

MDBA ANALYSIS:

MENINDEE LAKES WATER SAVING PROJECT PHASE 2 BUSINESS CASE

PROPONENT: NSW

Key points/summary

- The nature of how the water savings from the project will be captured as an enduring change requires agreement.
- Protection of additional inflows from the northern Basin under the Basin Plan needs to be addressed. Further management actions linked to flows at Bourke should also be linked into the new management arrangements.
- Further details on protection of the ecological values of the site is required, in particular golden perch and the lowland Darling River Endangered Ecological Community, listed under the NSW Fisheries Management Act 1994.
- The proposal does not fully address potential risks and impacts to downstream water users, including reliability of supply, water quality and interactions with planned environmental water (PEW)
- The MDBA anticipates the issues raised here will be included in the confirmation statement and will form part of the forward workplan. Those issues, via Actions (**A x**) are distinguished below.

1. Eligibility (3.1)

1.1 Supply measure requirements (3.1.1)

The proposal would meet the definition of a supply measure under the Basin Plan (cl.7.03 and cl.7.15) to:

- 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, noting that effects on reliability are determined by the proponent/s.

1.2 Measures not included in the benchmark conditions of development (3.1.2)

The MDBA confirms that the measure was not in the benchmark conditions of development (cl.7.02 of the Basin Plan).

2. Ecological values of the site (4.2)

The business case and supporting documentation provide an assessment of the site's ecological values (business case, Appendix 7). This draws upon a number of previous studies that have collated information on values of this site, although many of the references are quite dated e.g. no later fish references than 2004. It is noted that key values include:

- a healthy population of golden perch has been recorded in each of the Menindee Lakes with juvenile fish being recorded regularly in the upper lakes and Lake Wetherell.

- a broad diversity of aquatic and terrestrial habitats for a range of species and communities listed as threatened under both Commonwealth and state legislation, including the EPBC listed Coolibah-Black Box community, Menindee Nightshade, Silver Perch, Murray Cod, 37 waterbirds.
- 24 inundation dependent vegetation communities (wetlands, lignum, red gum, black box) with 511 native flora species documented or predicted to occur in the study area.
- 348 native fauna species including frogs, birds, fish, mammals and reptiles.
- important areas for waterbirds with over 70 species recorded, including 18 migratory bird species listed under international agreements; counts exceeding 200,000; breeding of 16 species including colonial nesting waterbirds; critical drought refuge; 1% of global populations for 6 species.
- 14 native fish species dominated by Australian Smelt, Bony Bream, Western Carp Gudgeon and Golden Perch.
- Nationally important wetlands.

A1 Further documentation should include:

- Acknowledgement of the lowland Darling River Endangered Ecological Community, listed under the NSW Fisheries Management Act 1994. This is a significant omission, as the legislation effectively applies endangered status to all native fish and aquatic animal life within a given boundary; in this case the listing includes the Menindee Lakes.
- Recognition of the emerging research from NSW DPI Fisheries, Murray-Darling Freshwater Research Centre, university researchers and others that suggests the area is of Basin-scale significance in supporting self-sustaining populations of golden perch and is a critical remaining hotspot for recruitment activity.

There is sufficient evidence to indicate that the Menindee Lakes have Basin-scale importance for populations of golden perch with a high proportion of the species in the Edward-Wakool, Goulburn, lower and mid-Murray originating from events in the Menindee Lakes/lower Darling. This is the only system remaining in the entire Basin that provides nursery habitat to sustain mass golden perch recruitment events.

3. Ecological objectives and targets (4.3)

A2 Ecological objectives and targets consistent with assessment criteria i.e. clearly articulated, consistent with the Basin Plan, quantified (where appropriate) and supported by evidence need to be provided.

A3 In particular, quantitative objectives for each of the lakes of and the downstream/upstream environments should be clearly articulated. Given their ecological connectivity, rivers in the northern Basin should also be considered.

