SA Offshore Windfarm Pty Ltd

SA Offshore Windfarm Project

EIS Scoping Report

278441-ENV-SA-RPT-004

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Job number 278441

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Document verification

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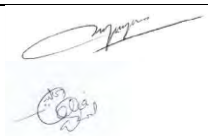
		Signature			
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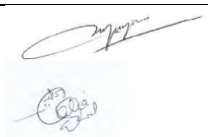
		Signature			
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Executive summary

Introduction

SA Offshore Windfarm Pty Ltd is proposing the construction, operation and decommissioning of the South Australian (SA) Offshore Windfarm ('the Project[1]') to be located 10 km offshore from Kingston SE.

Under current legislation the Project will likely be subject to assessment and approval by both State and Commonwealth Ministers.

Approval is required under *Environment Protection and Biodiversity Act 1999* (EPBC Act) for significant impacts on Commonwealth Matters of National Environmental Significance (MNES). Approval is also required by the South Australian Minister for Planning and Local Government under the *Planning, Development and Infrastructure Act 2016* (PDI Act).

Subject to planning and environmental approval, construction will likely commence in early 2025 for the Project to be generating electricity by 2026/27.

This EIS Scoping Report has been prepared to provide preliminary information to support the future Environmental Impact Statement (EIS) for the Project.

The Project will support the South Australian Government's target of net 100% renewable energy by 2030[2] and its ambition to be a national and international exporter of clean energy. It would also contribute to the Australian Commonwealth Government target to reduce greenhouse gas emissions to 26-28% below the 2005 levels by 2030[3].

Relevant Matters & Potential Impacts

More specific to the proposed site and Project Area, a desk-based search found the following key environmental aspects, which will need to be considered during design development and for the planning and environmental approvals:

Onshore

Commonwealth matters of significance:

- Nearby Commonwealth protected areas, including:
  - Conservation Parks / Areas
  - Heritage Sites
- Nearby nationally important wetlands:

[1] https://saoffshorewindfarm.com.au/
[2] https://reneweconomy.com.au/south-australia-minister-aiming-for-100-per-cent-renewables-before-2030-2030/
[3] https://www.pmc.gov.au/sites/default/files/publications/Summary%20Report%20Australias%202030%20Emission%20Reduction%20Target.pdf

  - The Coorong, Lake Alexandrina and Lake Albert
  - Watervalley Wetlands
- Commonwealth listed Critically Endangered Threatened Ecological Community (TEC), *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains* and *Subtropical and Temperate Coastal Saltmarsh*, likely to occur in the Project Area
- A number of Commonwealth Listed Threatened and Migratory Species in the area, including birds, frogs, mammals, plants and reptiles.

State matters:

- State flora sites in the area and within the site bounds, including rare and endangered species
- Patches of remnant native vegetation
- Native Title claim by First Nations of the South East #1 (SAD211/2017), covering all land within Project Area to a point 500m seaward of the Mean Low Water Mark. There is also a claim from Ngarrindjeri and Others Native Title Claim (SAD6027/1998), which also covers the area of Coorong and Kingston SE district
- State fauna sites within the Project Area, including rare, vulnerable and endangered species.

Offshore

Commonwealth matters of significance:

- Adjacent to a Commonwealth Marine Area
- Located within the Bonney Coast Upwelling (as mentioned above), a key ecological feature important for the biodiversity, ecosystem functioning and integrity of the Commonwealth Marine Area
- Commonwealth listed Critically Endangered TEC (*Giant Kelp Marine Forests of South East Australia*) potentially occurring within the Project Area
- A number of Commonwealth Listed Threatened, Marine and Migratory Species within the area, including birds, fish, whales, dolphins, turtles, sea dragons, sharks, seals and sea lions.

State matters:

Project infrastructure to be partly located within a State Marine Park, in a Habitat Protection Zone (HPZ) and a General Managed Use Zone (GMUZ). Some inter-array cables may also need to be located within a Sanctuary Zone (SZ), although this would be avoided where possible. The values and impacts to the SZ zone and surrounds will be further investigated during the next stage of the Project.

Other State matters include:

- Areas of dense seagrass from the coast leading to a low profile platform reef
- Located within the Coorong Coastal Commercial Fishing Zone and Pipi (Goolwa Cockle) Harvest Area
- Nearby Rock Lobster sanctuary located off Cape Jaffa.

It is likely that the Project will be deemed as Impact Assessed Development for the following considerations:

- Potential impacts on marine environment and migratory species
- Large scale of the Project with less understood impacts in South Australian context
- Location within a State Marine Park
- Underwater noise and/or vibration potentially impacting on sensitive marine receptors and species (offshore)
- Potential impact on South Australian benthic or marine species and communities, or their habitat
- Potential adverse impacts during operation and maintenance on visual and/or seascape and landscape values experienced from public open space (coast) or residential areas
- Socio-economic impacts (access restrictions and/or impacts to community, recreational use and public open space and disruption to local or regional businesses).

It is expected that the Project will be deemed a Controlled Action and require approval under the EPBC Act for impacts to MNES, including Threatened Ecological Communities and Threatened and Migratory Species.

Proposed Mitigation Measures

Future comprehensive marine and terrestrial studies will be undertaken to collect baseline data and characterise the existing conditions of the Project Area. Additional survey effort will be required to confirm the marine and terrestrial flora and fauna species likely to be present on site and confirm their known habitat. Further landscape, seascape and visual assessments and noise modelling and monitoring would identify risks and potential impacts to sensitive receptors.

Community Engagement

The development and implementation of a robust and proactive stakeholder engagement and community consultation program will be carried out to ensure increased inclusivity in environmental decision making. Incorporating local knowledge into the design process and strong communication around key and perceived environmental impacts will also help to manage community related risks and perceived negative Project outcomes.

Arup has prepared a Stakeholder and Community Engagement Plan for the current phase of the Project. The Plan is based on the principle that involving people from the very beginning of a project is the best way to achieve great outcomes and ensure the Project achieves and maintains a social licence to operate. The plan will be updated for each phase of the Project and will include consultation approaches for key stakeholders such as government departments and key agencies, community groups, local businesses and community members.

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Appendices

Appendix A
Preliminary Environmental Risk Review

Appendix B
BMT Report – Preliminary Marine Environment Assessment

Appendix C
PMST search

Glossary of Terms

Term	Description
AMSA	Australian Maritime Safety Authority
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
CEMP	Construction Environmental Management Plan
CHMP	Cultural Heritage Management Plan
CTV	Crew transfer vessels
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
DBYD	Dial-before-you-dig
DEM	Department of Energy and Mining (South Australia)
DEMP	Decommissioning Environmental Management Plan
DEW	Department for Environment and Water (South Australia)
DISER	Department of Industry, Science, Energy and Resources (South Australia)
DIT	Department of Infrastructure and Transport (South Australia)
DPTI	Department of Planning, Transport and Infrastructure (superseded name), now Department of Infrastructure and Transport (DIT)
EIS	Environmental Impact Statement
EMF	Electro-magnetic field
EMI	Electromagnetic interference
EPA	Environmental Protection Authority
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
ESCOSA	Essential Services Commission of South Australia
FAQ	Frequently Asked Question
FM	Frequent modulation
GMUZ	General Managed Use Zone
GHG	Greenhouse gas
GIS	Geographic Information System
ha	Hectares
HPZ	Habitat Protection Zone
IAP2	International Association of Public Participation (IAP2)

Term	Description
km	kilometres
kV	Kilovolt
LGA	Local Government Area
LV	Low voltage
m	Metres
MCA	Multi-criteria assessment
MHWM	Mean high-water mark
MNES	Matters of National Environmental Significance
MP	Member of Parliament
MW	Megawatts
Native Vegetation Act	Native Vegetation Act 1991 (SA)
NEM	National Electricity Market
NPW Act	National Parks and Wildlife Act 1972 (SA)
NVC	Native Vegetation Council
O&M	Operation and maintenance
OEMP	Operational Environmental Management Plan
OHS	Occupational health safety
OSP	Offshore substation platform
OWF	Offshore Windfarm
PDI Act	Planning, Development and Infrastructure Act 2016 (SA)
PIRSA	Department for Primary Industries and Resources South Australia
POB	Personnel on Board
PPE	Personal protective equipment
PV	Photovoltaic
REZ	Renewable Energy Zone
ROV	Remotely operated vehicle
SA	South Australia
SEB	Significant Environmental Benefit
SEPP	State Environmental Planning Policy
SOV	Service operation vessels

Term	Description
SZ	Sanctuary Zone
TEC	Threatened Ecological Community
TMP	Traffic Management Plan
TSB	Territorial Sea Baseline
WTG	Wind turbine generators

1 Introduction

1.1 Document purpose

This EIS Scoping Report has been prepared to provide preliminary information to support scoping of the future Environmental Impact Statement (EIS) for the Project. This report:

- Provides an overview of the proposed Project
- Describes the statutory planning approval framework
- Outlines the existing environmental aspects in the Project Area
- Identifies the key potential environmental risks and potential impacts
- Recommends mitigation measures and further environmental assessments
- Details the consultation that has already been carried out in the community and with key stakeholders.

1.2 Project overview

The offshore wind energy industry in Australia is still in its formative stages but has the potential to play a key role in the energy transition, supporting renewable energy targets and the development of clean tech industries. Australia is in a position, particularly in the southern half of the country, to create a significant new offshore industry. Conventional energy generation companies are already diversifying their operations into renewable energy sectors and the offshore oil and gas industry is in a unique position to exploit its highly skilled offshore workforce.

SA Offshore Windfarm Pty Ltd is proposing the construction, operation and decommissioning of the South Australian (SA) Offshore Windfarm ('the Project[1]'). The Project will be located approximately 10 km off the coast of Kingston SE (within the Kingston Local Government Area (LGA)), at the southern end of the Coorong and within the Limestone Coast region.

The Project would be directly adjacent a Commonwealth Marine Area, and part of the proposed Project infrastructure would be located within a State Marine Park (see Figure 1A). If constructed, it will have a generation capacity of up to 600 MW, enough to power 400,000[2] South Australian homes.

The Project will comprise up to 75 offshore wind turbine generators (WTGs) with supporting offshore and onshore electrical assets to transfer energy generated by the windfarm to the existing electricity network. The size of the individual WTGs is yet to be determined, with an anticipated capacity ranging between 8 MW and

[1] https://saoffshorewindfarm.com.au/
[2] Based on average household consumption of 6570kWh / year and 50% load factor for the 600MW OWF (www.arelectrical.com.au/average-electricity-usage-in-australia)

15 MW. The preferred WTGs are the larger (15 MW) WTGs, as fewer will be required (40), which will result in less construction and reduced visual impact.

Offshore assets (see Figure 1B) would be located in South Australian coastal waters[3] as defined in the *Seas and Submerged Lands Act 1973* (Cth) and the *Coastal Waters (State Powers) Act 1989*. Site selection for the landfall site and onshore infrastructure is ongoing, with both the existing ElectraNet Black Range substation (275 kV) at Willalooka and South East substation (275 kV) north of Mount Gambier being investigated as potential connection points to the National Electricity Market (NEM).

The selected location makes use of the very good wind resources, with mean wind speeds greater than 8.5 m/s at 100m elevation[4]. Other features that make the site potentially viable include favourable bathymetry with water depths < 25m and good access to the NEM that is unlikely to require reinforcement. In addition, the location is of preference due to the low population density within the surrounding area. The Project Area also benefits from the extended state waters related to the Lacepede Bay area.

The Project will support the South Australian Government's target of net 100% renewable energy by 2030[5] and its ambition to be a national and international exporter of clean energy. It would also contribute to the Australian Commonwealth Government target to reduce greenhouse gas emissions to 26-28% below the 2005 levels by 2030[6].

It is anticipated that the Minister for Planning and Local Government will deem the Project a 'Major Project' under Section 111 of the *South Australian Planning, Development and Infrastructure Act 2016* (PDI Act), categorising it as 'Impact Assessed Development' (not being restricted development) and requiring an Environmental Impact Statement (EIS).

The Project will also require approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for impacts to Matters of National Environmental Significance (MNES), including Threatened Ecological Communities and Threatened and Migratory Species.

Subject to planning and environmental approval, construction will likely commence in early 2025 to be generating electricity and storing energy by the Summer 2026 peak period.

Operation and maintenance activities will include routine inspections, and repair and replacement of equipment as required. It is expected that the Project will employ up to 100 full-time personnel.

[3] Coastal waters are generally defined as being within 3 nautical miles seaward of the territorial sea baseline (TSB). Reference: http://www.ga.gov.au/scientific-topics/marine/jurisdiction/maritime-boundary-definitions#heading-3
[4] https://globalwindatlas.info
[5] https://reneweconomy.com.au/south-australia-minister-aiming-for-100-per-cent-renewables-before-2030-2030/
[6] https://www.pmc.gov.au/sites/default/files/publications/Summary%20Report%20Australias%202030%20Emission%20Reduction%20Target.pdf

The design life of offshore WTGs is 30 years, although the proposed lease with the SA Government could extend to 60 years, with a break clause at 30 years, to provide an option to refurbish the Project. Therefore, when the WTGs are reaching the end of their natural working life, a decision will be made whether to refurbish the scheme or decommission the site.

It is anticipated that offshore structures above the seabed will be removed as part of the decommissioning process, with onshore infrastructure most likely to remain. Requirements for decommissioning will be established through the planning approvals for the Project.

1.2.1 Project Area and Study Area

The Project Area (Figure 1A and Figure 1B) includes areas with potential to be directly impacted by the Project plus ancillary activities including construction. The area includes:

- Potential footprint for permanent infrastructure
- All design options and alignments under consideration
- Potential construction site office, laydown and access routes.

The Project Area is depicted as the black dotted line in Figures 1A and 1B below. This is a broad and indicative Project Area for the purposes of further investigating and defining the extents of the Project and to identify environmental risks and potential impacts. As the design of the Project progresses, the Project Area will be refined and rationalised to show a more precise design envelop and project footprint.

The Study Area is aspect dependent and includes areas outside the Project Area with potential to be indirectly impacted by the Project. For some environmental aspects, broader Study Areas have been created to understand wider environmental impacts. For example, marine and terrestrial desktop studies have assessed a 5 km Study Area around the Project Area to better understand potential impacts to species.

Murray River

COORONG NATIONAL PARK

Black Range sub-station (275kV)

Bonney Coast Upwelling

PADTHAWAY EAST

PADTHAWAY

KINGSTON SE

CAPE JAFFA

LUCINDALE

NARACOORTE

BOATSWAIN POINT

ROBE

NORA CREINA

BEACHPORT

RENDELSHAM

SOUTHEND

KALANGADOO

NANGWARRY

TARPEENA

MOUNT GAMBIER

CARPENTER ROCKS

PELICAN POINT

Legend

- Substations
- Electricity Transmission Lines
- Study
- Project
- Coastal Waters Limit (3nm)
- Territorial Sea
- Built-up
- Murray River
- Bonney Coast Upwelling

Client: SA Offshore Windfarm Pty Ltd

Job Title: SA Offshore Windfarm Project EIA Scoping Report

Figure Title: Project Area

Kilometers: 0 4 8 16

Issue	Date	By	Chkd	Appd
A	8/10/2021	VG	AA	LH

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Scale at A3: 1 cm=6 km

Figure Status: Issued for Review

Coordinate System: GDA 1994 MGA Zone 54

Job No: 278441-05

Figure No: 1A Project Area_I

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Murray River

COORONG NATIONAL PARK

Indicative offshore characteristics
- WTGs max. generation capacity: 600 MW
- Number of turbines: 40 - 75
- WTG capacity: 8 -15 MW
- Offshore substation platform size: 800 m2
- Inter-array cables length: 400 - 700 km
- Offshore export cable length: 15 km

Black Range sub-station (275kV)

PADTHAWAY EAST

PADTHAWAY

KINGSTON SE

CAPE JAFFA

LUCINDALE

Bonney Coast Upwelling

BOATSWAIN POINT

ROBE

Legend

- Substations
- Electricity Transmission Lines
- Study Area
- Project Area
- Coastal Waters Limit (3nm)
- Territorial Sea
- Built-up
- Murray River
- Bonney Coast Upwelling

Client
SA Offshore Windfarm Pty Ltd

Job Title
SA Offshore Windfarm Project
EIA Scoping Report

Figure Title
Project Area

Kilometers
0 2.5 5 10

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Figure Status: **Issued for Review**
Coordinate System: **GDA 1994 MGA Zone 54**
Job No: **278441-05**
Figure No: **1B Project Area REvH**

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1.3 The proponent

SA Offshore Windfarm Pty Ltd is a wholly owned subsidiary of UK based Australis Energy Ltd (Australis).

