Lower Darling Water Security Options Analysis
FINDINGS REPORT
NSW Department of Industry

October 2018
## Glossary

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
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<tr>
<td>BAU</td>
<td>Business As Usual</td>
</tr>
<tr>
<td>BWC</td>
<td>Blackwatch Consulting</td>
</tr>
<tr>
<td>CEWH</td>
<td>Commonwealth Environmental Water Holder</td>
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<tr>
<td>CL&amp;W</td>
<td>Crown Lands and Water</td>
</tr>
<tr>
<td>EC</td>
<td>Electrical conductivity</td>
</tr>
<tr>
<td>GS</td>
<td>General Security water entitlement licence</td>
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<tr>
<td>GL</td>
<td>Gigalitres</td>
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<tr>
<td>HS</td>
<td>High Security water entitlement licence</td>
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<tr>
<td>MDBA</td>
<td>Murray-Darling Basin Authority</td>
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<tr>
<td>ML</td>
<td>Megalitres</td>
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<tr>
<td>MLWSP</td>
<td>Menindee Lakes Water Savings Project</td>
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<td>OEH</td>
<td>Office of Environment and Heritage</td>
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<tr>
<td>S&amp;D</td>
<td>Stock and Domestic</td>
</tr>
<tr>
<td>SDLAM</td>
<td>Sustainable Diversion Limit - Adjustment Mechanism</td>
</tr>
<tr>
<td><strong>The Department / DOI</strong></td>
<td><strong>NSW Department of Industry (Lands and Water)</strong></td>
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</table>
1 Preface

1.1 Purpose and scope of this document

The NSW Department of Industry (the Department) is currently considering options to ensure water security in the Lower Darling should the proposed Menindee Lakes Water Saving Project (MLWSP) proceed as described in the current MLWSP Concept Business Case. This document provides the findings of multi-disciplinary analyses relating to the Lower Darling Water Security Options Analysis (Lower Darling options analysis), which has been prepared by Deloitte and Blackwatch Consulting.

Deloitte and Blackwatch Consulting were engaged to review existing reports developed for the Department by a range of sources, provide supplementary analysis, and consult on, six possible options for addressing long-term water security issues in the Lower Darling following the proposed reconfiguration of the Menindee Lakes and associated operating changes.

The Lower Darling options analysis was performed to a pre-feasibility level. Its purpose is to inform more detailed analysis should the MLWSP proceed.

The options being considered have been developed by the Department and informed by an examination of the MLWSP, and advice from other government sources. As such, the options provided address a range of water supply issues in the Lower Darling. The six options are:

1. Lower Darling structural adjustment package with supplementary Stock & Domestic (S&D) pipeline, including servicing Pooncarie (Option 1)
2. On-farm water storages, with supplementary Pooncarie pipeline (Option 2)
3. Permanent in-stream gated regulators in the Lower Darling (Option 3)
4. Pooncarie pipeline offtake from the Wentworth to Broken Hill (W2BH) Pipeline (Option 4)
5. Large-scale S&D and horticulture pipeline (Option 5)
6. Re-scoping the proposed MLWSP to maintain a larger ‘drought reserve’ in the Menindee Lakes than proposed in the MLWSP Concept Business Case (Option 6).

The infrastructure components of options have been designed to supplement existing supply arrangements from the Darling River during any ‘no flow’ events. These options will be subject to further analysis and consultation.

The Department is committed to ensuring there is ongoing transparency of decision making in NSW. This document provides the findings of the analyses to in order to provide NSW communities with confidence that a robust evaluation process has been undertaken to inform the development of options for the final MLWSP proposal.

1.2 Background

1.2.1 The Murray-Darling Basin Plan and Sustainable Diversion Limits

The Murray-Darling Basin Plan (Basin Plan) is an inter-state governmental agreement to manage water in the Murray-Darling system sustainably for all users, including the environment. The Basin Plan sets limits ('Sustainable Diversion Limits' or SDLs) on how much water can be taken for irrigation, drinking, industry or other purposes in each state, and is scheduled to take effect in 2019. However, the introduction of an SDL Adjustment Mechanism (SDLAM) means governments can offset some of their limits by implementing new infrastructure or operational projects that manage water more effectively, achieving equivalent environmental outcomes with less water. These projects must be delivered by 2024.

1.2.1.1 MLWSP

The MLWSP is being analysed and developed by the NSW Government as a key project to meet its obligations under the Basin Plan, using SDLAM. The project is under development to improve the management and water use efficiency of the Menindee Lakes system by reducing the approximately 420 GL of annual evaporation that is currently lost in the lakes.
The MLWSP proposes building new, and enhancing existing, infrastructure in order to make the Menindee Lakes more efficient. The MLWSP also proposes to change the operating governance of the MLWSP to reduce the storage threshold for transferring operational control to the Murray-Darling Basin Authority (MDBA) to 80 GL.¹

Under the proposed project, which moves more water into and out of the Menindee Lakes faster, the MLWSP is targeting a long term average saving of 106 GL per annum through avoided evaporative losses. Water recovered by the MLWSP would be returned to the Murray Darling Basin and thus contribute to the 605 GL SDL adjustment for the southern basin.

The MLWSP is complex and evolving as parties seek to balance environmental, social and economic needs under the Basin Plan and NSW regulation, and as further analysis and consultation is undertaken.

1.2.1.2 Other MDB water management measures and planned changes
The Basin Plan also includes a range of measures that are being implemented in the Northern Basin and which will contribute to increased flows into the Menindee Lakes, including:

- Water recovery through the Basin Plan. In July 2018, the water recovery target for the Northern Basin was updated following the Northern Basin Review. The new target for the Northern Basin is 320 GL per year and is contingent on measures that will deliver better outcomes for the environment and communities than the previous target of 390 GL per year.
- Better management of low flows and water events. The MDBA is working with environmental water holders to establish priorities for the coordination of environmental flows and protection of low flows through the Barwon-Darling and Lower Darling.
- Improved compliance and enforcement following the MDBA independent panel’s review of compliance as well as NSW’s compliance review undertaken by Ken Matthews. In June 2018 all Basin Ministers endorsed a Basin Compliance Compact where each jurisdiction sets out its plans to improve compliance and enforcement activities. In addition, a NSW Natural Resources Access Regulator (NRAR) has been established and operational since April 2018. Its principal objectives are to ensure effective and accountable compliance and enforcement measures for the natural resources management legislation, and to maintain public confidence in the enforcement of the natural resources management legislation.
- As part of the NSW Government’s Water Reform Action Plan the Department has committed to implementation of a robust metering framework.