4. Anticipated ecological outcomes (4.4)

4.1 Anticipated ecological benefits (4.4.1)

The business case identifies a number of anticipated ecological benefits, however assessing the ecological benefits of the proposal is restricted due to the limited detail provided in some areas.

A4 Evidence is required to support some of the identified outcomes, including:

- Evidence to show that the proposed changes to flow metrics will achieve the ecological benefit which may originally have been achieved with that type of flow. For example, is the seedbank in sufficient condition that returning wetting/drying will result in vegetation outcomes? The business

case assumes that returning wetting/drying cycles and flow regimes closer to natural will result in reinstating ecological benefits. However, this system is fundamentally changed from its natural state, and current operating conditions result in Lake Cawndilla being filled to higher water levels with significantly longer periods of inundation than would have occurred naturally. It is likely that complementary measures will be required additional to water in order to actually reinstate many ecological objectives, for example Revegetation is an example that may be need to support recovery and/or re-establishment of vegetation communities.

- Substantiation of the statement that the proposed wetting/drying cycle would provide a diverse range of habitats and food resources for waterbirds, as loss of this habitat as a golden perch nursery would impact the food supply of piscivorous waterbirds species and may therefore have adverse impacts.
- Provide more detail on fish passage, including how engineering challenges for effective fish passage at large structures such as Menindee weir will be managed. Fully realising the benefits from fish passage partly depends on the sufficient recruitment of native fish in the system, which may be negatively impacted by the proposal.
- Provide evidence for potential nutrient cycle benefits from the 'boom and bust' ecology. Evidence suggests Lake Cawndilla already exhibits high levels of productivity under current operations — hence its importance as a fish nursery. There is the potential for adverse ecological impacts given the filling regime proposed is much drier than would have occurred naturally. While not noted in the business case or Appendix 7, the MDBA's assessment of environmental watering requirements for the Lower Darling River System (including Menindee Lakes) identified research that supported changes to the flow regime: "Reinstating a variable flow regime in either or both Lake Menindee and Lake Cawndilla would provide additional feeding habitats for resident waterbirds, which could increase their diversity and abundance, especially of some migratory shorebird species that inhabit this system (Jaensch et al. 2002). The drying of both Lake Menindee and Lake Cawndilla in 1995 and early 1996 was accompanied by significant increases in the number and density of birds using the lakes when they were refilled (Kingsford, Jenkins & Porter 2002). It is thought that a more variable flow regime in these lakes would also increase the diversity and abundance of aquatic plants, invertebrates and native fish, and has the potential to encourage terrestrial vegetation such as lignum and black box to re-establish in some parts of the lakebeds, which would provide roosting and breeding habitat for waterbirds (SKM 2009a)."
- Provide evidence that the drying and wetting phase for the various lakes (including Lake Cawndilla) will consider both spawning cues and the necessary conditions for successful breeding events for native fish, particularly golden perch. The native fish that inhabit Lake Cawndilla are predominantly juvenile golden perch spawned upstream in the Barwon-Darling (or tributaries) and deposited in the lakes through flows. The lakes do not provide adequate 'spawning through to recruitment' conditions for this species. The other major native fish inhabitants are generalist species like gudgeon that are not flow-dependent spawners. Improving spawning cues in Lake Cawndilla may not benefit the native fish present and the project may have overall negative impacts. In particular, there may be a significantly detrimental impact on golden perch recruitment attributable to the proposed drying cycle and reduced residence time of water when it reaches Cawndilla (the proposed quick draw down after two months is likely to be inadequate for young perch to successfully reach the juvenile stage).
- Provide details provided regarding the characteristics/conditions of the account or accounting and compliance arrangements to quantify additional inflows from the northern Basin under the Basin Plan.

- The business case states that the drying of Cawndilla is likely to assist in controlling carp numbers. Evidence suggests there is actually a very high percentage of native fish (largely young golden perch) that exit Cawndilla when it functions as a nursery habitat. Few carp exit through the outlet regulator so the scale of any actual benefits needs to be clarified.