Australis is an offshore windfarm developer / origination company, its team having project delivery experience in the UK. The company is focused on opportunities in Australia where three projects are being pursued offshore in Victoria, South Australia and Western Australia, with the goal of having its first windfarm operational by 2026.

Australis has been conducting desktop investigations for the potential for offshore wind development in South Australia since early 2020. The South Australian government has indicated initial support for renewable generation projects that will help meet their 100% renewable energy target.

Australis is led by Chairman Mark Petterson who played major roles in the liberalisation of the UK energy markets before becoming a leading pioneer in the offshore wind in the UK sector. At Warwick Energy he led the development of three successful offshore wind projects, totalling around 10% c. 800 MW of the UK's capacity, including the Thanet project, the world's largest offshore windfarm when it was commissioned in 2010.

1.4 Local context

The Project site is located within the Kingston local government area (LGA), at the southern end of the Coorong and within the Limestone Coast region. The region is rich in environmental assets with the Coorong known as one of Australia's most environmentally significant areas and one of South Australia's most visited tourist destinations. It is situated at the end of the Murray River, where the river meets the Southern Ocean for the Project Area.

Figure 2A and 2B shows the key local features and environmental constraints of the Project Area.

Prior to European settlement, the Coorong was one of the most densely populated areas in Australia, with the Traditional Owners, the Ngarrindjeri people having lived there for thousands of years. The Coorong remains an intrinsic part of their culture, spirituality, and identity. The Project site is within the area of a Native Title claim by First Nations of the South East #1 (SAD211/2017), which covers all land within the Project Area to a point 500m seaward of the Mean Low Water Mark and the Ngarrindjeri and Others Native Title Claim (SAD6027/1998) which covers the Coorong and Kingston SE district area.

A key feature of the Coorong is the Lake Alexandrina and Lake Albert Ramsar wetland (a wetland of international importance), that provides habitat for many local species as well as for migratory wading birds, some flying in from as far away as Alaska. The southern limit of these wetlands is approximately 8 km from the nearest proposed turbine.

The Millennium Drought, from 2001 to 2009, caused unprecedented impacts to the Coorong, which is now starting to show positive signs of recovery due to long-term government environmental programs. It is understood the local community are sensitive to developments that may cause environmental impact to the Coorong and surrounds, with many active conservation groups.

Offshore, the Project Area is located within the Bonney Coast Upwelling, which is a predictable, seasonal upwelling bringing cold nutrient rich water to the sea surface and supporting regionally high productivity and high species diversity in an area where such sites are relatively rare and mostly of smaller scale. It is one of 12 widely recognised and well-known areas worldwide where blue whales are known to feed in relatively high numbers. The area is significant as one of the largest and most predictable upwellings in south-eastern Australia. This is not the only upwelling in southeast Australia driven by the prevailing south-easterly winds, but it is the most prominent. In addition to whales, many endangered and listed species also frequent the area.

The Bonney Coast Upwelling is strongest through summer (January-March) with peak periods fluctuating with currents, winds and other climate driving factors. Although the shelf itself is located approximately 40-50 km offshore, it does come closer at the Cape Jaffa headland. At Cape Jaffa, the current pulls away from the coast in Lacepede Bay and the cold water is pulled in a more westerly direction and dissipates into the offshore waters of Lacepede Bay. These oceanographic events (not one single event) attract pigmy blue whales in high numbers and they can be found throughout the region. Although these species are more likely to occur along the edge of the coastal shelf, closer to the deeper water, they may occur in the shallower waters of the Lacepede Bay. This is because the way in which the currents pull the water closer to the coastline and move into the southern end of the bay increases the probability for blue whales to move closer to shore chasing large schools of krill (assuming there is adequate depth).

Southern right whales are much more common in the shallower waters and they will very likely be present in and around the Project Area. The sheltered aspect of the bay will also provide an area of refuge for these whales.

Areas of dense seagrass has been mapped from the coast leading to the low-profile platform reef. The Project would be located within the Coorong Coastal Commercial Fishing Zone and Pipi (Goolwa Cockle) Harvest Area, and with two Rock Lobster sanctuaries present in the area; one located off Cape Jaffa (approximately 8 km south of the nearest turbine), and the second at Margaret Brock Reef (approximately 10 km south of the nearest turbine).

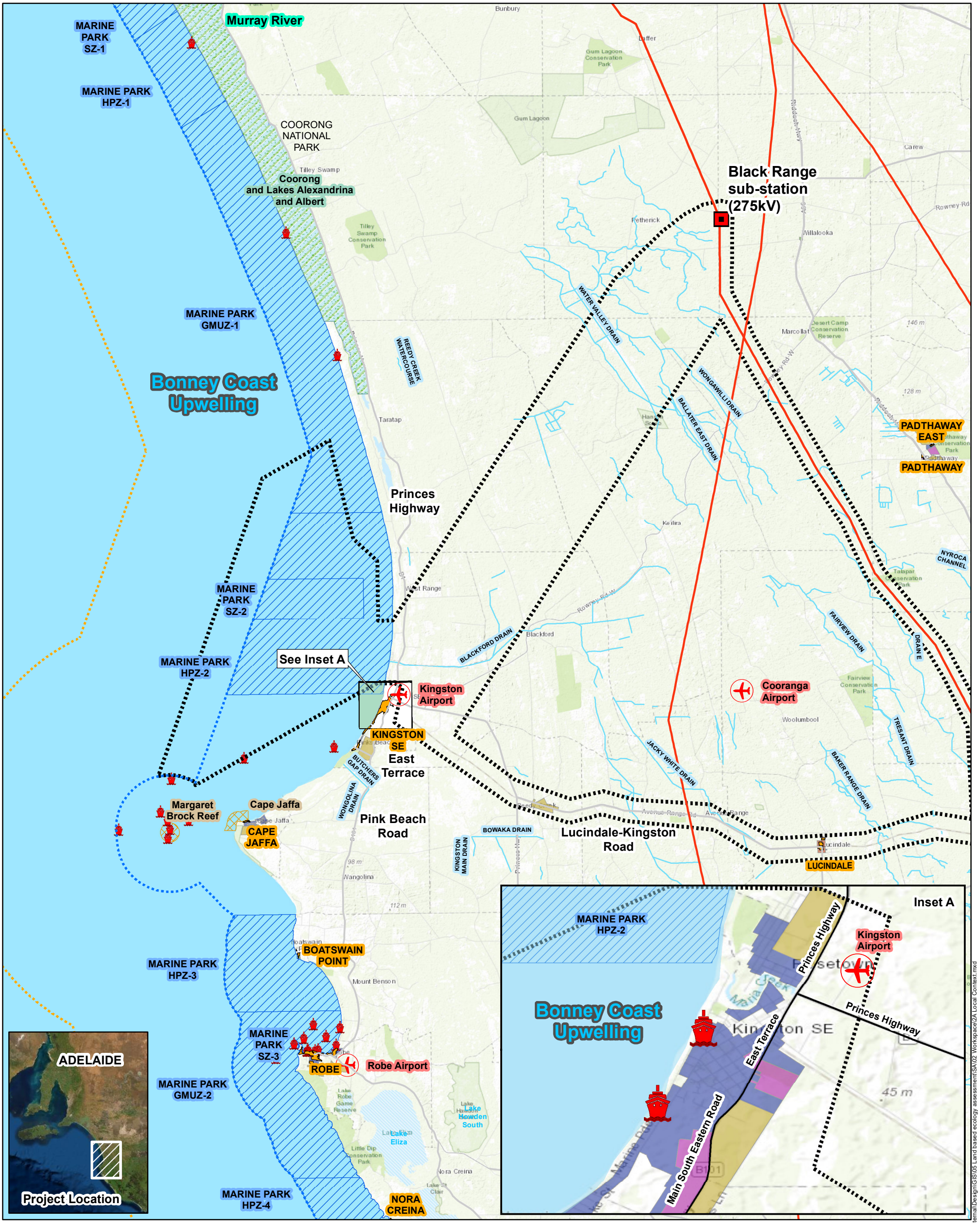
There are a number of State-listed shipwrecks in the areas, the closest being approximately 3 km from the nearest proposed turbine.

The wider Coorong region supports a healthy tourism industry, with visitor expenditure reported at $178 million in June 2019. This includes boating activities in the offshore marine park areas and scenic flights over the Coorong coast.

Fishing is one of the top socio-economic values, with the commercial Southern Rock Lobster and scale fishing industries providing a significant contribution to the economy.

The consistent, strong wind patterns throughout the south-eastern part of the State, in proximity to AEMO's 2020 ISP South East SA Renewable Energy Zone (REZ), provides tremendous opportunity to develop high capacity (and high-capacity factor) offshore wind in close proximity to critical transmission nodes.

It is the intent of SA Offshore Windfarm Pty Ltd and Australis Energy Ltd to maximise direct benefits to the local community and economy, and opportunities for such will be further explored throughout the Project's planning and development process.



Legend

- Substations
- Electricity Transmission Lines
- Coastal Waters Limit (3nm)
- Territorial Sea
- Project Area

Public Data

- Airports
- Shipwrecks
- Major Roads
- Drains
- Murray River
- Bonney Coast Upwelling
- Built-up Areas
- State Marine Parks
- State Rock Lobster Sanctuaries
- Forestry and Nature Conservation Reserves
- Ramsar Wetland Areas

Land Development Zone Categories

- COMMUNITY FACILITIES
- COUNTRY TOWNSHIP
- RECREATION
- RESIDENTIAL
- RURAL LIVING

Please note, the current Project Area represents an indicative area for the purposes of defining the likely extents of the Project and identifying environmental risks. While the area extends into Commonwealth Marine Areas, key Project infrastructure will be located within State waters only.

Client: **SA Offshore Windfarm Pty Ltd**

Job Title: **SA Offshore Windfarm Project**

Figure Title: **Project Description Doc. - Key features and Environmental Constraints**

Kilometers: 0 5 10 15

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A	8/6/2021	VG	DS	DS

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Coordinate System: **GDA 1994 MGA Zone 54**

Job No	Figure No
278441-00	Figure 2A

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Legend

- Substations
- Indicative Offshore Substation Location
- Indicative Turbine Locations
- Electricity Transmission Lines
- Indicative Cable Connections
- Coastal Waters Limit (3nm)
- Territorial Sea
- Study
- Project

Public Data

- Major Roads
- Airports
- Built-up
- Murray River
- Shipwrecks
- Forestry and Nature Conservation Reserves
- Ramsar Wetland
- Drains
- State Marine Parks
- State Rock Lobster Sanctuaries
- Bonney Coast Upwelling

Land Development Zone Categories

- COMMUNITY FACILITIES
- COUNTRY TOWNSHIP
- RECREATION
- RESIDENTIAL
- RURAL LIVING

Client
SA Offshore Windfarm Pty Ltd

Job Title
SA Offshore Windfarm Project EIA Scoping Report

Figure Title
Key features and Environmental Constraints

Kilometers
0 2.5 5 10

Issue	Date	By	Chkd	Appd
A	6/08/2021	ET	AA	LH

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Scale at A3: **1 cm=4 km**
Figure Status: **Issued for Review**
Coordinate System: **GDA 1994 MGA Zone 54**
Job No: **278441-05**
Figure No: **2B Local Context**

2 Project justification

2.1 Project objectives

SA Offshore Windfarm Pty Ltd is committed to responsible and sustainable development. As such the objectives of the Project are to:

- Develop an offshore windfarm that supports the Australian and South Australian governments' strategic goals and targets around increasing renewable energy supply
- Develop and implement a Project that is commercially viable
- To work in collaboration with all stakeholders, in particular local Council and the community
- Select a site that will maintain social and environmental values during construction, operation and decommissioning
- Investigate design solutions that maximise energy generation and supply to the NEM during peak periods and meet the South Australian technical requirements
- Determine opportunities to provide local and regional social and environmental benefits during construction and operation.

2.2 Project benefits

The benefits of the Project will include:

- Downward pressure on energy prices through increased competition
- Maintaining the existing economic benefits and environmental and social values of the region
- Direct economic expenditure and benefit to the local and state economies during construction and operational phases
- Indirect economic benefits associated with the flow on effect on both the local community and wider economy during construction and operation
- Contribution to system security through the installation of appropriate battery storage in combination with the OWF
- Long term renewable (green) energy supply to reduce SA's carbon footprint.

2.3 Project background and rationale

There is widespread agreement that energy systems need to be decarbonised as quickly as possible as part of the international effort to curb global warming.

There are several factors encouraging the development of offshore wind energy industries around the world. The wind resource offshore is extremely large and more stable than onshore, the costs are falling fast, and the technologies are proven.

The offshore wind energy industry in Australia is still in its formative stages but has the potential to play a key role in the energy transition, supporting renewable energy targets and the development of clean tech industries. Australia is in a position, particularly in the southern half of the country, to create a significant new offshore industry. Conventional energy generation companies are already diversifying their operations into renewable energy sectors and the offshore oil and gas industry is in a unique position to exploit its highly skilled offshore workforce.

Australis plans to develop offshore wind energy in the Southern Hemisphere, with the goal of having its first windfarm operational by 2026. Australis has been conducting desktop investigations for the potential for offshore wind development in South Australia since early 2020.

The South Australian government has indicated initial support for renewable generation projects that will help meet their 100% renewable energy target. Offshore windfarms are currently being built in areas of favourable wind conditions and shallow water where construction costs are lower. The density of wind energy offshore in southern Australia represents an attractive location for offshore windfarms, and when combined with the relatively shallow waters, and small tidal range, the proposed State waters location represents an ideal location for offshore windfarm construction.

The offshore environment in South Australia offers an opportunity to tap into a more powerful and consistent wind resource, with the potential to generate more electricity at a steadier rate than most other renewable energy sources. The consistent, strong wind patterns throughout the south-eastern part of the State, in proximity to AEMO's 2020 ISP South East SA Renewable Energy Zone (REZ), provides tremendous opportunity to develop high capacity (and high-capacity factor) offshore wind in close proximity to critical transmission nodes.

Some of the advantages of construction of offshore windfarms include:

- Offshore wind speeds tend to be higher than on land. Small increases in wind speed yield large increases in energy production: a turbine in a 6.7 m/s wind can generate twice as much energy as a turbine in a 5.4 m/s wind. Higher wind speeds offshore mean much more energy can be generated.
- Offshore wind speeds tend to be steadier than on land as there is nothing around to produce turbulence unlike onshore where hills, trees and buildings can interfere with wind flow. A steadier supply of wind means a more reliable source of energy.

- Many coastal areas have very high energy needs. Over 90% of Australia's population lives in coastal areas, with concentrations in major coastal cities. Building offshore windfarms in these areas can help to meet those energy needs from nearby sources, reduce losses in electrical transmission systems.
- Offshore windfarms have many of the same advantages as land-based windfarms – they provide renewable energy; they do not consume water; they provide a domestic energy source; they create jobs; and they do not emit environmental pollutants or greenhouse gases. They are also generally much larger than onshore farms, with improved economies of scale.
- WTGs used offshore are generally much taller than those onshore which pushes them up into the naturally higher wind flows at higher altitude.

The benefits of offshore wind are further depicted in Figure 3 below.

The Project has an estimated capital investment value of approximately A$1.75 billion ±30%. It will introduce proven offshore wind technology to South Australia, increasing the State's energy productivity and delivering jobs and investment into regional South Australia.

It is the intent of SA Offshore Windfarm Pty Ltd and Australis Energy Ltd to maximise direct benefits to the local community and economy, and opportunities for such will be further explored throughout the Project's planning and development process.

Offshore Wind

An overview of benefits

Larger Size of Turbines

- Offshore turbines generally much taller than onshore, access naturally higher wind flows at higher altitude
- Less turbines required to generate same amount of energy than onshore
- Improved economies of scale

Onshore wind farm

Solar farm

Transmission and distribution network

Homes

Short Distances to Population Centres

- Offshore wind farms can be located closely to energy demand of densely populated coastal locations (90% of Australia's population)
- Can help reduce transmission congestion in network and reduce electrical losses

Industries

Offshore Wind Farm

Quality of Wind Resource

- Larger turbines can reach greater wind speeds
- More consistent than onshore wind as less turbulence caused by hills, trees, buildings, etc.

