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# Final Report

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**South Australian Murray-Darling Basin Environmental  
Works and Measures Feasibility Program**

**State Sub-Projects**

**Volume 1: Delivery of State Sub-Projects**

**Department of Environment, Water and Natural  
Resources**

**28 March 2013**



**Government  
of South Australia**

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Department of Environment,  
Water and Natural Resources

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# INTRODUCTION

The River Murray is Australia's longest river and forms part of the Murray-Darling Basin (MDB) river system which drains most of inland Victoria, New South Wales and southern Queensland. Overall the MDB catchment area forms one seventh of Australia's land mass and contains arguably the most significant agricultural production areas in Australia. The catchment area of the MDB is a highly variable system and it is predicted that this variability will increase as a consequence of climate change.

The River Murray is a highly regulated river system with a series of storages, locks, weirs and barrages which were constructed in the 1920s and 1930s. These structures were originally installed to assist navigation, and to aid the extraction of fresh water for domestic and agricultural purposes.

The regulation of the Rivers of the MDB has enabled a thriving irrigation industry to develop, with over a third of Australia's food supply and 39% of Australia's agricultural income generated within the Basin. Further, the River Murray underpins the potable water supply for metropolitan Adelaide and numerous regional centres. However, the regulation of the Basin has resulted in significant ecological changes to the MDB. Under natural circumstances the flow in the river would be highly variable and include regular periods of wetting and drying of the floodplain. This lack of natural variability has deleterious effects on the floodplain ecosystem, which contains a large amount and diversity of biota and provides important refuges for species.

The recent drought took parts of the River Murray in South Australia to the brink of collapse (DEWNR 2012). Legacies of the drought still remain and include the need for further work related to managing acidification, riverbank collapse, levee bank cracking and to enable recovery in the Lower Lakes and Coorong. These years of drought provided insight into a future with reduced rainfall and the impacts of climate change. It is essential that more environmental water is returned to the River Murray to ensure the ongoing health of the ecosystem and a future for those who rely on the MDB.

The River Murray is essential to the economic, social, cultural and environmental well being of South Australians. It is now being increasingly recognised that a healthy, functional and productive riverine environment is critical for the overall health and condition of the main water course. The health and functioning of the floodplain is an indicator of the health of the entire River system. As the impacts of climate change become more evident the need to effectively manage and ensure the health of floodplains along the River Murray will become increasingly important as they play a critical role in ensuring the resilience of the River and its ability to recover from periods of low flow.

## **Background to the Environmental Works and Measures Feasibility Program (EWMFP)**

In response to the increasing recognition of the conflicting demands for water in the MDB, the Commonwealth Government developed a water reform package that included the establishment of the MDB Authority (MDBA) under a new Commonwealth Water Act (*Water Act 2007*). The MDBA has developed a MDB Plan ('Basin Plan') that aims to better balance extractions and water use demands against the actual and future predicted supply.

The proposed Basin Plan was released for public consultation in November 2011 and was adopted in November 2012. The Basin Plan recognises that current allocation of the water resources in the Basin cannot deliver a sustainably managed Basin and is the mechanism under the *Water Act 2007 (Cth)* to implement a new sustainable diversion limits (SDLs) across the basin to allow for the integrated management of the Basin.

The Basin Plan recognises the importance of healthy floodplains in outcome 2(c):

*“The outcome for the Basin Plan as a whole is a healthy and working Murray-Darling Basin that includes:...*

*(c) healthy and resilient ecosystems with rivers and creeks regularly connected to their floodplains and, ultimately, the ocean.”<sup>1</sup>*

The proposed Basin Plan included an environmental water recovery target of 2,750 Gigalitres per year (GL/year) which will result in a reduction in long-term average diversions for consumptive purposes across the Basin. Recently, this water recovery target has been refined to 3,200 GL/year. The Basin Plan aims also to increase the efficiency of water use through a range of proposed works and measures.

The Environmental Works and Measures Feasibility Program (EWMFP) is an initiative to improve environmental water management in the South Australian MDB. The South Australian Government has been successful in securing funding of \$1.8 million from the Australian Government for this program, to implement two streams of feasibility investigation.

