

Attachment 1: EEWD Revised Budget – September 2017

EEWD Measure 1: Develop and trial a Hydro-Cues water management strategy and tools						
Timelines	Phase	Actions	Delivery mechanism	Outputs and Deliverables	██████████	
					\$	
2017 - 2018	Phase I	1. Review current delivery, operation trials and investigations of environmental water management to capture learnings relevant to Hydro-cues.	Coordinated and delivered by an independent reviewer in consultation with relevant jurisdictional agencies.	Stocktake report on current practices and learnings.	Under Program Management	
2018 - 2021	Phase II.a	1. Review the environmental water demands, including targets outlined in the Basin Watering Strategy and long-term watering plans along the Murray, Goulburn, Murrumbidgee and Darling Rivers. Review of literature on ecological responses to flow magnitude, timing and duration.	Independent specialist expert advice: hydrological, ecological or modelling in consultation with environmental water and site managers.	Report on types of flows Hydro-Cues should be trying to create for different ecological objectives, and current understanding of potential ecological trade-offs.	██████████	
		2. Analyse observed historical flows to define the nature and timing of target flow events, including seasonal and event cues for releases.	Combination of MDBA and independent hydrological expertise.	Report on characteristics of flow events to be targeted for topping up, including possible cues for release decisions.	██████████	
		3. Analysis to estimate unregulated flow losses, return flows, and travel times on major rivers under different antecedent and flow conditions.	MDBA and independent specialists in hydrology and hydraulics.	Report on flow behaviour along rivers and impact of antecedent conditions on flow release timing and flow hydrograph shaping and alignment between catchments.	██████████	
		4. Review streamflow forecasting capability and feasibility review and recommendations for future requirements (to support Hydro-cues integrated with other e-watering). Review stream gauging network for adequacy to delivery required forecasting capability and water delivery.	MDBA and independent specialists in hydrology.	Report on required streamflow forecasting work required and any additional monitoring required.	██████████	
		5. Two options development and scenario planning workshops with river operators, environmental site managers and environmental water holders and relevant scientific/e-watering experts. Workshop 1 – in-channel flows. Workshop 2 – targeted overbank flows	Workshops coordinated and delivered by an independent facilitator in consultation with relevant jurisdictional agencies.	Agreed Hydro-Cues strategies to be assessed and scenarios to be considered.	██████████ & BAU	
		6. Develop/improve and use hydrology models to allow testing of different delivery strategy options, and assess any implications for other water users. Part A: Model testing the performance of Hydro-Cues options developed at step 5 (cue options, water release strategies including reduction/ceasing flows, timing, environmental outcomes achieved). Part B: Test the interactions with other e-watering approaches (eg flows outside hydro-cues range, targeted watering events, optimising watering during dry periods, interaction with planned environmental water, use of environmental works and measures, etc) and implications for eWater portfolio management.	Internal and external specialists in system modelling.	Hydrology models capable of testing Hydro-Cues options. Report on Hydro-Cues water management options, including potential impacts on water users, system issues, and other eWater delivery including environmental trade-offs (and any mitigation measures required).	██████████	

		Part C: Test the interactions with and implications for consumptive water users and system issues eg Barmah Choke, Lake Victoria operation, Hume Dam airspace, etc).				
		7. Four workshops to take learnings from the hydrological model analysis under step 6, and develop initial EEWD water management strategy (workshops on Part A, Part B, Part C and combined synthesis)	Workshops coordinated and delivered by an independent facilitator in consultation with relevant jurisdictional agencies.	Report on EEWD water management strategy, including breakdown of incremental implementation steps to be trialled in Phase II.b	██████████	
2021 - 2023	Phase II.b	1. Annual implementation trials of incremental changes to build and test the EEWD water management strategy.	MDBA, CEWO and jurisdictions	Annual shared learning workshops and reports of trial outcomes and recommendations allowing adaptive improvement in water management.	BAU & Under Measure 5	
		2. Install and operate additional stream gauging - contingency	Specialist contractors	Data collection at additional sites improving ability to predict and manage flows.	██████████	
		3. Commissioning and implementing flow forecasting tools	Independent specialist experts	Tools providing improved ability to predict unregulated flows	██████████	
		4. Future adaptive development and improvement to models and system support tools	MDBA and external specialists	Adaptive improvements of tools and flow management.	██████████	
2023 - 2024	Phase III	1. Analysis of outcomes of trials, monitoring and evaluation and implement additional investigations including modelling, ecological studies and operational reviews (linked to EEWD 5). 2. Revise EEWD strategy and decision support tools as required to prepare final, integrated strategy.	MDBA, CEWO and relevant jurisdictional agencies.	Annual reports of trial outcomes and overall project assessment of measure effectiveness.	BAU & Under Measure 5	
Sub-Total:					██████████	