Generation Profile

- Generates at different times of day to solar and onshore wind, and with more consistency
- Complimentary generation profile with other technologies
- Dependent on location can generate strongly at peak evening electricity period, helps meet peak demand periods

3 Alternatives considered

The SA Offshore Windfarm development process has considered the following options:

- A 'do nothing option'
- Different technology options
- Alternative sites – offshore and onshore
- Different generating capacities.

3.1 Do nothing

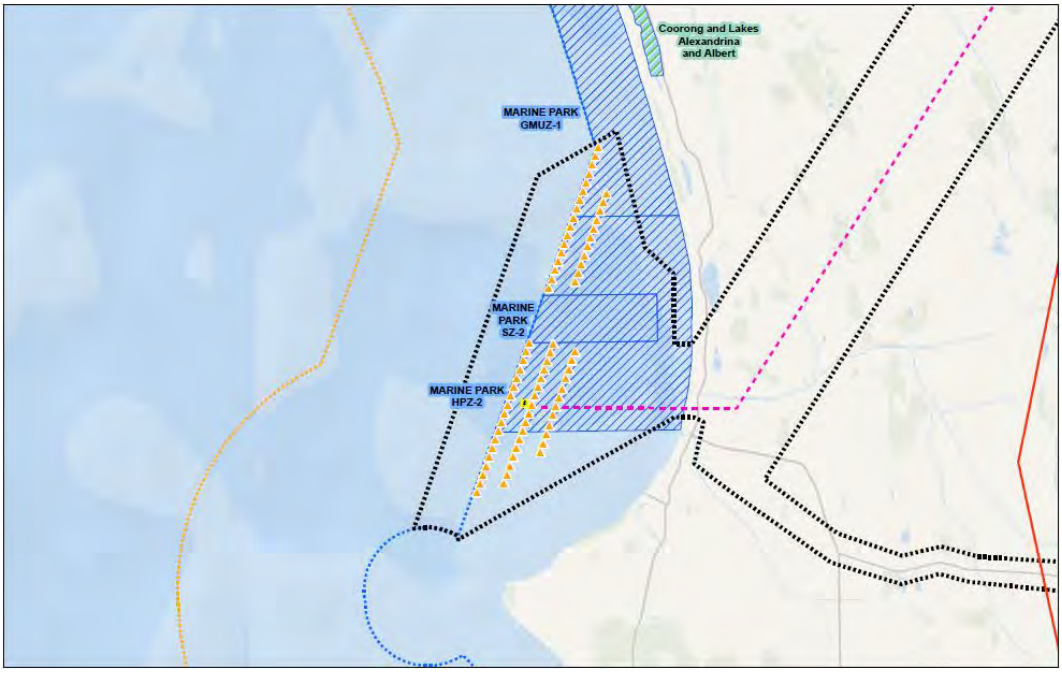
The 'do nothing' option would not help achieve the strategic goals and targets set by the Australian and SA governments around renewable energy, climate change and emissions, as listed in Section 2.2 and 2.3.

3.2 Different technology options

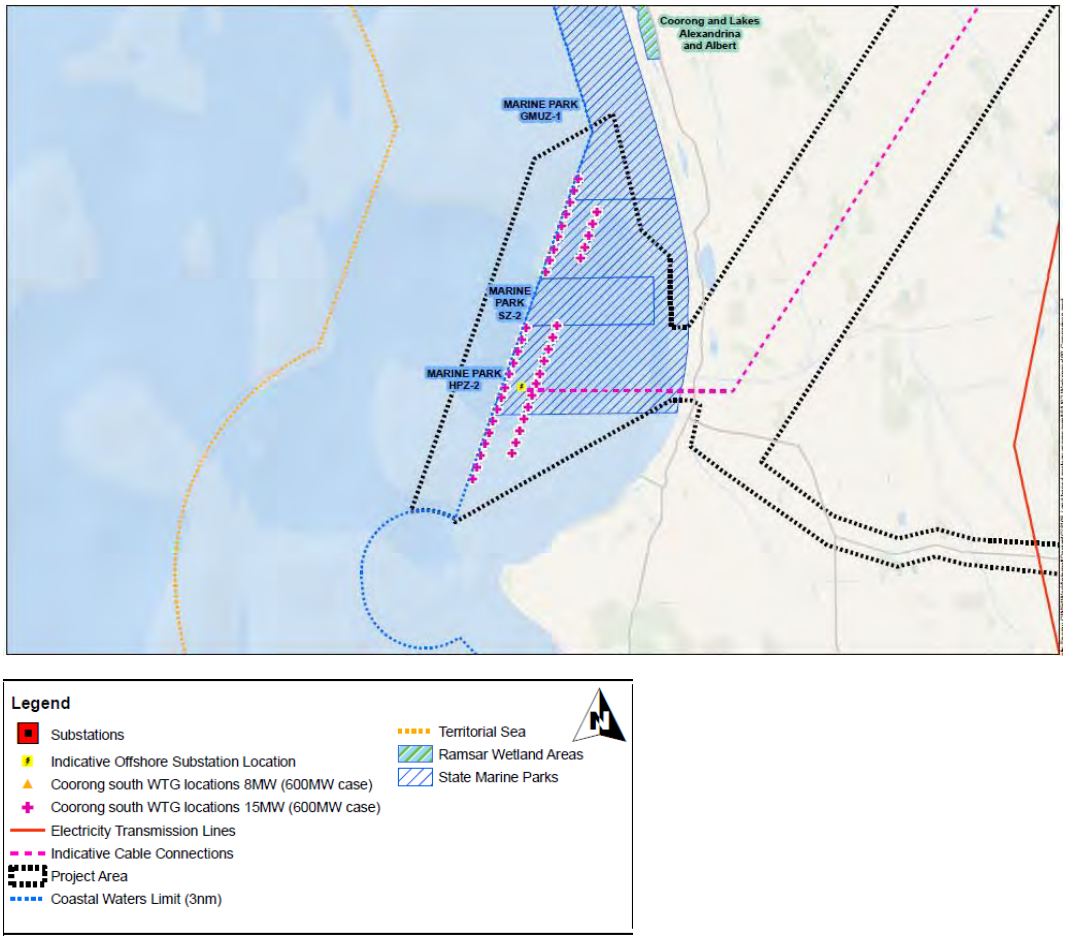
For the purpose of this EIS Scoping Report, and a future EIS, the Rochdale envelope approach has been applied, to allow for the consideration and evaluation of a range of technology options and 'worst-case' scenarios to accommodate for uncertainties at this early phase of the Project.

As such, both 8 MW and 15 MW WTGs are being considered for the Project, with the final turbine technology to be determined prior to construction and based on the Project approval and commercial, supply chain and technical considerations.

8 MW Option:



15 MW Option:



Stakeholder consultation may also inform turbine selection, dependant on whether a fewer number of larger turbines are preferred over more, slightly smaller turbines.

Regardless of the technology selected, the offshore environment in South Australia offers an opportunity to tap into a more powerful and consistent wind resource, with the potential to generate more electricity at a steadier rate than most other renewable energy sources. Offshore wind, combined with additional equipment as required, such a battery storage is preferred, and would provide the NEM with a consistent, dispatchable renewable energy resource, while providing grid stability.

3.3 Alternatives sites

3.3.1 Offshore

A multi-criteria assessment (MCA) was adopted as the methodology to delineate potential sites for offshore wind development in the South Australia coastal waters. The criteria were spatially represented via a Geographic Information System (GIS) database, thus allowing a "heat map" to be developed for visual assessment of suitable sites along the coastline. Several categories were assessed to determine the most appropriate sites for the offshore windfarms which included:

- Legislative boundaries (State vs Commonwealth)
- Distance to major port facilities
- Marine traffic
- Wind resource
- Water depth
- Environmentally sensitive sites and receptors
- Proximity to built-up areas, and
- Proximity to onshore electricity networks.

Each of the evaluation criteria were then weighted to reflect their relative importance in influencing the site selection. For example, Proximity to Built-Up Areas was assigned a weighting of 20% whereas Legislative Boundaries was assigned a weighting of 5%. The site characteristics were also assigned a suitability score ranging from zero to three with zero indicating an unsuitable site and three a suitable site. The scoring was than combined for each category in order to generate the "heat map" to allow a visual assessment of suitable sites.

When all MCA layers are weighted, scored and combined the largest area that scored highly was located south east of Kingston SE. This was the site that has therefore selected and had the following notable characteristics:

- Good wind resources associated with the site with mean wind speeds greater than 8.5 m/s at 100m elevation
- Water depths < 25m along most of the coastline
- Low marine traffic volumes
- Potential nearby access to the NEM at ElectraNet Black Range substation (275kV) and South East substation (275kV)
- Low population density within the surrounding area to mitigate any landscape, seascape and visual impact; and
- Benefits from location in Lacepede Bay as the area has extended state waters.

No other areas of sufficient size scored highly enough in the MCA to be deemed suitable for an OWF.

Following the MCA and site selection process, a second phase was conducted comprising a high-level desktop study of the Kingston SE site based on publicly available information. The purpose of the desktop study was to investigated site characteristics and site constraints which would have a significant impact on the Project and to check on potential fatal flaws to the site selected. The areas reviewed as part of this desktop study included land tenure, land use, ecology, Native Title, heritage, topography, geology and hydrology. Bathymetry and marine traffic were also investigated in greater detail. No fatal flaw was identified as part of the high-level desktop study.

3.3.2 Onshore

Currently a wide corridor is being investigated for the landfall site and onshore transmission infrastructure. The landfall site would be located landward of the mean high-water mark (MHWM) on land suitable to accommodate an underground joint pit. The transmission infrastructure is anticipated to be predominately above ground. It is anticipated the cable will be trenched/ buried from the shallow reach of the subtidal/intertidal habitat on shore where a connection will transfer the power to above ground cables. From here there are currently two transmission corridors being investigated as shown in Figure 4

Option 1: a new corridor connection to Black Range substation that will connect into the main South East substation transmission line corridor. The total area of Option 1 is approximately 66,501 ha.

Option 2: a new corridor connection along the Reedy Creek- Lucindale Road corridor into the main South East substation transmission line corridor. The total area of Option 2 is approximately 16,933 ha.

These options have been developed following initial discussions with ElectraNet regarding potential future grid connection opportunities, and will be further refined to determine final locations during design development, and subject to further technical and environmental studies, and discussions with Project stakeholders, including ElectraNet.

Murray River

COORONG NATIONAL PARK

Black Range sub-station (275kV)

PADTHAWAY EAST

PADTHAWAY

Bonney Coast Upwelling

Parankl Lagoon

KINGSTON SE

West Range

CAPE JAFFA

LUCINDALE

NARACOORTE

Wyomi

BOATSWAIN POINT

ROBE

NORA CREINA

Lake Howden South

Lake Eliza

BEACHPORT

Lake Saint Clair

Lake George

RENDELSHAM

SOUTHEND

NANGWARRY

KALANGADOO

TARPEENA

MOUNT GAMBIER

CARPENTER ROCKS

Lake Bonney

PELICAN POINT

ADELAIDE

Project Location

Legend

- Substations
- Electricity Transmission Lines
- Coastal Waters Limit (3nm)
- Territorial Sea
- Study Area
- Project Area

Project Regions

- Land Fall
- Option 1: Black Range Connection
- Option 2: Reedy Ck-Lucindale Rd Connection
- South East Transmission Corridor

Public Data

- Public Data
- Murray River
- Bonney Coast Upwelling

Client: SA Offshore Windfarm Pty Ltd

Job Title: SA Offshore Windfarm Project EIA Scoping Report

Figure Title: Project Options

Kilometers: 0 4 8 16

Issue	Date	By	Chkd	Appd
A	5/14/2021	VG	AA	LH

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Coordinate System: GDA 1994 MGA Zone 54

Job No	Figure No
278441-05	4 Project Options

Z:\PER\Projects\278000\278441-00 Australis Energy OWFs\Work\InternalDesignGIS\05 Land based ecology assessment\SA\02 Workspace\4 Project Options.mxd

3.4 Different generating capacities

Various generating capacities have been considered and guided by ongoing feasibility assessments, technology options, and early discussions with ElectraNet.

A generation capacity of up to 600 MW is proposed and will be further tested as the Project progresses and more detailed technical and market assessments are carried out with key stakeholders.

4 Project details

4.1 Project description

The Project comprises the construction, operation and decommissioning of an offshore windfarm with generating capacity of up to 600 MW.

Detailed site selection and design of the Project will be ongoing throughout the EIS and pre-construction phases. Therefore, the following description of the Project is indicative and designed to provide context for the EIS scoping process. The design envelope, possible construction methodologies and operational parameters will be developed in parallel with the EIS and will be influenced by the results of environmental and technical studies, and stakeholder consultation.

The key features of the Project are expected to include:

1. Offshore components

- Up to 40 - 75 offshore WTGs supported by monopile (or similar) foundations
- A network of buried or mechanically protected subsea cables along the seabed connecting the WTGs together and connecting the strings of WTGs to the offshore substation (known as inter-array cables)
- An offshore substation and substructure supported by monopile (or similar) foundations to collect and transform the output to a higher voltage
- Subsea cables buried or mechanically protected transmitting electricity generated from the windfarm to the onshore substation (known as the offshore export cable).

The offshore windfarm assets will be located within State waters.

The Project will comprise up to 75 offshore WTGs with supporting offshore and onshore electrical assets to transfer energy generated by the windfarm to the existing electricity network. The size of the individual WTGs is yet to be determined, with an anticipated capacity ranging between 8 MW and 15 MW. The preferred turbines are the larger (15 MW) WTGs, as fewer will be required (40), which will result in less construction and reduced visual impact.

The WTGs are expected to be supported by monopile structures. Monopiles may be installed from a jack-up vessel or a floating vessel. The transition piece is usually lifted and grouted or bolted in place from the same vessel.

Monopiles (up to 10m diameter) are generally moved into position using the main crane and upending tool and held in position by a gripper tool. They are the driven into the seabed before mounting and grouting transition pieces.

Transition pieces are usually carried and installed by the same vessel, although a two-vessel strategy in which transition pieces are installed by a separate vessel has been used on several occasions. An approximate timetable for installation once at the windfarm site is:

- Transport and positioning: 2 hours for floating vessels; 4 hours for jack-ups
- Preparations: 1 hour
- Lifting and pile positioning: 1 hour
- Driving: 6 hours, and
- Grouting: 2 hours.

Under some ground conditions, monopiles are grouted into a pre-drilled rock socket. Under conditions with boulders, a combination of drilling and driving may be required.

Cable installation activities will be preceded with a survey to define the route. This will be followed by a pre-lay grapnel run (or alternative method) to clear any debris from the cable route.

Different strategies for cable laying may be employed involving one or two vessels, and the chosen approach depends on seabed conditions, equipment available to the contractor and presence of any benthic communities and habitat.

Burial will provide protection to the cables, however additional protection (rock dumping, or grout bags, etc) may be required at key locations (e.g. where cables enter the WTG or offshore substation platform (OSP) or when ground conditions or crossings result in the cable being laid near to or on the seabed surface). Burial of cables will also assist in avoiding impacts to marine species (sharks, rays, bony fish, turtles and crustaceans) from electromagnetic fields (EMF). Burial depths for the offshore export cable will be subject to detailed assessment but is likely to be in the range of 1 - 3 m below seabed.

Pre-trenching and simultaneous lay and burial using a cable plough is preferred if the soil is suitable, as immediate burial and protection is obtained in a single pass which reduces costs and seabed disturbance. If seabed conditions are not suitable then a two-stage process will be used where the cable is laid on the seabed, after which a vessel with trenching vertical injector or jetting sled, undertakes the burial.

Cable ploughs can bury the cable down to 3 – 4 m below seabed level. The plough requires a tow force to pull the plough through the soil depending on the soil conditions and the required burial depth. Using a barge (for shallow water operations), this force is supplied by an anchor or a tow tug. For a dynamically positioned vessel, a specialist vessel with an appropriate bollard pull will be required. It is often not possible to plough close to the turbine or substation. In that case, a trenching remotely operated vehicle (ROV) may be used.

ROVs can have either a jetting system or a mechanical cutter. A high-pressure jetting system is used to fluidise the seabed and allow the cable to sink to the required depth (only in sandy sediments and softer clays). For rocky or hard clay seabed conditions, a mechanical cutter will be used.

Shore crossing is typically undertaken via trenching at shallow relief beach sites, such as those seen at this location. In hard (non-sand) coastal beach lithologies,

and or steeper or cliff related coastal settings horizonal directional drilling is undertaken to create the cable shore crossing conduit.

