



Site options profile #L9

Loveday Mussel Lagoons Wetland Complex - Draft Lock 3 Master Plan



Location: Weir Pool 3, River Chainage Markers 455 to 447 km

Land Tenure: Private landholders

Wetland Size: 157.2 hectares (Ha)

Normal Pool Level: 9.8 mAHD

PROPOSED OPTIONS	
Option #1:	Promote and enhance wetting and drying wetland management outcomes, by allowing for the independent management of the North and South Loveday and Mussels Lagoons.
Description	The central causeway structure and associated pipe culverts, dividing the North and South Loveday Lagoons provide an opportunity to manage these two lagoons independently. The presence of acid sulfate soils (ASS) in the North Lagoon has limited wetland management within the basin with prolonged lowered water levels, at times resulting in an odour nuisance to the surrounding community. Therefore, to achieve outcomes in the South Lagoon associated with longer drying periods and flexibility for managing for ASS in the North Lagoon, replacing or upgrading the existing causeway structures which divides the north and south lagoons is required. Designs for retrofit of six structures to enable regulation would be required. A review and potential upgrade of the inlet structure via the North Lagoon would also enhance management flexibility and outcomes. In addition, the replacement of the 'red gate' control structure would support the intended independent management of Loveday from the Mussels Lagoons, increasing operational flexibility. The existing structure is in poor condition and likely to need full replacement to function as a regulator.
Outcomes	• Benefits associated with an improved watering regime. • Conservation and improvement of floodplain vegetation. • Improved soil moisture conditions. • Improved acid sulfate soil management. • Improved invasive fish species management.
Option #2:	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 and promotion of reed growth 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 un-obstructed flow through the wetland. The likely focus for remediation works would be Sheepy Creek and the two tributaries that form Blackfellows Creek. Assessment will be required to determine target commence-to-flow levels and exactly where flow obstructions are.
Outcomes	• Benefits associated with an improved watering regime. • Enhanced capacity for greater exchange between the river and terminal wetlands. • Reduced build-up of sediment and abundant bullrush (<i>Typha spp</i>). • Conservation and improvement of wetland vegetation. • Improved soil moisture conditions. • Improved management of invasive fish species.
Option #3:	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 10.15 mAHd. 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. Works would likely require upgrade of the main causeway structure (as described in Option #1), a new regulator structure on Blackfellows Creek, and a new crossing structure within the floodplain at the northern end of the Big Mussel lagoon, as it appears that the existing structure is not wide enough for vehicle access. 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 an improved watering regime. • Conservation and improvement of floodplain vegetation. • Improved soil moisture conditions.

Option #4:	Sustain on-going management and maintain floodplain access, through the replacement or reinforcement of aging floodplain infrastructure in support of an increase in managed high-flow events and weir pool raising.
Description	An increase 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 aging floodplain infrastructure. To mitigate against any damage to the aging infrastructure, 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. If assessments indicate that replacement of critical infrastructure is necessary, there is an opportunity to review the structure heights and potentially increase the extent of water retention. Preliminary investigations indicate that the strategic replacement of structures to 10.5 mAHd could yield increased outcomes whilst minimising impacts associated with construction and ongoing operations and maintenance.
Outcomes	• Benefits associated with an improved watering regime. • Conservation and improvement of floodplain vegetation. • Improved soil moisture conditions.

SITE BACKGROUND

Description

The Loveday Swamps (North and South Basin) and the Mussel Lagoons Wetland Complex are located on the eastern side of the River, approximately 4 km from the township of Cobdogla. The wetlands lie between the River Murray to the west, and irrigated highland to the east. The wetland complex is comprised of both permanent and temporary wetland basins, including managed wetlands (Little Mussel Lagoon, Big Mussel Lagoon, Pipeline Lagoon, Sheeppark Lagoon, Germein Swamp, Dons Swamp and Gordons Swamp), an unmanaged permanent wetland (OP Lagoon), and a number of unmanaged temporary wetlands. The wetland complex is connected to the River Murray via the 'main inlet' and other flow paths including Sheeppark Creek and Blackfellows Creek¹.

