based on the best available information. Victoria's assessment of bores and reasonable domestic and stock use identified: • 2 ML/year as a reasonable volume for domestic and stock users and is expected to be sufficient on average to allow for any uptake of Traditional Owner rights as permitted under basic rights • bores older than 30 years are considered to be non-functional and are excluded from the estimation (calculated as at 30 June 2010)
Wimmera–Mallee: Sedimentary Plain SDL resource unit			
Take from groundwater (excluding basic rights)	Permitted take is equal to the SDL for the Wimmera–Mallee: Sedimentary Plain SDL resource unit as prescribed in schedule 4 of the Basin Plan minus the annual permitted take volume for take from groundwater under basic rights.[4] The reduction in the SDL to account for the West Wimmera (as defined in Schedule 4 of the Basin Plan) is determined using entitlement data on the Victorian Water Register, based on the location of licensed bores.[5]	Determined using entitlement data from all forms of take except Basic Rights use, on the VWR, based on the location of licensed and registered bores in the water resource plan SDL reporting area (excluding bores in the West Wimmera Groundwater Management Area that are also in the Basin)	Permitted take for groundwater SDL resource units is determined by the SDL prescribed for the SDL resource unit. This method is considered the most appropriate method for the Wimmera–Mallee water resource plan as further work is required to determine the most appropriate and cost-effective means for determining permitted take for groundwater. The SDL volume for take from groundwater under basic rights is determined in accordance with the method described in this Table. The method reflects the volume specified in Table 4 of this Report. The method is fixed as at 30 June 2010. Further consultation is occurring between Basin states and the MDBA to progress the development of permitted take methods. In the absence of these methods, it has been agreed between Victoria and the MDBA to rely on SDL volumes for the respective SDL resource unit for setting permitted take. Actual take reflects entitlements in Victoria as this is how a person is authorised to take water in a given accounting period. Therefore, the water actually taken is equal to the water taken under entitlement for this form of take. The best available information in relation to entitlement that is metered and recorded in the VWR. A map showing the West Wimmera is provided at Figure 1 of this report.

Form of take	Method		Best available information
	Permitted take 10.10(1) Basin Plan	**Actual take 10.15(1) Basin Plan**	
Take from groundwater under basic rights	Estimated based on the number of bores in the SDL resource unit less than 30 years old with a rate of 2 ML/year (excluding those bores in the West Wimmera GMA) calculated as at 30 June 2010. The volumetric method is outlined in Table 4 of this Report.	Estimated based on the number of bores in the SDL resource unit less than 30 years old with a rate of 2 ML/year (excluding those bores in the West Wimmera GMA) calculated as at 30 June 2010.	The method to determine permitted take and actual take is the same method used to determine the SDL for take from groundwater under basic rights for the Wimmera-Mallee: Sedimentary Plain SDL resource unit. The volumetric output from this method is outlined in Table 4 of this Report. This estimate is considered to be based on the best available information. Victoria's assessment of bores and reasonable domestic and stock use identified: • 2 ML/year as a reasonable volume for domestic and stock users and is expected to be sufficient on average to allow for any uptake of Traditional Owner rights as permitted under basic rights • bores older than 30 years are considered to be non-functional and are excluded from the estimation (calculated as at 30 June 2010).
Wimmera–Mallee: deep SDL resource unit			
Take from groundwater (excluding basic rights)	Permitted take is equal to the SDL for the Wimmera–Mallee: Deep SDL resource unit as prescribed in schedule 4 of the Basin Plan minus the annual permitted take volume for take from groundwater under basic rights.[6]	Determined using entitlement data from all forms of take except Basic Rights use, on the VWR, based on the location of licensed and registered bores in the SDL resource unit.	Permitted take for groundwater SDL resource units is determined by the SDL prescribed for the SDL resource unit. This method is considered the most appropriate method for the Wimmera–Mallee Water Resource Plan as further work is required to determine the most appropriate and cost-effective means for determining permitted take for groundwater. The SDL volume for take from groundwater under basic rights is determined in accordance with the method described in this Table. The method reflects the volume specified in Table 4 of this Report. The method is fixed as at 30 June 2010. Further consultation is occurring between Basin states and the MDBA to progress the development of permitted take methods. In the absence of these methods, it has been agreed between Victoria and the MDBA to rely on SDL volumes for the respective SDL resource unit for setting permitted take. Actual take reflects entitlements in Victoria as this is how a user is authorised to take water in a given accounting period. Therefore, the water actually taken is equal to the water taken under entitlement for this form of take. The best available information in relation to entitlement use that is metered and recorded in the VWR.