Stream 1 involves the completion of four feasibility studies with a view to providing environmental benefits using less water, or greater environmental benefits using the same water, and offsets for SDLs that will be imposed under the Basin Plan. South Australia’s suite of sub-projects developed under the EWMFP each address an aspect of river and floodplain health.

- Pike floodplain regulator – regulator to allow targeted application of water to the Pike floodplain to simulate larger flood events using less water.
- Katfish Reach regulator – regulator to allow targeted application of water to the Katfish Reach (Katarapko/Eckerts Creek) floodplain to simulate larger flood events using less water.
- Eastern Mount Lofty Ranges Low Flow By-Passes – low flow bypasses allow low flows to remain in the channel rather than divert into dams, thus increasing the length of time that the watercourses flow and reducing disconnectedness between upper and lower river reaches.
- Implications for Environmental Water Delivery – this project considers the risks associated with increased flows on infrastructure, local communities and the environment.

Together these four projects are important for South Australia as they increase the environmental benefit per unit of water used as well as address the need to use water more efficiently to meet SDL targets. The following four volumes of this report discuss these projects in greater detail.

Stream 2 was undertaken to gather project ideas from the community and conduct reviews and the pre-feasibility work to test these ideas. This project will be reported upon separately.

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<sup>1</sup> Murray-Darling Basin Authority (May 2012), Proposed Basin Plan—Revised Draft: pp 22.

## Objectives of this Report

In accordance with the Funding Agreement with the Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC) this report seeks to:

- Describe the conduct, benefits and outcomes of the Project(s);
- Evaluate the Project, including assessing the extent to which the project milestones have been achieved and why any aspect was not achieved; and
- Include a discussion of any other matters relating to the Project, limited to the minimum necessary for the affective assessment of performance, which the Commonwealth notifies the State should be included in the final project report at least 60 days before it is due.

## Structure of this Report

This final report is written in five (5) volumes as shown in Figure 1.

- Volume One (this volume) introduces the EWMFP and assesses achievement of the milestones and other matters relating to the project as a whole (second and third objectives above).

The following four volumes discuss each subproject individually, including the conduct, benefits and outcomes of each project (first objective above).

- Volume Two discusses the Pike Floodplain SDL Feasibility Investigation;
- Volume Three discusses the Katarapko Floodplain SDL Feasibility Investigation;
- Volume Four discusses the Eastern Mount Lofty Ranges Low Flow By-Passes SDL Feasibility Investigation; and
- Volume Five discusses the Implications for Environmental Water Delivery Feasibility Investigation.

## Evaluation of the EWMFP

The EWMFP has been executed with careful integration with other existing programs to maximise efficiency in investigations and work. Further, the EWMFP project team has been cognisant of the ongoing negotiations during the development of the Basin Plan for the MDB.

Efficiencies have been found by seeking to integrate this program with works already underway from other programs. The River Murray floodplain represents a complex physical environment as well as a complex operating and policy environment. As many investigations and assessments are underway in parallel in the study regions, this project has integrated this work to maximise efficiencies and prevent duplication of effort. In this way positive outcomes have been achieved for both the EWMFP and the other programs in less time than would be required to undertake works and assessments separately.

