Phase 2 MDBA Advice - Existing TLM works and measures: Hattah

Forward

Under the Basin Plan a measure must meet particular criteria to be considered as a supply measure for the purposes of the SDL adjustment mechanism. Under the Basin Plan (cl.7.03 and (cl.7.15) a supply measure must:

- operate to increase the quantity of water available to be taken in a set of surface water SDL resource units compared with the quantity available under the benchmark conditions of development;
- achieve equivalent environmental outcomes with a lower volume of held environmental water than would otherwise be required; and
- have no detrimental impacts on reliability of supply of water to holders of water access rights that are not offset or negated.

The Living Murray projects have been modelled as part of the MDBA's trial implementation of its ecological elements method, and the results indicate that the projects meet the above criteria.

Hattah Summary:

In 2003 The Living Murray Program began, then developing the project Hattah Lakes Environmental Flows Project that began works which enabled the lakes to be filled to 45.0m AHD and inundate up to 6000ha of floodplain wetlands. The Hattah lakes project is part of the Living Murray Initiative and is funded by the Australian Government, New South Wales, Victoria and South Australia through the Murray–Darling Basin Authority.

MDBA supports the Hattah package of works as meeting the Phase 2 criteria, and as listed in **Table 1**.

Hattah Lakes is an extensive wetland complex covering approximately 13,000ha within the 48,000ha Hattah-Kulkyne National Park. It is recognised for its many environmental, social and economic values. In particular, its role as refuge and breeding habitat for water birds and for its sites of indigenous cultural significance. Twelve of the lakes are listed as wetlands of international importance under the Ramsar Convention. As part of the First Step for the Living Murray Initiative, the following ecological objectives were established for the Hattah Icon Site:

- restore a mosaic of hydrological regimes, which represent pre-regulation conditions;
- maintain, and where practical, restore, the ecological character of the Ramsar site with respect to the Strategic Management Plan (DSE 2003);
- restore the macrophyte zone around at least 50% of the lakes to increase fish and bird habitat;
- improve the quality and extent of deep freshwater meadow and permanent open freshwater wetlands so that species typical of these ecosystems are represented;
- maintain habitat for the Freckled Duck, Grey Falcon and White-bellied Sea-eagle in accordance with Action Statements;
- increase successful breeding events for colonial waterbirds to at least two years in ten;
- provide suitable habitat for a range of migratory bird species;

- increase distribution, number and recruitment of local wetland fish by providing appropriately managed habitat; and
- maximise use of floodplain habitat for recruitment of all indigenous freshwater fish.

The development and implementation of the Hattah works project have proceeded through a number of agreed phases with several plans:

- *The Living Murray - Hattah Lakes Icon Site Environmental Management Plan 2006-2007.*
- *Hattah Lakes Environmental Flows Project – Investment Proposal 2010*
- *Hattah Lakes Environmental Flows Project - Construction proposal 2011*
- *TLM Hattah Lakes Environmental Water Management Plan February 2012*
- *Hattah Lakes - Interim Operating Plan 2012-2013*
- *Hattah Lakes G-MW Commissioning Plan 2013*
- *The MDBA delegate (RM Executive Director) approved G-MW to proceed to Tender in August 2011 (Water Act 2007, Clause 58) and Construction (Water Act 2007, Clause 60) in December 2011. Note that Ministerial Council 46 endorsed the TLM works special account budget in November 2008 (refinement of the original budget approved in November 2003).*

In order to assist SDL evaluation of icon site structures **Table 1** describes each work, with key information and variations.

Risks and possible ecological impacts were identified in these various plans, modelled and adaptably managed during the first commissioning.

The Hattah project has developed a flexible package of works that meets the hydrologic requirements of the Lakes. In particular, these works are able to operate and deliver water under a variety of operations; when flows exceed 20,000 ML/day at Euston or under a dry scenario pumping can commence when the Murray River Level is above 38.3mAHD, which corresponds to about 5,000 ML/day at Euston. This enables, to the best possibility natural flow patterns that would have occurred naturally.

The structures at Hattah have been built and successfully commissioned by the state constructing authority on behalf of the Joint programs (G-MW) in 2013. Beginning in 2013, and again in 2014, environmental water holders have undertaken two watering events (67GL and 105GL – excluding return flows) with water being pumped up to 1,000 ML/day at a cost range of $3-5 per ML. In the first event significant environmental outcomes were achieved being the inundation and lateral connectivity between the River Murray Channel and 17 wetland sites. The second Inundation reached 6100ha with approximately 60 GL of water was returned from the lakes to the River Murray, bringing with it native fish and organic carbon. Other recorded ecological responses were: river red gums and black box growth, native fish recruitment, some waterbird recruitment and substantial increase in floodplain biotic processes.

During the commissioning, several important lessons were found:

- The monitoring equipment needs to be considered during the design phase with a clear understanding of what location best meets the accounting of inflows and outflows.
- The return flow regulators of Oatey's and Messenger's capacity is approximately 750ML/day. The estimation and coordination of return flows into the Murray for use at other icon sites can be improved in future events.