1.2.2 Western Weirs Proposal study
WaterNSW has proposed a holistic approach to the management of weirs in the far west of NSW. The proposed project covers the Barwon-Darling River from Mungindi to Wentworth, which includes the Lower Darling Regulated Water Source. The proposal is currently seeking funding to complete a feasibility study and strategic business case.

If subsequently implemented, the proposal could see WaterNSW assume the ownership of weirs, upgrade weirs to become gated structures (regulators), provide fish passages, remove some weirs, and continue to operate and maintain the new regulators. The program could include:

- Construction of a new integrated system of gated weirs (regulators) to replace current fixed crest weirs along the river
- Provision of fish passage (where required) on all new and existing fish barriers along the river
- Removal of weirs and structures that provide no benefits to the system
- Implementation of new ownership, maintenance, operations and cost recovery arrangements for infrastructure and operations along the river
- Amendments of the Water Resource Plan considering the new operational regime on the river.

¹ Current arrangements transfer control using a 480 GL/ 640 GL threshold, when water volumes across the lakes rise above 640GL, operations of Menindee Lakes is transferred to the MDBA. Should storage volumes fall below 480GL then control is transferred to the NSW Government until the levels return to 640GL.
The outcome of this proposal will inform the further development of the MLWSP.

1.3 Limitations
The findings of the report should be regarded as pre-feasibility analysis and should not be interpreted as a feasibility study, nor business case. Rather, it should be used to prioritise options to maintain the Lower Darling’s water security should the MLWSP proceed.

It is likely that Basin Plan hydrological modelling will continue to evolve. If this modelling results in changes in expected water flows in the Northern Basin or Menindee Lakes the analysis in this report should be revisited prior to commissioning any detailed feasibility analysis.
2 The Lower Darling Region

The Lower Darling River System refers to the 530 km section of the Darling River from the Menindee Lakes to the Darling River’s confluence with the River Murray at Wentworth in south-western NSW. The township of Pooncarie is the midpoint of the region, located approximately 120 kms by road from Menindee to the North and Wentworth to the South. The specific area under study for these options is the area of the river downstream of Weir 32 near Menindee, through Pooncarie, to the upstream (Darling) influence of the Wentworth Weir (identified between the broken lines in figure 2.1). This is the area that has historically relied on a large storage capacity in the Menindee Lakes for water security, particularly during periods of low or no flow.

Figure 2.1: The Menindee Lakes and Lower Darling Catchment

Source: NSW Department of Primary Industries, Office of Water, Water Resources and Management Overview – Lower Darling Catchment, 2012
2.1 Socio-economic profile

2.1.1 Demographic
The region supports a relatively small and sparse population. The 2016 Census for the combined Menindee, Wentworth and Pooncarie towns, which covers the majority of the Lower Darling catchment area, identified a population of 2,154 people. The main population centre within the Lower Darling catchment, the small township of Pooncarie, was home to 166 residents in 46 occupied dwellings in 2016. The Lower Darling region has a relatively older population, with a median age of 48 compared to the state median of 38.

2.1.2 Cultural heritage
The Menindee Lakes and Lower Darling River lie within the country of the Barkandji Nation, one of the 24 Sovereign First Nations from the southern part of the Murray-Darling Basin that are a part of the Murray Lower Darling Rivers Indigenous Nations (MLDRIN). The Barkandji are the people of the Darling River and have maintained strong connections to the land and waterways of the region. In 2015, the Federal Court determined that the Barkandji People hold native title rights and interests in the area.

The long association of the Barkandji with the Menindee Lakes and Lower Darling River has resulted in the region having a very high density of culturally significant sites and artefacts. The distribution of recorded Aboriginal sites, as indicated by previous searches of the Aboriginal Heritage Information Management System (AHIMS), indicates the majority of sites are located close to the river and lake beds, including: artefacts, stone quarries, shell middens, culturally modified trees and burial sites. The Barkandji people maintain a cultural association with the lakes and rivers, valuing the flora, fauna and ecology of the region, as well as maintenance and restoration of a natural flow regime.

2.1.3 Economic profile
The Lower Darling region has a relatively high unemployment rate of 10% compared with the NSW average of 6.3%. Despite this, the township of Pooncarie has a relatively low unemployment rate of 3.5%.

The Lower Darling region’s main industry of employment is agriculture, accounting for 26% of jobs in Menindee, Wentworth and Pooncarie. Accommodation and food services (12%), health care and social assistance (11%) and education (9%) are the other major sources of employment in the region. Within the agriculture industry, the main commodity of employment is sheep farming at 40% of total agricultural employment, followed by grape production (12%).

Community consultation undertaken to inform this report highlighted that much of the agricultural industry is associated with intergenerational family businesses with a rich family history in the region. This has fostered a strong sense of community within the local agricultural sector. Prior to the Commonwealth Government purchase of its water entitlement and the agreement to remove irrigated infrastructure in 2017, Webster was a major employer and driver of economic activity with its irrigated cropping operations at Tandou.

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2 Due to data limitations, the following analysis is of all Lower Darling regions, beyond the impacted ‘in-scope’ area.
3 ABS 2016 Census
Tourism and local recreation also contribute significantly to socio-economic activity in the Lower Darling region. Key areas of recreation include camping and fishing at the Menindee Lakes and along the Lower Darling River, and water sports on the Menindee Lakes.

Based on 2009 fishing data, annual expenditure on fishing in the Lower Darling is approximately $19.5 million. Key fishing and tourism groups around the Menindee and Lower Darling region include (but not limited to) Wentworth Anglers Club, Fort Courage Fishing Club/ Caravan Park, Menindee Regional Tourist Association, and Wilcannia Tourism Association. There are a number of fishing events held in the region attracting local and regional visitors, including the Menindee Fishing Competition and Fort Courage Fishing Competition. During community consultations, a member of the Wentworth Anglers Club advised that the Fort Courage Fishing Club has approximately 1,000 members, with only 40% located within 100km. This highlights that local and visiting fishers value the region’s unique aquatic environment.

2.2 Water entitlements
Approximately 348 GL of total water entitlements are currently held in the Lower Darling Regulated River. The hydrological review, summarised in Section 3, confirms that high priority water needs located between Weir 32 and the Wentworth Weir Pool at Ellerslie would be affected by the proposed MLWSP, which is defined as the in-scope region. Only 8.9 GL of entitlements are located within this in-scope region. Within this area, the majority of entitlements and water volumes are General Security (GS) entitlements (68%). The remaining entitlements being High Security (HS) entitlements (19%), Stock and Domestic (S&D) entitlements (11%), and a Local Water Utility (LWU) entitlement (2%) that services the township of Pooncarie.