continued

Form of take	Method		Best available information
	Permitted take 10.10(1) Basin Plan	Actual take 10.15(1) Basin Plan	
Take from groundwater under basic rights	Estimated based on the number of bores in the SDL resource unit less than 30 years old with a rate of 2 ML/year calculated as at 30 June 2010. The volumetric method is outlined in Table 4 of this Report.		The method to determine permitted take and actual take is the same method used to determine the SDL for take from groundwater under basic rights for the Wimmera-Mallee: deep SDL resource unit. The volumetric output from this method is outlined in Table 4 of this Report. This estimate is considered to be based on the best available information. Victoria's assessment of bores and reasonable domestic and stock use identified: • 2 ML/year as a reasonable volume for domestic and stock users and is expected to be sufficient on average to allow for any uptake of Traditional Owner rights as permitted under basic rights • bores older than 30 years are considered to be non-functional and are excluded from the estimation (calculated as at 30 June 2010)

1 The relevant SDL for take from groundwater under basic rights is outlined in Table 4 of this report.

2 Based on SKM 2012, An assessment of groundwater management and monitoring costs in Australia, Waterlines report, National Water Commission, Canberra. This considers observation bores; however, the typical domestic and stock bores installed more than two decades ago are mild-steel cased and have similar life expectancies to monitoring bores.

3 For examples see SKM, CSIRO and the Bureau of Rural Sciences 2010, Surface and/or groundwater interception activities: initial estimates, Waterlines report, National Water Commission, Canberra.

4 The relevant SDL for take from groundwater under basic rates is outlined in Table 4 of this report.

5 The limit on the taking of groundwater (licensed and domestic and stock) from the area of the Victorian West Wimmera Groundwater Management Area in the Murray Darling Basin (see Figure 1) under the Victorian Water Act is 3.2 GL (Victoria's section 71 report for 2017-18). The volume may vary due to trade within the West Wimmera Groundwater Management Area but is not expected to increase markedly, due to the poor quality of groundwater in the area (CSIRO and SKM 2010)