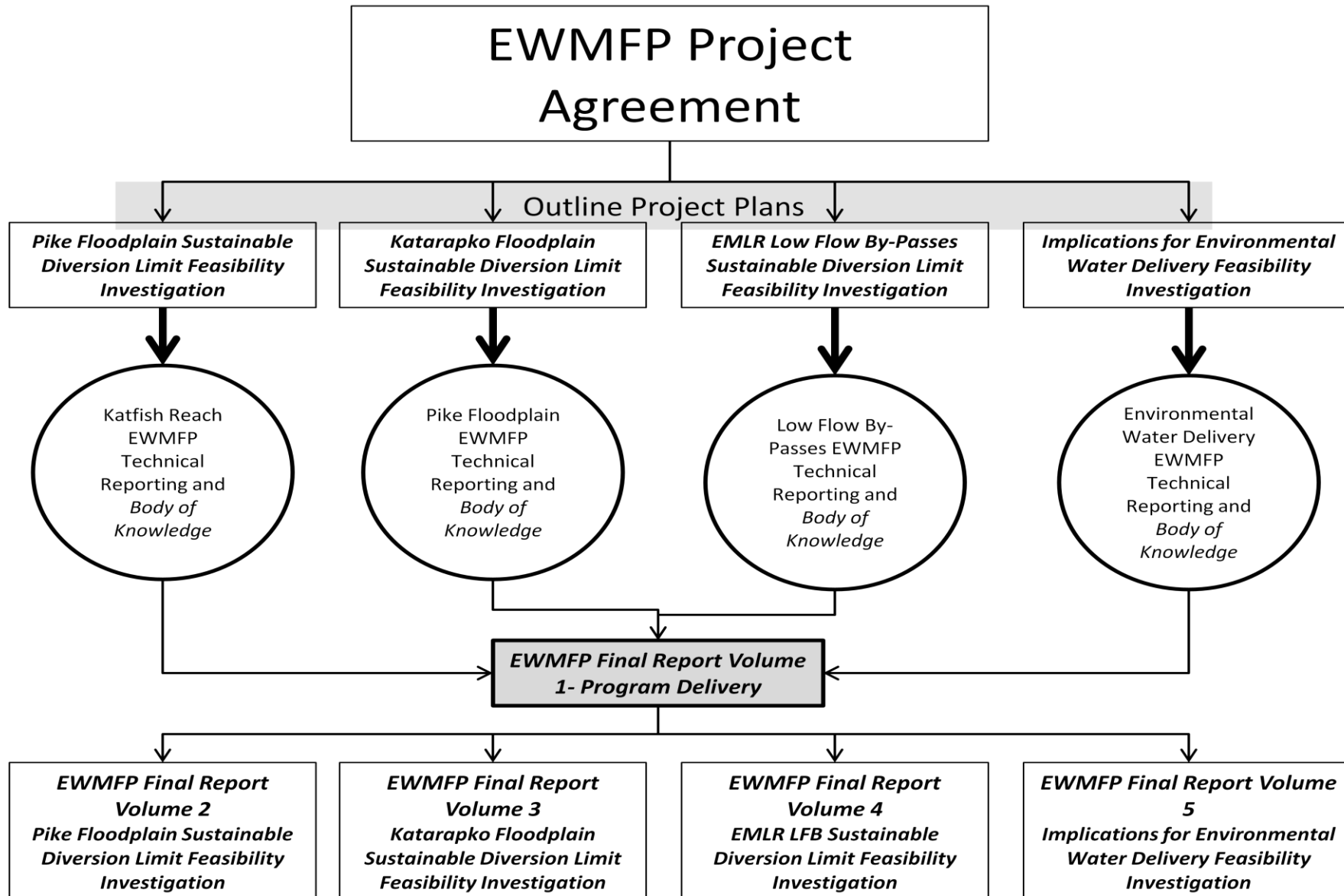
## **Achievement of Milestones**

The milestones for the EWMFP as agreed in the funding schedule are outlined in Table 1. This table also outlines the extent to which the milestones have been met.

Table 2 outlines the tasks undertaken to deliver outputs from the Outline Project Plans EWMFP and Figure 2 outlines the overview of EWMFP governance and deliverables.

## **Other matters relating to the Project**

No other matters were raised by the Commonwealth for inclusion in this report.