Water Entitlements in the Lower Darling catchment support a range of domestic and agricultural outcomes, including but not limited to:

6 Includes a small entitlement for Broken Hill of approximately 6 - 9 GL per annum, which can be met from the Murray River following the commissioning of the Wentworth to Broken Hill Pipeline.
7 Based on advice from the Department, this analysis excludes entitlements that are Government held (which would be progressed as part of the proposed MLWSP), for conveying works and/or have no approval attached.
• The LWU water entitlement is used for town water supply for Pooncarie
• S&D water entitlements are used for livestock drinking water and domestic use on stations. Material volumes are also consumed by wild animals, including kangaroos, emus and goats.
• GS water entitlements are used predominantly for seasonal cropping activities, livestock feed cropping, supplementing irrigation of permanent plantations, and livestock drinking water.
• HS water entitlements are used for irrigating permanent plantings, including citrus, stone fruit, and wine grape plantations.8,9

There have been relatively few water entitlement trades in the Lower Darling River System. The volume weighted average HS entitlement traded value over the 2018 financial year was $1,643 per ML. GS entitlement prices are significantly lower, with the 2018 financial year average price at $400 per ML.

2.3 Stakeholder feedback
A number of stakeholder consultations were held to inform the development and analysis of options for the report. The project team met representatives from the following stakeholder groups:

1. Barkandji Nation indigenous community
2. Lower Darling Horticultural Group
3. Representative group of Menindee township
4. GS and S&D entitlement holders in Pooncarie, and tele-meetings with two other entitlement holders unable to attend the town hall meeting
5. Wentworth Anglers Club
6. Wentworth Shire Council
7. Commonwealth Department of Agriculture and Water Resources
8. NSW Office of Environment and Heritage
9. Murray-Darling Basin Authority
10. NSW Land and Water Commissioner
11. NSW Fisheries.

The community consultation provided insight into the options and sentiment relating to broader water supply issues associated with the proposed MLWSP and the Basin Plan. Feedback included:

1. Community stakeholders identified insufficient and/or no consultation on the overarching MLWSP leading up to this project
2. A number of community stakeholders identified that the Menindee Lakes is drawn down too quickly under current operations, and that environmental outcomes in the Lower Murray are prioritised over their local environmental outcomes
3. The majority of community stakeholders believed that more should be done by Government to enforce and monitor water extraction in the Northern Basin
4. Changing government representatives present at consultations made meaningful community engagement difficult
5. Most community stakeholders expressed that the Lower Darling River is the cornerstone to communities’ livelihood
6. The Barkandji representatives discussed the need for cultural water, distinguished from environmental water, which could be managed from the Menindee Lakes
7. Some community stakeholders suggested that current continuous minimum flows are already too low
8. The Darling River acts as a natural fence for livestock. ‘No flow’ events create commercial and biosecurity risks as livestock move across farm boundaries
9. The Wentworth Shire Council highlighted concern over current water quality in the river system and the health impacts on community members
10. Many community stakeholders felt that the time taken to implement the MLWSP and appropriate water security solutions in the Lower Darling has been too long, resulting in uncertainty and missed opportunities.

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8 MDBA, Lower Darling Catchment, Accessed: September 2018
9 NSW Department of Primary Industries 2012, Water resources and management overview – Lower Darling River Catchment
It is anticipated that a comprehensive engagement process will be carried out in the region by the Department relating to the MLWSP proposal and the Lower Darling options.
3 Hydrological review

Peer reviewed MDBA hydrological modelling\(^\text{10}\) suggests that as a result of cumulative impacts of Basin Plan changes, which includes the proposed MLWSP, there will be more water in the Lower Darling River more often.

Detailed hydrological modelling of the Menindee Lakes system, developed by Blackwatch Consulting, leveraging observed actual experience, supports the MDBA’s overarching finding. However, the analysis also suggests, based on historical data and under the conditions of the proposed MLWSP, that:

- During the last 18 years there would have been additional impacts on High Security (HS) and Stock and Domestic (S&D) entitlement holders in the Lower Darling resulting from longer periods of no flow below Weir 32, and resulting in reduced allocations to the aforementioned entitlement holders.
- Additional Basin Plan inflows are forecast to be capable of maintaining supply to Weir 32, enabling existing HS and GS entitlement holders above Weir 32 to be excluded from the scope of impacted entitlement holders.
- In the case of the worst drought on record (2006 – 2007), measures would have been required to mitigate water supply interruptions (i.e. period of no flow below Weir 32). The duration of supply interruptions depends upon the level of assumed inflows following implementation of the Basin Plan.
- Northern Basin water recovery (projects and entitlement buybacks) under the Basin Plan is forecast to increase average inflows to the Menindee Lakes by an average of 140-150 GL/year. If this is realised, periods of no flow below Weir 32 are expected to be materially less than if upstream water recovery did not occur, although these additional inflows may be reserved for environmental outcomes and not be available for consumptive use.
- Given high evaporation rates in this region (in excess of 2 metres annually), there is limited incremental benefit from increasing the Menindee Lakes water reserve for drought periods beyond about two years (ignoring water quality issues). Water quality issues are also likely to increase as water is stored for longer periods in Menindee Lakes.
- Increasing the amount of reserve held in the upper Lakes may not protect Lower Darling users from the impact of future droughts, and would impact on the volume of SDL adjustment that could be achieved, relative to the proposed MLWSP.

The proposed MLWSP has been shown to impact water security and supply in the Lower Darling for high priority water requirements. The hydrological review confirms that water supply impacts in the Lower Darling would need to be addressed in order for the current MLWSP proposal to be viable.

It should be noted that a number of key projects and policies under development will impact the underlying hydrological modelling as their scope matures. These include:

- Final scope of the MLWSP, including operational changes
- Implementation of northern basin initiatives
- WaterNSW Western Weirs Proposal study

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\(^\text{10}\) The “source model” is the MDBA’s Murray Simulation Model. The modelling (and Peer Review) is described in the following reports:

- Independent Review of Hydrologic Modelling for SDL Adjustments, Bewsher Consulting Pty Ltd, 2017
4 Options Introduction

This chapter introduces the objectives of the project options, provides an overview of the options and details the evaluation criteria by which options are assessed. Appendix A contains a more detailed description of each of the options analysed.

4.1 Objectives of the project options

A set of objectives have been established to support analysis of water supply options for the Lower Darling region in the context of the MLWSP proceeding in its current proposed form. Establishing and managing appropriate outcomes for the Lower Darling region is a critical element of the larger MLWSP proposal.