4.2 Potential adverse ecological impacts (4.4.2)

A5 An environmental impact statement (EIS) is required.

Under The Living Murray (TLM) program, the Great Darling Anabranh Pipeline project recovered 47 GL/y for the environment at a cost of \$54 million. The works allowed the re-introduction of more natural flow conditions along 460 kilometres of the Anabranh. Modelling has shown a risk under the Menindee Lakes proposal that environmental flows may not be met at the frequency envisaged by TLM project, potentially undermining previous Commonwealth investment to restore the environment. Appendix 7 of the business case states that alternative options for delivering water to the Anabranh should be considered. Without detailed hydrologic modelling of changes to flows within the Great Darling Anabranh it is unclear whether proposal options adequately provide for delivery of water to the Anabranh.

A6 Hydrologic modelling of changes to flows within the lower Darling River and Great Darling Anabranh and anticipated ecological impacts (with reference to their environmental water requirements, including the SFIs specified for the Lower Darling River) should include recognition of the potential impacts from water quality both in the lakes and in downstream systems. For example water quality issues in the lower Darling during drier periods, particularly stratification of refuge pools and subsequent fish kills if reinstated flows are insufficient or poorly timed (e.g. conditions leading to fish kills in LDR in water years of 2003/04, 2007/08, 2006/17).

An EIS is a statutory requirement, however the required EIS tests to determine whether a project can proceed are unlikely to fully take account of the need for environmental equivalence as per the SDL adjustment mechanism. For example, the EIS would likely focus on the proposal's effect on threatened species and may not deal with species that are not threatened but are nevertheless of high value.

A7 The proponent should clearly outline the proposed scope of the EIS and the governance arrangements for sharing information with the MDBA and jurisdictions as the EIS progresses. Potential adverse impacts for which MDBA seeks further assessment as part of the EIS include:

- The potential implications for water dependent biota and ecological functions of the altered rates of rise and fall in Lake Cawndilla. The business case acknowledges the trade-off between impacts on local environmental values and the benefits of evaporative savings. Modelling presented in Appendix 7 indicates that over the long-term 10 GL per year less evaporative savings would be realised if the filling period was reduced from 36 to 12 months. The EIS process should undertake a formal cost/benefit assessment of the trade-offs associated with different filling regimes at Lake Cawndilla.
- Consideration of the ecological benefits and potential adverse impacts of all proposed changes including on the aquatic community more broadly in this EEC (not just the Menindee Lakes themselves).
- An assessment of the impacts of the proposal on the wider range native fish and aquatic species within the entire lowland Darling River aquatic Endangered Ecological Community (as listed under the NSW Fisheries Management Act 1994) should be undertaken. For example, it is likely that the lower Darling Murray cod are an important source to re-populate southern Basin rivers after blackwater kills. Any assessment should consider ecological, socio-economic and cultural impacts, for example changes to abundance of species considered a valuable recreational angling fish or of importance to aboriginal communities.

- With respect to Measure 17 (Cawndilla additional E-flows) the proposed environmental operation appears to be a balance between water savings and ecological requirements of the Lake. These should be clarified, as estimated periods of time with no water of ~10 years are likely to have significant impacts on Red Gum and EPBC listed Coolibah-Black Box woodlands that fringe the lake (8.3).
- Potential impacts on golden perch, as the current proposal may lead to the loss of:
 - over 8,000 ha of golden perch nursery habitat in Lake Cawndilla for over 65% of time (longer if the continuous residence time of water in the lake is insufficient).
 - over 15,000 ha of golden perch nursery habitat in Lake Menindee for over 20% of the time (likely longer as the rapid draw down will reduce the residence time of water in the lake, preventing development of young golden perch)
 - potentially functional nursery habitat in other lakes in the Menindee system, not able to be determined yet from this proposal¹.
- Pending adequate assessment of potential impacts on golden perch, the waterbirds components may also need re-assessment as this could significantly impact on their food resources.
- More detail is required on the proposed operating regime for regulators at the Anabranche offtake, Emu Lake and Yartla Lake that seek to limit ‘breakouts’. These lateral connections with the floodplain and into dry lakes and anabranches are recognised as being important for the ecological health of the system.