**Figure 1: EWMFP overview and structure of reports**

**Table 1: Milestones for EWMFP**

Output	Milestones	Date milestone report due	Date milestone delivered	Notes
The delivery of feasibility investigations, including the costs, risks and benefits, of sustainable diversion limit offset environmental works and measures sub-projects	Acceptance of project management plans for the State sub-projects	13 September 2011	15 September 2011	First three outline project plans submitted to SEWPaC (Craig Bradley, A/Assistant Secretary) 15 September 2011. Additional outline project plan submitted 2 November 2011.
	Engagement of project team and procurement of staff/consultants to deliver the Project	30 November 2011	22 November 2011	The Department of Environment, Water and Natural Resources (DEWNR) <sup>2</sup> engaged an Acting Project Manager on 22 November 2011 to begin the job of delivering the project. Due to unforeseen delays in the process of engaging project staff, the role of project manager and project officer was filled in early 2012. Consultants have been procured throughout the life of the project to undertake tasks as they arose and enable to project to progress smoothly.
	Completion of the State sub-projects: <ul style="list-style-type: none"> <li>• investigations completed as per the project management plans;</li> <li>• information provided to assist determination of potential SDL offsets; and</li> <li>• acceptance of final report</li> </ul>	31 December 2012 (extended to 29 March 2013)	28 March 2013	These projects are discussed in Volumes 2-5 of this report

<sup>2</sup> On 1 July the Department for Water (DFW) merged with the Department of Environment and Natural Resources (DENR) to form the Department of Environment, Water and Natural Resources (DEWNR). To avoid confusion, the new department name (DEWNR) is used throughout this report except in the reference list where reports were specifically prepared for a previous department.



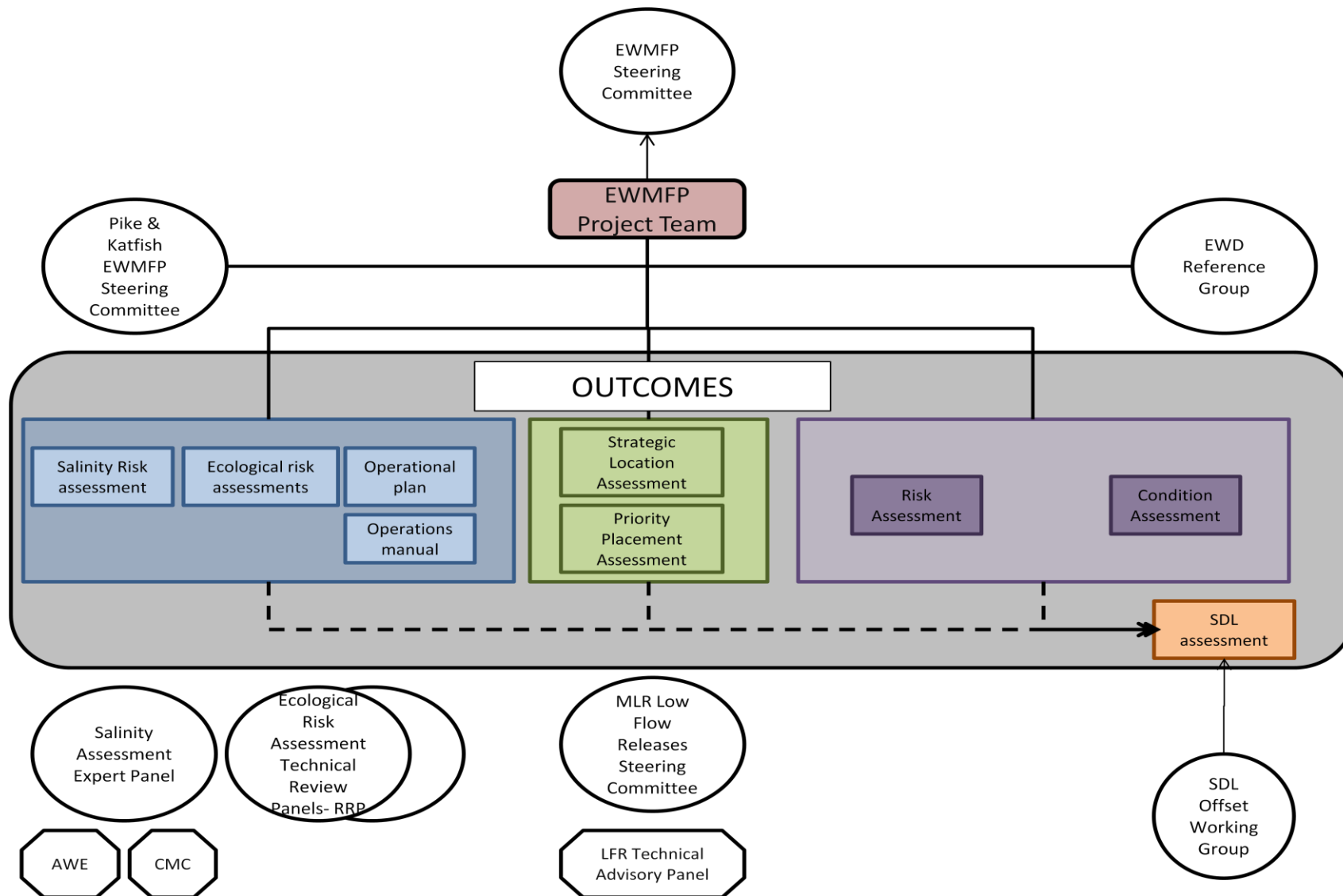
**Table 2: Outline of tasks undertaken to deliver outputs from the Outline Project Plans EWMFP**