For the purpose of this analysis, the objectives of the project were:

- **Water security outcomes** - introduce a sustainable water supply solution for high priority water requirements in the Lower Darling by June 2024.
- **Cost effectiveness** - deliver value for money to the State within the context of achieving NSW’s SDL water recovery targets.
- **Environment, heritage and recreation** – minimise risks of negative environmental, heritage and/or recreation impacts associated with Lower Darling options.
- **Option implementation** – ensure the Lower Darling option is deliverable and manageable within planning frameworks and timing constraints.

4.2 Overview of Options

The options analysis has considered a range of options to address water security issues in the Lower Darling catchment. The options have been developed by a range of sources and are based on:

- Retaining the Darling River as the primary water source for Lower Darling communities
- Solutions are additive to projects already being undertaken in the Murray-Darling Basin that may impact water supply security
- Hydrological modelling confirming that the proposed MLWSP will directly impact water supply arrangements in the Lower Darling catchment between Weir 32 and the Wentworth Weir
- The MLWSP being delivered as proposed in the Concept Business Case (2017)
- Solutions focus on surface water supply rather than groundwater supply (with the exception of the supplementary Talyawalka bore field under option 3) due to a lack of certainty about the rate of replenishments and concern with water quality degradation as the aquifers are drawn down.

The options cover a range of solutions, including a structural adjustment package, new water supply infrastructure, new permanent water harvesting infrastructure, and alterations to the MLWSP design. The infrastructure components of options have been designed to supplement existing supply arrangements for the Darling River during any ‘no flow’ events. The six options are summarised in the table below.

Table 4.1: Summary of options and solutions proposed

<table>
<thead>
<tr>
<th>#</th>
<th>Option title</th>
<th>Primary water source</th>
<th>Structural adjustment</th>
<th>Supply infrastructure</th>
<th>New harvesting infrastructure</th>
<th>Alter MLWSP design</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lower Darling Structural Adjustment Package with supplementary S&amp;D pipeline</td>
<td>Darling River (secondary: Murray River)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>On-farm water storages (with</td>
<td>Darling River</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#</td>
<td>Option title</td>
<td>Primary water source</td>
<td>Structural adjustment</td>
<td>Supply infrastructure</td>
<td>New harvesting infrastructure</td>
<td>Alter MLWSP design</td>
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<tr>
<td>3</td>
<td>Permanent in-stream gated regulators and bore field</td>
<td>Darling River (secondary: Talyawalka bore field)</td>
<td>✓</td>
<td>✓</td>
<td></td>
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<tr>
<td>4</td>
<td>Pooncarie pipeline offtake from the W2BH Pipeline</td>
<td>Darling River</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Large-scale irrigation and S&amp;D and horticulture pipeline</td>
<td>Darling River (secondary: Murray River)</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>6</td>
<td>Re-scoping the proposed MLWSP to maintain a larger ‘drought reserve’ in the Menindee Lakes</td>
<td>Darling River</td>
<td></td>
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</table>

### 4.3 Evaluation Framework

An evaluation and scoring framework was established to form the basis against which each option has been assessed. The framework was developed by the Deloitte and Blackwatch project team and endorsed by the Department prior to analysis commencing, ensuring an objective process for evaluating options.

Scoring for each criterion is either:

- Binary – if a minimum standard must be met for the option to be feasible, or
- Objectively rated from 1 to 5 – to evaluate performance relative to other options, noting that a higher rating indicates a better outcome.

Each option was assessed against the criterion in the following hierarchical sequence, recognising the threshold nature of some criteria:

1. The option must be capable of meeting binary threshold criteria that relate to water security, and solution deliverability (’threshold analysis’)
2. Options that meet the threshold criteria are then evaluated on their relative ability to deliver a range of outcome criteria (’outcomes analysis’).

The evaluation criteria is detailed in Appendix B.
5 Options Analysis

The options analysis is based on the proposed MLWSP proceeding as outlined in the Concept Business Case, and the Northern Basin Plan delivering the modelled benefits in respect of additional inflows to the Menindee Lakes. While both of these assumptions are subject to change as policies, plans, and projects are further investigated, consulted on and designed, they provide a baseline to assess options for the Lower Darling.

The options aim to meet high priority water requirements following the proposed reconfiguration of the Menindee Lakes. These include meeting HS water entitlements, S&D water entitlements, and Pooncarie’s town supply requirement.

This Lower Darling options analysis contributes to the understanding and assessment of long-term water security options in the Lower Darling following the proposed reconfiguration of the Menindee Lakes and operating changes associated with the proposed MLWSP.

The MLWSP, as currently proposed, has potential to impact economic, environmental, heritage and recreational outcomes in the Lower Darling catchment. While there will be more water, more often in the Darling River, it is expected that there will be intermittent periods of ‘no flows’ during severe drought events. It is anticipated that mitigation activities for potential impacts will be identified as part of the regulatory approvals process for the project.

The analysis in this chapter does not consider the broader impacts of the MLWSP, such as tourism, cultural or social amenity impacts. However, community feedback was received on stakeholder perceptions of the MLWSP and these related issues, summarised in section 2.3 above. These impacts will be subject to analysis under the final MLWSP business case.11

5.1 Summary of threshold analysis

The threshold analysis determines whether options are capable of meeting the water security and project deliverability threshold. This threshold analysis is supported by a hydrological and engineering assessment.

In the table below, a score of ‘1’ indicates that the option is capable of meeting the threshold service level, while a score of ‘0’ indicates that the option is not capable of meeting the threshold service level.

Table 5.1: Summary of threshold options analysis

<table>
<thead>
<tr>
<th>Option</th>
<th>Security of S&amp;D and town (Pooncarie) water supply</th>
<th>Security of high and general security licences’ water supply</th>
<th>Project deliverability - ability to meet service levels in timely manner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1 – Structural adjustment package and S&amp;D pipeline</td>
<td>1</td>
<td>1*</td>
<td>1</td>
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<tr>
<td>Option 2 – On-farm storages, with pipeline to Pooncarie</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Option 3 – Gated regulators and bore field</td>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Option 4 – W2BH pipeline to Pooncarie pipeline</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Option 5 – S&amp;D and Horticultural pipeline</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Option 6 – Increased drought reserve under MLWSP</td>
<td>1^</td>
<td>1^</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes:
* Assumes HS water entitlements are purchased by government.

11 As per Infrastructure NSW Infrastructure Investor Assurance Framework (IIAF) requirements.
^ Assumes continued use of contingency measures in the Northern Basin to maintain current security of supply from the Menindee Lakes.

