



Working Together

CONTACT

South Australian
Murray-Darling Basin
Natural Resources
Management Board

Mannum Road
PO Box 2343
Murray Bridge SA 5253

Phone: (08) 8532 1432
Fax: (08) 8531 1843

www.samdbnrm.sa.gov.au

Volumetric conversion for the Mallee Prescribed Wells Area

WHAT IS VOLUMETRIC CONVERSION?

Volumetric conversion is the process of changing current area-based licences to volumetric allocations. Historically irrigation licences in the Mallee Prescribed Wells Area (Mallee PWA) were issued as area-based allocations. The area-based allocations are expressed as hectare irrigation equivalents (haIEs), which has allowed irrigators to grow a maximum area of crop, rather than being limited to a volume. Once the water allocation plan is adopted all existing area-based licences will be issued with a volumetric limit, in accordance with the policies contained within the plan.



**All existing area-based
licences will be issued
with a volumetric limit.**



WHY DO WE NEED VOLUMETRIC CONVERSION?

State legislation and National policy agendas require all water allocations to be expressed as a volume and all water use to be measured to ensure compliance with annual volumetric limits. By limiting and monitoring the water quantity used against the reaction of the water resource, the resource can be better managed.

WHO HAS BEEN INVOLVED IN VOLUMETRIC CONVERSION?

Many people and organisations have been involved in providing information and discussing options to assist the SA MDB NRM Board develop a method for converting the haIE allocations to volume.

Bodies directly involved include:

- SA MDB NRM Board staff
- Mallee Water Resources Committee
- Irrigator Reference Group
- Individual irrigators
- Mallee Coorong NRM Group
- Regional Development Australia
- Rural Solutions SA
- Department for Water
- EconSearch Pty Ltd

Information used to develop the volumetric conversion process includes:

- Annual water use reports (including water use, crop areas, seasonal and crop changes)
- Department for Water meter readings
- Discussion paper: Volumetric Conversion by EconSearch Pty Ltd (2006)
- Report – Definition of Irrigation Requirements in the Mallee PWA, Rural Solutions SA for DWLBC (2004)
- Comments from public meetings held on discussion papers developed for the water allocation plan
- Information learnt from irrigation efficiency projects.



MORE INFORMATION

For more information contact the South Australian Murray-Darling Basin Natural Resources Management Board
Phone: (08) 8532 1432



WHY NOT DIRECT CONVERSION FROM AREA TO VOLUME?

If all licensed haE (hectare equivalent) allocations were converted to volume using the revised Net Irrigation Requirements (NIR), the Annual Allowable Volume (AAV) of all management areas and Permissible Annual Volume (PAV) for the Mallee PWA would be exceeded.

The haE allocation system assumed a volumetric estimate using a method¹ to derive the original irrigation requirements for crops in the Mallee (Desmier, 1991).

A revision of the method² identified an increase in the NIR for the reference crop. This increase was mainly due to the effectiveness of rainfall being reconsidered from 100% effective under the Desmier system to 65% effective as per Skewes 2004. Rainfall effectiveness is one component of the method to calculate NIR of the reference crop. An increase in the NIR means that the crop requires more water.

The NIR does not cover all the water application requirements for crops in the Mallee. These are considered additional volumes where crops have been developed (e.g. delivery component – water not taken up by the crop but required for delivering the crop’s NIR).

//
Finding a suitable method for volumetric conversion has been a complex issue.
//

WHAT ARE THE ISSUES THAT HAVE HELD UP VOLUMETRIC CONVERSION?

Finding a suitable method for volumetric conversion has been a complex issue. Consideration has been given to the water resource, economic, social and legal aspects. The issue has become more complicated given the timing for the development of a revised water allocation plan, along with increasing pressures of water users moving from the River Murray to the Mallee PWA, during times of reduced water allocation.

During discussions to develop a method for volumetric conversion, several issues were identified that needed addressing when converting to volumetric allocations:

- Resource sustainability, allocation limits for management areas, *particular requirements in the Border Zones*
- Use of the latest information where possible; e.g. *revised volume for NIR*
- Intent to provide equitable share of the resource; *provide allocations where there is available PAV*
- A desire to ensure the continuation of existing water use developments.

WHAT INFORMATION IS BEING USED TO QUANTIFY DEVELOPMENT?