Output	Milestones	Outputs	Tasks undertaken to deliver outputs
<p>The delivery of feasibility investigations, including the costs, risks and benefits, of sustainable diversion limit offset environmental works and measures sub-projects</p>	<p>Milestone 1: Acceptance of project management plans for the State sub-projects</p>	<p>Outline Project Plan – Pike floodplain</p> <ul style="list-style-type: none"> <li>• Salinity Risk Assessment for Pike Environmental Regulators;</li> <li>• Ecological Risk Assessment for Pike Environmental Regulators; and</li> <li>• Operational Plan for Pike Environmental Regulators.</li> </ul>	<p>Salinity Risk Assessment Expert Panel</p> <ul style="list-style-type: none"> <li>• Collate existing data and analyse</li> <li>• Formulate methodology</li> <li>• Undertake assessment</li> <li>• Prepare report</li> </ul> <p>Ecological Risk Assessment Expert Panel</p> <ul style="list-style-type: none"> <li>• Literature review and review of previous management actions</li> <li>• Analyse existing data</li> <li>• Undertake assessment</li> <li>• Prepare report</li> </ul> <p>Operational Plan</p> <ul style="list-style-type: none"> <li>• Undertake assessment of existing conditions</li> <li>• Prepare Monitoring Strategy</li> <li>• Consult with relevant experienced personnel</li> <li>• Prepare preliminary report</li> </ul>
		<p>Outline Project Plan – Katfish floodplain</p> <ul style="list-style-type: none"> <li>• Salinity Risk Assessment for Katarapko Environmental Regulators;</li> <li>• Ecological Risk Assessment for</li> </ul>	<p>Salinity Risk Assessment Expert Panel</p> <ul style="list-style-type: none"> <li>• Collate existing data and analyse</li> <li>• Formulate methodology</li> <li>• Undertake assessment</li> <li>• Prepare report</li> </ul>

		<p>Katarapko Environmental Regulators; and</p> <ul style="list-style-type: none"> <li>Operational Plan for Katarapko Environmental Regulators.</li> </ul>	<p>Ecological Risk Assessment Expert Panel</p> <ul style="list-style-type: none"> <li>Literature review and review of previous management actions</li> <li>Analyse existing data</li> <li>Undertake assessment</li> <li>Prepare report</li> </ul> <p>Operational Plan</p> <ul style="list-style-type: none"> <li>Undertake assessment of existing conditions</li> <li>Prepare Monitoring Strategy</li> <li>Consult with relevant experienced personnel</li> </ul> <p>Prepare preliminary report</p>
		<p>Outline Project Plan – Eastern Mount Lofty Ranges</p> <ul style="list-style-type: none"> <li>Technical reports;</li> <li>Concept designs; and</li> <li>Installation of demonstration LFB at targeted sites.</li> </ul>	<p>Technical reports</p> <ul style="list-style-type: none"> <li>Design methodology for priority placement of low flow releases (LFR) using existing environmental risk framework</li> <li>Design scenarios for strategic placement of LFR</li> <li>Determine metrics for assessment of scenario options</li> <li>Build hydrologic model and analyse scenarios</li> <li>Analyse model results</li> <li>Calculate return flows</li> </ul>
		<p>Outline Project Plan – Implications of environmental water delivery</p> <ul style="list-style-type: none"> <li>Risk Assessment Report – loss volumes, areas inundated, impacts;</li> </ul>	<p>Environmental Flows Risk Assessment</p> <ul style="list-style-type: none"> <li>Assessment of potential evaporation and seepage water losses and water losses due to levee bank failure, number of assets (land parcels, community titles, roads and sewage infrastructure) that may be a risk of inundation</li> </ul>