The key findings of the threshold analysis are:

- Five of the six options are capable of being designed to meet the water security requirements of all Lower Darling water users, although potentially to varying levels of certainty and service.
- Option 4 should be eliminated as a standalone option from further analysis as it does not address HS water entitlement and S&D water entitlement requirements.

5.2 Summary of outcomes analysis

The table overleaf provides a summary of the relative performance of options against the remaining outcomes based criteria.

In scoring the relative performance of each option to achieve each criterion, a score has been applied from ‘1’ - being least aligned with achieving the desired outcome (i.e. poor performance) - to ‘5’ being strongly aligned with achieving the desired outcome (i.e. good performance). The criteria have not been weighted at this early stage of assessment.

The analysis performed is preliminary in nature and should only be used to inform decisions relating to further investigation of options.
Table 5.2: Summary of outcomes options analysis

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Option 1 – Structural Adjustment Package and S&amp;D pipeline</th>
<th>Option 2 – On-farm storages with pipeline for Pooncarie</th>
<th>Option 3 – Gated regulators and bore field</th>
<th>Option 5 – S&amp;D and Horticultural pipeline</th>
<th>Option 6 – Increased drought reserve under MLWSP</th>
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<tbody>
<tr>
<td>Water supply</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Improvement in security of supply</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>3</td>
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<tr>
<td>Minimise hydrological risk*</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>5</td>
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</tr>
<tr>
<td>Water quality</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Cost efficiency / effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of solution</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Economic impact on NSW</td>
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<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Environment, Heritage &amp; Recreation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimise risks to environmental outcomes*</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Minimise risks to heritage assets*</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Support recreational pursuits and physical amenity in the region</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Option implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of operational governance</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Engineering feasibility of works / ease of implementation</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

* This is a preliminary risk analysis undertaken by Deloitte and Blackwatch. Evaluation of risks has been performed on an inherent risk basis. In further investigation and development of options, mitigation and management measures may have the ability to reduce the risk profile. More work to verify risks will be undertaken in consultation between the Department and WaterNSW.
Given the project context, hydrological modelling results and analytical assumptions detailed in this report, the key findings that informed the evaluation above include:

- Option 1 and Option 5 deliver the most reliable water supply outcomes in the region by supplementing existing water delivery from the Darling River during ‘no flow’ periods with a pipeline that connects to both the Wentworth Weir (on the Murray River system) and Weir 32 (on the Darling River system). These options are capable of withstanding periods of ‘no flow’ in the Lower Darling that exceed the worst drought on record.
- Option 1 delivers the most cost efficient and effective outcome by supporting SDL adjustment while minimising impacts on NSW agricultural production and the total project delivery cost.
- Option 6 delivers the least risk to environmental, cultural heritage and recreational outcomes for the Lower Darling by altering the current MLWSP proposal to enable the Lower Darling River to operate more closely to its current operations. This option is more likely to reduce ‘no flow’ events, which is of high recreational and cultural heritage value to a range of community groups in the region, including fishing clubs and the Barkandji people. However, Option 6 presents greater water security and quality risks during drought periods. This includes risks associated with salinity and blue-green algae.
- Option 6 is the least complex option to deliver, closely followed by Option 1, Option 2 and Option 5.
- Option 2 presents risks associated with water quality and is less cost effective in comparison to Option 1 and Option 6.
- Option 3 supports economic activity in NSW and was found to deliver the easiest operational governance arrangements. This option may be challenging to gain requisite construction approvals, however, these barriers may be mitigated given development of the larger Western Weirs Strategy Proposal by WaterNSW (referenced in section 1.2.2).12

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12 An objective of the proposed WaterNSW study is to assess how gated regulators can be best designed to incorporate fish passage and enhance environmental outcomes.
6 Recommendations

Recommendations are dependent on the NSW Government’s policy position and investigative analysis relating to the MLWSP and other Basin Plan developments in the Northern Basin.

There is a need for a solution

The proposed MLWSP has been shown to impact water security and supply in the Lower Darling. The hydrological review confirms that water supply impacts to HS water entitlement holders, S&D water entitlement holders, and town supply requirements in the Lower Darling between Weir 32 and the Wentworth Weir Pool will need to be addressed in order for the current MLWSP proposal to be viable.

Options shortlisting

Five of the six options analysed are capable of being designed to meet the water security threshold requirements of all Lower Darling water users. Only Option 4 should be eliminated as a standalone option from further analysis as it does not address HS water entitlement and S&D water entitlement requirements.

Timing of option delivery

The Lower Darling options analysis is premised on the MLWSP being operational, which is scheduled for 2024. Therefore, an option for impacted Lower Darling water users needs to be in place before June 2024.

Importantly, all of the options considered here are capable of being delivered prior to June 2024, provided further analysis does not identify significant regulatory constraints.

Significant uncertainty remains in the final scope of the MLWSP, and regarding other changes to the broader Murray-Darling River system. These elements are high priority areas for further work by the NSW Government. The outcome of this work could materially impact the hydrological modelling that underlies the options analysis.

Given the time required to deliver a solution for the Lower Darling, the MLWSP timeline, and the important analysis being undertaken by various government agencies across a range of projects in the entire Darling River system, the decision to initiate detailed design and planning of a particular option for the Lower Darling can be deferred up to 12 months without compromising Basin Plan commitments, provided the option does not have a significant consequential impact on the works schedule of the MLWSP.

This time should be used to accelerate integrated system planning and stakeholder consultation, including for the MLWSP and Lower Darling water security options.

Investigation of remaining options

If the NSW Government proceeds with the MLWSP as proposed in the Concept Business Case, including the implementation of an 80 GL operational governance ‘drought reserve’, it is recommended that the following options to mitigate impacts on Lower Darling\(^\text{13}\) HS and S&D users be further investigated:

- Option 1 - Structural adjustment package with supplementary S&D pipeline, including Pooncarie
- Option 2 - On-farm water storages, with supplementary Pooncarie pipeline
- Option 3 - In-stream gated regulators\(^\text{14}\)

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\(^\text{13}\) Defined as water users located below Weir 32 and above influence of Wentworth Weir.

\(^\text{14}\) The Western Weirs Proposal being developed by WaterNSW may improve this option’s outcomes through a more integrated approach to weir management in NSW, or justify in-stream regulators to support outcomes beyond...
• Option 5 - S&D and horticulture pipeline.

Should the Commonwealth and NSW governments be unable to address policy, stakeholder, environmental or heritage concerns in delivering the proposed MLWSP, including a secure water supply option for the Lower Darling, it is recommended that Option 6 – Increase the drought reserve in the Menindee Lakes - be prioritised with the unrealised NSW SDL adjustments (water recovery not realised as currently proposed under the MLWSP) sought from other projects and/or entitlement buybacks.