The role of the inter-jurisdictional working group (IJWG) is focussed in the first instance on Phase 3 business case requirements and any ongoing requirement for the IJWG is subject to review by NSW. It is suggested that long-term arrangements for inter-jurisdictional involvement over the timeframes of the EIS are formalised.

The Menindee Lakes falls outside of the SDLAM framework for testing environmental equivalence. As such, any trade-off of environmental outcomes associated with generating water savings at Menindee Lakes will not contribute to lower environmental outcome scores using the Ecological Elements method and therefore is not taken into account in determining the adjustment volume. The business case states that a separate assessment of the local environmental needs has been commenced and further work will be necessary as part of the formal EIS process.

A8 Further clarification is required from the proponent regarding the assessment of local environmental needs and how this information will be used to revise the proposal as required. At minimum, MDBA would expect that a qualitative assessment will be undertaken to confirm that the net environmental outcomes of the final proposal are environmentally equivalent.

5. Hydrology of the area and environmental water requirements (4.5)

5.1 Current hydrology and proposed changes to the hydrology (4.5.1)

Modelling of the proposal has been done in consultation with NSW using best information available.

A9 The proponent should clarify:

- how remaining entitlements will be managed if not fully purchased.

¹ Based on data from “Menindee Water Savings Project Stages A1 and A2 – Environmental Water Needs and Water Management Arrangements”, GHD, January 2016

- how targeted environmental watering to Lake Cawndilla using held environmental water entitlement is accounted for against the environmental account. The business case provides the provision for held entitlement to be used between periods of sufficient water coming from the north to trigger the filling of Lake Cawndilla using planned environmental water. There should be no assumption that held environmental water will be used in the intervening period and even if so, it may not be sufficient to maintain environmental outcomes (especially during extended droughts).

5.2 Environmental water requirements (4.5.2)

The business case notes that ecological communities at Menindee Lakes consist of a diverse range of flora and fauna assemblages that are wholly or partly dependent on wetting and drying cycles to fulfil at least some component of their life cycles.

A10 Further documentation is required to provide the basis case for environmental water requirements including:

- Details of spatial coverage – documentation (primarily within Appendix 7) focuses on watering requirements of Lake Cawndilla. However, little to no description of the environmental water requirements of other areas directly affected by the proposal is provided i.e. other lakes within the Menindee Lakes system, the Lower Darling River and the Great Darling Anabranch (which has its watering requirements very briefly outlined), as well as ecological values in connected northern rivers. Where appropriate, ecological values in the wider southern-connected basin that are influenced by the Menindee Lakes and connected systems should also be considered.
- Lack of ecological theme coverage. Where information is provided it tends to focus on watering requirements of flood dependent vegetation. However, the area known to support significant waterbird and fish ecological values and the description of their requirements is inadequate. Either information is not provided, only very briefly considered and described or general in nature e.g. habitat requirements. As per comments above, the current information omits consideration of other lakes and river systems and these need to be addressed.

Given ecological objectives and targets have not been clearly articulated, the business case has been unable to describe their link with environmental watering requirements. Similarly, information is not provided on the frequency and duration of inundation under the proposed regime so it not possible to clearly understand how the proposal affects the achievement of environmental watering requirements.

While the proposal identifies environmental considerations during operation there is limited information on how the proposed operating regime will meet identified environmental watering requirements.

A11 Further information will be required in subsequent phases on environmental water timing, frequency, volume, conditions etc.

6. Operating regime (4.6)

The proposal sets out a new operating regime at Menindee including amended wetting and drying sequences at Lake Cawndilla, relaxing constraints along lower Darling and additional inflows into the Murray leading to improved environmental outcomes along the Lower Darling and Murray.

A12 The operating regime presented is high level in nature and detail. Further detail which will be required in subsequent phases is at Appendix A.