EEWD Measure 2: Develop mechanisms to provide real-time and efficient water management decision making (integration of environmental water management with river management)						
Timelines	Phase	Outputs and Deliverables	Delivery Mechanism	Outputs and Deliverables	██████████	
					\$	
2017 - 2018	Phase I	1. Undertake review of current environmental watering delivery administration and coordination processes (and roles and responsibilities), and identify material issues.	Coordinated and delivered by an independent reviewer in consultation with relevant jurisdictional agencies.	Stocktake report on current practices and learnings. Work program for Phases II.a and II.b.	Under Program Management	
2018 - 2019	Phase IIa	1. Develop and agree required SCB administration and coordination processes and arrangements needed for Hydro-Cues delivery and identify specific areas for review and revision.	Two workshops coordinated and delivered by an independent facilitator in consultation with relevant jurisdictional agencies.	Report on required structure and work program.	██████████ & BAU	
		2. Investigate and develop options to address issues and opportunities. Seven cross-jurisdictional and cross-agency workshops required: introduction/scope; planning; delivery in-channel; delivery overbank; environmental site manager needs; monitoring and reporting; and a synthesis session across themes. There also needs to be several supporting workshops to explore	Ten workshops coordinated and delivered by an independent facilitator in consultation with relevant jurisdictional agencies to explore and prioritise options.	Reports on issues and proposed solutions.	██████████ & BAU	

		other key issues such as communication; potential impacts on other water users; and community needs around notification.				
		3. Scope the design requirements of planning and real time river operator and environmental water decision support tools that will be required to implement the EEWD water management strategy.	MDBA and relevant jurisdictional agencies (river operator and environmental water and site manager – end user feedback), and external specialists	Report on design requirements and concept designs completed that meet the needs of river operators and environmental water holders for planning and real time decision support tools	██████████ & BAU	
		4. Investigate and scope improved data management systems including online tools and data/management information sharing, and community awareness and notification processes.	External experts with input from relevant jurisdictional agencies and community representatives (design requirements)	Report on data and information management needs, concept design and work to be undertaken.	██████████	
		5. Review and agree revised SCB system scale administration and coordination framework and change needs.	Workshop coordinated and delivered by an independent facilitator in consultation with relevant jurisdictional agencies.	Agreement on changes to be implemented in Phase 11b. Consolidated report of agreed changes to administration and coordination processes	██████████ & BAU	
2019 - 2023	Phase IIb	1. Change administration and coordination processes	MDBA, CEWO and relevant jurisdictional agencies	Progressively implement and trial agreed changes to administration and coordination process	BAU	
		2. Test new administration and coordination framework for southern connected basin.	MDBA, CEWO and relevant jurisdictional agencies	Demonstrated improved decision speed and efficiency	BAU & Measure 5	
		3. Translate initial EEWD management strategy by developing the first tranche of river operator and environmental water manager decision support tools and protocols – delivery “menus” for planning the use and real-time delivery of environmental water using a hydro cues approach. Tools that get iterated and updated each year in response to user feedback	MDBA and relevant jurisdictional agencies (river operator and environmental water and site manager – end user feedback), and external specialists.	Improved decision making under variable future flow scenarios. Annual iterations that improve the planning and delivery, procedures, ‘menus’ and decision support tools for river operators and environmental water and site managers, by learning and building on the experiences and outcomes of the previous year	██████████	
		4. Create and test improved data management systems including online tools. For improved information sharing and management, but also greater transparency around environmental water use that the general public can access for awareness and notification purposes (to increase confidence in environmental water management)	External experts	Improved data and information management (including community notification) providing decision speed and efficiency.	██████████	
2023 - 2024	Phase III	1. Analysis reports on outcomes of trials, monitoring and evaluation with respect to administration, coordination, data management, etc (linked to EEWD 5). 2. Revise administration and coordination, data management and its application.	MDBA, CEWO and relevant jurisdictional agencies	Annual reports on outcomes from implementing new framework and data management systems.	BAU/Under Measure 5	
Sub-Total:					██████████	