6 The relevant SDL for take from groundwater under basic rights is outlined in Table 4 of this report.

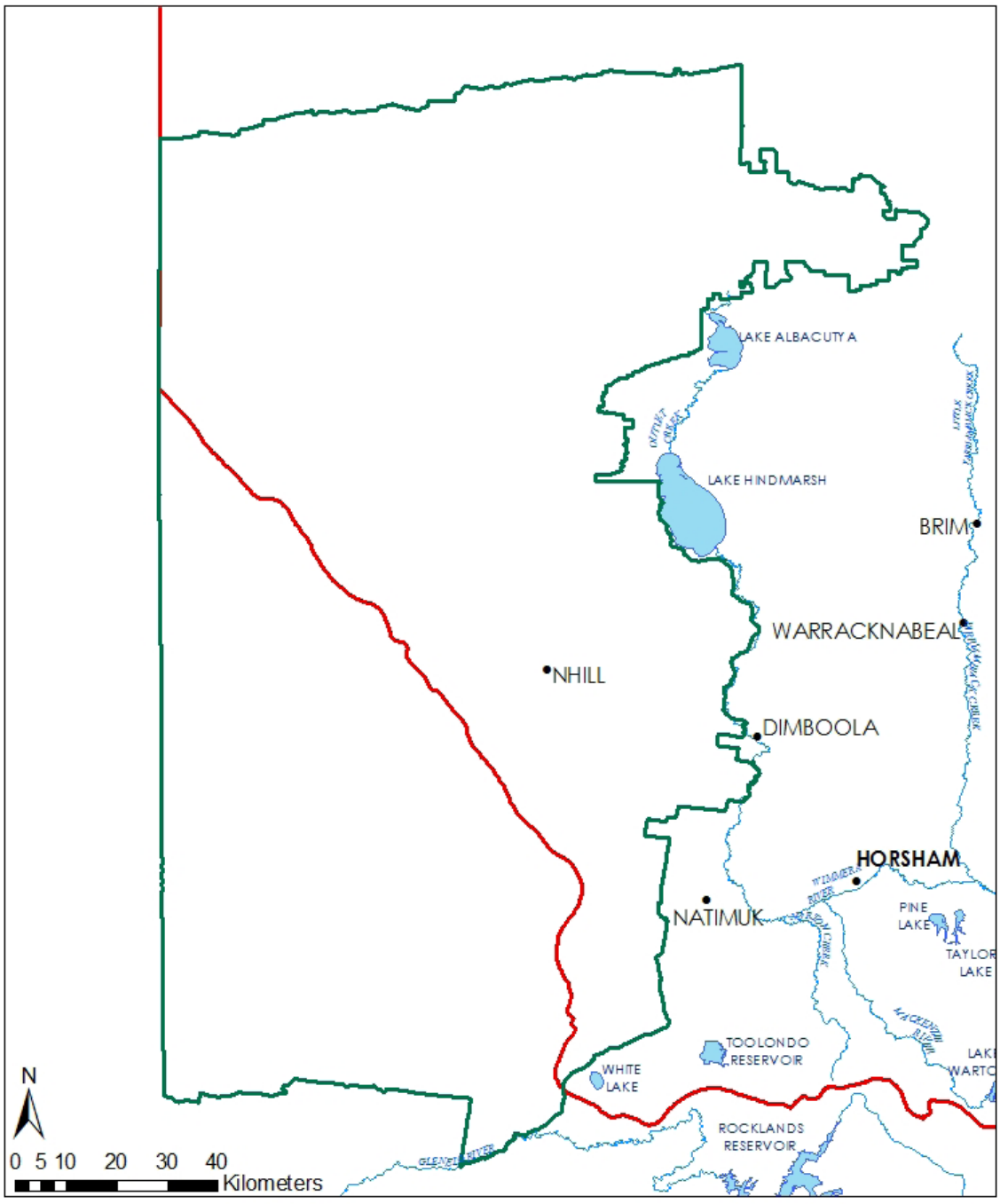

Figure 1: West Wimmera Groundwater Management Area and Wimmera-Mallee water resource plan Groundwater SDL boundary

4.2 Matters accounted for in the permitted take method (10.12)

The matters outlined in section 10.12 of the Basin Plan are accounted for in the methods proposed for determining the maximum volume of water that the plan permits to be taken for consumptive use during a water accounting period (the alphabetical numbering corresponds to the paragraph numbering in BP 10.12.

Table 9: Matters relating to accounting for water

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(a)	All forms of take from the SDL resource unit and all classes of water access right	All forms of take from the SDL resource unit and all classes of water access rights are accounted for by the methods specified for the purposes of 10.10(1). A different method has been developed for each form of take being taken from groundwater (excluding basic rights) and from groundwater under basic rights, as detailed in Part 4.1 of this report. The classes of water access right accounted for by the methods are: • take and use licences (take from groundwater) • section 8 and section 8A rights (take from groundwater under basic rights)
(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 (also referred to as carryover)	Carryover of groundwater take is permitted in some groundwater management areas and is recorded in the VWR. Carryover is considered to be taken into account in the method for annual permitted take as permitted take reflects the long-term average determined as the SDL for the relevant SDL resource unit. Victoria and the MDBA consider that the most appropriate method for determining permitted take for groundwater is to state that permitted take equals SDL. Carryover does not affect the method for permitted take as it reflects the long-term average take represented by SDL. Therefore, while it is "accounted for" in the method, it will not result in variations to the method to adjust annually for carryover as it occurs.
(c)	For a surface water SDL resource unit, return flows must be taken into account in a way that is consistent with arrangements under the Murray–Darling Basin Agreement immediately before the beginning of the Basin Plan	This matter is not relevant for the Wimmera–Mallee (groundwater) water resource plan area.