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

In the late 19th-early 20th century, the Loveday Mussel Lagoons Wetland Complex was used for grazing. The adjacent Loveday Swamps were utilised as irrigation disposal basins from the 1970s onwards. The SA Field and Game Association (Barmera-Moorook Region) has managed the

wetland complex since 1984 when it began leasing the area from the Cobdogla Irrigation Trust. The construction of locks and weirs along the River Murray led to several wetland basins within the Loveday Mussel Lagoons Wetland Complex to become permanently connected at pool level. The installation of regulators has since enabled the wetting and drying of wetlands, improving the ecological health of the area¹.

WETLAND ECOLOGY

The wetland complex is composed of a number of connecting permanent waterbodies, ephemeral wetlands and areas that are hydrologically manipulated. It is considered to have high conservation value² and moderate to high conservation status³. The swamps are extensively used as feeding and breeding areas by waterbirds and fish.

Flora: Vegetation composition at the wetland complex includes river red gum and black box woodland and forest, lignum shrublands, saltbush and samphire shrubland, reedbeds and sedge. See references^{1,4}, for detailed description of flora and fauna at site.

Fauna: The swamps provide some of the best waterbird breeding habitat in the region and surveys have been conducted by Murraylands and Riverland Landscape Board with the assistance of members of the SA Field and Game Association. A total of 98 bird species have been recorded across the wetland complex, among them the regent parrot (*Polytelis anthopeplus monarchoides*) which is listed as vulnerable regionally and nationally¹. This species is believed to have reduced dramatically since the 1950s and it was thought at some stage to be extinct in the wild. A total of twelve fish species, eight native and four invasive have also been found across the fish surveys conducted at the wetlands^{1,4}, no fish species of national significance were found. A total of six frog species have been recorded at the complex; among them, the nationally and state-listed Southern bell frog (*Litoria raniformis*)¹. Two species of tortoise have been recorded in Loveday Mussel Lagoons Wetland Complex, the Macquarie turtle (*Emydura macquarii*) and Eastern long-necked tortoise (*Chelodina longicollis*)³.

WETLAND MANAGEMENT

Current Management:

The Loveday Mussel Wetland Complex has restricted access and is managed by the SA Field and Game Association - Barmera-Moorook Region (excluding the North Basin) in conjunction with the Berri Barmera Landcare Group, and Murraylands and Riverland Landscape Board. The wetland is utilised for recreational activities, including fishing and duck hunting.

The permanent basins (i.e. Big and Little Mussel Lagoons, Pipeline Lagoon, Sheepyard Lagoon and Dons Swamp) are hydrologically managed as temporary wetlands and are wet and dried through the operation of several flow-control structures located across the site. As noted above, the control structure 'red gate' is currently inoperable as it is jammed closed. The Loveday Mussel Lagoons Wetland Complex must not be dried while Loveday Swamp South Basin is full due to groundwater issues. There are a number of temporary flow paths across the wetland complex that could be improved to increase lateral connectivity within this area.

The presence of exposed acid sulfate sediments during lowered water levels in Loveday North has also led to odour issues.

Infrastructure:

Loveday Swamps (North and South Basin) and the Loveday Mussel Lagoons Wetland Complex are hydrologically connected. Loveday Swamp (North) connects to the main river channel via a regulator, and to Loveday Swamp (South) via the causeway pipes. Loveday South connects to Loveday Mussel Lagoon via the EWS Weir ('red gate') and the main river channel via Blackfellows Creek. The EWS weir ('red gate') is currently inoperable as it is jammed closed. The Loveday Mussel Lagoons connects to the river via the main inlet regulator, Blackies Oven and Sheepyard Creek.

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 Loveday Mussels, these included:

Environmental

- There are significant risks associated with acid sulfate soils at this site and these would require further assessment before any construction works or wetting and drying activities are undertaken^{5,6}.
- Need to determine management intentions for southern lagoon in relation to intended wet-dry regime.

Cultural

- Construction works need to be mindful not to disturb areas of cultural importance.

Community/Social

- Field and Game community group is important stakeholder.

Operational/logistics

- Need to ascertain that existing infrastructure to be retained can withstand the expected new water levels.
- Site will need a new management plan for management of new structures.

