

Healthy Coorong, Healthy Basin

Coorong Infrastructure Investigations

Feasibility and Future Directions

August 2022





Respect and Reconciliation

Aboriginal people are the First Peoples and Nations of South Australia. The Coorong, connected waters and surrounding lands have sustained unique First Nations cultures since time immemorial. The *Healthy Coorong, Healthy Basin* program acknowledges the range of First Nations' rights, interests and obligations for the Coorong and connected waterways and the cultural connections between Ngarrindjeri Nations and First Nations of the South East peoples across the region and supports their equitable engagement.

Aboriginal peoples' spiritual, social, cultural and economic practices come from their lands and waters, and they continue to maintain their cultural heritage, economies, languages and laws which are of ongoing importance. The Department for Environment and Water (DEW) works across the State with Aboriginal South Australians to conserve and sustain Country. Through this work we seek to improve the relationship between Aboriginal and non-Aboriginal people and build respect based on mutual understanding and acceptance of each other.



Introduction

The *Healthy Coorong, Healthy Basin (HCHB)* program is a commitment, jointly funded by the Australian and South Australian governments, to restore the long-term health of the Coorong.

The HCHB Coorong Infrastructure Investigations Project is exploring opportunities for long-term operational infrastructure to improve the ecological health of the Coorong South Lagoon.

The hydrology of the Coorong, Lower Lakes and Murray Mouth system has been dramatically altered over time. Maintaining the long-term ecological health and resilience of the Coorong may not be achievable through improved knowledge and water resource optimisation alone. Operators have very few tools to manage flows efficiently and effectively within the Coorong and in particular, the Coorong South Lagoon. Additional management options may be required, particularly in the face of climate change.

Since 2020, the Coorong Infrastructure Investigations Project has engaged with community, First Nations and stakeholders through the Options, Investigations and Feasibility stages of the project to develop a significant evidence base regarding long-term management solutions.

This documents summarises the journey to feasibility assessment and outlines which concepts will be progressed through the next stage of further investigations, design and approvals, from 2022 to 2024.



Table 1. Project stages

Note: Community and First Nations consultation is a foundational activity undertaken throughout every stage of the project.



Options

Throughout 2020, we consulted community, First Nations and stakeholders on which long-term management options for the Coorong should be subject to further investigation.

Over the past two decades a range of major infrastructure and management options have been identified to improve water delivery to the Coorong for ecological benefit. The objectives of each option have varied but they have generally aimed to address two key biotic drivers: salinity and water level.

More recently, we have an improved understanding of the role of nutrient loads as a key ecological driver. Work has continued under the HCHB Program to understand nutrient dynamics within the Coorong and its impacts. This improved understanding of nutrient dynamics has informed the Coorong infrastructure investigations process.

In June 2020, following a review of the Coorong infrastructure investigations completed to date and community consultation, five broad options were shortlisted for further feasibility investigations:

- A connection between the Coorong South Lagoon and Southern Ocean
- Targeted dredging of Coorong flow constrictions to improve connectivity
- Lake Albert to Coorong Connector
- Further augmentation of South East Flows to the Coorong
- Additional automated barrage gates

In shortlisting these, feedback from community consultation confirmed:

“that the most important, essential outcome, is finding the option/s that best contributes to improving the ecology of the South Lagoon, as determined by scientific evidence, given water availability and constraints.”



Investigations

Throughout 2021 we undertook the following detailed investigations to address knowledge gaps and inform a feasibility assessment of the shortlisted options:

- Hydrodynamic, biogeochemical and ecological modelling (to inform ecological risk assessments and analyses)
- Cultural heritage surveys
- Engineering technical feasibility assessments (to inform concept designs)
- Capital and operating and maintenance cost estimates
- Preliminary socio-economic assessments.

The investigations were guided by the findings from the HCHB Scientific Trials and Investigations Project and the *Desired state of the Southern Coorong – discussion paper*. The discussion paper provides an up-to-date, shared understanding of the current state of the Southern

Coorong, explains what might happen if we ‘do-nothing’, presents an overview of the ‘desired state’, and provides guiding principles on how to achieve the desired state.

Hydrodynamic modelling indicated that the following options would not deliver sufficient ecological benefits and were discontinued from investigations in mid-2021:

- Further augmentation of South East Flows to the Coorong
- Additional automated barrage gates

The remaining three options proceeded to full feasibility assessment, which resulted in 13 more specific concepts (or variants) proceeding to concept design and were investigated for feasibility.

Community, First Nations and stakeholders were engaged throughout this process and consulted on the feasibility assessment criteria.