continued

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(d)	Trade of water access rights	Trade of entitlements to take and use groundwater is permitted in the water resource plan and is accounted for in the groundwater statutory and local management plans. Groundwater is not held under an entitlement for the environment and therefore the requirement in section 10.12(3) is not relevant for the Wimmera–Mallee (groundwater) water resource plan area. Therefore, the only trade that affects the SDL method for permitted take (based on the long-term average take) is trade between SDL resource units. Trade has been taken into account as it is permitted in the Wimmera-Mallee water resource plan area, however does not require an annual adjustment to the method for permitted take. This is because the permitted take reflects the long-term average level of take and trade cannot change the maximum volume of take permitted in the relevant system.
(e)	Water resources which have a significant hydrological connection to the water resources of the SDL resource unit	This matter is not relevant to the Wimmera–Mallee (groundwater) water resource plan area as any significant hydrological connections identified in response to section 10.05(b) of the Basin Plan were taken into account when determining the relevant SDL. For groundwater take, permitted take equals SDL for the relevant form of take and relevant SDL resource unit. While there is a significant connection between Victoria and South Australia across the Tertiary Limestone Aquifer (identified in response to section 10.05(b) of the Basin Plan), it is not relevant to the determination of permitted take as the connectivity informed the determination of the SDL for the Wimmera-Mallee: Sedimentary Plain SDL resource unit. The groundwater SDL does not include groundwater take within the West Wimmera groundwater management area (GMA), because the groundwater resources in the West Wimmera GMA have been excluded from the water resources of the Murray-Darling Basin under the Water Regulations 2008). This is due to the groundwater resources within the West Wimmera GMA being only remotely hydrologically connected to the River Murray and disconnected to surface ecosystems in the Murray-Darling Basin. See **Figure 1**.
(f)	Circumstances in which there is a change in the way water is taken or held under a water access right	This matter is not relevant to the Wimmera–Mallee (groundwater) water resource plan area.

continued

Section 10.12(1) Basin Plan requirements		How the matters were accounted for by the methods for determining permitted take
(g)	Changes over time in the extent to which water allocations in the unit are used. Note: Paragraph (g) includes what is commonly known as a growth-in-use strategy.	This matter is not relevant for the Wimmera–Mallee (groundwater) water resource plan area. The SDL method for permitted take allows for growth as full utilisation of existing licences is well below SDL and therefore growth in use is permitted up to this prescribed limit.
(h)	Water sourced from the Great Artesian Basin and released into a Basin water resource, by excluding that water	This matter is not relevant to the Wimmera–Mallee (groundwater) water resource plan area as there is no water sourced from the Great Artesian Basin.
(i)	Water resources which are used to manage aquifer recharge	This matter is not relevant for the Wimmera–Mallee (groundwater) water resource plan area. Currently there are no Managed Aquifer Recharge schemes operating or proposed in the Wimmera–Mallee (groundwater) water resource plan area.

4.3 Demonstration of method

Section 10.10(4) of the Basin Plan requires that the Wimmera–Mallee Water Resource Plan set out a demonstration that the method relates to the SDL of each SDL resource unit in such a way that, if applied over a repeat of the historical climate conditions, it would result in the meeting of the SDL for the SDL resource unit, including as amended under section 23B of the Commonwealth Water Act.

The demonstration or explanation as to how this requirement has been met is outlined in **Table 9** above for each method outlined in this report. **Table 8** relates to the methods for determining permitted take for groundwater forms of take.

Given that Victoria is required to run the method for permitted take on an annual basis, only the long-term average of permitted take can be compared to the SDL to demonstrate compliance with SDLs over the life of the plan. **Table 10** identifies the same volumes for SDL and long-term average permitted take on the basis that the methods for calculating permitted take and SDL are identified and are based on identical climate sequences and therefore always provide the same result.

Table 10: SDL volume and permitted take volume (10.10(4) Basin Plan)

Form of take	SDL (ML)	Long-term Average Permitted take (ML)
Wimmera–Mallee: Highlands SDL resource unit		
Take from groundwater (excluding basic rights)	2,575	2,575
Take from groundwater under basic rights	175	175
Wimmera–Mallee: Sedimentary Plain SDL resource unit		
Take from groundwater (excluding basic rights)	189,284*	189,284*
Take from groundwater under basic rights	816	816
Wimmera–Mallee: deep SDL resource unit		
Take from groundwater (excluding basic rights)	20,000	20,000
Take from groundwater under basic rights	0	0

* The limit on the taking of groundwater (licensed and domestic and stock) from the area of the Victorian West Wimmera Groundwater Management Area in the Murray Darling Basin (see Figure 1) under the Victorian Water Act is 3.2 GL (Victoria's section 71 report for 2017-18). The volume may vary due to trade within the West Wimmera Groundwater Management Area but is not expected to increase markedly, due to the poor quality of groundwater in the area (CSIRO and SKM 2010).