Offshore ancillary components may also be required during pre-construction, construction and operation, such as navigational aids, meteorological and oceanographic monitoring devices. The type, number and positions will be confirmed during development of the Project, and in consultation with the relevant authorities. It is anticipated these will be located within both State and Commonwealth waters.

2. Coastal and onshore assets

- A landfall site with a transition joint pit connecting the marine cables from the offshore substation to the onshore cables that will run to the onshore substation
- An onshore substation, which may include further transformers
- A new overhead transmission line supplying energy generated from windfarm to the National Electricity Market (NEM), with additional equipment as required, which may include battery storage for fast frequency response to provide stability to the grid
- A battery system connected to the NEM
- Temporary construction areas and upgrade to access roads.

Currently a wide corridor is being investigated for the landfall site and onshore transmission infrastructure, with final locations to be determined during design development, and subject to further technical and environmental studies, and discussions with Project stakeholders. The landfall site would be located landward of the mean high-water mark (MHWM) on land suitable to accommodate an underground joint pit. The transmission infrastructure is anticipated to be predominately above ground.

Both the existing ElectraNet 275 kV Black Range substation at Willalooka and 275 kV South East substation north of Mount Gambier are being investigated as potential connection points to the NEM. The Black Range substation is located approximately 60 km from the Project Area and connection would be require a new transmission corridor and overhead line from the Project's onshore substation. Connection to the South East substation would be via a new overhead transmission line from the Project's onshore substation to a suitable point along the existing ElectraNet Tailem Bend to South East transmission corridor, and then via a new overhead line following this corridor south to the South East substation for connection. Existing electricity easements and other infrastructure corridors would be utilised as much as practicable to minimise impact.

Onshore ancillary infrastructure associated with the Project includes operation and maintenance facilities comprising a control room, site offices, storage facilities, crew transfer vessels (CTVs) and personnel facilities. These will be sited remote to the Project Area in a local port.

3. Construction and maintenance vessels

Turbine installation is normally undertaken with a self-propelled jack-up vessel designed primarily for the purpose, though in some cases, jack-up barges have been towed with tugs. An example of specification for these vessels is:

- Length: 130 m, Beam 40 m, Draft 5 m
- Crew berths: 100
- Crane: 1,500 tonnes
- Carrying capacity: 9,300 tonnes
- Maximum transit speed: 12 knots
- Jack-up depth: 45m
- Wind turbine component capacity: 5 sets
- Number of jack-up legs: 4-6
- Jack up speed: 1m/min, and
- Dynamic positioning system (DP2).

Most of the vessels in operation have been used for both turbine and foundation installation. Increasingly the fleets are diverging. The increase in turbine capacity (and therefore rotor diameter) is associated with a higher hub height. At the same time, foundation mass is increasing, and they can now be installed more rapidly from a floating vessel. Floating vessels are considered a natural next step for turbine installation, offering theoretically faster installation than jack-ups.

Different specialist vessels will normally be used for export and array cable installation, as export cable-laying vessels will typically have larger carousels to accommodate longer cables. It is possible that the same vessel might be used for both operations on this Project. The vessels may need to have a shallow draft to install the cables in shallow water.

Simultaneous lay and burial can be carried out with a variety of burial tools. In that case, the cable is buried during the lay to obtain immediate protection. Otherwise, a post-lay burial is required.

Cable-laying vessels are characterised as follows:

- Up to 30 m (breadth) by 140 m (length) and can operate at a speed up to 14kn (transit speed).
- Accommodation for a crew of up to 90.
- The current capacity of carousels is of up to 7,000 t. Some contractors offer vessels with a double carousel
- Likely to be equipped with a 3D motion compensated crane with up to 25 t and a 25 t A-frame.

- Generally equipped with a personnel transfer gangway (for example Ampelmann system) and a helideck.

CTVs and service operation vessels (SOVs) may be used to support construction and maintenance activities. SOVs are larger vessels than CTVs and can fulfil a wider range of functions being capable of operating offshore for weeks rather than a single day.

Specialist vessels are used for crew transfer to the windfarm for installation and commissioning tasks. These are typically 15-20 m workboats of the kind regularly used during windfarm maintenance.

ROV support vessels are 80-100 m DP2 vessels with a moon pool and deck crane.

The types and mix of vessels will depend on vessel availability as well as distance and capacity of ports from the Project Area and construction and maintenance requirements and strategies.

Where possible, vessel movements and docking would be limited to State waters. However, some navigation may be required through Commonwealth waters.

4. Existing port and harbour modifications

Existing port facilities would be used where possible to support the transport and marshalling of equipment and Project components from globally distributed supply chains, as well as construction and maintenance vessels and activities.

Suitable port and harbour facilities are currently being investigated based on the following criteria:

- Proximity to the Project, to allow for efficient vessel movements and transportation during construction and maintenance
- Water depths and tidal conditions suitable to the proposed Project vessels and activities
- Dedicated or shared berthing facilities
- Portside facilities and land availability for construction and maintenance activities (including laydown, storage and assembly of components)
- Potential opportunity to provide local employment benefits.

Construction port requirements are typically:

- At least 8 hectares suitable for lay down and pre-assembly of product
- Quayside of length 200-300 m length with high load bearing capacity and adjacent access
- Water access to accommodate vessels up to 140 m length, 45 m beam and 6 m draft with no tidal or other access restrictions
- Overhead clearance to sea of 100 m minimum (to allow vertical shipment of towers)

- Sites with greater weather restrictions or for larger scale construction may require an additional lay-down area, up to 30 hectares.
- Large areas of land are required due to the space taken when WTGs are stored lying down on the ground.

Ancillary components at existing ports to support with construction and maintenance activities may include staff car parking areas, waste handling and refuelling facilities, staff office areas and a marine control centre for directing activities, and storage facilities for minor components).

A schematic of the Project is shown in Figure 5.

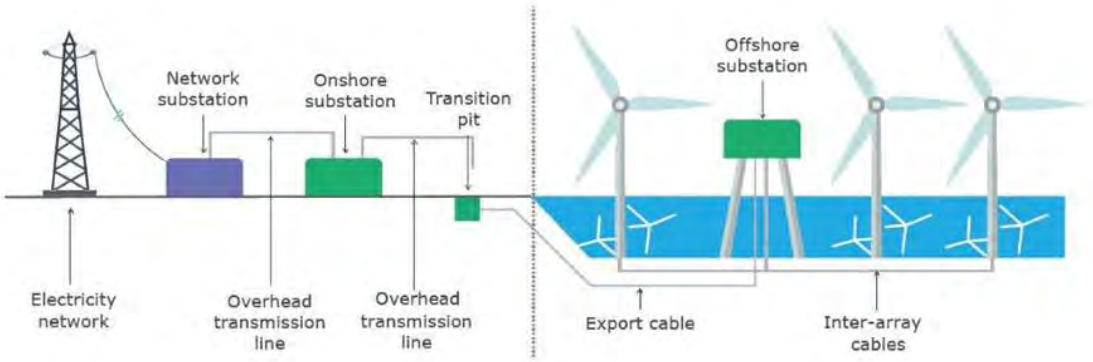


Figure 5: Project schematic

4.1.1 Project specifications

The indicative offshore Project characteristics are detailed in Table 1 below, along with anticipated location in State and/or Commonwealth waters.

Table 1: Indicative offshore characteristics

Feature	Parameters	State waters	Commonwealth waters
Wind Turbine Generators (WTGs)		✓	
Maximum generation capacity	600 MW		
Number of turbines	40 – 75		
WTG capacity	8 – 15 MW		
Max. rotor diameter	220 m		
Max. hub height	154 m		
Design. life	30 years		
Separation between WTG	825 – 1100 m (5 x rotor diameter)		
Spacing between rows	2 – 2.5 km		
Max. water depth at turbine locations	25 m		
Monopile foundations dimensions	6.5 – 8 m		
Monopile foundations depth	30 – 50 m		
Offshore substation		✓	

Feature	Parameters	State waters	Commonwealth waters
Platform size	800m^2		
Format	i.e. 66 – 132 – 275kV		
Monopile foundations depth	30 – 50 m		
Inter-array cables		✓	
Total length (dependent upon WTG size)	400 km – 700 km		
Format	i.e. 66 kV		
Offshore export cable		✓	
Length	15 km		
Format	275kV		
Burial depth	1 – 4 m		
Offshore construction platforms (J/U)		✓	
Number	1 or 2 dependent upon WTG size		
Size	up to length: 260m, beam: 50m, draft: 12m		
Construction vessels		✓	✓
Number	3 – 5		
Size	15 – 20m (CTV) 80 –100m (ROV support)		
Service Operation Vessels (SOV)		✓	✓
Number	1		
Size	x Up to 85m in length with accommodation for 60 POB		
Navigational aids and monitoring devices		✓	✓

The indicative onshore Project characteristics are detailed in Table 2 below.

Table 2: Indicative onshore characteristics

Feature	Parameters
Transition pit	
Footprint	10 x 15 m (5 m deep)
Cable size	275kV
Onshore substation	
Footprint	300 x 250 m (20 m high)
Format	275kV
Transmission line	
Total length	56 km to 220 km dependent upon substation connection at Black Range or SE
Format	2 x 275 kV
Connection point	Either ElectraNet 275 kV Black Range substation or 275 kV South East substation

Feature	Parameters
Construction sites	
Footprint of temporary construction compound and lay down areas	Construction port requirements are typically: • At least 8 hectares suitable for lay down and pre-assembly of product • Quayside of length 200-300m length with high load bearing capacity and adjacent access • Water access to accommodate vessels up to 140m length, 45m beam and 6m draft with no tidal or other access restrictions • Overhead clearance to sea of 100m minimum (to allow vertical shipment of towers). Sites with greater weather restrictions or for larger scale construction may require an additional lay-down area, up to 30 hectares. Large areas of land are required due to the space taken when turbines are stored lying down on the ground.
Operation and maintenance facilities	Operations relate to management of the asset such as health and safety, control and operation of the asset including wind turbines and balance of plant, remote site monitoring, environmental monitoring, electricity sales, administration, marine operations supervision, operation of vessels and quayside infrastructure, and back office tasks. An onshore control room provides access to detailed real-time and historical data for the wind turbines, substation, met station, offshore crew and vessels. Systems ensure that the operations duty manager knows where all personnel and vessels are located.

4.2 Key development activities

Prior to commencement of pre-construction or construction works, a number of preparatory tasks need to be completed. These tasks include:

- Initial environmental assessment and referrals to relevant State and Commonwealth referral agencies
- Stakeholder engagement and community consultation
- Thorough environmental field studies and investigations
- Environmental approvals and permits and tenure agreements
- Detailed design of Project.

4.3 Key construction activities

A high-level overview of the key construction activities and staging is provided below.

4.3.1 Offshore

Pre-construction

- Preparation of the seabed (including dredging as necessary)
- Installation of ancillary components, including navigational aids and establishment of temporary 500 m exclusion zones around WTGs locations.

Construction

- Transport of WTGs and offshore substation monopiles and foundation components to site to marshalling site or sites
- Sequential driving of monopiles into seabed followed by fixing of transition pieces to the monopiles
- Installation of scour protection, as required
- Erection of WTG towers and nacelles, either pre-erected or erected individually at the site
- Installation of the turbine blades
- Construction of the OSP and installation of substation components and equipment
- Pre-trenching and simultaneous lay and burial of the array cables using a cable plough or trenching ROV
- Installation of the offshore export cable using a cable plough or trenching ROV.

4.3.2 Onshore

Pre-construction

- Upgrades to, or construction of, site access site roads (clearing and levelling)
- Removal of areas of non-native vegetation
- Clearing and levelling of the onshore substation building area
- Establishment of onshore construction sites (offices, laydown areas, etc)
- Delivery of equipment

Construction

- Construction of foundations for the substation
- Excavation and preparation of the landfall site
- Installation of underground cables from offshore
- Installation of overhead transmission line

- Installation of substation switch-room and electrical equipment
- Electrical connection of cables
- Remove construction facilities and site tidy up.

4.4 Key operational and maintenance activities

'Operation' generally refers to activities contributing to the high-level management of the windfarm, which will include remote monitoring, environmental monitoring, electricity sales, and administration and other back office tasks. There may be a possible 50m exclusion zone around offshore assets during operation to maintain safety of key maintenance personnel and equipment as well as the public, as in other jurisdictions.

'Maintenance' refers to the up-keep and repair of the physical assets and systems, which can be divided into preventative maintenance and corrective maintenance. Preventative maintenance will include the proactive repair and replacement of known wearing components based on routine inspections or information from condition monitoring systems, and corrective maintenance will include the reactive repair or replacement of failed or damaged components. Typical operation and maintenance (O&M) activities include:

- Onshore and offshore logistics
- Turbine and blade maintenance, inspection, and service
- Foundation inspection and repair
- Cable inspection and repair
- Scour monitoring and management
- Substation maintenance and service
- Environmental monitoring and inspections.

4.5 Key decommissioning activities

'Decommissioning' refers to the retirement of the physical facilities of the Project, including dismantlement, rehabilitation, landscaping and monitoring.

It is expected that offshore structures (such as the WTGs) will be removed to just below the seabed as part of the decommissioning process, with cables and onshore infrastructure most likely to remain.

Requirements for decommissioning will be established through the planning approvals for the Project and a decommissioning management plan will be developed prior to the commencement of decommissioning, in consultation with the relevant authorities. The decommissioning plan will include:

- Rehabilitation strategies and objectives

- Timeframes for rehabilitation
- Infrastructure (if any) agreed to remain in place
- Monitoring and mitigation measures.

4.6 Project Timeline

The indicative timeline for the Project is shown in Figure 6.

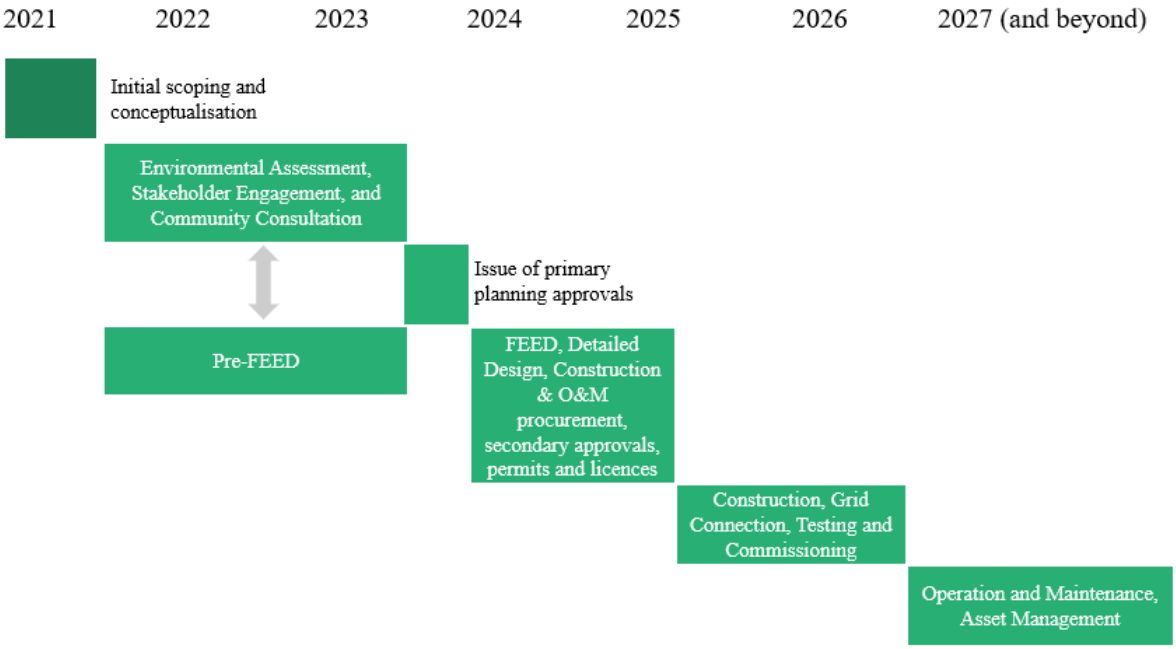


Figure 6: Indicative Project timeline

5 Strategic and statutory context

The Project is located in an area with high environmental and social values, with development subject to both State and Commonwealth environmental and planning legislation. Given the nature of the development and the environmental assets and values present, the Project will be subject to assessment and approval by both the State and Commonwealth.

In South Australia, a development proposal can be declared as a 'Major Project' by the Minister for Planning and Local Government if it is considered to be of economic, social or environmental importance to South Australia. The way that major projects are assessed in a state-run process differs from other development applications.

