



Site options profile #L7

Beldora & Spectacle Lakes Wetland Complex - Draft Lock 3 Master Plan



Location: Weir Pool 3, River Chainage Markers 489 to 463

Land Tenure: Unallocated Crown Land under Full License (Primary Production)

Wetland Size: 1,772 hectares (Ha)

Normal Pool Level: 9.8 mAH

PROPOSED OPTIONS

Option #1:	Improve floodplain condition by promoting: - An increase in the duration of floodplain watering associated with managed and natural high-flow events, through the retention of water, utilising existing infrastructure and complementary works - Opportunities for increased floodplain watering inundation extent and frequency associated with weir pool raising - Improved wetland drying activities through active drawdown and transport of floodplain nutrients associated with weir pool lowering.
Description	The current height of the main inlet structures to the wetland are set to 10.58 mAH. This presents an opportunity to support the utility of existing structures to hold water within the wetland to extend the duration of watering events such as those associated with high-flow events and weir pool raising. To achieve this a number of outflow points would need to be investigated and potentially remediated to ensure water can be retained. Raising of the bank on the western side of the inlet structure will also be needed, along with another small blocking bank to block a flow path to the river. The main inlet to the wetland is well positioned to exploit the benefits associated with weir pool manipulation. This presents an opportunity to increase the extent of managed floodplain area and have greater control of watering frequency through weir pool raising. It also presents an opportunity to complement existing management outcomes associated with wetland drying. Active wetland drawdowns associated with weir pool lowering allow for more rapid exposure of substrate and the transport of floodplain nutrients, including salt, back to river, avoiding the accumulation and concentration risks associated with drying via evaporation.
Outcomes	- Benefits associated with implementing a wetting and drying regime, as outlined in the Beldora and Spectacle Lakes Wetland Management Plan. - Enhanced capacity for conservation and improvement of wetland and floodplain vegetation. - Improved soil moisture conditions. - Opportunities to mobilise salt out of the wetland.
Option #2:	Sustain on-going management and maintain floodplain access, through the replacement or reinforcement of floodplain infrastructure in support of an increase in managed high-flow events and weir pool raising.
Description	An increased frequency in managed high-flow events and inundation equivalents with the implementation of the Constraints Measures Strategy (CMS) project and future weir pool manipulation activities has the potential to impact on floodplain infrastructure. To mitigate against any damage to the ageing infrastructure at Beldora South and Paddy's Perry, an integrity assessment and potential upgrade or reinforcement of the structures is needed, to ensure they can withstand more frequent watering events and not compromise management outcomes and floodplain access.
Outcomes	- Benefits associated with implementing a wetting and drying regime, as outlined in the Beldora and Spectacle Lakes Wetland Management Plan. - Improved resilience to high flow events.
Option #3:	Improve connectivity by reinstating natural commence to flow levels and un-obstructed flow through the main upstream inlets to the wetland complex, through review and remediation of sill levels and re-profiling of obstructed flow paths.
Description	Less frequent high flow events, drought mitigation measures and changes in land management have led to deposition of material along the connecting creeks at the upstream end of the wetland. The deposition of material has potentially created high points within the creeks and artificially high sill levels that could be remediated to support more natural commence to flow levels and allow for un-obstructed flow through the wetland. The Beldora community group have prioritised the following works to improve connectivity throughout the system:

	- reed removal at Spectacle Creek - channel opening along Spectacle Creek - reed removal at Paddys Perry and Beldora South structures - removal of sheet pile at Beldora South structure.
Outcomes	- Enhanced capacity for greater exchange between the river and terminal wetlands. - Benefits associated with implementing a wetting and drying regime, as outlined in the Beldora and Spectacle Lakes Wetland Management Plan.

Option #4:	Promote the conservation of the local regent parrot population, by supporting the installation of a new embankment and structure enabling watering activities as described within the Regent Parrot Recovery Project.
Description	The 'Loveday 4x4 Lagoon' falls within the 'Katarapko Regent Parrot Floodplain Habitat Zone', identified as part of the regent parrot recovery initiative. The strategic watering of this site to support the conservation and improvement of vegetation important to regent parrots, is seen as a key part of conserving the current population.
Outcomes	- Conservation and improvement of vegetation important to regent parrots. - Support the conservation of the current regent parrot population.