KEY STAKEHOLDER INVOLVEMENT

- Berri Barmera Council
- Berri Barmera Landcare
- Central Irrigation Trust (CIT)
- Commonwealth Environmental Water Office
- Murraylands and Riverland Landscape Board
- National Parks and Wildlife Service SA
- River Murray and Mallee Aboriginal Corporation (RMMAC)
- SA Field and Game Association (Barmera-Moorook Region)
- SA Water

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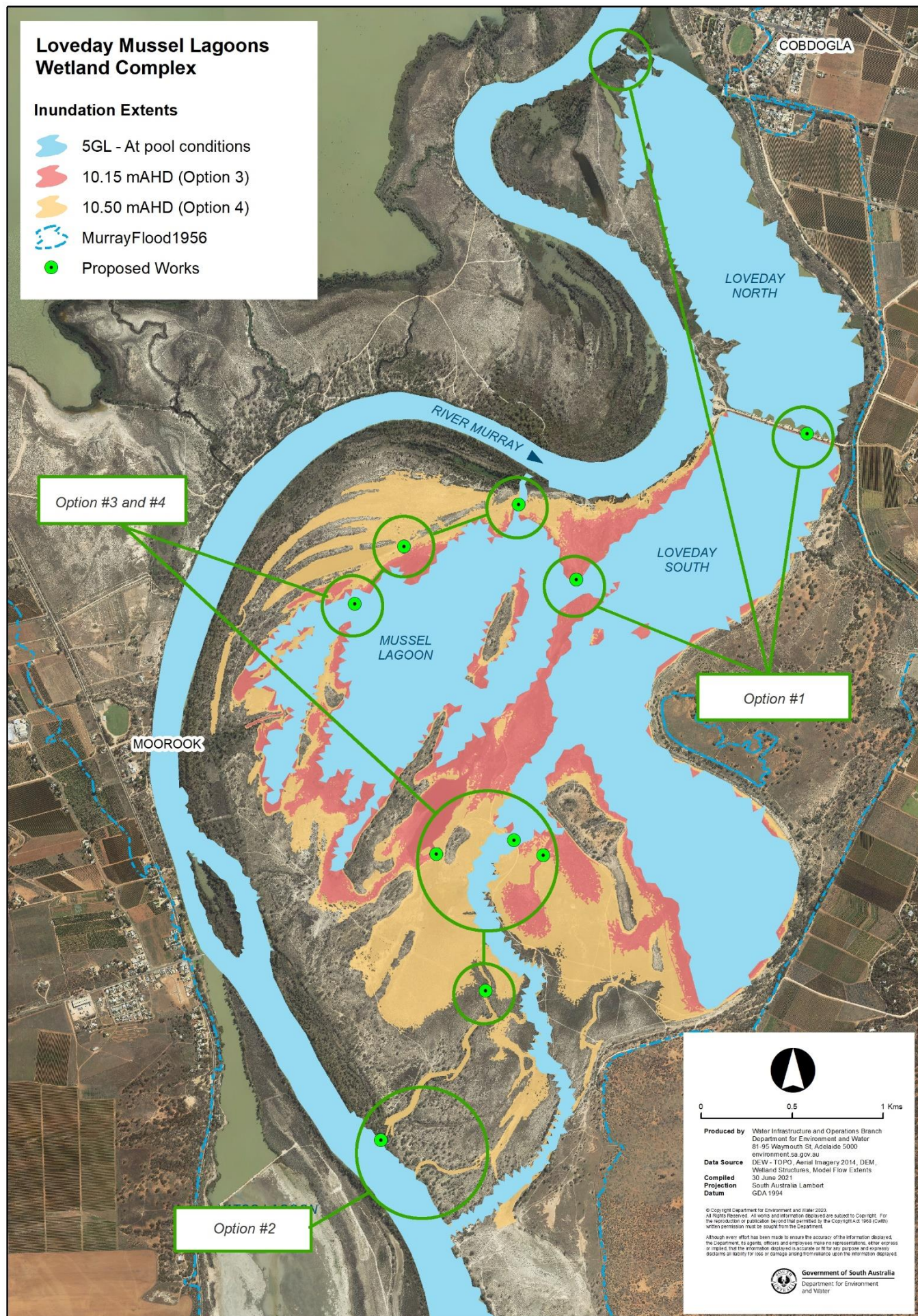


Loveday causeway

Loveday Mussel Lagoons Wetland Complex

Inundation Extents

-  5GL - At pool conditions
-  10.15 mAHD (Option 3)
-  10.50 mAHD (Option 4)
-  MurrayFlood1956
-  Proposed Works



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Data Source DEW - TOPD, Aerial Imagery 2014, DEM,
Wetland Structures, Model Flow Extents

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Projection South Australia Lambert
Datum GDA 1994

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