Where impacts of the project may be substantial, less understood or unable to be assessed against set criteria, the project is deemed 'Impact Assessed Development' by the Minister or by regulation.

It is likely that the Project will be deemed a 'Major Project' under Section 111 of the South Australian PDI Act, which categorises it as 'Impact Assessed Development'.

5.1 Primary Approvals

The Primary approvals road map is presented in Figure 7 and detailed in Section 5.1.1 and 5.1.2.

5.1.1 Commonwealth requirements

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) relates to the definition, protection and management of all matters of national environmental significance (MNES), such as ecological communities, species and their habitat. Where an action is proposed that has, will have, or is likely to have, a significant impact on any MNES, the action must be referred to the Minister for the Environment to determine if it is a 'controlled action' and therefore needs approval under the Act. It is illegal to undertake an action that will have a significant adverse impact on any MNES without prior approval under the Act.

The EPBC Act also provides for protection of the environment where the proposed action is on or will affect Commonwealth land or marine areas.

As a number of Commonwealth MNES have been identified within the Project Area and the Project is located adjacent to a Commonwealth marine area, a referral to the Department of Agriculture, Water and the Environment (DAWE) will be submitted to understand the need for assessment of the Project under the EPBC Act, and if so, the level of assessment required.

5.1.2 State requirements

The *Planning, Development and Infrastructure Act 2016* (PDI Act) provides for the planning and regulation of development in South Australia. The PDI Act and associated regulations sets out the procedures by which different forms of development are assessed.

It is likely that the Project would be deemed as a Major Project and required to follow the Impact Assessed Development pathway for the following considerations:

- Potential impacts on the marine environment and migratory species
- Large scale of project with less understood impacts in South Australian context
- Location within the State Marine Park
- Visual and community impacts (especially recreational and tourism use of the area).

In preliminary engagement with SA Planning, this has been discussed as the preferred approval pathway for the Project.

The first step in the assessment process is declaration of the Project as Major Project (Impact Assessed Development) by the Minister of Planning. A development application is then to be lodged by the proponent which is used to determine the assessment requirements.

Impact Assessed Development triggers a comprehensive Environmental Impact Statement (EIS) requiring whole-of-government assessment. The State Planning Commission issues a Practice Direction for preparation of the Project EIS, which contains the assessment guidelines.

The Impact Assessed Development process provides an opportunity for formal public consultation prior to a decision being made. The proponent is required to respond to any comments received through the provision of a Supplementary EIS.

The Minister has authority and makes a determination. The proposal may be approved, approved with conditions, approved in part or rejected. The process does not allow for third party appeals once a decision has been made.

This report includes scoping for the EIS in support of the Project application. The work completed during this stage is to help the South Australian Government classify the Project (i.e. declare as a Major Project) and provide direction on what needs to be assessed, how it should be assessed and to what level of detail.

The Impact Assessed Development process is recommended for this Project for the considerations listed above, as well as the following:

- No terms of reference issued for the environmental assessment adding risk to study scopes and resulting assessments not being accepted by approval authorities

- Public Infrastructure process not accredited under Bilateral Agreement with Commonwealth Government, resulting in two separate assessment documents required by the State and Commonwealth governments, and adding risk, costs and inefficiencies to the approvals process (see next section for further information on the Bilateral Agreement)
- The Impact Assessed Development approach is a high-profile process with all key documents made available to the public
- The Impact Assessed Development approach best accommodates the staged evolution of a development within the broader project program and works best when flexibility is needed to adjust design concepts and layouts and incorporate solutions to impact issues.

5.1.3 Bilateral Agreement

The Commonwealth of Australia had a Bilateral Agreement with the State of South Australia under section 45 of the EPBC Act relating to environmental assessment, accrediting the South Australian impact assessment process for major developments under the former *Development Act 1993*. It is understood that a similar Bilateral Agreement is currently being drafted for Impact Assessed Developments under the PDI Act.

Therefore, should the Project also require assessment under the EPBC Act, it can likely be assessed through the South Australian Impact Assessed Development process under the requirements of the future State/Commonwealth Bilateral Agreement, or as a 'one-off' accreditation.

This means it can undergo a streamlined assessment process in co-ordination with DAWE, with only one EIS document prepared, one period of public consultation undertaken and one response to submissions document prepared, to satisfy the legislative requirements of each jurisdiction.

Following assessment, the South Australian government will provide the Assessment Report to the Commonwealth Minister for the Environment, who will then make a (separate) decision whether to approve the proposed action under the EPBC Act.

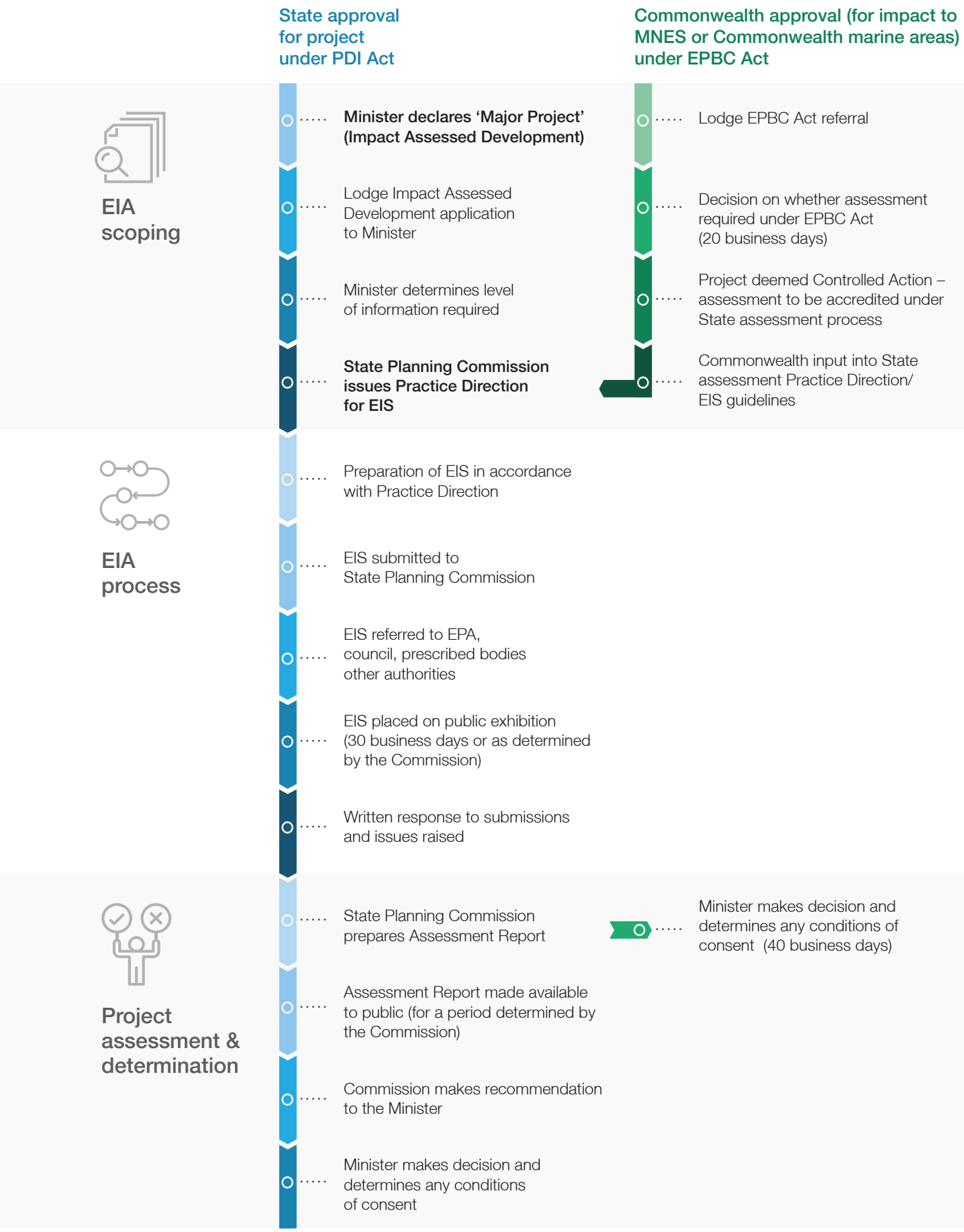


Figure 7: Approval pathway

5.2 Secondary approvals

In addition to the primary approvals, a number of secondary state approvals, permits and licences may be required. The potential additional approval requirements are included, but may not be limited to those presented in Table 3 below.

Table 3: Additional approvals, permits and licences

Legislation	Requirement	Timing	Authority
Planning, Development and Infrastructure Act 2016	Development that involves construction, or buildings and structures, may require assessment by a building certifier and approval against the Building Rules. The Building Rules prescribe the minimum technical requirements that apply to building and construction work and consist of the Planning, Development and Infrastructure (General) Regulations 2017, the Building Code of Australia and, where applicable, Minister's Specifications.	Following Project consent	Department of Infrastructure and Transport (DIT)
Aboriginal Heritage Act 1988	An authorisation would be required in accordance with Section 23 of the Aboriginal Heritage Act for the disturbance of any Aboriginal sites, objects or remains	Following Project consent and prior to disturbance	Aboriginal Affairs and Reconciliation
Crown Lands Management Act 2009	Approval would be required for any occupation of Crown land, including for excavations or other development	Following Project consent and prior to the commencement of work	Department for Environment and Water (DEW)
Dangerous Substances Act 1979	A licence may be required to keep certain prescribed substances in any premises, or to transport certain prescribed dangerous substances.	Following Project consent and prior to the commencement of work	Department of the Premier and Cabinet (Safe Work SA)
Electricity Act 1996	A licence would be required to generate electricity and operate the transmission line, as well as approval to carry out work near electrical infrastructure.	Following Project consent and prior to the commencement of work/ operation	Essential Services Commission of South Australia (ESCOSA)
Environment Protection Act 1993	Approval would be required under Schedule 1 Section 8(4) of the Act for the removal of solid matter from the bed of any marine waters or inland waters by any digging or suction apparatus.	Following Project consent and prior to the commencement of work	Environment Protection Authority (EPA)
	Approval would be required under Schedule 1 Section 8(6) of the Act for earthworks operations in the course of which more than 100 kilolitres of wastewater containing suspended solids in a concentration exceeding 25 milligrams per litre is discharged directly or indirectly to marine waters or inland waters	Following Project consent and prior to the commencement of work / during work	

Legislation	Requirement	Timing	Authority
	A licence would be required under Schedule 1 Section 7(6) of the Act during construction if groundwater is intercepted, or if dredged spoil requires dewatering, or if low lying areas need dewatering following rainfall	Following Project consent and prior to the commencement of work / during work	
	A licence would be required under Schedule 1 Section 2(5) of the Act during construction for concrete batching works at site that have a total capacity for production exceeding 0.5 cubic metres per production cycle	Following Project consent and prior to the commencement of work	
Harbours and Navigation Act 1993	An operating agreement for the Project may be required under the Harbours and Navigation Act. The Harbours and Navigation Regulations 2009 may also need to be amended to include any particular controls applying within the Project boundary and operational areas for restricted vessels.	Following Project consent and prior to the commencement of work	Department of Infrastructure and Transport (DIT)
Heritage Places Act 1993	A permit would be required under Part 5 to excavate or disturb places or remove items from a State Heritage Place.	Following Project consent and prior to the commencement of work	Department for Environment and Water (DEW)
Marine Parks Act 2007	Renewable energy infrastructure (including wind) is permissible within the General Managed Use Zone and Habitat Protection Zone of the State Marine Park, and not allowed within the Sanctuary Zone or Restricted Access Zone as it is deemed inconsistent with the definition of the zone. However, under Section 19 of the Marine Parks Act, the Minister for Environment and Water may grant a permit for an activity that would otherwise be prohibited or restricted in a zone on a case-by-case basis. It is likely that a permit would be required under Section 19 of the Marine Parks Act for carrying out works (construction) in a Marine Park Zone.	Following Project consent and prior to the commencement of work	Department for Environment and Water (DEW)
Native Vegetation Act 1991	Approval would be required under the Native Vegetation Regulations 2017 for the clearance of native vegetation in relation to the Project. The clearance activity may also be subject to a further risk assessment and require the delivery of a Significant Environmental Benefit (SEB) offset	Following Project consent and prior to the commencement of work	Native Vegetation Council (NVC)

6 Matters and impacts

6.1 Methodology

A Preliminary Environmental Risk Screening (Appendix A) was undertaken to provide a high-level risk assessment of relevant land, planning and environmental aspects, including the risk of impact to existing ports and harbours, aircrafts, radars, shipping and navigation, traffic and transport and others.

The current assessment of potential impacts on all aspects for the construction, O&M and decommissioning phases has been completed using a high level assessment of desktop sources. The assessment is primarily based on the information from the SA Online mapping service (i.e. Location SA Map Viewer).

During the future scoping and assessment phases, site investigations will be completed and an appropriate impact assessment in will be carried out. A precautionary approach to risk evaluation has been applied until further studies are carried out.

Further, in conducting the risk screening, different criteria and sources were relied upon including Risk Framework (attachment to Appendix A).

Two investigation areas, the Project Area (Figures 1A and 1B) and a Study Area, as defined in section 1.2.1 above, were assessed to ensure a holistic approach of the Project's location, regional context and potential risks.

From this preliminary screening, aspects shown in Table 4 were deemed to be key aspects for further investigation on the basis that they have the potential, in the absence of appropriate mitigation measures, to have a significant impact ('medium and above' inherent risk rating) on the environment. These are discussed in more details in Section 6.2.

According to Table 4, most of the impacts are identified during construction phase, however, these impacts are expected to be short term as construction is expected to take approximately 24 months. Best practice and bespoke mitigation measures would be explored through design development to minimise impacts.

Table 4: Key risks for further investigation

Key Aspect	Project phase
Aboriginal heritage (including underwater heritage)	Construction, Operation
Ecology - benthic, marine, ornithology and terrestrial	Construction, Operation
Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Construction
Hydrology, flooding and water quality	Construction, Operation, Decommissioning
Land use	Construction
Landscape, seascape and visual	Construction, Operation
Noise and vibration	Construction, Operation, Decommissioning

Key Aspect	Project phase
Ports and harbours	Construction, Decommissioning
Socio-economic	Construction, Operation, Decommissioning
Traffic and transport (onshore)	Construction, Decommissioning
Waste and resource	Decommissioning

The potential impacts and management of other less significant ('low and below' risk rating) aspects that require a more detailed assessment within an EIS as the Project progresses, as well as possible mitigation measures that could be applied to minimise impact are discussed in Section 6.4.

6.2 Assessment of key aspects

6.2.1 Ecology – benthic and marine (Construction-Operation-Decommissioning)

The term marine environment is defined in the Preliminary Marine Environment Assessment Report (BMT, 2021) as marine waters up to the Highest Astronomical Tide (HAT) boundary. BMT has used a 5 km buffer around the Project Area to form the Study area for assessment within the Preliminary Marine Environment Assessment Report (Appendix B). This Report has identified a number of values associated with the marine environment, including:

- Potential presence of the EPBC Act listed endangered threatened ecological community (TEC) Giant Kelp Marine Forests of South East Australia
- A rich diversity of benthic habitats, including reef, seagrass meadows and macroalgae forests, which support a high number of marine fauna species. Seagrass and macroalgae forests are also considered protected vegetation under South Australia's *Native Vegetation Act 1991*
- A number of EPBC Act listed Critically Endangered and Endangered marine species, including seabirds, shorebirds, whales, turtles, etc.
- Foraging habitat for a number of EPBC Act listed vulnerable and migratory marine species, including shorebirds, shorebirds, whales, turtles, dolphins etc.
- Important habitat to life cycle functions (reproduction, migration) of commercially important species, such as rock lobster and abalone
- The Project is located within the Habitat Protection Zone of a State Marine Park.

The following potentially significant impacts (depending on design, timing and other mitigation measures that can be applied) have been identified for the Project according to the BMT Report (2021):

- Matters of National Environmental Significance:
    - Reduced occupancy area for a number of Critically Endangered and Endangered threatened species, including seabirds (albatross and petrel),

whales (blue and southern right), turtles (loggerhead and leathery) and the Australia sea lion as a result of project hazards (i.e., underwater noise, bird strike during wind turbine operation, light pollution)

- Modify or decrease habitat of the orange-bellied parrot (Critically Endangered).