Option #5:	Promote improved floodplain condition and support opportunities for passive recreational activities, through the installation of new embankments and structures at a proposed floodplain watering site adjacent Spectacle Lakes.
Description	Install new structures and embankments to 11.8 mAHd in support of a proposed floodplain-watering site that seeks to promote improved floodplain condition, in particular black box habitat, while supporting opportunities for passive recreational activities, such as canoeing.
Outcomes	- Support recreational activities for the nearby Loveday 4x4 park. - Enhanced capacity for conservation and improvement of wetland and floodplain vegetation. - Improved soil moisture conditions.

SITE BACKGROUND

Description

The Beldora and Spectacle Lakes wetland complex is a series of managed, pool-connected wetlands including Beldora North and South and Spectacle Lakes. Beldora North wetland feeds water to the Beldora South Wetland and Spectacle Lakes. The lakes consist of two seasonally inundated basins that are joined by a creek and are connected to the broader wetland complex downstream by a wide channel. The lakes are surrounded by floodplains to the northwest/southwest and the Loveday 4x4 Adventure Park to the northeast/southeast.

Cultural Significance

The River Murray and Mallee Aboriginal Corporation (RMMAC) holds native title over the River Murray within the Lock 3 Reach. The First Peoples intimate knowledge and understanding of Country and active participation across all levels is vital to the effective management of this landscape.

Post-colonial use

Since river regulation and the construction of locks and weirs along the River Murray, the water regime in the wetland complex has been altered. Following the construction of Lock 3 in 1925, approximately 151 hectares (Ha) of the wetlands in the wetland complex were permanently connected with the River Murray at weir pool level. The lack of inundation in these areas has resulted in the decline of floodplain habitat within the wetland complex. The installation of regulators has since enabled the wetting and drying of the wetlands, improving the ecology within this area¹.

WETLAND ECOLOGY

The wetland complex represents a site of significant ecological value, particularly due to the habitat it provides for native flora and fauna communities^{1,2}. It contains a mosaic of small temporary wetlands and larger waterbodies that provide a breeding habitat for a variety of wetland fauna. It is described as a wetland with high potential for ecological benefits and an important drought refuge for birds and aquatic fauna^{3,4}.

Flora: Plant structural formations include: reedbeds, sedgelands, lignum shrublands and river red gum and black box woodland and open forest (see² for detailed description of flora at site). Plant diversity is relatively low in Beldora North (due to static water level for 70 years), compared with Beldora South and Spectacle Lakes, with those plants that prefer static water levels favoured.

Fauna: Beldora wetland complex is considered to have a high diversity of frogs in relation to other wetlands in the region¹ and provides good habitat for birds. Baseline surveys were conducted during 2003-04, 2005^{2,5} and additional surveys were undertaken during 2006⁶ and 2012⁷. The southern bell frog, regent parrot, musk duck and freckled duck have been recorded as species of conservation significance at these sites.

WETLAND MANAGEMENT

Current Management:

The primary management activity is wetland conservation with some cattle grazing. The site is managed by Beldora Station in conjunction with the Department for Environment and Water (DEW) and the Murraylands and Riverland Landscape Board. The Beldora North Wetland inlet regulators are operated for the purpose of achieving ecological outcomes. The Spectacle Lakes-Beldora Wetland Management Plan provides the strategy for managing water levels via wetting and drying at Spectacle Lakes and the Beldora North and South Wetlands through the main Beldora North regulating structure.