5. References

DELWP. (2018). *Wimmera-Mallee Water Resource Plan Model*. Melbourne: Department of Environment, Land, Water and Planning.

RMCG. (2011). *Stock and Domestic Water Use Modelling Resource Manager's Handbook*. Melbourne: Department of Environment, Land, Water and Planning.

Schedule 1: Wimmera–Mallee system allocation rules for regulated rivers

Extract of clause 2 and 3 of schedule 2 of the storage manager appointment instrument.

2. MAKING WATER ALLOCATIONS

2.1 In July and in each subsequent month until the maximum allocation for entitlements in Table 1 of this Schedule is reached, or at such other times as the storage manager believes it to be required, the storage manager must determine the water available to meet the entitlements in Table 1 of this Schedule, and bulk entitlement holders' share of that water in accordance with the following steps.

2.2 To determine the water available to meet entitlements, the storage manager must take the resources that could be diverted from the Wimmera–Mallee system, determined in accordance with clause 3 of this Schedule.

2.3 The storage manager must –

(a) use the water available as determined in accordance with sub-clause 2.2 to determine the water allocation to entitlement holders; and

(b) inform the entitlement holders of the water allocation determined under paragraph 2.3(a), and at the same time make available the method and calculations and any other information used to determine the water allocation.

Table 1: Shares of water available

Water available (ML)	A	B	C	D	E	F
	126,050	98,050	75,971	53,459	45,253	0
Grampians Wimmera Mallee Water						
System operating water:						
Pipeline and balancing storage losses	2,960	2,960	2,960	2,960	2,960	0
Commonwealth Environmental Water Holder	28,000	0	0	0	0	0
Glenelg compensation flow	3,300	3,300	825	50	50	0
Recreation	3,090	3,090	648	0	0	0
Wimmera–Mallee Pipeline Product	44,720	44,720	36,352	25,725	21,540	0
Coliban Water						
Wimmera–Mallee Pipeline Product	300	300	244	173	145	0
Wannon Water						
Wimmera–Mallee Pipeline Product	2,120	2,120	1,723	1,220	1,021	0
Environment						

continued

Water available (ML)	A	B	C	D	E	F
	126,050	98,050	75,971	53,459	45,253	0
Wetlands	1,000	1,000	250	0	0	0
Wimmera–Mallee Pipeline Product	40,560	40,560	32,970	23,332	19,537	0

Notes to Table 1:

- If the volume of water available is greater than shown for column A, the share is equal to the volume shown in column A.
- If the volume of water available is between any two columns, the share is linearly interpolated between the shares in the adjacent columns. For example, if there is 60,000 ML of water available (between columns C and D), Wannon Water's share is equal to: [(1,723-1,220)x(60,000-53,459)/(75,971-53,459)]+1,220 = 1,366 ML. The calculation is to be rounded to the nearest whole number.

3. THE RESOURCES THAT COULD BE DIVERTED IN THE CURRENT YEAR

3.1 The storage manager must, in determining water allocations, make an assessment of the resources that could be diverted from the headworks in the current year using the method outlined in Table 2 of this Schedule.

Table 2: Method for estimating the resources that could be diverted

Available water in month i	=	measured total volume in headworks at the start of month i
	-	estimate of total dead storage
	-	the volume of carryover and any accumulated passing flows defined under the schedule 1 of the Wimmera and Glenelg Rivers Environmental Entitlement Order 2010
	+	an estimate of harvestable inflows and pick-up from start of month i to 30 June next
	+	the measured total amount of water released from headworks from 1 July last to the start of month i
	-	the volume of reserve
	-	the estimated headworks losses from the start of month i to 30 June next

3.2 In making the assessment in sub-clause 3.1, the storage manager must –

(a) reach agreement with all entitlement holders on the method used to calculate –

(i) the estimated harvestable inflows and pick-up;

(ii) the estimates of headworks losses; and

(iii) the estimated dead storage,

(b) make available to all entitlement holders the information used to apply the method.