- State Matters:
  - Reduced habitat or biodiversity values of a State Marine Park with impacts to the benthic environment (seagrass, reef or macroalgae)
  - Potential permanent loss of small areas of protected native vegetation, with the placement of infrastructure within areas of benthic habitat that contain seagrass meadows and macroalgae forests.

Additional investigations, including field surveys will be required to assess and confirm these values and potential impacts identified through the desktop assessment. Further information about the existing environment, potential impacts and future assessment for different marine aspects are discussed in the sections below.

6.2.1.1 State Benthic and Marine features

Existing environment

Based on desktop searches there are nine listed marine species under South Australian *National Parks and Wildlife Act 1972* (NPW Act) known or likely to occur within the Study Area. These include five whale species, three turtle species and Australian Sea Lion (*Neophoca cinerea*).

There are eight species listed under the *Fisheries Management Act 2007* that may be present in the Study Area. These include the Southern Rock Lobster and Abalone. The Project sits within areas significant to the Southern Rock Lobster (*Jasus edwardsii*) population. The Study Area is also part of the southern zone of the South Australia Abalone Fishery. There are up to twenty-six species of seadragon and pipefish known to occur within the region.

The EPBC Act listed TEC Giant Kelp Marine Forests of South East Australia has the potential to occur within the eastern section of the Study Area, around Cape Jaffa. The reef within the Study Area supports the western extent of giant kelp and bulk kelp, which are both EPBC listed. Further site surveys will be required to confirm their presence.

Broad-scale Seamap Australia benthic habitat mapping identifies almost half of the Study Area as low-profile reef with macroalgae. Areas outside the site but within the Study Area contain a mosaic of seagrass meadows, reefs (notably Margaret Brock and North Reefs) and unconsolidated substrate. The reefs within the Study Area support the most western extent of giant kelp (*Macrocystis angustifolia*) and bull kelp (*Durvillea potatorum*) (PIRSA 2005). These kelp areas may be classified as the Giant Kelp Marine Forests of South East Australia TEC, however, further ground-truthing will be required to confirm whether their

characteristics and habitat meet the TEC criteria. Refer to Figure 8 for the benthic habitat map (BMT 2021).

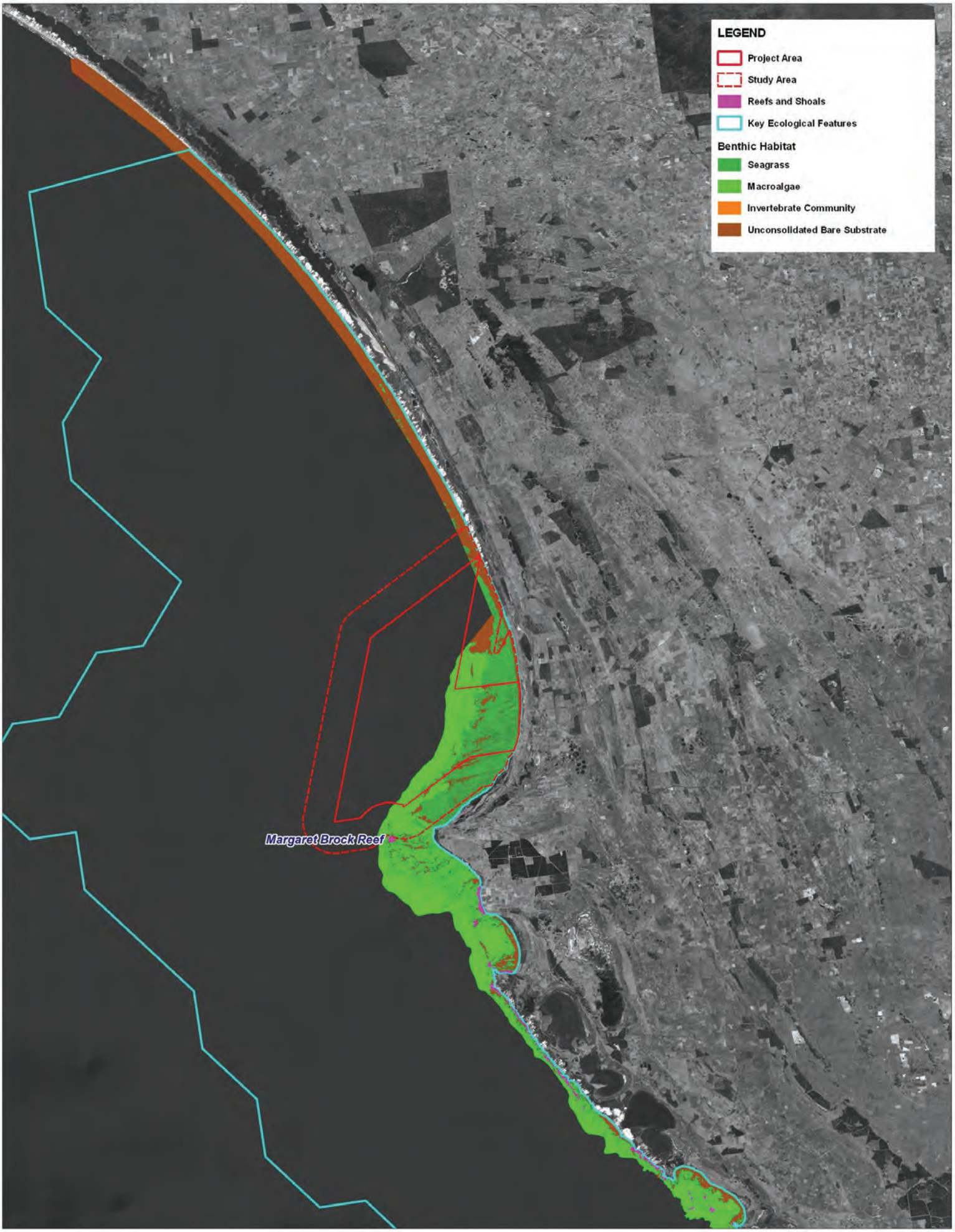
Potential impacts

During operational phase, the Project works will potentially intersect with marine species habitat, migration routes and feeding areas. The turbine structures may impact migration patterns and feeding grounds, resulting in habitat displacement and altered movement patterns. The residual risk rating at operational phase is considered Medium if all possible mitigation measures are undertaken.

During construction and decommissioning phase, works are not expected to impact on groundwater or perched aquifers where benthic fauna occurs. A low residual risk rating at construction and decommissioning stage is precautionary until further assessment of local groundwater systems is carried out and decommissioning methods are further developed. Other construction and decommissioning activities may impact benthic and marine wildlife; however, the effects are likely to be temporary.

Further assessment

Marine studies and surveys are required during EIS to collect baseline data and characterise existing conditions, confirm the species present in the Project Area and within the regions of known habitat. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables.



Title:

Protected Areas
Benthic Habitat

Figure: 4-3

Rev: B

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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6.2.1.2 State-listed Migratory Birds

Existing environment

There are potentially twenty-eight bird species (not all migratory) of SA listed threatened species known or likely within/surround the Project Area including areas of work such as the Black Range substation (Option 1), Reedy-Ck-Lucindale Rd (Option 2) and the potential corridors for transmission lines from the Black Range Substation to the South East Substation.

There are nine migratory bird species in the Project Area that are listed on the NPW Act. There are also threatened NPW Act listed non-migratory populations known to occur within the area. There is potential for migratory birds that utilise the East Asian-Australasian Flyway to be present in the Project Area during the southern hemisphere summer period.

The Coorong and Lakes Alexandrina and Albert Wetlands System (Ramsar wetland), are adjacent to the marine boundary 20 km west of the land-based section of the Project Area. While the boundary does not directly intersect this region, there are several wetland features that continue along the coast that intersect with regions that are likely to be inhabited by the same species that would be present within the Ramsar site.

The inland environment consists of an ephemeral wetland network which provide habitat to several species requiring freshwater habitats for foraging and breeding. Some of these high environmental values include parts of the southern extent of the Watervalley Wetlands. There is potential for the powerline corridor (Black range and Reedy Ck-Lucindale Rd) to clear, fragment and interrupt existing habitat associated with the wetlands. In addition, the existing corridor that heads south to the southeast substation may require widening and may impact a number of forestry, conservation and protected area.

Potential impacts

It is unlikely that construction activities would interact with any threatened and/or migratory birds; however further assessment is required to plan for placement of offshore and onshore infrastructure. Marine birds may also be exposed to noise impacts from piling when diving.

During operational phase, the Project Area is likely to be traversed by migratory bird species, including species listed under the EPBC Act. There is risk of birds colliding with WTG rotors, resulting in injury or death. Birds may also avoid areas near the rotors, resulting in habitat displacement and altered movement patterns. At most risk are large pelagic seabirds, which feed in offshore waters and, being slow fliers, may be unable to evade the moving rotors. As the WTGs will be located offshore, the Project will avoid nearshore areas commonly frequented by shorebirds. A medium residual risk rating is expected for impacts to migratory birds during operation.

During decommissioning phase, it is unlikely that the activities would interact with any threatened and/or migratory birds. Decommissioning is not expected to substantially modify or fragment species distribution, result in increased invasive species or seriously disrupt the lifecycle. A low residual risk rating at the

construction and decommissioning stage is expected given all mitigation measures are implemented.

Further assessment

Further studies and surveys are required to collect baseline data and characterise existing conditions, confirm the species present on site and within the regions of known habitat. Particular focus will be given to WTG tower height and flight paths of critically endangered or threatened birds and their relative movement patterns. If smaller areas within the Project Area are found to contain habitat for terrestrial fauna, these areas may be avoided.

Additional controls during works may be required such as the seasonality of work as to not disturb nesting and or foraging behaviour of some of these species if the areas of habitat cannot be avoided.

6.2.1.3 EPBC listed threatened species and ecological communities

Existing environment

There are 10 EPBC listed threatened marine species known or likely to occur within the Project Area. These include five whale species, Australian Sea Lion (*Neophoca cinerea*), Loggerhead Turtle (*Caretta caretta*), Green Turtle (*Chelonia mydas*), Leatherback Turtle (*Dermochelys coriacea*) and White Shark (*Carcharodon carcharias*). There are also two seadragon species listed under the EPBC Act as 'marine' species, leafy seadragon (*Phycodurus eques*) and weedy seadragon (*Phyllopteryx taeniolatus*) known to occur within the region.

There are eight EPBC Act listed threatened seabird and shorebird species also known or likely to occur within the Project Area. These include Soft-plumaged Petrel (*Pterodroma mollis),* Fairy Prion (*Pachyptila turtur subantarctica*), Northern Siberian Bar-tailed Godwit (*Limosa lapponica menzbieri*), Australasian Bittern (*Botaurus poiciloptilus*), Australian Painted Snipe (Rostratula australis), Australian Fairy Tern (*Sternula nereis nereis*) and Easter Hooded Plover (*Thinornis cucullatus cucullatus*).

Orange-bellied Parrot (*Neophema chrysogaster*) is also identified as known or likely to occur in the Study Area. This species is a terrestrial bird; however, it breeds in south-west Tasmania from November to March, then travels to mainland Australia in winter. Due to this migration, consideration of coastal environments and marine impacts for this species will be important in the impact assessment.

The EPBC listed threatened ecological community (TEC) Giant Kelp Marine Forests of South East Australia has the potential to occur within the eastern section of the Study Area, around Cape Jaffa. Commonwealth mapping of the likely extent of this TEC identifies an area to the eastern end of the Study Area as 'maybe occurring'. Benthic habitat mapping shows approximately 170 km^2 of macroalgae exists within the Study Area, which may meet the criteria for the TEC (BMT 2021). Site surveys will be required to confirm the area of TEC potentially impacted by the Project.

Potential impacts

There is the potential for the TEC Giant Kelp Marine Forests of South East Australia to occur within the Project Area. Further site investigations are required to determine if this ecological community occurs and if so, whether it may be disturbed. It is most likely to occur around the Margaret Brock Reef area where conditions are most suited to the presence of giant kelp. Currently no WTGs are planned in this location.

Margaret Brock Reef is at the further western range of the TEC and forms only a small area of the total extent of the community. Provided WTGs and cabling can avoid direct disturbance to habitat likely to support the TEC, the action is unlikely to have a significant impact to this TEC (BMT 2021).

The Project Area potentially intersects with marine species habitat, migration routes and feeding areas. The turbine structures may impact migration patterns and feeding grounds, resulting in habitat displacement and altered movement patterns.

There is risk of birds colliding with WTG rotors, resulting in injury or death. Birds may also avoid areas near the rotors, resulting in habitat displacement and altered movement patterns.

The impact to threatened species is considered to be a significant impact under the EPBC criteria because the Project is likely to modify, destroy, fragment, isolate or disturb important areas of habitat that would have an adverse impact on the marine ecosystem functioning. Decommissioning may also impact new communities that have formed around the base of the WTGs and along the underground cable networks in the seabed.

Further assessment

Further studies and surveys are required to collect baseline data and characterise existing conditions, confirm presence of any threatened species and/or habitat that may support listed communities or species on site and within the regions of known habitat. Particular focus will be given to WTG tower height and flight paths of critically endangered or threatened birds and their relative movement patterns. If smaller areas within the Project Area are found to contain habitat for terrestrial fauna, these areas may be avoided.

Additional controls during works may be required such as the seasonality of work as to not disturb nesting and or foraging behaviour of some of these species if the areas of habitat cannot be avoided.

6.2.1.4 EPBC Act migratory species and marine species

Existing environment

There are thirteen EPBC Act listed threatened Marine species known or likely to occur within the Project Area. These include six whale species, three turtle species, Dusky Dolphin, Porbeagle and White Shark. There are also two seadragon species listed under the EPBC Act as ‘marine’ species, leafy seadragon

(*Phycodurus eques*) and weedy seadragon (*Phyllopteryx taeniolatus*) known to occur within the region.

Potential impacts

During the construction and decommissioning phases, impacts are is considered to be significant under the EPBC Act criteria because the Project is likely to modify, destroy, fragment, isolate or disturb important areas of habitat that would have an adverse impact on the marine ecosystem functioning. The inherent risk rating for construction and decommissioning is considered 'medium'.

During operational phase, the Project Area potentially intersects with marine species habitat, migration routes and feeding areas. The turbine structures may impact migration patterns and feeding grounds, resulting in habitat displacement and altered movement patterns. The inherent risk rating at this stage is considered 'very high' due to significant impact to the migratory birds from turbine movement. If appropriate mitigation measures are implemented, the risk could be reduced to a high-risk rating.

Further assessment

Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables.

6.2.1.5 EPBC Act Commonwealth marine environment

Existing environment

The Commonwealth marine area commences three nautical miles (defined as three nautical miles from Lowest Astronomical Tide (LAT) under the *Seas and Submerged Lands Act 1973*) from the coastline, also known as the Territorial Sea Baseline (TSB).

The nearest Commonwealth Marine Park is the Murray Marine Park, located approximately 60 km west of the Study Area. The marine park stretches from the mouth of the Murray River to 400 km south of the coastline across the continental slope and deeper water ecosystems and provides a foraging habitat for seabirds and blue whales.

A large portion of the South Australia coastline, including the Study Area, falls within the Bonney Coast Upwelling. This upwelling is listed by the Commonwealth as a Key Ecological Feature, which while not a MNES in its own right, forms a component of the Commonwealth Marine area MNES. The Bonney Coast Upwelling is a highly productive area, providing important habitat to a wide range of species, including an important feeding area for blue whales, seabirds, penguins, pinnipeds and fish (BMT 2021).

Potential impacts

At present, no direct physical disturbance of the Commonwealth marine area is proposed. However, indirect impacts may potentially occur, such as reduction in water quality or the generation of underwater noise extending beyond state waters (BMT 2021).

The operation of the Project is likely to have impact on Commonwealth Marine Areas and associated industries such as fisheries. Although works do not take place in Commonwealth waters, there is potential for indirect impacts to waters, as a result of spills, cable laying (or removal), piling activity and the introduction of pest species or changes to hydrodynamics. The inherent risk rating is considered High for the construction and operation phase of the Project due to the potential indirect impact on the Commonwealth Marine Areas.

Further assessment

Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables.

Once studies have been completed, further design consideration can be given to the proposed turbine locations to avoid areas of high ecological value.

6.2.2 Ecology - terrestrial (Construction-Operation-Decommissioning)

Existing environment

The Coorong and Lakes Alexandrina and Albert Wetlands System (Ramsar wetland), are adjacent to the marine boundary 20 km west of the land-based section of the Project Area (Figure 2A and 2B). While the boundary does not directly intersect this region, there are several wetland features that continue along the coast that intersect with regions that are likely to be inhabited by the same species that would be present within the Ramsar site.