Process recommendations

Detailed analysis, consultation and business cases should be undertaken before proceeding with any water supply option for the Lower Darling. Investigations pursued should be based on option ratings provided in table 5.2. These analyses need to be undertaken in the context of the latest Basin Plan hydrological modelling, MLWSP scope, and the Western Weirs Proposal study.

6.1 Next steps

The identified next steps focus on activities required to ensure the security of Lower Darling water supply arrangements. Independent of the option/s progressed, the following actions are recommended:

• Continue to engage with stakeholders on the MLWSP, including the Wentworth Shire Council, Broken Hill Shire Council, Barkandji leaders, community and business stakeholders
• Integrate the Lower Darling water security options into the larger MLWSP
• Formalise communication channels between the MLWSP (incorporating the Lower Darling water security options), Water Resource Plans, and the Western Weirs Proposal study projects
• Accelerate investigations relating to the MLWSP and, in doing so, provide greater certainty to Lower Darling communities of future water supply arrangements
• Further collaboration with other government stakeholders to better understand the impact of environmental water use on Menindee Lakes inflows from the north
• Progress discussions with Office of Environment and Heritage (OEH) and the Commonwealth Environmental Water Holder (CEWH), on the on-going management and location of their entitlements
• Progress discussions with NSW Fisheries relating to impacts of Lower Darling flow changes on native fish
• Perform further analysis of fencing impacts and responsibilities in the region associated with increased frequency of ‘no flow’ events.

Lower Darling water security, however this position will need to be confirmed within 12 months for this option to service Lower Darling water security requirements.
Appendix A – Description of Options

Option 1
Option 1 is comprised of two key components:

- A Structural Adjustment Package for HS water entitlement holders in the Lower Darling catchment who are forecast to be negatively impacted on average under the proposed MLWSP; and
- A new pipeline to address the security of water supply requirements for S&D users and town supply during ‘no flow’ periods.

Scope of the Structural Adjustment Package

The Structural Adjustment Package aims to compensate HS water entitlement holders that will be adversely impacted by the proposed MLWSP. The hydrological review highlights that HS water entitlements located on the Darling River downstream of Weir 32 and upstream of the Wentworth Weir at Ellerslie will experience less reliable water supply following the implementation of the proposed MLWSP. A compensation package has been proposed to remove HS entitlements from the region. Under this option, entitlements would be purchased by government for an agreed price or converted to GS entitlement.

There is currently approximately 1,670 ML of HS water entitlements that are privately owned by a number of individual licence holders in the in-scope region. The type and scale of irrigated production undertaken with these HS entitlements varies markedly, ranging from extensive permanent plantations (approximately 280 hectares of citrus, wine grapes, stone fruit) to seasonal cropping production.

The Structural Adjustment Package is proposed to be based on negotiated changes in water entitlements for the existing HS water entitlement holders. Options include:

a) Purchase of HS water entitlements by government, enabling seasonal cropping using existing GS Water Entitlements and dryland farming to continue into the future

b) Purchase of HS water entitlements and GS water entitlements by government, enabling dryland farming to continue into the future

c) Conversion of HS water entitlement to less reliable GS water entitlements at an appropriate exchange rate, enabling seasonal cropping using GS water entitlements and dryland farming to continue into the future.

The value of the compensation package for the HS water entitlement holders will be related to the change in water entitlements.

Government would incur additional program management costs to support the delivery of the Structural Adjustment Package, should this option be implemented.

Scope of the S&D pipeline

The S&D pipeline aims to ensure remaining high priority water requirements, namely town water supply for Pooncarie, and S&D entitlements, continue to be met following the MLWSP. The pipeline would only be operated intermittently during ‘no flow’ events.

The hydrological modelling (summarised in Chapter 3) highlights that town supply, and S&D entitlement holders located along the Darling River between Weir 32 and the Wentworth Weir Pool at

15 The Baseline Scenario assumes the implementation of the Basin Plan, including the MLWSP as currently scoped in the Phase 2 Business Case 2017.
Ellerslie will be impacted by the proposed MLWSP. Unlike HS water entitlement holders, elimination of these water requirements through an adjustment package is not feasible. This necessitates the design of a scheme that supplements existing Darling River supply with a pipeline that addresses interruption of supply during anticipated ‘no flow’ water events below Weir 32.

Within the region, these entitlements equate to an annual total of 1,144 ML, as set out in table A.1 below. While the table below reflects entitlements, water usage is expected to be less, based on observed entitlement usage.

Table A.1: Water usage requirement for S&D pipeline infrastructure

<table>
<thead>
<tr>
<th>User</th>
<th>Entitlement (ML per annum)</th>
<th>Usage description</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pooncarie</td>
<td>160 (Local Water Utility)</td>
<td>Assuming 0.5 ML annual demand for each of the 46 occupied private dwellings in the wider Pooncarie area, estimated usage is expected to be significantly less than 160 ML per annum.</td>
<td>Pipeline</td>
</tr>
<tr>
<td>S&amp;D entitlements</td>
<td>984</td>
<td>Estimated usage for domestic and stock water users is comparable.</td>
<td>Pipeline</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,144</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: DoI, Blackwatch, 2018

The preferred pipeline infrastructure scheme, based on the degree of risk allowance, to supply high security water requirements is a two-pipeline design that allows supply to Pooncarie from two directions. A pipeline from Weir 32 to Pooncarie and a pipeline from the Wentworth Weir Pool at Ellerslie to Pooncarie. A high-level map of the proposed pipeline route is provided below.

Figure A.1: Proposed S&D pipeline route

16 ABS 2016 Census.
17 This takes account of the low rainfall and the use of the supply both for internal domestic use and for garden watering. This value is validated by comparison with: Mildura with an average household demand of 434kL/year (ESC Vic, 2018); and Broken Hill - with an average household demand of 328kL/year (PIAC, 2005)
**Option 2**

Option 2 involves construction of approximately 50 on-farm storages to secure water supply for S&D water entitlement holders and HS water entitlement holders. A low capacity pipeline solution has been incorporated in option 2 to ensure reliable supply is available to Pooncarie during 'no-flow' events.

A total of 2,814 ML of water entitlements within the Lower Darling in-scope region need to be supplied by on-farm storages and the Pooncarie pipeline. This is summarised in table A.2 below.