		<p>and</p> <ul style="list-style-type: none"> <li>• Condition Assessment and price/quantity report for River Murray Levee Bank remediation.</li> </ul>	<p>and assessment of water quality risks upon flood recession</p> <ul style="list-style-type: none"> <li>• Review existing legal advice relating to augmenting natural flows and impacts on third parties</li> </ul> <p>Condition assessment of levee banks</p> <ul style="list-style-type: none"> <li>• Review of existing data and information relating to levee banks condition and calculation of potential remediation costs</li> </ul>
	<p>Milestone 2:</p> <p>Engagement of project team and procurement of staff/consultants to deliver the Project</p>	<p><b>Project Team: DEWNR</b></p> <p>Dan Croucher (Project Director) [in-kind]</p> <p>Susan Lee (Project Manager) 0.5FTE</p> <p>Whendee Young (Project Manager) 0.4FTE</p> <p>Jana Bradley (Project Officer: EWD) 0.5FTE</p> <p>Tahnee Sutton (Admin Officer) 0.25 FTE</p>	
		<p><b>Other DEWNR Staff – in-kind contributions</b></p> <p>Chris Morony, Andrew Johnson, Mandy Rossetto, Julia Grant, Andrew Beal, Josh Kaplan, Brad Hollis, Mike Harper, Benita Dillon, Lara Suitor, Mardi van der Wielen, Simon Sherriff, Mike Fuller, Martin Stokes, Andrew Moll, Adam West, Di Favier, Matt Gibbs</p>	<p><b>Committees</b></p> <p>EWMFP Steering Committee</p> <p>Pike and Katfish EWMFP Steering Committee</p> <p>Environmental Water Delivery Reference Group</p> <p>Sustainable Diversion Limit Offset Working Group</p> <p>In addition, many departmental staff were involved in the Salinity Risk Assessment Expert Panel for the Pike and Katfish projects, as discussed in Volumes 2 and 3.</p>

		<p><b>Consultants</b></p> <p>AECOM  Aqunta  Australian Water Environments  Catchment Management Consulting  Consilius  MBH  SA Water Corporation  The University of Adelaide  Water Technology</p>
	<p>Milestone 3:</p> <p>Completion of the State sub-projects:</p> <ul style="list-style-type: none"> <li>• investigations completed as per the project management plans;</li> <li>• information provided to assist determination of potential SDL offsets; and</li> <li>• acceptance of final report</li> </ul>	<p>These projects are discussed in Volumes 2-5 of this report</p>



**Figure 2: Overview of EWMFP governance and deliverables**

Note: AWE=Australian Water Environments; CMC=Catchment Management Consulting; RRP=Riverine Recovery Program; EWD=Environmental Water Delivery.

## **SUMMARY AND CONCLUSIONS**

The EWMFP as a whole has been successfully executed. In addition to the achievement of the milestones outlined above, the project has established effective working groups and technical expertise to enable a smooth transition to the next phase (detailed design and on ground works) in the event that the projects progress to the next phase and funding is secured.

## **REFERENCES**

Department of Environment, Water and Natural Resources (DEWNR) 2012, *2012-13 Annual Environmental Watering Plan for the SA River Murray*, DEWNR, Adelaide

Murray-Darling Basin Authority (MDBA) 2012, *Basin Plan*, MDBA, Canberra