EEWD Measure 3: Develop water accounting rules needed to support Hydro-Cues delivery						
Timelines	Phase	Tasks	Delivery Mechanism	Outputs and Deliverables	Commonwealth Funded	
					\$	

2017 - 2018	Phase I	1. Review current environmental watering accounting rules and identify issues for Hydro-Cues delivery.	Coordinated and delivered by MDBA in consultation with relevant jurisdictional agencies	Stocktake report on required outcomes for accounting, and recommendations for work to deliver required outcomes.	Under Program Management	
2018 - 2020	Phase IIa	1. Two workshops to develop a shared vision of the River Murray accounting system.	MDBA with jurisdictional agencies (and external facilitator).	Report on required accounting system characteristics.	████████ plus BAU	
		2. Series of discussion papers and workshops to identify and work through the issues and develop solutions.	MDBA with jurisdictional agencies (and external facilitator), and external expert contractors on complex issues.	Reports on proposed accounting change recommendations.	████████ plus BAU	
		3. Modelling of issues and proposed solutions (to test effectiveness and issues to be managed) to inform action 2 above.	MDBA/external expert contractors.	Series of modelling advice and a final report supporting the necessary accounting rule changes (data system support).	████████	
		4. Review accounts and supporting infrastructure, and create new accounting support system.	MDBA/external expert contractors with input from State jurisdictional agencies	Document outlining new system	████████ & BAU	
2020 - 2022	Phase IIb	1. Implement changes to relevant documentation to demonstrate River Murray accounting system	State jurisdictional agencies with MDBA coordination.	Accounting changes to enable Hydro-Cues completed.	BAU	
2022 - 2024	Phase III	1. Analysis of completion and effectiveness of changes implemented and required modification of changes	MDBA to lead with oversight from jurisdictions.	Annual reports on outcomes from implementing new framework and optimisation of changes where needed.	BAU & Under Measure 5	
Sub-Total:					████████	

EEWD Measure 4: Develop and establish a clear framework for Hydro-Cues operational decisions						
Timelines	Phase	Tasks	Delivery Mechanism	Outputs and Deliverables	████████████████████	
					\$	
2017 - 2018	Phase I	1. Review the River Murray Operations framework, the MDB Agreement, and state legislation as necessary to identify potential legal impediments and issues for hydro cues operations.	Coordinated and delivered by an independent reviewer in consultation with relevant jurisdictional agencies.	Report on current status, limitations and possible mandate. Work program to address limitations.	Under Program Management	
2018 - 2020	Phase IIa	1. Three river operators' workshops to take Hydro-Cues delivery scenarios, developed as part of measure 1, and develop a strategy for creating a clear mandate for operations.	Workshops coordinated and delivered by an independent facilitator in consultation with relevant jurisdictional agencies.	Reports on workshop outcomes, including strategy for creating the mandate for ordering and delivery, and a proposed trial plan.	████████ & BAU	
		4. Collect learnings from Environmental water trials over the past 9 years (Murray RiverOps improvements) and assess applicability to delivering Hydro-cues scenarios. - Detail relevant learnings and how they can be applied to refine the EEWD strategy and inform how to establish a clear framework for hydro-cues operational decisions.	Independent consultant, relevant jurisdictional agencies and MDBA	Report on lessons from the annual deviations trials and how the process of incrementally gaining river operation improvements could apply to hydro-cues operations.	████████	