7. Assessment of risks and impacts of the operation of the measure (4.7)

The business case identifies a number of potential risks and states “preliminary analysis shows there are no intolerable residual risks remaining after the application of controls” (Section 13). It is considered that whether a risk is intolerable or not is considered too high a bar for determining acceptability, in particular as the test only relates to whether the scope of works are likely to meet regulatory approvals.

Many risks identified in section 13.2 are not expressed in terms of impact to the project. They are expressed as a risk of an event occurring, without making the link to the consequence/impact of that event on the project (i.e. impacts to time, quality or cost). As such the mitigation measures generally lack detail and may not appropriately mitigate the risks.

The mitigation strategy proposed for identified environmental risks is the EIS process. Given scheduled timing for EIS completion is late 2020, it is not possible to assess whether mitigation strategies from the EIS process are acceptable.

At a high level there are two major risks that have been identified in terms of project delivery that should be considered in more detail: risk to project delivery timeframes; and risk to project delivery budget. Specifically, these risks relate to inundation of work areas, cultural heritage impacts during construction works, community objections, environmental impact during construction works, lack of detail around commissioning and O&M arrangements, lack of detail around the proposed designs, required involvement of third parties.

Cultural heritage impacts will be detailed in the documentation required for gaining an Aboriginal Heritage Impact Permit (AHIP). The timeframe for successfully gaining an AHIP (based on MDBA experience with Lake Victoria) can be greater than four years. An application for an AHIP should be commenced as soon as practical and independent/simultaneous to submitting an EIS (noting that an AHIP is normally part of an EIS unless exempt e.g. for state significant infrastructure projects).

The proposed delivery time frame is short (less than 2 years for construction, commissioning and handover) and the construction schedule assumes dry conditions, which may be an unrealistic assumption given the location of the works. Should wet conditions be experienced there is a risk that the works will not meet the 2024 project delivery timeframes. This may also result in additional costs that are not currently factored into the project budget.

Additional time is needed for cultural heritage inclusion and related considerations.

The limited supporting site investigations and relatively low level of design maturity represents a high degree of uncertainty associated with the proposal. Design drawings are not provided for a number of proposed structures. As such the 30% contingency proposed is likely insufficient; by way of example, MDBA currently commits about \$1m on implementation of the AHIP for Lake Victoria—an amount well beyond what was originally envisaged—which demonstrates the need for increased funds to cover contingencies such as AHIP application and ongoing implementation.

The limited consideration given to key construction risks further increases the risk of the project exceeding the cost estimate.

The location of the proposal is a culturally rich area and cultural heritage will be a key consideration throughout the project. Changed operating regimes could impact and/or expose cultural heritage sites. The business case states that if significant cultural heritage is found at Lake Cawndilla and is negatively impacted by the changed flow regime, a plan (via the AHIP) will be developed to protect these. An indicative cost is provided as well as who would be responsible for its implementation. If it is similar to Lake Victoria, the implementation costs and timeframes involved are likely to be a significant commitment and likewise require an AHIP.

A13 Identify what consideration has been given to the impact of changed operating regimes on heritage sites, and any budget set aside for cultural heritage management/monitoring during the construction phase.

The business case has not provided any commentary on the potential risk to water quality or mitigation measures. The combined works and measures proposed may alter the flow and salt loads downstream of Menindee lakes and subsequently in the Murray River with the potential for water quality degradation.

A14 Further information is required regarding water quality impacts (chapter 9 section 9.02 of the Basin Plan) that may result from the measure.

A15 The risk register identifies risks to stream metabolism and primary productivity from reductions in bankfull and overbank flows however the scope should also include risks to water dependent biota, as well as risks as a result of a reduction in wetting at Lake Cawndilla.

One risk that is not covered is the breaking of a long drought period when the flow at Bourke reaches 590 GL/month. What would be the operational decision framework and what does this mean for the volume of water savings. Perhaps some sensitivity modelling around the rules would provide an indication of the scale of this risk.

