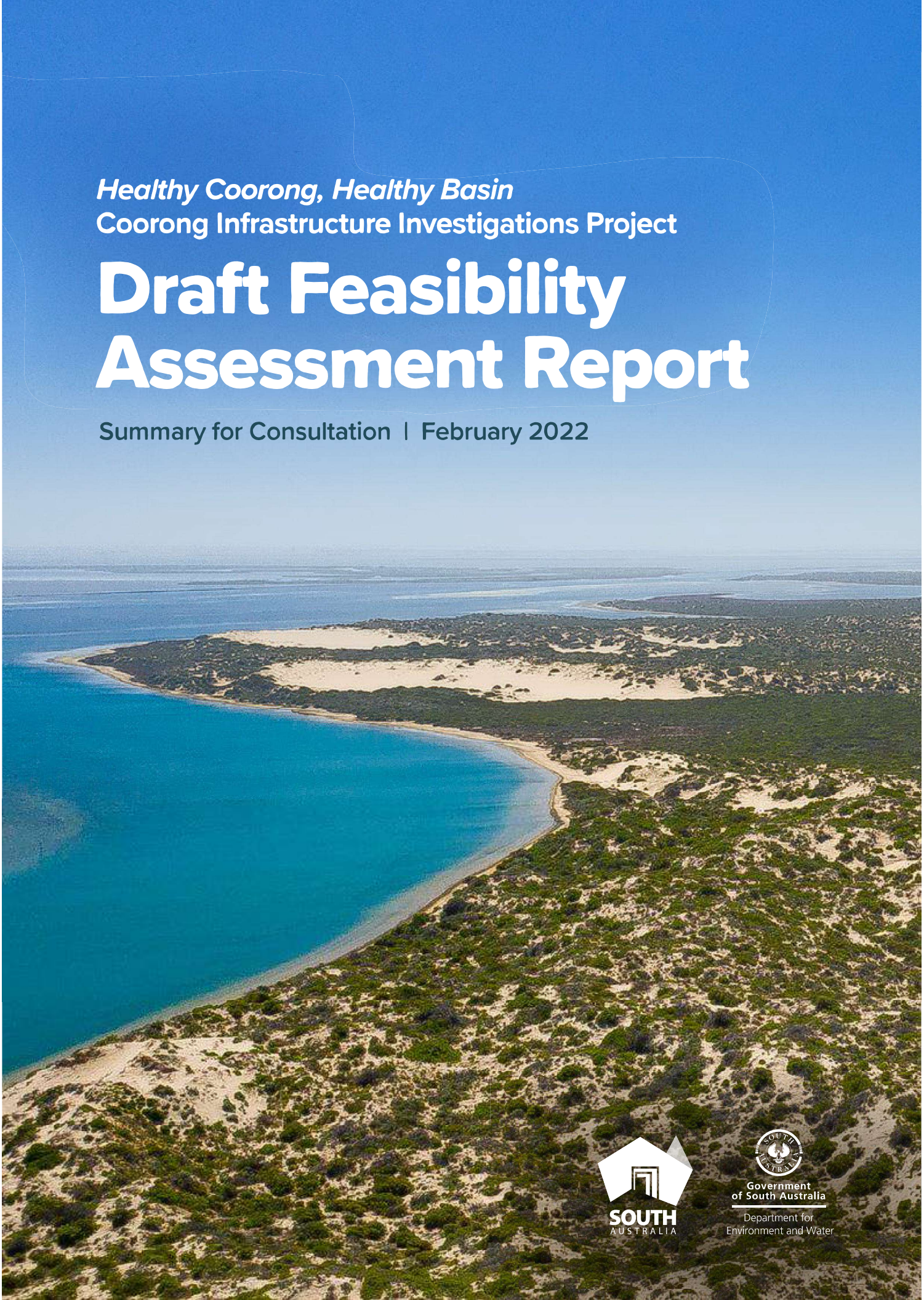
*Healthy Coorong, Healthy Basin*

Coorong Infrastructure Investigations Project

# Draft Feasibility Assessment Report

Summary for Consultation | February 2022



SOUTH AUSTRALIA

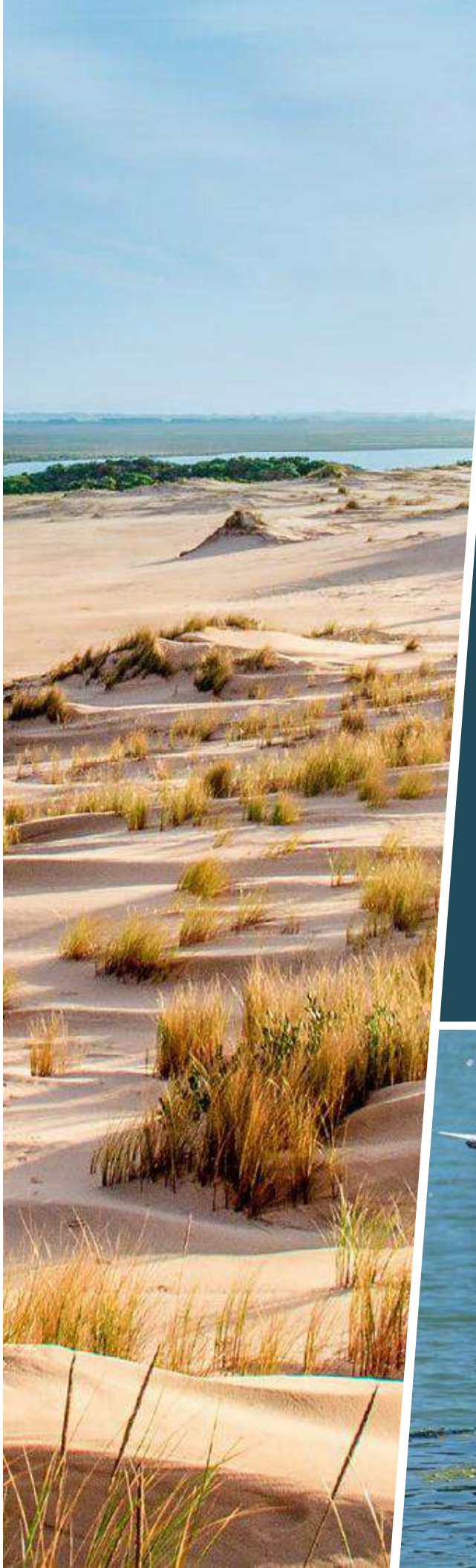
Government of South Australia

Department for Environment and Water

## 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's Coorong Infrastructure Investigations Project (CIIP) is exploring long-term opportunities for operational infrastructure to improve the ecological health of the Coorong. The CIIP is assessing the feasibility of various infrastructure options and a business case for future investment will be developed for options that are deemed feasible and provide the greatest ecological benefit to the Coorong South Lagoon.

This Draft Feasibility Assessment Report summarises the CIIP feasibility studies undertaken as part of Phase 1 of the HCHB Program and will inform the development of a business case, with preferred options and recommendations for further investigations for potential construction in HCHB Phase 2 (subject to relevant funding approval from the Australian Government).

CIIP comprises three stages:

STAGE 1

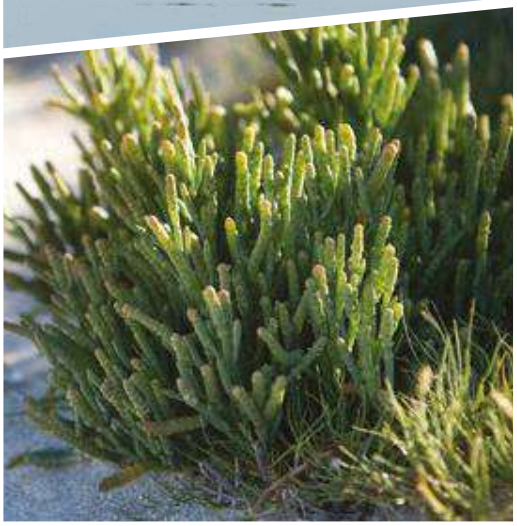
# High-level options analysis and shortlisting for further feasibility investigation

A range of major infrastructure and management options have been identified over the past two decades aimed at improving 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. 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 key findings related to the feasibility of infrastructure in this report.

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

- Permanent connection between the Coorong South Lagoon and Southern Ocean
- Coorong Lagoon dredging to improve connectivity
- Lake Albert – Coorong Connector
- Further augmentation of South East Flows to the Coorong (South East Flows Augmentation, SEFA)
- Additional automated barrage gates.

In shortlisting these, feedback from community consultation confirmed "the options that best contribute to improving the ecology of the South Lagoon as determined by scientific evidence, given water availability and constraints" should be pursued.



STAGE 2

# Feasibility investigations for prioritised options

From January to December 2021, we undertook the following detailed investigations to address knowledge gaps and establish the feasibility of the shortlisted options:

- Hydrodynamic, biogeochemical and ecological modelling
- Ecological assessments and analyses
- Cultural heritage surveys
- Engineering technical feasibility assessments
- Concept designs
- Preliminary Socio-economic assessments
- Risk assessments
- Capital and operating and maintenance cost estimates.