Table 2. Summary of concepts in feasibility assessment

PROCEED TO FEASIBILITY ASSESSMENT	ENGINEERING CONCEPTS (13 concepts)
A connection between the Coorong South Lagoon and Southern Ocean	<ul style="list-style-type: none"> ♦ Pump out (jetty discharge) ♦ Pump out (lower visual impact discharge) <ul style="list-style-type: none"> ♦ Bidirectional (pump in or out) (separate pumping stations) ♦ Bidirectional (pump in or out) (one common pumping station) ♦ Circulation (pump in and out) (jetty discharge) ♦ Circulation (pump in and out) (lower visual impact discharge) ♦ Passive Southern Ocean connector
Coorong Lagoon dredging to improve connectivity	<ul style="list-style-type: none"> ♦ Pump out (jetty discharge) + dredge Parnka Point ♦ Pump out (lower visual impact discharge) + dredge Parnka Point ♦ Passive Lake Albert connector channel + dredge Parnka Point ♦ Passive piped Lake Albert connector + dredge Parnka Point
Lake Albert to Coorong Connector	<ul style="list-style-type: none"> ♦ Passive Lake Albert connector channel ♦ Passive piped Lake Albert connector





Feasibility

In late 2021 we synthesised the investigations to objectively assess the technical feasibility and the environmental, social and cultural benefits and impacts of these long-term management solutions to improve flows to the Coorong.

In early 2022, a draft Feasibility Assessment Report and summary document were released for community consultation.

Key Findings

All the concepts explored in the Feasibility Assessment Report provide an overall ecological improvement from the base case (or status quo) across water level and salinity and some options also provide an ecological improvement in all indicators (water level, salinity and nutrients).

In determining preferred options, we looked at the extent of improvement that each concept can offer.



Key Finding 1

The Lake Albert Connector option (with or without dredging) does not provide ecological improvements to the health of the Coorong South Lagoon to the same extent as the Coorong South Lagoon – Southern Ocean Connector options. It was also found that the Lake Albert Connector concepts are the only concepts that fail to keep salinity under 100g/L when conditions of the Millennium Drought are simulated. They also fail to reduce the risks associated with the nutrient conditions in the Coorong ecosystem (compared to the base case).

Key Finding 2

Pumping water out of the Coorong South Lagoon is the most effective way of improving and maintaining desired salinity and nutrient concentrations. Pumping out of the Coorong South Lagoon can be achieved through different discharge structure options (i.e. jetty, breakwater or lower visual impact FlexMat).

Key Finding 3

Pumping into the Coorong South Lagoon from the Southern Ocean would provide a water source in addition to flows down the River Murray and provide water managers with an additional management lever with which to manage the system. This water would be in addition to water for the environment returned and delivered under the Murray-Darling Basin Plan.

Key Finding 4

Dredging on its own will not deliver sufficient ecological restoration benefits, but in conjunction with other options can improve the health of the Coorong South Lagoon. Dredging has additional ecological and social benefits by improving hydrological connectivity and boat accessibility between the Coorong North and South lagoons.



Consultation Feedback

During February 2022, we sought feedback from community, First Nations and stakeholders on the Draft Feasibility Assessment Report. Common themes of feedback received via the consultation sessions, the survey, or written submission included:

- There was a strong message coming through about action. People want a solution delivered, not just talked about. Whilst most people expressed this view, some were still not confident that all options had been fully investigated and wanted preferred options subjected to a more detailed assessment.
- People had concerns about the Lake Albert options, mainly due to the (un)reliability of Murray-Darling Basin system flows, both now and into the future.
- There was a general preference for options/structures which are the less intrusive (visually, size/scale, noise), and have a minimal environmental impact, especially on birdlife.
- Although the community see the benefit of leveraging the Southern Ocean to improve the Coorong South Lagoon, there was concern about the potential impact that pumping hypersaline and/or nutrient rich water (or dredgeate) may have on the nearshore ocean environment, including the Piri and Southern Rock Lobster fisheries. We have always maintained that the potential environmental impacts need to be further investigated during the next stage of the project.
- There was support to minimise ongoing operational funding requirements. People supported passive options based on the perception that they would cost less to construct and operate. The feasibility investigations have clearly indicated that passive options are a higher cost.
- Whilst there was recognition that First Nations have been closely engaged throughout the investigations, there is interest from community to hear more from First Nations about their views and perspectives.



“The Ngarrindjeri Aboriginal Corporation and Board of Directors agrees the [Coorong Infrastructure Investigations Multi-Criteria Assessment] Outcomes Report supports Ngarrindjeri Nations views and cultural values and that the process that has been undertaken is in line with Ngarrindjeri community sentiment.”

Clyde Rigney Snr
Chairperson, Ngarrindjeri Aboriginal Corporation
(on the process of engagement through the
Multi-Criteria Analysis of the CIIP options)

“Thank you team. You are all doing what we have dreamed will happen for a long time and I trust the way forward will see that the work proposed is only one of the steps to see the southern end of the Murray system become a healthy one, both ecologically and physically... I will follow the next stages of this and future works with great intent and great interest.”

Consultation participant



Feasibility Outcome

In mid-2022 the Feasibility Assessment Report was finalised to incorporate this consultation feedback.