The annual water use reports provided by licensees are a source of information on the crops grown during the Assessment Period (1 July 2004 – 30 June 2009) and post the Assessment Period. Since the adoption of the current Water Allocation Plan in December 2000, there has been a licence requirement that licensees provide annual water use reports.

WHY NOT USE ACTUAL WATER USE OR AVERAGE WATER USE FOR CROPS GROWN IN THE MALLEE?

The irrigation and crop management practices vary greatly amongst water users in the Mallee and from season to season. There are some inefficient water use practices and some crops that may not be grown to their full crop potential. There are management areas where the water use exceeds the AAV. There are occasional incidences of incomplete meter readings due to meters being broken or relocated without the Department for Water being informed. Metered water use data was not considered as reliable or fair as annual water use reports for crops grown.

WHY ARE AUXILIARY REQUIREMENTS NOT IN THE FORMULA?

Auxiliary requirements were discussed during the development of the discussion paper: Volumetric Conversion for the Mallee PWA. Further developments identified there can be no provision for auxiliary requirements as there is no consistency in the need or volumes required for this additional water by irrigators. Many of the purposes suggested for auxiliary water were for purposes not directly for crop growth, but rather individual crop production practices where alternative practices could be applied instead of using additional water. The majority of management areas will be fully allocated up to the AAV, some even with reductions, before additional water for auxiliary uses are even considered.

¹ Food and Agriculture Organisation 1977, FAO Irrigation and Drainage Paper #24

² FAO Irrigation and Drainage Paper #56, Skewes M, 2004

HOW DOES THE DRAFT PLAN SUGGEST VOLUMETRIC CONVERSION OCCUR?

The volumetric conversion policies within the draft Plan are based on the level of licence development within a given period. As a priority, all developed haEs will be converted to a volume known as the **Conversion Volume**. If allocation remains within the management areas' AAV after providing for development within the Assessment Period, conversion volumes will be calculated for development post the Assessment Period and non developed haEs respectively.

Conversion Volume =

Base Allocation
+ Crop Area Ratio (CAR) Component
+ Delivery Component

Base Allocation is the developed haE x NIR of the reference crop.

Crop Area Ratio (CAR) component

CAR is a ratio between the volumes of water required for the reference crop compared to the volume required for a particular crop type grown.

For example for every 1 haE of the reference crop, 1.84 hectares of summer fodder can be grown.

The revised CAR will be applied where the revised CAR decreased by more than 5% to the previous CAR, during the review from Desmier rates (FAO #24) to Skewes rates (FAO #56).

For example the summer fodder ratio changed from 1.84 to 1.63 hectares, therefore the calculation of area grown will use the revised CAR which decreased by 13%.

Delivery component to assist in achieving irrigation efficiency, a volume is provided to ensure the crop receives its NIR whilst some of the unavoidable water losses are provided for, such as losses through irrigation systems, due to site characteristics and variable climatic conditions. For the purpose of volumetric conversion, an 85% irrigation efficiency target was considered appropriate.

To determine the volumetric conversion of individual irrigation licences, a volumetric conversion calculator has been developed, which includes all the components of the conversion volume.

CONVERSION VOLUME (EXAMPLES):

Example 1: A Licence holder has a 90 haE allocation in the Northern area (original volume estimate is 918 ML using Desmier figures). The allocation is located within Management Area X. The revised NIR of the reference crop in the Northern area = 11.80 ML/ha.

Table 1 shows the development history during the assessment period (1 July 2004 – 30 June 2009).

Base Allocation; the developed haEs are identified from the maximum area (in hectares) under irrigation (developed) during a single water use year during the Assessment Period. The Assessment Period is 1 July 2004 – 30 June 2009.

In this example the 2006/2007 year is the maximum year.

Base Allocation for Potatoes is: (42.70 haE x 11.80 ML/ha)	= 503.86 ML
Base Allocation for Lucerne is: (34.80 haE x 11.80 ML/ha)	= 410.64 ML
Total	= 914.50 ML

CAR component; Where the CAR changed by more than 5% (indicating less area of crop can be grown in relation to the reference crop), a formula is used to identify the additional volume required.

CAR component = (actual hectares of crop grown x revised NIR of the crop) – Base Allocation.