The inland environment of the Ramsar wetland consists of ephemeral networks which provide habitat to several species requiring freshwater habitats for foraging and breeding. Some of these high environmental values include parts of the southern extend of the Watervalley Wetlands.

There are two TECs potentially present within the Project Area as shown in Table 5.

Table 5: Potential impacts to TECs known to, or likely to occur within the Project Area

TEC	Status	Potential Significance Impacts	Project Region
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	Black Range Connection (Option 1) Reedy Creek – Lucindale (Option 2)
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critical Endangered	Community likely to occur within area	Black Range Connection (Option 1) South East transmission corridor

Based on a search of the PMST, there are potentially 35 EPBC Act listed threatened flora and fauna species within the new connection Black Range substation (Option 1) that are likely and/or are known in the Project Area. In addition, there are 37 EPBC listed threatened species known or likely within/surround the Project Area including areas of work such as the Black Range substation (Option 1), Reedy Ck- Lucindale Rd (Option 2) and the potential corridors for transmission lines from the Black Range Substation to the South East substation.

Based on a search of the SA NatureMaps database conducted on 15 February 2021, there are historical records of 25 flora and 35 fauna threatened species listed under the NPW Act located within the Project Area.

Table 6 listed the EPBC species potentially occur within the Project Area following the PMST searches conducted on 15 February 2021 (Appendix C).

Table 6: Listed EPBC species (terrestrial) within the Project Area (PMST search, 2021)

Scientific Name	Common Name	EPBC Act Status	Type of presence within the Project Area	Option 1: Black Range Connection	Option 2: Reedy Creek-Lucindale Connection	South East Transmission Corridor
Mammals						
Antechinus minimus maritimus	Swamp Antechinus	Vulnerable	Species or species habitat may occur within area	x	x	x
Isoodon obesulus	Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern)	Endangered	Species or species habitat likely to occur within area	x	x	x
Miniopterus orianae bassanii	Southern Bent-wing Bat	Endangered	Species or species habitat likely to occur within area	x	x	x
Potorous tridactylus	Long-nosed Potoroo (SE Mainland)	Vulnerable	Species or species habitat likely to occur within area			x
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Foraging, feeding or related behaviour may occur within area	x	x	x
Frogs						
Litoria raniformis	Growling grass frog, Southern Bell frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog	Vulnerable	Species or species habitat known to occur within area	x	x	x
Fish						
Galaxiella pusilla	Eastern Dwarf Galaxias, Dwarf Galaxias	Vulnerable	Species or species habitat known to occur within area	x	x	x
Reptiles						
Delma impar	Striped legless lizard, Striped snake-lizard	Vulnerable	Species or species habitat likely to occur within area		x	

Scientific Name	Common Name	EPBC Act Status	Type of presence within the Project Area	Option 1: Black Range Connection	Option 2: Reedy Creek-Lucindale Connection	South East Transmission Corridor
Birds						
Calyptorhynchus banksii graptogyne	South-eastern Red-tailed Black-Cockatoo	Endangered	Foraging, feeding or related behaviour known to occur within area	x	x	
Falco hypoleucos	Grey Falcon	Vulnerable	Species or species habitat likely to occur within area	x	x	
Grantiella picta	Painted Honeyeater	Vulnerable	Species or species habitat likely to occur within area	x	x	
Hirundapus caudacutus	White-throated Needletail	Vulnerable, Migratory Terrestrial Species	Species or species habitat likely to occur within area	x	x	x
Lathamus discolor	Swift Parrot	Critically Endangered	Species or species habitat may occur within area	x	x	
Leipoa ocellata	Malleefowl	Vulnerable	Species or species habitat known to occur within area	x	x	
Pedionomus torquatus	Plains-wanderer	Critically Endangered	Species or species habitat may occur within area	x	x	
Pezoporus occidentalis	Night Parrot	Endangered	Extinct within area	x	x	
Motacilla cinerea	Grey Wagtail	Migratory Terrestrial Species	Species or species habitat may occur within area	x	x	
Motacilla flava	Yellow Wagtail	Migratory Terrestrial Species	Species or species habitat may occur within area	x	x	x

Scientific Name	Common Name	EPBC Act Status	Type of presence within the Project Area	Option 1: Black Range Connection	Option 2: Reedy Creek-Lucindale Connection	South East Transmission Corridor
Myiagra cyanoleuca	Satin Flycatcher	Migratory Terrestrial Species	Species or species habitat known to occur within area	x	x	x
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Migratory Wetlands Species	Species or species habitat likely to occur within area	x	x	
Gallinago megala	Swinhoe's Snipe	Migratory Wetlands Species	Foraging, feeding or related behaviour likely to occur within area	x		
Gallinago stenura	Pin-tailed Snipe	Migratory Wetlands Species	Foraging, feeding or related behaviour likely to occur within area	x		
Numenius minutus	Little Curlew, Little whimbrel	Migratory Wetlands Species	Foraging, feeding or related behaviour likely to occur within area	x		
Tringa nebularia	Common Greenshank, Greenshank	Migratory Wetlands Species	Species or species habitat likely to occur within area	x	x	x
Plants						
Amphibromus fluitans	River swamp wallaby-grass, floating swamp wallaby-grass	Vulnerable	Species or species habitat may occur within area			x
Caladenia colorata	Coloured Spider orchid, Small Western Spider orchid, Painted Spider orchid	Endangered	Species or species habitat may occur within area	x	x	x
Caladenia formosa	Elegant spider orchid, Blood-red spider orchid	Vulnerable	Species or species habitat likely to occur within area			x

Scientific Name	Common Name	EPBC Act Status	Type of presence within the Project Area	Option 1: Black Range Connection	Option 2: Reedy Creek-Lucindale Connection	South East Transmission Corridor
Caladenia tensa	Greencomb Spider orchid, Rigid Spider orchid	Endangered	Species or species habitat likely to occur within area	x	x	x
Caladenia versicolor	Candy Spider orchid	Vulnerable	Species or species habitat may occur within area	x	x	x
Cassinia tegulata	Avenue Cassinia	Critically Endangered	Species or species habitat known to occur within area	x	x	x
Cryptostylis hunteriana	Leafless Tongue-orchid	Vulnerable	Species or species habitat may occur within area			x
Dipodium campanulatum	Bell flower Hyacinth orchid	Endangered	Species or species habitat known to occur within area			x
Dodonaea procumbens	Trailing Hop-bush	Vulnerable	Species or species habitat may occur within area		x	x
Glycine latrobeana	Clover glycine, Purple clover	Vulnerable	Species or species habitat known to occur within area	x	x	x
Olearia pannosa subsp. pannosa	Silver daisy-bush, silver-leaved daisy, Velvet daisy-bush	Vulnerable	Species or species habitat known to occur within area	x		x
Pomaderris halmaturina subsp. halmaturina	Kangaroo Island Pomaderris	Vulnerable	Species or species habitat known to occur within area		x	
Prasophyllum spicatum	Dense leek orchid	Vulnerable	Species or species habitat likely to occur within area			x
Prasophyllum validum	Sturdy Leek orchid, Mount Remarkable Leek orchid	Vulnerable	Species or species habitat likely to occur within area		x	
Pterostylis arenicola	Sandhill greenhood orchid	Vulnerable	Species or species habitat likely to occur within area	x		
Pterostylis chlorogramma	Green-striped greenhood	Vulnerable	Species or species habitat likely to occur within area		x	x

Scientific Name	Common Name	EPBC Act Status	Type of presence within the Project Area	Option 1: Black Range Connection	Option 2: Reedy Creek-Lucindale Connection	South East Transmission Corridor
Pterostylis cucullata	Leafy greenhood	Vulnerable	Species or species habitat may occur within area	x	x	
Senecio psilocarpus	Swamp fireweed, smooth-fruited groundsel	Vulnerable	Species or species habitat likely to occur within area	x	x	x
Thelymitra epipactoides	Metallic sun-orchid	Endangered	Species or species habitat known to occur within area	x	x	x
Thelymitra matthewsii	Spiral sun-orchid	Vulnerable	Species or species habitat may occur within area	x	x	x
Xerochrysum palustre	Swamp Everlasting, Swamp Paper Daisy	Vulnerable	Species or species habitat likely to occur within area			x

Landfall

The land fall section of the Project Area extends 2 km south and about 9 km north of Kingston SE. The area includes the coastal stretches of Long Beach and south past the Blackford Drain, Ross Creek (Kingston Main Drain) to the Kingston Gulf course. The land fall region then extends inland about a 1 km in from the Princess Highway.

Based on the SA Vegetation types on NatureMaps, the vegetation community types include Coastal shrubland, Tall Shrublands and tall Sedgelands. Intact vegetation is scattered in amongst residential, urban development and historic clearing. To the north of this region includes Teilaka and Partari lakes and the southern tip of Paranki Lagoon Conservation Park.

Option 1: New Black Range Connection

Inland into the new corridor region the vegetation communities consisting of:

- Low woodland
- Tussock grassland
- Melaleuca forest and woodland
- Melalecua shrubland >1m
- Allocasuarina low woodland
- Melaleuca tall shrubland/Gahnia sedge
- Samphire shrubland
- Eucalyptus mallee forest and mallee woodland
- Eucalyptus forest and woodland
- Fernland/herbland.

Option 2: New Reedy Creek- Lucindale Rd Connection

Inland into the new corridor region the vegetation communities consisting of:

- Tussock grassland
- Melaleuca forest and woodland
- Melalecua shrubland >1m
- Allocasuarina low woodland
- Melaleuca tall shrubland/Gahnia sedge
- Samphire shrubland
- Eucalyptus mallee forest and mallee woodland
- Eucalyptus forest and woodland
- Fernland/herbland.

The Reedy Creek – Lucindale Rd alignment has approximately 11 km of Roadside Significant Sites that contain long sections of native and intact vegetation.

Potential impacts

There is potential for the powerline corridor (Black Range and Reedy Ck-Lucindale Rd) to clear, fragment and interrupt existing habitat associated with the wetlands. In addition, the existing corridor that heads south to the south east substation may require widening and may impact a number of forestry, conservation and protected areas.

It is unlikely that construction activities would interact with any threatened and/or migratory birds however further assessment is required to plan for placement of offshore and onshore infrastructure. The residual risk rating for construction impacts to EPBC Act and state listed terrestrial species are considered low.

The Project Area is likely to be traversed by migratory bird species, including species listed under the EPBC Act. There is risk of birds colliding with WTG rotors, resulting in injury or death. Birds may also avoid areas near the rotors, resulting in habitat displacement and altered movement patterns.

Once the windfarm is operational a few impacted risks remain including with the collision/ entanglement risk with powerlines, maintenance clearing and bush fire risk. Additional terrestrial dominated EPBC listed species are also present from the coastal reaches of the site inland. A number of these migratory bird species may move out along the coast as they migrate before coming inland. The WTGs may interfere with migratory paths and behaviour. The risk rating for impacts to Commonwealth listed species and their habitat at operational phase is considered High.

Decommissioning is not expected to substantially modify or fragment species distribution, result in increased invasive species or seriously disrupt their lifecycle. Decommissioning works are not expected to have a large impact on terrestrial species. A residual Low risk rating is precautionary until further assessments on decommissioning methods are developed.

Further assessment

Additional survey effort is required to confirm the vegetation communities, habitats and species present likely on site and within the regions of known habitat. Further terrestrial and marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to locations of turbine platforms and cables, the transmission line corridor, any additional substations and WTG tower height and flight paths of critically endangered or threatened birds and their relative movement patterns.

6.2.3 Aboriginal heritage (include underwater heritage) (Construction-Operation-Decommissioning)

Existing environment

Prior to European settlement, Coorong was one of the most densely populated areas in Australia, with the Traditional Owners, the Meintangk people, who were members of the Ngarrindjeri people having lived there for thousands of years. The Coorong remains an intrinsic part of their culture, spirituality and identity. The Project site is within the area of a Native Title claim by First Nations of the South East #1 (SAD211/2017), which covers all land within the Project Area to a point 500 m seaward of the Mean Low Water Mark and the Ngarrindjeri and Others Native Title Claim (SAD6027/1998) which covers the Coorong and Kingston SE district area. Culturally sensitive landforms or intangible heritage sites are also likely to present within the Project Area.

Potential impacts

During construction, it is possible that known or previously unrecorded Aboriginal cultural heritage sites could be encountered and construction works potentially impact on their heritage values. While the Project infrastructure would be located to avoid impacts as much as practicable (by utilising previously disturbed land and existing infrastructure easements and corridors where possible), some disturbance to Aboriginal cultural heritage sites could be required. This will be further examined and determined as the Project progresses, with the avoid, minimise, mitigate, offset hierarchy applied during design development. The risk rating for the construction stage is considered to be ‘moderate’ due to the possibility of impacting on unrecorded Aboriginal cultural heritage sites.

It is not likely Aboriginal sites and objects would be affected during operation and decommissioning stages as all ground disturbance activities would have occurred during site establishment and construction work. Therefore, the risk rating for Aboriginal heritage at operation and decommissioning stage is considered ‘low’.

Culturally sensitive landforms or intangible heritage sites within the Project Area could potentially be impacted by Project works during construction and operation. Desktop assessments have not been able to identify culturally sensitive sites and consultation with Aboriginal representatives is required. If present, there is a risk that construction activities could temporarily restrict access to some culturally sensitive sites.

If the Project footprint interferes with culturally sensitive landforms, decommissioning activities will also continue to disrupt the connection to land. Project infrastructure would utilise previously disturbed land where possible and avoid impacts to sensitive landforms and intangible heritage. The risk rating for all stages to culturally sensitive landforms is considered ‘moderate’ due to the possibility of impacting on culturally sensitive landforms during pre-construction, construction, operation maintenance and decommissioning works, resulting in long-term loss of connection to the land.

Further assessment

A more detailed Aboriginal heritage assessment and cultural heritage engagement program would be undertaken for the EIS to understand any archaeological and cultural heritage constraints at the site to avoid or minimise impacts on heritage values. This would include:

- Engagement and site walkovers with Native Title claimants and local Aboriginal groups to confirm known and intangible cultural heritage values within the construction footprint and Project Areas. Design would avoid and minimise impacts to sites of cultural significance where practicable.
- A Cultural Heritage Management Plan (CHMP) will be prepared in consultation with relevant Aboriginal parties to outline measures for the management and protection of Aboriginal heritage sites through all stages of the Project and would include an unexpected finds procedure. Mitigation, such as salvage prior to works on-site, may be carried out for impact to areas containing large artefact scatters.

6.2.4 Land use (Construction)

Existing environment

The onshore section of the Project Area covers approximately 1,800 km^2 and intersects various land uses zoned by the Kingston District Council. Outside of the Town of Rosetown and Kingston SE, the majority of the Project Area is within a Rural Zone, with small pockets of Conservation Zone, namely along the coastline. The construction of the Project (namely ancillary sites) would be inconsistent with these planning zones. Refer to Figure 9 for the zoning map (BMT 2021).

Currently, a wide corridor is being investigated for the landfall site and onshore transmission infrastructure, with final locations to be determined during design development, and subject to further technical and environmental studies, and discussions with Project stakeholders. The landfall site would be located landward of the mean high-water mark (MHWM) on land suitable to accommodate an underground joint pit. The transmission infrastructure is anticipated to be predominately above ground. Existing electricity easements and other infrastructure corridors would be utilised as much as practicable to minimise impact. Onshore ancillary infrastructure associated with the Project includes operation and maintenance facilities comprising a control room, site offices, storage facilities, and personnel facilities. These will be sited remote to the Project Area. Key construction activities would be carried out within State waters, including the transport of monopile foundations by supply vessels, piling works, and seabed excavation for installation of offshore cables.

Potential impacts

The pre-construction and construction works are assessed as having a high-risk rating due to potential impacts to existing and potential future residential, recreational, commercial and industrial land uses within the area. This is a precautionary risk rating.

For onshore construction, acquisition of freehold land is unknown and impacts to property acquisition or tenure of land or waters during construction is of moderate risk rating. This is a precautionary risk rating at this stage.

