
Phase 2 MDBA Advice - Existing TLM works and measures:

Gunbower

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.

Gunbower Summary:

In 2003 The Living Murray Program began developing the project Flooding Enhancement Gunbower Forest Project that described two packages of work known as the Lower Landscape package of works and the Hipwell Road Channel package of works. The 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 Lower Landscape Works and Gunbower Hipwell Road Channel package of works as meeting the Phase 2 criteria.

Gunbower Island State Forest (Gunbower Forest) is a highly significant floodplain ecosystem on the River Murray in northern Victoria. Covering 19,450 hectares (ha) the forest is part of the Gunbower-Koondrook-Perricoota system. It is a wetland of international significance and is recognised under the Ramsar convention. As part of the First Step for the Living Murray Initiative, the following ecological objectives were established for the Gunbower-Koondrook-Perricoota Icon Site:

- Inundation up to 4750ha of forest
- 80% of permanent and semi-permanent wetlands in healthy condition
- 30% of River Red Gum forest in healthy condition
- successful breeding of thousands of colonial waterbirds at least 3 years in 10
- healthy populations of resident native fish in wetlands.

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

- *The Living Murray - The Gunbower, Koondrook-Perricoota Forest Icon Site Environmental Management Plan 2006-2007.*
- *Flooding Enhancement of Gunbower Forest Project – Investment Proposal (Gunbower-Koondrook-Perricoota Forest)*
- *Lower Landscape Works – Investment Proposal (Gunbower-Koondrook-Perricoota Forest)*
- *Flooding Enhancement of Gunbower Forest - Interim Operating Plan July 2013 (D13/36163)*
- *Environmental Water Delivery Plan – First Operation of the Hipwell Road Channel Gunbower Forest– May 2014*
- *Lower Landscape Works Construction Proposal, The Living Murray Environmental Works and Measures Program, July 2010*
- *Flooding Enhancement of Gunbower Forest Project, Construction Proposal, Hipwell Road Channel Package of Works, July 2012*
- *The MDBA delegate (RM Executive Director) approved G-MW to proceed to Construction for the Lower Landscape works in July 2010 and Hipwell Road works in September 2012 (Water Act 2007, Clause 58). 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 evaluation of icon site structures **Table 1** describes each work, with key SDL information, variations and status.

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

The project has developed the best fit between the hydrologic requirements of the forest and the broader system operations/opportunities, between the Torrumbarry Irrigation District, and flows within the Goulburn and Murray rivers. This mimics to the best possibility natural flow patterns that would have occurred from the Goulburn and Murray rivers, by delivering inundation via offtake, with the ability to capitalise overbank flow events from the Murray.

The structures of Hipwell channel works have been undertaken and successfully commissioned by GMW in 2014. Beginning in May 2014, TLM commenced the first full scale watering of Gunbower forest, with water being delivered through Hipwell offtake during both off irrigation and on-irrigation periods. Significant environmental outcomes were achieved being: inundation of ~3,800 ha with ecological responses of: river redgums, native fish recruitment, with substantial increase in floodplain biotic processes.

During the commissioning, several important lessons were found:

- There was approximately 1000ha less inundation than expected, due in part to the roughness in the forest (than originally modelled).
- The designed and modelled inflows did not reach 1650ML/day. The maximum inflow was less than 800ML/day flow in through Hipwell Channel. Further investigations are appropriate to understand if it is still feasible to increase capacity close to 1650ML/day.
- The estimation of Gunbower creek capacity was originally estimated by GMW as 1650ML/day, whereas during the commissioning, third party impacts occurred for flows greater than 1,200ML/day (Gunbower weir). Further investigation are underway to determine if third party impacts can be addressed to increase the capacity of Gunbower Creek upstream of Hipwell Road Weir.

TLM is currently undertaking an investigation to further understand these issues with the investigation anticipated to take between 12-18 months.

In relation to the current SDL adjustment process, modelling indices, rate Gunbower Creek and Hipwell Channel as 1650ML/day, instead of the actual flow capacities of 800ML/day (Hipwell offtake) and 1200ML/day (Gunbower Creek limit at Gunbower weir). It is likely that inundation area is also over estimated.

There are clear links between this package of works and recently submitted projects by Victoria. Consideration of existing works will need to be considered in Phase 2 of recent projects, particularly with regards to the inundation, inflows and Gunbower Creek capacity.

Ongoing costs to maintain works is estimated at approximately \$300K annually plus delivery costs. Environmental use of water remains cost effective, although MDBA notes the new Gunbower Creek Delivery Share arrangement of \$300,000-350,000pa continues until 30/6/2017.

Incorporating TLM learnings:

The most practical way to incorporate the learnings at Gunbower into the SDL Adjustment modelling is by adjusting both the Gunbower Creek and Hipwell offtake capacity to 1200ML/day and 800ML/day respectively. This change will result in less area inundated than what is represented in the trial SDL adjustment scenario which will affect the potential SDL offset volume.

Table 1: List of TLM structures for SDL adjustment

Package	Works	Key purpose	Built under TLM program, commissioned	Variations or key comments for modelling	Key Links
Hipwell Package	Hipwell Road Weir	Allow water in the creek up to 81.92AHD, allowing 1650ML/day in through Hipwell offtake regulator	Yes, fully commissioned	Maximum flows at less than 800ML/day through Hipwell Road offtake regulator	Gunbower proposals
	Hipwell Offtake Regulator, Channel and bridge	Allow flows into forest between 300-1650ML/day, with fish lock.	Yes, fully commissioned	Maximum flows at less than 800ML/day. Investigating options to increase flow rate as part of Gunbower Stage 2 works. Investigations are expected to take 12-18 months	Gunbower proposals
Lower Landscape Works	Yarran Creek Regulator	Upgrading of structure, to three bays and a fish ladder to allow flows between Gunbower creek and the forest.	Flows up to 340ML/day	Low inflow capacity compared to Hipwell Road channel, therefore not likely to be big impact on modelling.	Lower Landscape Investment Proposal and Construction Proposal
	Black Swamp Regulator	Upgrade of pipe culvert, single bay structure.	900mm pipe, without fish passage	Low inflow capacity compared to Hipwell Road channel, therefore not likely to be big impact on modelling.	Lower Landscape Investment Proposal and Construction Proposal
	Reedy Lagoon Regulating Structure	Box culvert regulator, single bay.	Inflow up to 325ML/day	Low inflow capacity compared to Hipwell Road channel, therefore not likely to be big impact on modelling.	Lower Landscape Investment Proposal and Construction Proposal
	Little Gunbower Creek regulator	Single bay lay-flat gated structure	Built in 2005-06 as early stage TLM works program to allow managed flows from Gunbower Creek to the forest	Low inflow capacity compared to Hipwell Road channel, therefore not likely to be big impact on modelling.	Lower Landscape Investment Proposal and Construction Proposal
	Shillinglaws Regulator	Four bay, dual leaf gated structure on River Murray effluent. Operated to	Refurbishment of existing regulator in 2005-06 as early stage TLM works program	Regulator default position is open to allow overbank flows. Regulators are closed to maintain	Lower Landscape Investment Proposal and Construction Proposal

		maintain managed flows in forest and allow overbank flows into forest		managed flows on floodplain and extend duration of overbank flows.	
	Barham Cut regulator	Three bay structure on River Murray effluent. Operated to maintain managed flows in forest and allow overbank flows into forest	Refurbishment of existing regulator in 2005-06 as early stage TLM works program	Regulator default position is open to allow overbank flows. Regulators are closed to maintain managed flows on floodplain and extend duration of overbank flows.	Lower Landscape Investment Proposal and Construction Proposal