CAR for Potatoes is: (80 ha x 7.04 ML/ha) – 503.86 ML	= 59.34 ML
CAR for Lucerne is: (40 ha x 11.11 ML/ha) – 410.64 ML	= 33.76 ML
Total	= 93.1 ML

Delivery component	= Base Allocation + CAR	
	85%	
	– (Base Allocation + CAR)	
	= $\frac{914.50 + 93.1}{85\%}$	
Total	= 177.8 ML	

Developed Conversion Volume	= Base Allocation	= 914.50
	+ CAR	= 93.1
	+ Delivery	= 177.81
Total	= 1185.41 ML	

Table 1: Development History (1 July 2004 – 30 June 2009)

Northern Area	Area (ha)	Year	CAR	haE	Develop haE	Undev haE	NIR (ML/ha)	CAR revised
Potatoes (summer)	40	2008/2009		21.35				
Lucerne pasture	0			0.00	21.35			
Potatoes (summer)	40	2007/2008		21.35				
Lucerne pasture	20			17.40	38.75			
Potatoes (summer)	80	2006/2007	1.88	42.70			7.04	1.68
Lucerne pasture	40		1.15	34.80	77.50	12.50	11.11	1.06
Nil irrigation	0	2005/2006		0				
Nil irrigation	0	2004/2005		0	0			

DISCLAIMER

This fact sheet has been prepared as an information source to add to the discussion about the draft Water Allocation Plan for the Mallee Prescribed Wells Area. This fact sheet does not form part of the Plan. If there is any conflict between this fact sheet and the Plan, then the information in the Plan takes precedence.

The fact sheet is only intended to provide an insight into the draft Plan in a general sense and should not be taken as constituting legal advice on the application or construction of the Act in any particular circumstances. No liability will be accepted for any such reliance on its contents.

For further information on the draft Plan for the Mallee Prescribed Wells Area or other NRM information please go to our website: www.samdbnrm.gov.au. Or phone our Murray Bridge NRM Office on 8532 1432.

//
If reductions are required, it is proposed that proportional reductions are applied.
//

VOLUMETRIC CONVERSION – FINAL ALLOCATION (EXAMPLES):

Using the previous example of a Conversion Volume of 1185.41ML, the following examples outline possible scenarios for determining the final volumetric allocation for this hypothetical individual allocation.

Example 1:

AAV of management area X	= 6,500 ML
Total of all Conversion Volumes in the management area (not including undeveloped halEs)	= 8,600 ML
Reduction to developed conversion volume required to remain within management area's AAV	= 24%

If reductions are required, it is proposed that proportional reductions are applied to all calculated conversion volumes.

Individual Volumetric Allocation	= 1185.41 ML
	less 24.42%
Total	= 895.95 ML

Example 2:

The total developed Conversion Volumes are less than the management area's AAV. The licence holder further developed after the Assessment Period (post June 2009). The Conversion Volume for development is 100 ML.

AAV of management area X	= 6,500 ML
Total developed Conversion Volumes	= 5,000 ML
Total developed post Assessment Period	= 2,000 ML
Total Conversion Volumes	= 7,000 ML
Reduction to required to post Assessment Period	= 25%

Individual Volumetric Allocation	= 1185.41 ML
	+ (100 ML
	less 25%
	= 75 ML)
Total	= 1260.41 ML

Example 3:

The total developed Conversion Volumes are less than the management area's AAV.

The licence holder developed 100 ML Conversion Volume equivalent post June 2009.

Undeveloped halE remaining on licence is 47.50 ML of the Conversion Volume equivalent.

AAV of management area X	= 6,500 ML
Total developed Conversion Volumes	= 5,000 ML
Total developed post Assessment Period	= 1,000 ML
Total undeveloped Volume	= 2,000 ML
Total Conversion Volumes	= 8,000 ML
Reduction required to undeveloped volume only	= 75%

Individual Volumetric Allocation	= 1185.41 ML
	+ 100 ML
	+ (47.50 ML
	less 75%
	= 11.9ML)
Total	= 1297.31 ML

Example 4:

The total developed Conversion Volumes are less than the management area's AAV. The licence holder has the equivalent of 147.50 ML undeveloped. There are no developments post June 2009 in the management area.

AAV of management area X	= 6,500 ML
Total developed Conversion Volumes	= 5,000 ML
Total undeveloped volume	= 4,000 ML
Total Conversion Volumes	= 9,000 ML
Reduction to undeveloped volume only	= 37.5%

Individual Volumetric Allocation	= 1185.41 ML
	+ (147.50
	less 37.5%
	= 92.2 ML)
Total	= 1277.60 ML