

**Submission
No 1**

INQUIRY INTO WATER AUGMENTATION

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Please accept the following which highlights inconclusive information that Government Departments have relied on to publish false and inconclusive information regarding evaporation rates from the Menindee Lakes Scheme. The Government has relied on false information and inconclusive reports to justify their attempt to place the Broken Hill and District Community on bore water and in justification to drain the Menindee Lake, stating that if the Lakes were not drained, the water would have evaporated. My submission is that a final report was completed for the Australian Government, National Water Commission titled- Assessment of Evaporation Losses from the Menindee Lakes using SEBAL Remote Sensing Technology.

The report in its entirety can be found at:

http://archive.nwc.gov.au/__data/assets/pdf_file/0018/18360/Assessment_of_Evaporation_Losses_from_the_Menindee_Lakes_using_SEBAL_Remote_Sensing_Technology.pdf

Firstly I must point out the limitations that have been placed on this document by the producers of the document "Sinclair Knight Merz which are: LIMITATION: This report has been prepared on behalf of and for the exclusive use of Sinclair Knight Merz Pty Ltd's Client, and is subject to and issued in connection with the provisions of the agreement between Sinclair Knight Merz and its Client. Sinclair Knight Merz accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party. Now that is a good start but it does get better.

Secondly I must point out a statement in the report at page 1, which the Government does not repeat but it is a point which the Government must regulate. It states "The question of how much water is being used by different land use types at the catchment scale is the great unknown in the catchment water balance".

The document provides information of evaporation losses from the Menindee Lakes Scheme across 2004/05.

Part 3.2. of the document states:

3.2. Water Balance and Climate Data Availability Daily water balance and climate data for this application was supplied by the NSW Department for Water and Energy for the 2002/03, 2004/05 and 2007/08 water year (July to June) for Lake Wetherell and Lake Pamamaroo. No data was assessed for Lake Menindee or Lake Cawndilla as both lakes were empty between 2003 and 2010. Surely the Government is not relying on inconclusive and uncreditable information.

For Lake Wetherell and Lake Pamamaroo annual evaporation estimates across 2004/05 using SEBAL were 133.1 GL and 118.1 GL respectively. The pan evaporation method produced estimates of 129.3 GL and 118.7 GL respectively; and the water balance method produced estimates of 125.8 GL and 132.4 GL. For Lake Wetherell and Lake Pamamaroo annual evaporation estimates across 2004/05 using SEBAL were 133.1 GL and 118.1 GL respectively. The pan evaporation method produced estimates of 129.3 GL and 118.7 GL respectively; and the water balance method produced estimates of 125.8 GL and 132.4 GL.

This study used the water balance method to estimate evaporation from Lake Wetherell and Lake Pamamaroo on an annual, quarterly, monthly and daily basis, corresponding to the time scales and dates of available SEBAL 2009 data.

3.4.1. Water Balance Method

The water balance method (also referred to as the mass balance method) is a commonly applied method as it is relatively simple and based on data which is often available for regulated storages. The water balance method calculates evaporation based on the differences between storage volume, inflows and outflows over discrete time periods:

E = Evaporation (ML); R = Rainfall (mm);

SA = Surface Area (ha); I = Inflows (ML); and O = Outflows (ML).

Equation 1

Where:

(Storage volumes measured in ML)

Important factors listed in this document that contribute to the document findings being incorrect include:

- A major limitation of the water balance method is that as evaporation is calculated as the residual; all unmeasured components of the balance contribute towards the volume of evaporation. This includes seepage, groundwater inflows, bank storage and local runoff. If such components are significant, the estimates of evaporation may be in error.

Additionally, measurement errors (for inflows, outflows, storage volume, surface area etc) may be large, increasing the error associated with calculating evaporation. For other components of the balance, assumptions are made that can significantly affect the estimate of evaporation. For example, the assumption regarding travel time and loss is most likely to be accurate during periods of constant,

within-channel inflows. However, during periods of initial flows after dry periods and during flood or high flows when flow occurs over the floodplain, losses may be much higher.

- Lake Wetherell Inflows to Lake Wetherell were based on flow at Wilcannia (approximately 150 km upstream of Lake Wetherell) with a travel time of 5 days. Note that 'losses' on the flood plain of the Darling River between Wilcannia and the Menindee Lakes can be highly variable; as such, accurately determining inflows can be difficult (flow over the flood plain is also difficult to measure). For the purposes of this assessment a fixed loss of 60 ML/day has been assumed to account for river losses between Wilcannia and Lake Wetherell (personal communication Richard Cooke, DWE). Outflows from Lake Wetherell were based on discharges to the Darling River through Wetherell outlet regulator plus transfers to Lake Pamamaroo through the Pamamaroo inlet regulator. There was no discharge directly over the Lake Wetherell main weir throughout 2004/05. Inflows are based on flow data 150km up stream at Wilcannia, river distance is calculated as approx. 3:1 ration, there is approx. 450km of evaporation and water extraction for animal, human, irrigation usage before it has reached the Menindee Scheme and these are calculated as total evaporation loss from the Menindee Lake Scheme.

- Lake Pamamaroo Inflows to Lake Pamamaroo were based on transfers from Lake Wetherell through the Pamamaroo inlet regulator. Outflows from Lake Pamamaroo were based on discharges to the Darling River through the Pamamaroo outlet regulator. There were no discharges to Lake Menindee through the Menindee inlet regulator (via Copi Hollow) throughout the 2004/05 water year.

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- Additionally, measurement errors (for inflows, outflows, storage volume, surface area etc) may be large, increasing the error associated with calculating evaporation. For other components of the balance, assumptions are made that can significantly affect the estimate of evaporation. For example, the assumption regarding travel time and loss is most likely to be accurate during periods of constant, within-channel inflows. However, during periods of initial flows after dry periods and during flood or high flows when flow occurs over the floodplain, losses may be much higher.

In conclusion to this inconclusive report that the Government is relying on, lets consider this:

Part 2.2 of the report states:

2.2. Evaporation from the Menindee Lakes

Evaporation from the Menindee Lakes is very high; with average annual evaporation estimated to be 426 GL/year, and up to 700 GL/year when the lakes are full (Maunsell, 2007). This is due to the hot semi-arid environment of the lower Darling and the shallow, large surface area nature of the lakes. The Department of Primary Industries-Water website provides information on Water saving in the Darling River including the Menindee Lakes and in this information it provides a figure of 426 gigitalitres that is lost each year from the (On average 426 gigitalitres of water is lost in evaporation from the lakes system each year.) where did they get that figure, surely not from a report that is inconclusive and a report that identifies errors in the calculation of evaporation.

<http://www.water.nsw.gov.au/water-management/water-recovery/darling-water-saving>

Considering the statement at point 2.2 that the lakes water evaporation rate is as high as 700GL/Per year when full and no data was assessed for Lake Menindee or Lake Cawndilla as both lakes were empty between 2003 and 2010.

Now consider this: The capacity of the Menindee Lakes Scheme is 1731GL so when full and with no inflows or out flows we would expect to have no water in the Lakes after a period of approximately 26 months, we all know that that statement is totally false. Thank you for the opportunity to submit this document.