To date there appears to be limited community engagement and the proposal may not adequately address potential risks around third party involvement. Outcomes may be improved where effective stakeholder engagement is implemented.

8. Complementary actions and interdependencies (4.9)

This proposal was modelled as part of the final assessment of an agreed package of measures. Interdependencies have been factored into determining the SDL adjustment volume, which is documented as part of the published draft Determination Report.

The proposal includes the formation of a working group to identify inter-jurisdictional issues associated with the project and provide advice on further development of the project. It is likely that many of these issues, especially those around water accounting, water delivery and interdependencies on other rules such as ADF, Special Accounting, Environmental Water accounting and the Lake Victoria Operating Strategy will not be resolved prior to the sign off of the Business Case. Some issues may not even be resolved prior to commencement of construction. As such, these issues may need to be progressed via the appropriate interjurisdictional committees such as the Water Liaison Working Group, RMOC, BOC and Ministerial Council over the coming years.

9. Project governance and project management arrangements (4.11)

9.1 Legal and regulatory requirements (4.11.2)

The business case identifies the need to review and potentially amend a number of provisions in the NSW Water Sharing Plan for the NSW Murray and Lower Darling Regulated Rivers Water Sources 2016, which is a transitional water resource plan. While a number of provisions have been identified as potentially requiring amendments, the level of detail provided in the business case about the potential changes is not sufficient to determine if they have the potential to introduce new inconsistencies with the Basin Plan.

A16 Detail should be provided on the potential required amendments to the transitional water resource plan.

The business case suggests that construction of a new regulator at the offtake to Cawndilla Creek will facilitate environmental flows to the higher value assets using held environmental water. Similarly, it is proposed that managed, periodic inundation of Lake Cawndilla occur using held entitlement. Particular care should be taken when considering amendments that interact with planned environmental water rules (e.g. proposed changes to clause 31 which deals with the environmental water allowance for the Lower Darling Water Source). In making changes to these arrangements the requirement in section 10.28 of the Basin Plan (no net reduction in the protection of planned environmental water compared to that in place under state water management law immediately before the commencement of the Basin Plan) should be considered.

A17 The proponent is requested to provide evidence that the proposal is not substituting planned environmental water for held environmental water given the proposed use of held entitlements is to reinstate inundation regimes provided for under current water sharing arrangements.

A18 The proponent should also provide evidence that sufficient volumes of held environmental water would be available under a range of climatic conditions to support the proposed filling regime and outline any impacts on the volume of held environmental water available to meet other environmental objectives. There would be value in indicating the likelihood that environmental water holders would use their water, for example, to fill Lake Cawndilla as proposed.

A19 If the proposal requires changes to the WSP and NSW wishes for the amendments to be recognised as part of the transitional plans under the Water Act 2007 they should be submitted to the MDBA so the “no less consistent” test can be applied. Alternatively, the potential changes to the WSP may be considered as part of the development of a Basin Plan-consistent water resource plan for the Murray and Lower Darling WRP area.

Appendix A – considerations for detailed design and further operating strategy refinement

A20 Further detail required in subsequent phases includes:

- While the proposal identifies environmental considerations during operation there is limited information on how the proposed operating regime will meet identified environmental watering requirements. Appendix 7 identifies, at a high level, the water regime required for ecological assets, however limited information is provided on how operation of the proposal will deliver the environmental water requirements (timing, frequency, volume, conditions etc.). Further information will be required subsequent phases.
- Work to identify interactions between proposed infrastructure works and the range of scenarios (e.g. extreme climatic conditions or emergency conditions)
- More information is needed for the Menindee main regulator, operating regimes during construction to mitigate risks e.g. sequencing of works, need for bypass flows, etc. and the proposed operating regime of the Emu Lake, Yartla Lake and Darling Anabranh regulators to meet downstream flow requirements.
- Justification of additional regulator costs as it is unclear why the ecology between Morton-Boolka regulator needs to be managed separately to management of Cawndilla
- Further work to inform operating rules for the proposed Morton-Boolka regulator (i.e. modelling, geomorphology assessment). Refinement of operating rules may in turn impact functional requirements and design of the structure and should be considered in project scheduling (6.3.2).
- As the project is refined some project components may not function or be considered good value. Consideration should be given to implications on overall project outcomes and objectives.
- The criticality of fish passage at the proposed Menindee regulator outlet is unclear as well as the operational, biological and functional requirements for fish passage at the site. Given the head difference a conventional (vertical slot) fishway is unlikely to be feasible or optimal.
- The modelling includes data up to 2009 and therefore does not include the recent very dry inflow period. The final proposal should consider the recent very low inflow period and allow flexibility in operations to account for hydrological regimes outside the current modelled scenarios such as long dry periods, emergencies, maintenance and to allow for innovative ideas in the future.
- Provide detail on additional land inundated (and other benefits) along the Lower Darling and Murray rivers.
- Examine any impacts on the duration of no/low flow periods along the Lower Darling River and any impacts on the operation of Lake Victoria.
- Outline operations under extreme climatic conditions or emergency conditions.
- Clarify powers to operate current and proposed structures, e.g. who would be responsible for giving direction for current and new structures during flood operations (NSW or MDBA).
- The proposal states that the MDB Agreement should be changed to quarantine additional northern Basin inflows into environmental accounts. The effectiveness of this is not discussed, but it may work, if quarantined then used immediately and let flow downstream.
- A flow volume of 600 GL/month is proposed to trigger releases into Lake Cawndilla. For operational purposes, this rule may need some flexibility to take into account forecast flows, a rolling 30 day volume, an out clause for extreme conditions and a timetable for reviewing each of the rules to take into account climate changes and new information. The rules need to provide certainty and clarity but also flexibility.

- The proposal suggests that the Menindee storage could be drawn down to 80 GL, which would be used for riparian use on the lower Darling for 12 about months. To cover future uncertainties, such as changing climate, upstream flow conditions and seasonal outlooks, this volume may need some flexibility and could be couched in terms of a certain reliability rather than a set volume. Detail is needed on how the 80 GL would be released (constant flow at x ML/day or pulsed) and who would be responsible for directing releases (NSW or MDBA)
- The current proposal indicates (p101) that the project outcomes are consistent with the original intent of the additional dilution flow rules, however they will be triggered less frequently. The potential impacts on the water level in Lake Victoria are not assessed in the proposal and they will need to be examined in detail by MDBA modelling.
- A rule may be required to ensure water no longer stored in Lake Cawndilla has no negative impact on Aboriginal cultural heritage and environmental outcomes at Lake Victoria. Less water in Menindee may trigger conditional rules at Lake Victoria more often. There may need to be a rule or process to allow water to bypass Lake Victoria.
- Consider transitional arrangements should works be finalised but changes to policies/rules not yet agreed.
- The proposal to allow trade from the Murray into the Darling, restricted to the “volume remaining in the Lakes available to meet the new delivery in the current water year” should be reviewed by the Trade Working Group and the Water Liaison Working Group.
- At an estimated cost of \$6m for the Cawndilla regulator, additional detail on the ecological benefits is required to better assess the value for money of this structure.
- Average annual operating and maintenance costs are estimated at \$438,500, approximately 0.3% of the project cost, which appears very low. Insufficient budgets may reduce asset longevity and use and result in sub-optimal operational performance. Rather than considering periodic timing for each of the 13 packages as two-yearly, consider timeframes associated with major cyclical maintenance allowances (14.7).
- Identify clearly ownership and maintenance responsibilities for the proposed measures.
- Clarify why the Morton Boolka Regulator has not been sited further downstream where the channel width is significantly reduced.
- Include consideration of geomorphology and sedimentation processes/risks associated with the removal of Old Menindee Town Weir, and the potential for increased scour risks for releases from Lake Menindee Outlet due to reduced tailwater (6.4).
- Include consideration of ecological implications associated with preventing break-out of flows and regulator operation to provide flows to the areas for Measures 5 & 6.