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

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

The remaining three options proceeded to full feasibility assessment, which resulted in 13 concepts (refer Table 1 below)

**Table 1.** Summary of concepts designed mapped to each infrastructure option

| PROCEED TO ENGINEERING CONCEPT DESIGN | ENGINEERING CONCEPTS (13 concepts) |
|---|---|
| A connection between the Coorong South Lagoon and Southern Ocean | • Pump out (jetty discharge)<br>• Pump out (low visual impact discharge)<br>• Pump in or out (separate pumping stations)<br>• Pump in or out (one common pumping station)<br>• Circulation (pump in and out) (jetty discharge)<br>• Circulation (pump in and out) (low visual impact discharge)<br>• Passive Southern Ocean connector |
| Coorong Lagoon dredging to improve connectivity | • Pump out (jetty discharge) + dredge Parnka Point<br>• Pump out (low visual impact discharge) + dredge Parnka Point<br>• Passive Lake Albert connector channel + dredge Parnka Point<br>• Passive piped Lake Albert connector + dredge Parnka Point |
| Lake Albert to Coorong Connector | • Passive Lake Albert connector channel<br>• Passive piped Lake Albert connector |

These concepts proceeded to concept design and were investigated for feasibility. This Draft Feasibility Assessment Report will help determine whether, individually or collectively, the concepts can form a feasible investment case for maintaining and enhancing the ecological character of the Coorong.

**Table 2.** Summary of the features of CIIP infrastructure concepts. *Denotes alternating directions of pumping.

| Option | | Concept # | Description | Connector details | | Dredging details | |
|---|---|---|---|---|---|---|---|
| | | | | Number of pipes | Diameter | Dredging - length | Dredge width |
| Lake Albert Connector | | 1A | Passive Lake Albert connector channel | 1 | Channel 13 m base width | | |
| | | 1B | Passivwe piped Lake Albert Connector | 7 | 2.1 m | | |
| | | 2 | *Dredge Parnka Point* | Dredging is not considered on | | | |
| | Dredging | 1A+2 | Passive Lake Albert Connector channel + dredge Parnka Point | 1 | | 17.5 km | 100 m – 200 m |
| | Dredging | 1B+2 | Passive piped Lake Albert Connector + dredge Parnka Point | 7 | 2.1 m | 17.5 km | 100 m – 200 m |
| Coorong South Lagoon – Southern Ocean Connector | | 3A | Pump out (jetty discharge) | 1 | 2.2 m | | |
| | | 3B | Pump out (low visual impact discharge) | 1 | 2.2 m | | |
| | Dredging | 3C | Pump out (jetty discharge) + Dredge Parnka Point | 1 | 1.2 m | 17.5 km | 100 m – 200 m |
| | Dredging | 3D | Pump out (low visual impact discharge) + Dredge Parnka Point | 1 | 1.2 m | 17.5 km | 100 m – 200 m |
| | | 4A | Pump in or out (separate pumping stations) | 1 | 1.4 m | | |
| | | 4B | Pump in or out (one common pumping station) | 1 | 1.6 m | | |
| | Dredging | 5A | Circulation (pump in and out) (jetty discharge) | 2 | 1.4 m | 9 km | |
| | Dredging | 5B | Circulation (pump in and out) (low visual impact discharge) | 2 | 1.4 m | 9 km | |
| | | 6 | Passive Southern Ocean Connector | 10 | 2 m | | |
| Discontinued | | *South East Flows Augmentation* | | *This option did not progress to concept* | | | |
| | | *Automated Barrage Gates* | | *This option did not progress to concept* | | | |

| Discharge structure | | | Pump | | Proposed operation | | |
|---|---|---|---|---|---|---|---|
| FlexMat (low visual impact) | Jetty | Breakwater | Pump direction | Number of pumps | Target Flow (maximum possible) | Typical flow days (current conditions) | Typical Flow Days (climate change) |
| | | | Passive | | 1,000 ML/d | 241 days | 143 days |
| | | | Passive | | 1,000 ML/d | 241 days | 143 days |
| its own – Dredging details are summarised for 1A+2, 1B+2, 3C, 3D | | | | | | 2 year operation (365 days) | |
| | | | Passive | | 1,000 ML/d | 241 days | 143 days |
| | | | Passive | | 1,000 ML/d | 241 days | 143 days |
| | 1 x 150 m | | Intermittent pump | 8 (Coorong) | 1,000 ML/d | 137 days | 189 days |
| 1 | | | Intermittent pump | 6 (Coorong) | 1,000 ML/d | 137 days | 189 days |
| | 1 x 150 m | | Constant pump | 3 (Coorong) | 250 ML/d | 365 days | 365 days |
| 1 | | | Constant pump | 3 (Coorong) | 250 ML/d | 365 days | 365 days |
| | 1 x 350 m | | Bidirectional pump | 4 (Coorong)<br>4 (Ocean) | 350 ML/d | 365 days* (alternating direction) | 365 days* (alternating direction) |
| | | 1 (200 x 50 m) | Bidirectional pump | 4 (Young Husband Peninsula) | 350 ML/d | 365 days* (alternating direction) | 365 days* (alternating direction) |
| | 1 x 350 m (in)<br>1 x 150 m (out) | | Bidirectional pump | 4 (Coorong)<br>4 (Ocean) | 350 ML/d | 365 days* | 365 days* |
| 1 | 1 x 350 m (in) | | Bidirectional pump | 3 (Coorong)<br>4 (Ocean) | 350 ML/d | 365 days* | 365 days* |
| | | 1 (240 x 160 m) | Passive | N/A | Variable | 365 days | 365 days |