		2. Undertake Legal and Legislative reviews of issues and liability.	Expert legal consultants.	Reports on issues and possible solutions (including legal and legislative).	██████████	
		3. Review operating procedural documentation including suitability assessment of Objectives and outcomes, River Murray Operations framework, state legislation, and the MDB Agreement as necessary a) Identify changes required and inform Measures 1, 2 and 3.	Independent consultant	Report on changes requires in Phase IIb	██████████ & BAU	
2020 - 2023	Phase IIb	1. Identify and document required changes to develop delivery mandate and allow incremental trialling and delivery process described in measure 1 to proceed. 2. Stakeholder engagement .	Expert legal consultants, MDBA, and relevant jurisdictional agencies. Stakeholder communication and information sessions.	Expert advice and changes to the River Murray framework, state legislation, and the MDB Agreement. Formal consultation.	██████████	
		2. Legal and legislative changes implemented	MDBA and jurisdictions.	Changes implemented.	BAU	
		3. Amend Objectives and Outcomes document and/or River Murray Operations framework.	MDBA and jurisdictions.	Changes implemented.	BAU	
2023 - 2024	Phase III	1. Analysis of outcomes of trials, monitoring and evaluation with respect to application of EEWD to operations, etc (linked to EEWD 5). 2. Revise approach and relevant operations frameworks as needed	MDBA to lead with oversight from jurisdictions.	Annual reports on outcomes from implementing new framework and optimisation of changes where needed.	BAU & Under Measure 5	
Sub-Total:					██████████	

EEWD Measure 5: Establish and use a monitoring and evaluation system to refine Hydro-Cues strategy and for project evaluation						
Timelines	Phase	Tasks	Delivery Mechanism	Outputs and Deliverables	Commonwealth Funded	
					\$	
2017 - 2018	Phase I	1. Review existing evaluation frameworks and processes.	Coordinated and delivered by an independent reviewer in consultation with relevant jurisdictional agencies	Report on adequacy of current M&E frameworks.	Under Program Management	
2018 - 2019	Phase IIa	1. Develop monitoring and evaluation plan focused on EEWD issues and including risks and issues identified in development of business case and subsequent workshops and investigations - Outline and document M & E requirements to support trials and to assess identified issues - Identify matter 9.3 reporting requirements - Identify M&E governance - Identify data collection and management requirements	Program management team and external expertise		██████████ & Under Program Management	
2019 - 2024	Phase IIb	1. Implement M&E and report annually and over the longer term - Annual and longer terms reports for sites/assets across the southern connected basin	Program management team States and MDBA	Annual reports identify progress and support adaptive management.	Under Project Management	██████████ & BAU
		2. Implement monitoring and data collection and evaluation for new data	Relevant contractors		██████████	

2024 -	Phase III	1. Evaluation of EWWD and reporting as outlined in the Basin Plan	MDBA in partnerships with jurisdictions and environmental water holders/site managers	Program effectiveness assessment. Ongoing evaluation framework and processes for adaptive management	BAU	
Sub-Total:						

Project Management						
Timelines	Phase	Tasks	Delivery Mechanism	Outputs and Deliverables		
2017 - 2024	All	1. Program management team	MDBA staff			
		2. Program delivery	MDBA staff			
		3. Program design, planning, facilitation, coordination costs & support for governance				
		4. Annual program workshop costs	Coordinated and delivered by MDBA in consultation with relevant jurisdictional agencies	Program delivery coordinated across measures and jurisdictions		
		5. Overarching communication and engagement strategy - Strategy documents for government agencies (i.e. NRM, CMAs...) and public costs for strategy development - consultation over 6.5 years	Coordinated and delivered by MDBA in consultation with relevant jurisdictional agencies	Broad community understanding of and involvement in project.		
Sub-Total:						

Totals						
EEWD 1						
EEWD 2						
EEWD 3						
EEWD 4						
EEWD 5						
Project Management						
				Commonwealth work program sub-total:		
				Contingency		
				Commonwealth grand total:		

BAU - Resources provided under Business as Usual