This option does not aim to change the expected frequency or duration of cease to flow periods, nor change the design of the proposed MLWSP (as per 2017 Concept Business Case). The option will require water to be pumped from the river to be stored in on-farm storages when there is risk of a cease to flow event. As such, the on-farm storages and pipeline would only be used intermittently to provide greater security of water supply for high security users.

**Table A.2: Water supply required for option 2**

<table>
<thead>
<tr>
<th>User</th>
<th>Entitlement (ML per annum)</th>
<th>Usage description</th>
<th>Option 2 Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pooncarie</td>
<td>160</td>
<td>Assuming 0.5 ML annual demand for each of the 46(^{18}) occupied private dwellings in the wider Pooncarie area, estimated usage is expected to be significantly less than 160 ML per annum.(^{19})</td>
<td>Pipeline</td>
</tr>
<tr>
<td>S&amp;D entitlements</td>
<td>984</td>
<td>Estimated usage for domestic and stock water users is comparable.</td>
<td>On-farm storages</td>
</tr>
<tr>
<td>HS entitlements</td>
<td>1,670</td>
<td>Covers 15 separate licences. On-farm storages intend to cater to horticulturalists, this is a subset of all HS entitlements held in the in-scope region.</td>
<td>On-farm storages</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,814</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: DoI, Blackwatch, 2018*

\(^{18}\) ABS 2016 Census.

\(^{19}\) This takes account of the low rainfall and the use of the supply both for internal domestic use and for garden watering. This value is validated by comparison with: Mildura with an average household demand of 434kL/year (ESC Vic, 2018); and Broken Hill - with an average household demand of 328kL/year (PIAC, 2005)
**Option 3**

Option 3 was developed by WaterNSW as a potential solution to continue water supply to users in the Lower Darling catchment that have potential to be impacted under the Base Case (assumes the proposed MLWSP proceeds). This option is comprised of two key components:

- An adjustment to the operating water flow regime
- Construction of new storage infrastructure downstream of Weir 32 on the Lower Darling river, including four gated regulators. There is an optional addition of 13 boreholes located across the Talyawalka aquifer to supplement supply from the Menindee Lakes.

According to the Department's Water Registry, to meet town, stock and domestic, and HS Entitlement demand, there is an annual total water supply of 2,814 ML required from new storage infrastructure during 'no flow' water events below Weir 32. The annual demand required from new storage infrastructure is broken down by user type in the table A.3 below.

<table>
<thead>
<tr>
<th>User</th>
<th>Entitlement (ML per annum)</th>
<th>Usage description</th>
<th>Option 3 Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pooncarie</td>
<td>160 (Local Water Utility)</td>
<td>Assuming 0.5 ML annual demand for each of the 4620 occupied private dwellings in the wider Pooncarie area, estimated usage is expected to be significantly less than 160 ML per annum.21</td>
<td>Gated regulators and bore holes</td>
</tr>
<tr>
<td>S&amp;D entitlements</td>
<td>984</td>
<td>Estimated usage for domestic and stock water users is comparable.</td>
<td>Gated regulators and bore holes</td>
</tr>
<tr>
<td>HS entitlements</td>
<td>1,670</td>
<td>Covers 15 separate entitlement licences. Excludes Government, conveying works and licences with no approval attached.</td>
<td>Gated regulators and bore holes</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,814</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: DoI, Blackwatch, 2018*

The in-stream gated regulators would be used to store water during low flow periods.

The four regulators cover a combined length of approximately 358km of the Darling River. The locations of new gated regulators, shown in figure A.3 below, are:

- Darling at Ashvale
- Darling at Jamesville
- Darling at Pooncarie
- Darling downstream of Great Darling Anabranch.

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20 ABS 2016 Census.
21 This takes account of the low rainfall and the use of the supply both for internal domestic use and for garden watering. This value is validated by comparison with: Mildura with an average household demand of 434kL/year (ESC Vic, 2018); and Broken Hill - with an average household demand of 328kL/year (PIAC, 2005)
In conjunction with four gated regulators, Option 3 also allows an additional 13 boreholes be developed across the Talyawalka aquifer. The WaterNSW proposal provided for connection of the boreholes via 17.3km of raw water mains to an outlet works on the Lower Darling river approximately 19km downstream of Weir 32. Talyawalka boreholes would come into operation when a trigger level is reached. Locations of the Talyawalka boreholes are shown in figure A.4 below.
Figure A.3: Proposed Talyawalka boreholes for option 3

Source: WaterNSW
**Option 4**

Option 4 proposes to connect Pooncarie’s town water supply to the Wentworth to Broken Hill (W2BH) pipeline, which is currently under construction. To meet the requirements of Pooncarie, only a small offtake would be required (see table below). Similar to the other infrastructure options, this would only be used during 'no flow' events. That is, for the vast majority of time Pooncarie would draw on the Darling River for town supply.

This option does not consider other high security requirements in the Lower Darling, namely HS water entitlement holders and S&D entitlement holders that are forecast to be impacted by the proposed MLWSP.

Table A.4 below demonstrates that option 4 addresses less than 5% of a total 2,814 ML water entitlements impacted by the proposed MLWSP.

Table A.4: Water supply required for option 4

<table>
<thead>
<tr>
<th>User</th>
<th>Entitlement (ML per annum)</th>
<th>Usage description</th>
<th>Option 4 Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pooncarie</td>
<td>160</td>
<td>Assuming 0.5 ML annual demand for each of the 46²² occupied private dwellings in the wider Pooncarie area, estimated usage is expected to be significantly less than 160 ML per annum.²³</td>
<td>Pipeline</td>
</tr>
<tr>
<td>S&amp;D entitlements</td>
<td>984</td>
<td>Estimated usage for domestic and stock water users is comparable.</td>
<td>No solution</td>
</tr>
<tr>
<td>HS entitlements</td>
<td>1,670</td>
<td>Covers 15 separate entitlement licences. Excludes Government, conveying works and licences with no approval attached.</td>
<td>No solution</td>
</tr>
<tr>
<td>Total</td>
<td>2,814</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: DoI, Blackwatch, 2018

²² ABS 2016 Census.
²³ This takes account of the low rainfall and the use of the supply both for internal domestic use and for garden watering. This value is validated by comparison with: Mildura with an average household demand of 434kL/year (ESC Vic, 2018); and Broken Hill - with an average household demand of 328kL/year (PIAC, 2005)
Option 5
This option provides pipeline infrastructure to increase the resilience of water supply for users who may be adversely impacted by the proposed MLWSP. This includes town, S&D, and HS water entitlement holders located on the Darling River between Weir 32 and the Wentworth Weir Pool. The pipeline would only be operational during 'no flow' events.