Whilst all 13 concepts investigated have been optimised in their design to provide ecological improvements to the Coorong, many of the options have limitations. In assessing feasibility, differentiation comes down to the extent of ecological improvement that each concept offers, their varying constructability considerations and the risks to environment and cultural heritage.

The feasibility investigations identified that variants of a connection between the Coorong South Lagoon and Southern Ocean (with or without targeted dredging as a complementary action) have the most potential for improving the health of the Coorong South Lagoon.

In the context of the consultations outcomes, we have determined that further work is required before a definitive construction recommendation can be made on any option.

The three concepts that will progress through further investigations in the proposed 2023-24 Design and Approvals stage are all variants of a connection between the Coorong South Lagoon and Southern Ocean:

Circulation

Pump in at one location and out at another, with lower visual impact discharge

Provides the best ecological outcomes for the Coorong South Lagoon

Bidirectional

Pump in or out at one location, with separate pumping stations

Provides the 'next best' ecological outcome for the Coorong South Lagoon

Pump Out

Lower visual impact discharge, with dredging

Included in the event that further investigations of the other options prove prohibitive

These options will be considered by the project with and without dredging as a complementary action, with concepts refined, as required.

Table 3. Summary of the three Southern Ocean Connection concepts progressing to further investigations, design and approvals

		Circulation	Bidirectional	Pump Out
Concept	Description	Consisting of two pumping locations, enabling water to be pumped in from the Southern Ocean at the south end of the Coorong South Lagoon and pumped out into the Southern Ocean near Parnka Point, creating a circulation effect.	Consists of a bidirectional pipe with pumps at either end, with the intention that water can be pumped in or out of the Coorong South Lagoon, based on water requirements.	Involves pumping out from Coorong South Lagoon to the Southern Ocean, in conjunction with targeted dredging of the constrictions around Parnka Point.
Connector Details	Number of pipes	2	1	1
	Diameter	1.4 m	1.4 m	1.2 m
Dredging Details	Dredging Length	9 km	-	17.5 km
	Dredge Width	-	-	100 m – 200 m
Discharge Structure	FlexMat (lower visual impact)	1	-	1
	Jetty	1x 350m (Southern Ocean)	1x 350m (Southern Ocean)	-
Pumps	Pump Direction	1 pump in, 1 pump out	Bidirectional pump	Constant pump out
	Number of Pumps	3 (Coorong) 4 (Ocean)	4 (Coorong) 4 (Ocean)	3 (Coorong)
Proposed Operation	Target Flow (maximum possible)	350 ML/d	350 ML/d	250 ML/d
	Typical Flow Days (current conditions)	Between 222 days (current) and 166 days (with climate change) at 350 ML/d pump in. Every day at 350 ML/d pump out (24 hours per day, 365 days per year).	Every day at 350 ML/d (24 hours per day, 365 days per year) with pump stations alternating.	365 days
Key Findings		This option performed the best at delivering positive ecological outcomes as a result of circulating oceanic water through the South Lagoon, reducing salinity and increasing extraction of nutrients from sediments over a larger area. The circulation option in combination with dredging will greatly improve connectivity between lagoons, enhance ongoing flushing and provides more control to manage water quality under low water level conditions.	This option would improve salinity and water levels enabling water quality and ecological benefits, in particular reducing nutrient loads through export and dilution seasonally. The bidirectional pumping option enables water levels to be maintained through input of oceanic water at times of the year when pumping out would otherwise lead to ecologically harmful low water levels. Dredging in combination with bidirectional pumping will enhance connectivity and improve ongoing flushing.	Water quality improvements will be made through the export of high salinity and eutrophic water to the ocean leading to improved habitat quality. Pumping out operations will be timed to avoid ecologically harmful low water levels at certain times of the year. Dredging can improve water flow and connectivity between lagoons.

Future Directions

Design and Approvals

Subject to Australian Government funding approval, the next stage of the Coorong Infrastructure Investigations Project will involve two years of:

- Detailed Engineering Designs
- Cost Analysis
- Environmental Impact Assessments
- Further Cultural Heritage Assessments
- Legislative Approvals (including *EPBC Act 1999*)
- Further Socio-Economic and Cost-Benefit Assessments.

This remains an investigations project and no decision has been made to proceed with any particular option.

Community, First Nations and stakeholder consultation will continue throughout the process and before any decision to proceed with any particular option is made.

Should a suitable long-term management option for the Coorong South Lagoon be identified, appropriate approvals obtained and a decision made by governments to proceed with its construction, the earliest that any Coorong infrastructure on-ground works could commence would be 2025.

Any decision to proceed to construction would be subject to Australian and South Australian government consideration and approvals.

Further Information

www.environment.sa.gov.au/topics/coorong

Email project.coorong@sa.gov.au to receive information about what's happening in the Coorong direct to your inbox.

This project is part of the South Australian Government's *Healthy Coorong, Healthy Basin* Program, which is jointly funded by the Australian and South Australian governments.



Map 1. Possible locations of options.





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