In relation to the Current SDL adjustment process, there are inconsistent modelling indices for outflows at Oatey's. Current SDL model specifies this value at 1250ML/day, whereas the commissioning has this as 750ML/day. Discussions with MDBA modelling notes that this difference has minimal net effect on the SDL adjustment outputs.

There are clear links between this package of works and recently submitted projects by Victoria, primarily the Hattah Lakes North Business case, near the existing TLM Hattah structures of Bitterang Levee and Oateys Regulator. Consideration needs to be given to the joint nature of factors such as ownership, operation and then SDL offsets.

Annual ongoing costs to provide electricity to the pump station is approximately $180,000 pa and a further $84,000 for labour and maintenance.

Event costs include a pumping usage charge that can range between $3/ML and $5/ML. For example, if the natural frequency is returned to the system the pumping could range between 40GL to 90GL depending on the ecological outcomes sought and the River Murray levels during the event. Correspondingly then the cost will range between about $150,000 to $450,000 per event. If the system is dry the maximum inundation is 116GL (about $580,000), however this is an unlikely event.

Table 1: List of TLM structures for SDL adjustment

Hattah	Chalka Creek sill lowering	To lower sills to 41.75m AHD to allow commence to flow threshold from 36,700ML/day down to 20,000ML/day.	Yes, no commissioning required	Need to be maintained to ensure the sill levels stay at 41.75mAHD.	Chalka South rock ramp fishway requires modification. This may affect the commence to flow threshold.
	Oatey's regulator	Control of return flows to the Murray via Chalka Creek North, with a capacity up to 1250ML/day. Fish passage (overshot mode). Natural event the structure is not an impediment and is controlled by the channel gradient.	Yes, not yet commissioned to full capacity	• Seepage issues occurred near full capacity. Work will be completed by June 2015 by G-MW to reduce the risk of structure failure under future waterings. Design variation should note return flows now at 750ML/day	In Hattah North project regulators are proposed on Chalka Ck North downstream of Oateys. These structures will be dependent on releases from Oateys.
	Chalka Creek North rock ramp fishway	To reduce erosion and enable fish passage from the Murray into Chalka Ck North with a capacity of 750ML/day.	Yes, not yet commissioned	• The capacity of release was restricted due to hydraulic conditions causing erosion at the at the Chalka Ck North rock ramp fishway. The next watering is to determine the max capacity. Current thinking is 400ML/day – 500ML/day.	• The reduced hydraulic capacity will restrict the rate of release from Oateys under the TLM works. However if operating Hattah North structures the releases are not restricted as water will be pooled behind the proposed structures. • However, the release rate from Hattah north structures will be dependent on Chalka Ck North's hydraulic capacity.
	Cantala regulator	Between Lake Cantala and the Murray. Structure default position is open to allow flows	Yes, not yet commissioned to full capacity	N/A	N/A

		to enter and return naturally. Under a managed event this structure is closed to prevent erosion on return to Murray.			
	Messengers regulator	Replacement of structure to 45.5m AHD control inundation within lakes. Control of return flows to Murray up to 750ML/day. Fish passage (overshot mode). Natural event the structure is not an impediment and is controlled by the channel gradient.	Yes, not yet commissioned to full capacity	N/A	N/A
	Chalka Creek South rock ramp fishway	To reduce erosion and enable fish passage from the Murray into Chalka Ck South with a capacity of 750ML/day.	Yes, yet to be commissioned	• The capacity of release was restricted to 200ML/day due to hydraulic conditions causing erosion. Anticipated works will be completed by June 2015. The next watering is to determine the max capacity. The aim is still 750ML/day releases.	N/A
	Stop banks at Bitterang, Breakout and Cantala	Earthen banks to allow inundation level of 45m AHD. The banks will never be overtopped during a managed event.	Yes, not yet commissioned to full capacity	Water will reach the banks under a large managed event or when flows in the river exceed over 100,000 ML/day at Euston	Modification of the Bitterang levee is proposed under Hattah North project to enable flows to reach further north. This structure can only be used in conjunction with the TLM works.
	Little Hattah regulator	Refurbished, allowing flexibility of water duration between the southern lakes.	Yes, Commissioned 2013 and 2014	N/A	N/A
	Pumping Station	Pumps used to assist pumping up to 43.5m AHD (redgum)	Yes, not yet fully commissioned.	N/A	• If the pumps fail then TLM and Hattah North

		45m AHD (Blackbox), Capacity of 1,000ML/day in total (144ML/day per pump). Pump 7 can be switched to pump water to Lake Kramen. Pumps must be operated when Murray River levels are above 38.3m AHD.			structures cannot be utilised in a managed event. • The pumps are <u>not</u> an option to pump to Lake Boolca and achieve the volume of water required to meet the TLM ecological objectives. The option prescribed under the Hattah Lakes North project is required for water to reach Lake Boolca.
	Lake Kramen Regulator	Pump water to Lake Kramen to inundate once every 8 years.	Yes, commissioned 2014	This work was identified during the Construction proposal stage. This now allow additional watering to be undertaken at Lake Kramen.	N/A