A total of 2,814 ML of water entitlements is required to be addressed by the option 5 pipeline, summarised in the table A.5 below.

Table A.5: Water supply required for option 5 pipeline

<table>
<thead>
<tr>
<th>User</th>
<th>Entitlement (ML per annum)</th>
<th>Usage description</th>
<th>Option 5 Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pooncarie (Local Water Utility)</td>
<td>160</td>
<td>Assuming 0.5 ML annual demand for each of the 46 occupied private dwellings in the wider Pooncarie area, estimated usage is expected to be significantly less than 160 ML per annum.25</td>
<td>Pipeline</td>
</tr>
<tr>
<td>S&amp;D entitlements</td>
<td>984</td>
<td>Estimated usage for domestic and stock water users is comparable.</td>
<td>Pipeline</td>
</tr>
<tr>
<td>HS entitlements</td>
<td>1,670</td>
<td>Covers 15 separate entitlement licences. Excludes Government, conveying works and licences with no approval attached.</td>
<td>Pipeline</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,814</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: DoI, Blackwatch, 2018

The preferred pipeline infrastructure scheme, based on the degree of risk allowance, to supply high security water requirements is a two-pipeline design that allows supply to Pooncarie from two directions. A pipeline from Weir 32 to Pooncarie and a pipeline from the Wentworth Weir Pool at Ellerslie to Pooncarie.

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24 ABS 2016 Census.
25 This takes account of the low rainfall and the use of the supply both for internal domestic use and for garden watering. This value is validated by comparison with: Mildura with an average household demand of 434kL/year (ESC Vic, 2018); and Broken Hill - with an average household demand of 328kL/year (PIAC, 2005)
Option 6
This option increases the drought reserve in the Menindee Lakes relative to the drought reserve proposed in the MLWSP Concept Business Case (80 GL), while all other components of the proposed MLWSP remain unchanged. That is, this option does not reduce the scope of infrastructure investment proposed in reconfiguring the Menindee Lakes.

This option assumes a drought reserve of 275/615 GL stored in the top two Menindee Lakes – Lake Wetherell and Lake Pamamaroo. The drought reserve refers to the storage volume threshold for the Menindee Lakes, which transfers control of the Menindee Lakes to the NSW Government to ensure that Lower Darling and Broken Hill water needs can be met through drought periods.

Option 6 alters the scope of the proposed MLWSP to deliver a Menindee Lakes system that operates more closely to its current state (noting the removal of Broken Hill and Tandou water demand). The intent of increasing the drought reserve is to ensure that all water entitlements in the Lower Darling can continue to be met by water storage in the Menindee Lakes. As such, this option includes no additional infrastructure solutions for the Lower Darling water users.

A total of 2,814 ML of water entitlements held by affected Lower Darling water users in the in-scope region is required to be supplied by the retained reserve in Menindee Lakes under option 6, summarised in table A.6 below.

Table A.6: Water supply required for option 6

<table>
<thead>
<tr>
<th>User</th>
<th>Entitlement (ML per annum)</th>
<th>Usage description</th>
<th>Option 6 Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pooncarie</td>
<td>160 (Local Water Utility)</td>
<td>Assuming 0.5 ML annual demand for each of the 46 occupied private dwellings in the wider Pooncarie area, estimated usage is expected to be significantly less than 160 ML per annum.²⁸</td>
<td>Maintain reserve in Menindee Lakes</td>
</tr>
<tr>
<td>S&amp;D entitlements</td>
<td>984</td>
<td>Estimated usage for domestic and stock water users is comparable.</td>
<td>Maintain reserve in Menindee Lakes</td>
</tr>
<tr>
<td>HS entitlements</td>
<td>1,670</td>
<td>Covers 15 separate entitlement licences. Excludes Government, conveying works and licences with no approval attached.</td>
<td>Maintain reserve in Menindee Lakes</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: DoI, Blackwatch, 2018

²⁶ As per previous MDBA hydrological modelling.
²⁷ ABS 2016 Census.
²⁸ This takes account of the low rainfall and the use of the supply both for internal domestic use and for garden watering. This value is validated by comparison with: Mildura with an average household demand of 434kL/year (ESC Vic, 2018); and Broken Hill - with an average household demand of 328kL/year (PIAC, 2005)
Appendix B – Evaluation criteria

Table B.1: Evaluation Framework for options analysis

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water supply outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>Ensure the security of S&amp;D and town (Pooncarie) water supply</td>
<td>Binary: 0 – 1 (option discarded from further analysis if 0)</td>
</tr>
<tr>
<td>Ensure the security of high and general security licences’</td>
<td>Binary: 0 – 1 (option discarded from further analysis if 0)</td>
</tr>
<tr>
<td>Overall improvement in security of supply</td>
<td>1 (low) to 5 (high)</td>
</tr>
<tr>
<td>Minimise hydrology risk</td>
<td>1 (low reliability) to 5 (high reliability)</td>
</tr>
<tr>
<td>Water quality</td>
<td>1 (low quality) to 5 (high quality)</td>
</tr>
<tr>
<td><strong>Cost effectiveness</strong></td>
<td></td>
</tr>
<tr>
<td>Cost of solution</td>
<td>1 (high cost and high risk) to 5 (low cost and low risk)</td>
</tr>
<tr>
<td>Economic impact on NSW</td>
<td>1 (high negative impact on economy) to 5 (high positive impact on economy)</td>
</tr>
<tr>
<td><strong>Environment, heritage &amp; recreation</strong></td>
<td></td>
</tr>
<tr>
<td>Minimise inherent risks to environmental outcomes</td>
<td>1 (high risk to environment) to 5 (low risk to environment)</td>
</tr>
<tr>
<td>Minimise inherent risks to heritage assets</td>
<td>1 (high risk to cultural assets) to 5 (low risk to cultural assets)</td>
</tr>
<tr>
<td>Support recreational pursuits and physical amenity in the</td>
<td>1 (disruption to recreation expected) to 5 (positive impact to recreation)</td>
</tr>
<tr>
<td><strong>Option implementation</strong></td>
<td></td>
</tr>
<tr>
<td>Timeliness (including planning and approvals)</td>
<td>Binary floor: 0 – 1, if implemented by June 2024 (option discarded from further analysis if 0)</td>
</tr>
<tr>
<td>Ease of operational governance</td>
<td>1 (complex/ high effort) to 5 (simple/ low effort)</td>
</tr>
<tr>
<td>Engineering feasibility of works / ease of implementation</td>
<td>1 (complex/ high effort) to 5 (simple/ low effort)</td>
</tr>
</tbody>
</table>
Limitation of our work

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