The Spectacle Lakes land parcel is under lease relating to a pipeline and an annual licence issued for a 4WD training facility. In 2014, an earth bank with two regulating structures was constructed across the inlet of Beldora North. These regulating structures in the North were used from 2014 to implement a wetting and drying hydrological regime across the entire Beldora and Spectacle Lakes complex. Since the construction of the Northern structure, the Paddy's Perry and Beldora South regulating structures are no longer used but still allow for connectivity and vehicle access. Both smaller structures are fitted with fish screens to exclude large carp upon refilling in Beldora South and Spectacle Lakes if a full dry is not achieved in Beldora North.

Infrastructure:

The Beldora North main inlet channel (constructed under the Riverine Recovery Project) connects at pool level through two regulators and associated embankment. Each regulator is set to 10.58 mAHD (top of piers) and is comprised of box culverts that have rotating carp screens attached to the river side of the regulator. Both regulators provide vehicle access across the inlet. These regulating structures have been used since 2014 to wet and dry the entire complex.

A regulating structure was installed in 2003 across the inlet to Beldora South Wetland. This structure consists of six box culverts each 0.9 m high x 1.2 m wide and can manage water levels between +9.41 mAHD and 10.4 mAHD. There are also two small pipe culverts in the Beldora South Wetland, above weir pool level. This structure is not currently used to implement a wetting and drying regime but is fitted with fish screens and allows for vehicle access.

The Spectacle Lakes inlet channel connects to the Beldora North Wetland. During 2003, a regulating structure (Paddy's Perry) was installed across the inlet channel to Spectacle Lakes. The regulator has an invert of +9.43 mAHD and can manage water levels between +9.43 mAHD and up to +10.6 mAHD. It consists of two box culverts each 0.9 m high. This structure is not currently used to implement a wetting and drying regime but is fitted with fish screens and allows for vehicle access.

ISSUES AND DRIVERS

As part of the Master Planning Project engagement process, an ongoing register of issues and drivers relating to sites and options was maintained. These highlighted key considerations and investigations that would need to be factored in and undertaken as part of any next steps towards realising the outcomes described within the option profiles. For Beldora-Spectacle Lakes, these included:

Environmental

- There are some risks associated with acid sulfate soils at this site and this would require further assessment before any construction works or wetting and drying activities are undertaken, see Addendum 1 to¹ and ⁸ for updated information.
- Consider excluding flow from selected sections to limit carp entering the area.

Cultural

- Construction works need to be mindful not to disturb areas of cultural importance, particularly in relation to access points.

Community/Social

- Consider current uses of floodplain for recreational activities and cattle grazing. Livestock can damage wetlands in multiple ways if allowed unlimited access to the wetland. Livestock cause soil and plant disturbance through pugging and compacting wet soil, further causing erosion of stream banks and sedimentation of wetlands. Livestock also introduce nutrients to the water through their urine and faeces causing algal blooms. Allowing livestock to access wetlands is not only damaging to the wetlands but can affect livestock health and productivity⁹. Reducing/removing stock would lessen trampling and promote healthy soil and plant communities.
- Beldora community are very interested in clearing Spectacle Creek to improve connectivity to the pool-connected site.

Operational/logistics

- Consider the logical sequencing of these options.
- Confirm structural integrity of existing structures and suitability for refurbishment.
- Option 1 – consider need for multiple culverts to prevent erosion or overtopping.

KEY STAKEHOLDER INVOLVEMENT

- Beldora Station
- Berri Barmera Council
- Berri Barmera Landcare
- Central Irrigation Trust (CIT)
- Commonwealth Environmental Water Office (CEWO)
- Loveday 4x4 Adventure Park
- Murraylands and Riverland Landscape Board
- National Parks and Wildlife Service SA

- Regent Parrot Recovery Team
- River Murray and Mallee Aboriginal Corporation (RMMAC)
- SA Water