*design as the option was discontinued on the basis that is did not provide sufficient benefit to the Coorong South Lagoon*

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# Key Findings

All concepts explored provide an ecological improvement from the base case (or status quo). To determine a preferred concept, points of differentiation come down to the extent of improvement that each concept offers, varying constructability considerations and thus risks to environment and cultural heritage, and subsequent financial implications. Table 7 summarises the key findings for each option, with further detail explored below the table.

**Table 2.** Summary of key findings for each concept under feasibility investigation

| Concept | Traffic light | Key finding |
|---|---|---|
| **Passive Lake Albert connector channel** | 🔴 | • These options provide less improvement to salinity (current conditions) and no improvement to salinity (climate change conditions) in the Coorong South Lagoon when compared with the base case.<br>• There is no improvement to nutrient levels in the Coorong South or North lagoons compared to the base case. |
| **Passive piped Lake Albert Connector** | 🔴 | |
| **Passive Lake Albert connector channel + dredge Parnka Point** | 🔴 | |
| **Passive piped Lake Albert Connector + dredge Parnka Point** | 🔴 | |
| **Pump out (jetty discharge)** | 🟢 | • There are two discharge options for pumping out.<br>• The low visual impact options provide the greatest benefit to visual amenity. Construction would not proceed into the surf zone as far as a jetty would. |
| **Pump out (low visual impact discharge)** | 🟢 | |
| **Pump out (jetty discharge) + dredge Parnka Point** | 🟢 | • Potential to improve nutrient levels further in the Coorong South Lagoon, when compared with pumping out without dredging.<br>• Additional connectivity benefits for boat access. |
| **Pump out (low visual impact discharge) + dredge Parnka Point** | 🟢 | |
| **Pump in or out (separate pumping stations)** | 🟢 | • Pumping water from the Southern Ocean to the Coorong South Lagoon would provide a water source in addition to River Murray flows. This provides water managers with an additional management lever to manage the system. |
| **Pump in or out (one common pumping station)** | 🔴 | • Breakwaters are designed at a height where they could be overtopped by waves.<br>• This poses significant safety risks to the public and operations and maintenance staff access. |
| **Circulation (pump in and out) (jetty discharge)** | 🟡 | • Two separate alignments (one for pumping in at the Coorong South Lagoon and the other pumping in North of Parnka Point) provide greater risks to impacts on the Younghusband Peninsula (vegetation impact and Cultural Heritage) during construction.<br>• 22 hectares of vegetation clearance would be needed compared with 11 hectares for single pipe concepts. |
| **Circulation (pump in and out) (low visual impact discharge)** | 🟡 | |
| **Passive Southern Ocean Connector** | 🔴 | • Breakwaters are designed at a height where they could be overtopped by waves.<br>• This poses significant safety risks to the public and operations and maintenance staff access. |

**RED** Limitations to feasibility (that cannot be resolved with design improvements)

**YELLOW** Limitations to feasibility (that can be resolved with design improvements)

**GREEN** Feasible option that may improve the health of the Coorong South Lagoon

All the concepts we explored provide an overall ecological improvement from the base case (or status quo) across all indicators (water level, salinity and nutrients). In determining a preferred option, 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 produce 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.

**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 low 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.

In February 2022, we will seek feedback from community stakeholders on this Draft Feasibility Report, specifically in relation to the preferred option(s), before finalising this report to submit to the Australian government for funding consideration to develop a business case.


STAGE 3

## Develop business case

Subject to funding approval, a business case will be developed for the preferred option(s) for consideration by governments. If governments consider the business case to be worthy of investment, the works program will be delivered under HCHB Phase 2.

## You can provide input to this process by:

**Registering for an online webinar for a summary of the information presented in this report**

**Dropping in to an Online Open House event**

**Providing feedback on our online survey (responses close 3 March)**

**www.environment.sa.gov.au/topics/coorong/get-involved**

Once we develop the business case, this will be submitted for consideration by governments. Further investigations to refine the preferred infrastructure and address knowledge gaps for approvals will need to occur prior to construction.

We are committed to ensuring that the government's decisions and actions reflect the community's values and aspirations and incorporate local knowledge and expertise.

If you have any questions, please email **projectcoorong@sa.gov.au**

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