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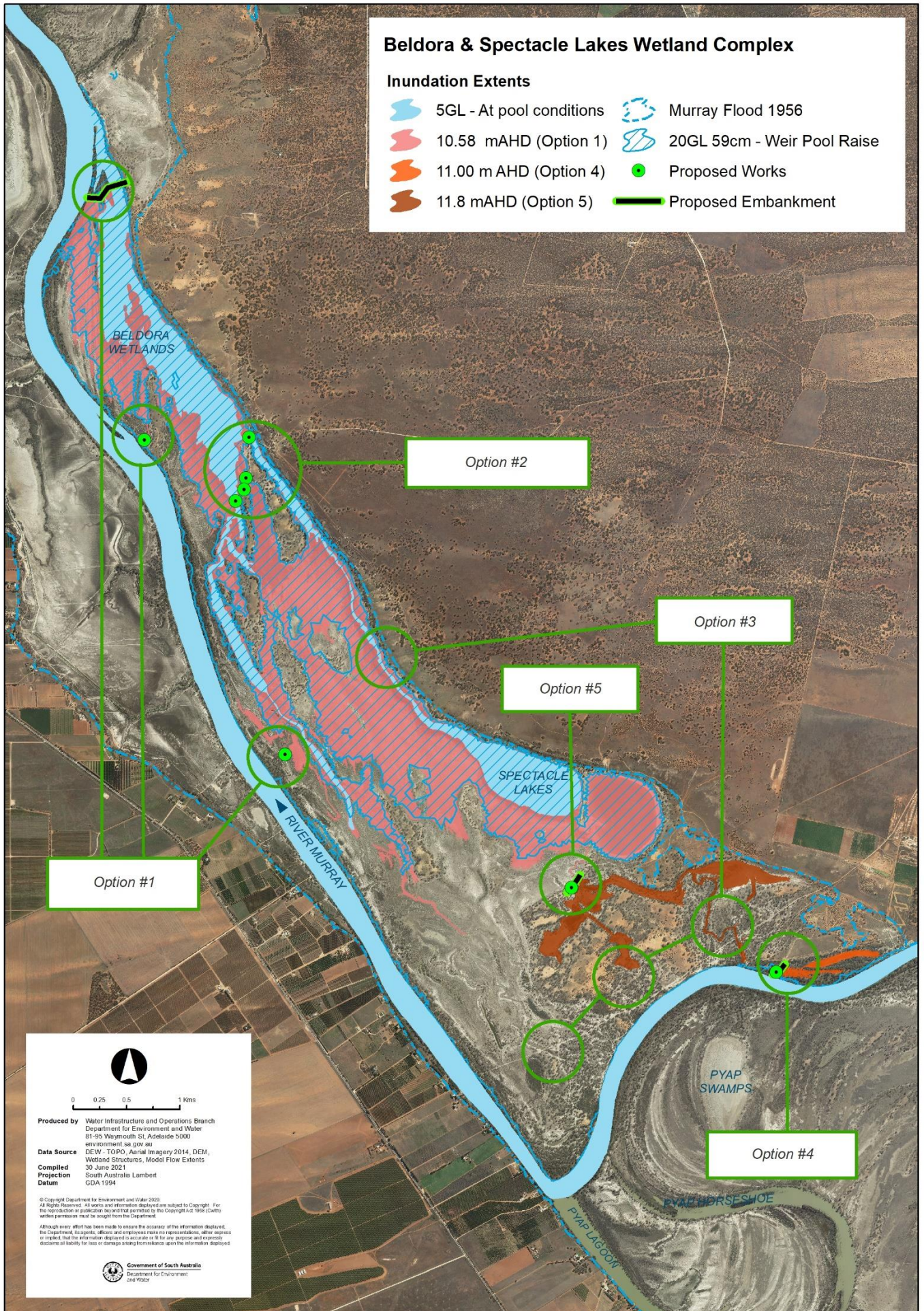
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Beldora & Spectacle Lakes Wetland Complex

Inundation Extents

-  5GL - At pool conditions
-  10.58 mAH (Option 1)
-  11.00 mAH (Option 4)
-  11.8 mAH (Option 5)
-  Murray Flood 1956
-  20GL 59cm - Weir Pool Raise
-  Proposed Works
-  Proposed Embankment




 0 0.25 0.5 1 Kms
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 Wetland Structures, Model Flow Extents
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 Projection South Australia Lambert
 Datum GDA 1994

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