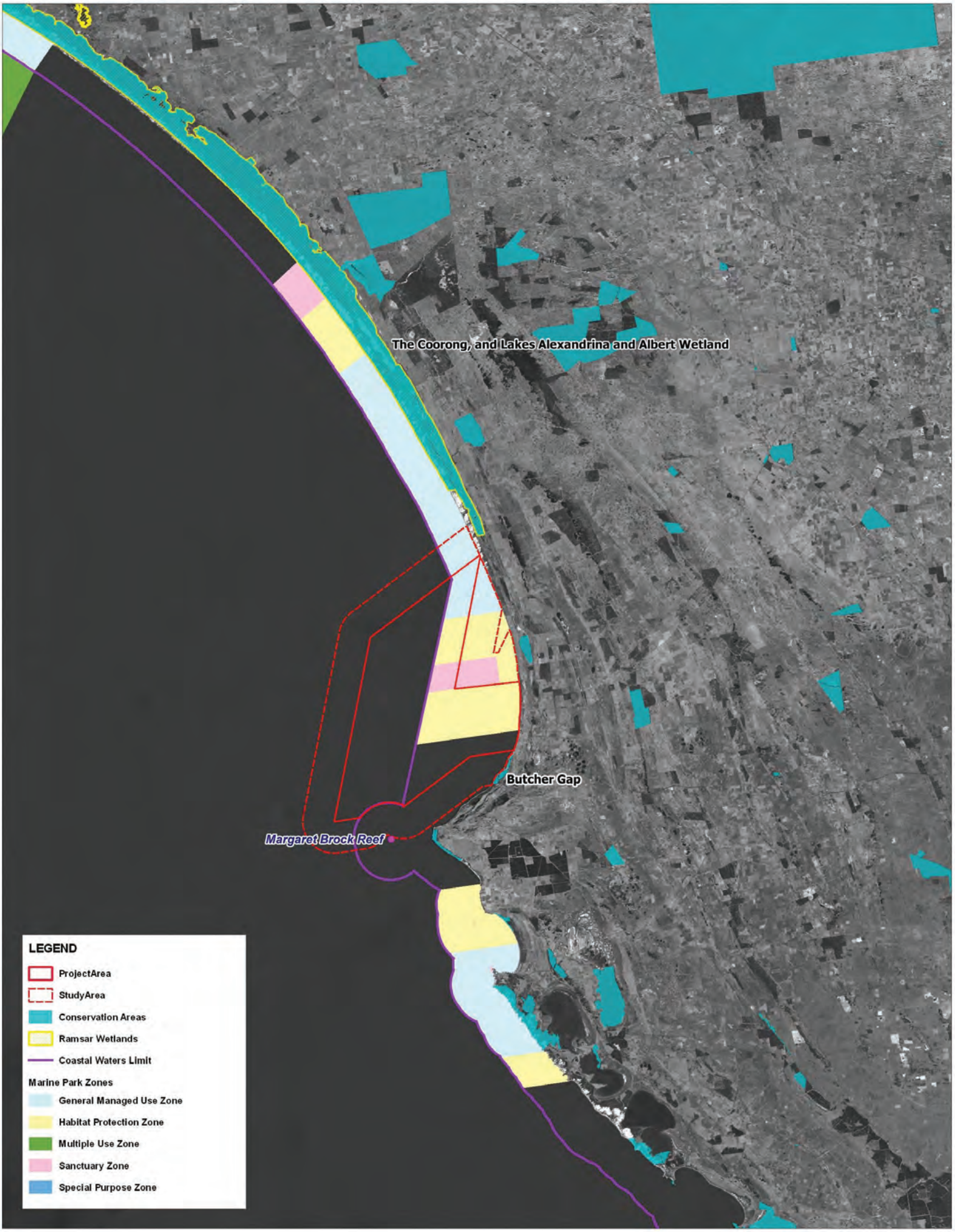
Changes to land use and any acquisition or tenure changes would occur during pre-construction and construction, and as such there would be no further land use impacts during operation or decommissioning.

As the design of the Project progresses the Project Area will be further refined to exclude/avoid residential areas.

Further assessment

The suitability of the site and the impact on strategic land values would be further considered in the EIS stage. Further assessment will identify specific impacts and in particular, any property acquisition or easements required as part of the pre-construction phases of the Project. Further design development will aim to reduce land use impacts by refining the Project Area and construction boundary to avoid sensitive land uses. Consultation with local council will take place during detailed design, to ensure impacts are managed and appropriate consideration is given to future developments planned in the area. Management measures will be included in the CEMP, including ancillary sites to be rehabilitated to their pre-construction condition.

Further consultation with relevant government agencies will determine key risks and impacts to acquiring access to the water for offshore construction. The Project will be developed in accordance with the Coastal Adaptation Strategy that applies to the Project Area.



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6.2.5 Landscape, Seascape and Visual (Construction-Operation-Decommissioning)

Existing environment

Although onshore infrastructure will be located adjacent to some existing infrastructure, the offshore WTGs will create a permanent change to the landscape and seascape character and visual amenity of Kingston SE. The natural landscape of Kingston District Council, being a major recreational (e.g. fishing) and recreation and tourism node (winemaking), is expected to be highly valued by the local, regional and state community. The WTGs and construction equipment will likely form a noticeable feature on the landscape and seascape that is currently untouched oceans views. The landscape and seascape character of the surrounding area is expected to hold ecological, scientific and social significance to the community.

Potential impacts

The site was selected being of the lower population density of the area, to reduce potential impacts as much as possible. The WTGs have been indicatively placed as far off the coast as possible to reduce seascape and visual impacts. Decommissioning would have similar impacts to those identified during construction. Potential impacts to landform are considered to be significant throughout construction, operation and decommissioning, therefore it is considered high risk. However, potential impacts to landscape, seascape and visual amenity associated with construction and decommissioning phase are considered to be of a temporary nature, while impacts throughout operation phase are of permanent nature due to the expected long duration of the project lifespan (up to approximately 60 years in operation).

Further assessment

Further seascape, landscape and visual assessments will be carried out at the EIS stage to understand the magnitude of change for landscape and seascape character and impact to visual amenity at various viewpoints along the coastline and residential areas. This would be done in consultation with community and key stakeholders. Landscaping and revegetation would be used where practicable to minimise onshore impacts.

6.2.6 Marine geology, oceanography and physical processes (Construction-Operation-Decommissioning)

Existing environment

At this coastal location, tides and tidal currents, waves, wave-driven currents, and wave current interaction would determine the driving condition for sediment movement. The Coorong Region is classified as microtidal with a tidal range of 0.7 m from lowest to highest astronomical tide. Tides are predominantly semi-diurnal, with a single tide cycle on most days. The Project may cause changes to coastal and marine processes (such as tides, currents, water flow and wave patterns) and impact on coastal land and assets and the marine environment during the Project's life cycle.

Potential impacts

The installation of temporary marine structures could alter local hydrodynamic processes; however, it is unlikely to be significant in the far-field with only minor and temporary influences related to localised scour in the near field. Decommissioning equipment is unlikely to alter local hydrodynamic processes. Construction/decommissioning equipment is unlikely to change coastal geomorphological processes because of their temporary nature.

During operation, the permanent marine structures (e.g. turbine foundations, array spacing and seabed cable connections) could alter local hydrodynamic processes. These impacts are likely to be associated with localised scour in the immediate vicinity of the structures, and potentially scour around cables could occur if care is not taken to secure adequate protection during and after laying. The presence of the windfarm is unlikely to be significant in the far-field with only small influences in the near field. It is expected that localised scour would be more pronounced during operation due to the permanent nature of turbine structures and cables.

The residual risk rating for marine geology is considered to be a low risk in the operational phase, and a very low risk in the construction and decommissioning phases.

Further assessment

Appropriate computer modelling methods using tidal, wave and sediment modelling scenarios are required to assess hydrodynamic impacts to seafloor habitats and coastal geomorphological processes during all phases of the Project – both in the vicinity of the windfarm and further afield (near shore).

6.2.7 Marine water quality and sediment quality (Construction-Operation-Decommissioning)

Existing environment

Seagrass meadows are a good indicator of water quality. Monitoring of quality of the seagrass meadows within Coorong found a number of drains were impacted by an excess of nutrient runoff (Wear et al 2006). Overall, soluble and total

nutrient levels are relatively low throughout Coorong, with impact on seagrass meadows potentially a result of the recovery time of Posidonia species during episodic high rainfall events. Pressures that may result in increased nutrients within the area include discharge from agricultural drains, urban stormwater and septic tank leakage. Construction/decommissioning activities are likely to increase these levels.

Potential impacts

Modelling will be required to assess turbidity generated by construction and decommissioning activities. Pile driving or dredging to install cabling in clean sands is expected to generate a short-term, low intensity sediment plume. It is likely that the plume would dissipate rapidly and would be unlikely to impact on adjacent light sensitive habitats or impede fauna vision.

Vessels, WTGs and facilities utilise and store a variety of fuels, oils, lubricants and other chemicals. These substances can have lethal and sub-lethal effects to organisms (Yuewen and Adzigbli 2018) and can persist in the environment for long periods of time. An uncontrolled release could occur from (for example) vessel collision, equipment failure, leaks, etc.

If trenching is required there may be significant disturbance to the seabed. Trenching will likely increase turbidity of the water and reduce clarity dependent on the method of trenching deployed. The water quality will be impacted within the immediate region and potentially further afield dependent on the strength of the current movements. The Giant kelp TEC has the potential to occur within the Study Area. This community may become impacted by increased turbidity and have residual effects of smothering in the wider region.

The risk rating for the impacts to marine water and sediment quality during construction, operation and decommissioning is considered moderate due to the possibility of worsening the marine water quality. These would be temporary in nature.

Further assessment

A marine pollution risk assessment will be undertaken at the EIS stage to inform the development of spill management strategies. Standard chemical storage, handling and maintenance procedures will be required. Further studies are also required to understand the benthic substrates. Where possible, construction methodology would look to minimise disturbance of the seabed and apply methods that would minimise the dispersion of sediments. In addition, controls would be in place to limit works if the currents are expected to move sediments outside the Project Area.

6.2.8 Noise and vibration (Construction-Operation-Decommissioning)

Existing environment

Sensitive receptors (onshore) within the Project Area may be sensitive to noise particularly as it is likely the ambient noise level is low given the remoteness of

the coastal area. Site selection was determined due to lower sensitive receptors in the area, and accordingly the Project Area. The area surrounding Kingston SE is largely rural and therefore it is expected that noise impacts may be minimal further afield (i.e. residential housing in Kingston SE).

Recent vessel traffic data (AMSA 2021) shows that vessel traffic is quite low, with boating only limited to recreational fishing and crayfishing in the area, indicating that marine background noise levels are likely to also be low. Port Adelaide is the closest main port, located approximately 300 km to the north west.

Potential impacts

Construction, maintenance and decommissioning of the onshore substation, landfall site and underground cables may cause noise and vibration impacts to nearby onshore sensitive receptors. Some minor noise will be generated by heavy vehicles using haulage routes; however, this is considered to be low risk.

Piling works during construction are likely to be of short duration (expected to be between 40 – 75 days for all WTGs) and sequential. In the marine environment, piling works and trenching during construction may generate underwater noises and vibrations that would elicit a behavioural response in marine species up to several kilometres away (for impulsive and continuous noise). However, piling may need to occur seasonally to reduce interactions with listed threatened species likely to occur in the region. Temporary and permeant hearing loss may be experienced depending on the construction methodology and the proximity of the marine species to the works. Noises from construction vessels will depend on the speed/power of travel, the type, size of vessel and the proximity of the marine species to the noise source. Due to significant imminent impacts to offshore sensitive marine receptors and species, underwater noise and vibration impacts from construction works are considered to be a high risk. Mitigation measures to reduce noise impacts can include seasonal construction windows (vary depending on species), safety zones, pingers, etc.

Operation of the WTGs is likely to generate low frequency underwater noise, however it is expected to be low enough (much lower than piling) that it is unlikely to cause acute impacts to marine fauna. However, the noise and vibration during the operational phase would be more continuous and may cause changes to behaviour of fauna species. The scale of impact is dependent on the size and cumulative noise impact of the WTG array. Given that the Project Area contains important marine species and current background noise levels are likely to be low, the unmitigated risk of underwater noise impacts is high.

Similar to construction, decommissioning activities (i.e. taking the monopiles out of the seabed) will be sequential and of short duration. This may generate noises and vibrations that would elicit a behavioural (or startle) response in marine species up to several kilometres away (for impulsive and continuous generation of noise). However, decommissioning may need to occur seasonally to reduce interactions with listed threatened species likely to occur in the area. Noises from vessels will depend on the speed/power of travel, the type, size of vessel and the proximity of the marine species to the noise source. The unmitigated risk of underwater noise is considered ‘moderate’ for decommissioning.

Further assessment

Further noise modelling and monitoring would identify areas where construction noise and vibration may exceed acceptable levels for sensitive receptors. Onshore mitigation strategies include use of noise suppression devices, noise barriers where appropriate and limiting time frames for noisy works.

Further underwater noise monitoring and modelling for piling and vessel noise would identify risks and potential impacts to marine species. This work would inform stop work distances to be implemented in general accordance with the *Underwater Piling Noise Guidelines* (DPTI 2012) and other internationally best practice guidelines. Relevant mitigation measures would be incorporated into the CEMP/ DEMP including engaging a marine species-spotter to check there are no sensitive species in the work zone before work starts. Any recreational groups or tourism operators would be notified about the construction works before they start. Further, mitigation measures to reduce impacts include seasonal construction windows (vary depending on species), safety zones/lookout, pingers etc. (e.g. SA DTI 2012).

Potential operational impacts shall be assessed against Statutory guidelines and targets for operational noise and vibration and appropriate mitigation strategies would be developed.

6.2.9 Socio-economic (Construction-Operation-Decommissioning)

Existing environment

Construction, operation and decommissioning works are not expected to have an impact on regional or state economic development. There could be employment opportunities for the wider region which would benefit the regional economy. This is a positive risk rating.

Kingston SE is a major recreational node and popular tourist destination along the south coast of South Australia. The beaches at Kingston SE, including Wyomi Beach and Pink Beach are utilised by local residents and tourists for recreational activities such as swimming, kite/wind surfing, surfing, sailing, boating and fishing. The rocky outcrops of the continental shelf are frequently used for recreational rock lobster fishing from November to June each year.

Potential impacts

Although residential displacement and access to community facilities is unlikely to be impacted, the community's access to recreational and open space will be restricted at times during construction or decommissioning. It is understood that the recreational assets of the Project Area are highly valued by the community, as such engagement would be carried out with the community to understand how impacts can be reduced. Construction activities would be staged over the anticipated 24-month construction period, and therefore these impacts to access and community facilities will be temporary and short term.

Recreational activities closer to shore, including swimming, surfing and kitesurfing are not likely to be restricted during construction/decommissioning as the majority of construction works will be undertaken more than 5 km offshore and over short durations. However, boating and fishing closer to WTG locations may be restricted during construction/decommissioning due to safety exclusion zones. This would be temporary and short term and potential impacts to local and regional businesses will be further investigated during the EIS. Construction works and operation of the Project could attract people to the local region for work and tourism and therefore could contribute positively to the local economy of the area.

There will be no residential displacement during operation and maintenance. There may be some disruption to access for locals and tourism during maintenance works. Although these maintenance impacts would occur over a short and limited duration, it has the potential to impact on recreational and commercial fisheries.

Other social and economic risk and impacts have been discussed in other sections.

Further assessment

Consultation with Department for Primary Industries and Resources South Australia (PIRSA) is required to understand the importance of the Project Area to the Southern Rock Lobster and how the construction of wind towers might affect the population, as well as any compensation might be required if access is impacted.

Further, a Stakeholder and Community Engagement Plan will be developed for all phases of the Project. Consultation would occur with the community regarding construction activities that may cause impacts to access to community facilities, residential areas, recreational activities and public open space. The environmental assessment at EIS stage would further identify and address community perception of the Project and determine the predicted impacts based on existing conditions. Where potential impacts are identified, methods to avoid, manage or mitigate these impacts would be incorporated into a Project CEMP, OEMP and DEMP. Further stages of design will consider staging construction to avoid the peak fishing season (e.g. November - June) where feasible. Where usual accesses are impeded, an alternate access route will be provided if it is safe to do so.

6.2.10 Human health, Hazards and risks (Construction)

Existing environment

Electro-magnetic fields (EMF) are produced wherever electricity is used or transmitted. The project cables, substations and transmission lines will generate EMF as part of a power project. While there is no established evidence that exposure to EMF from power lines, substations, transformers or other electrical sources, regardless of proximity, causes any health effects, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) still refers to guidelines that recommend the limiting of exposure to electro-magnetic fields so that the threshold at which the interactions between the human body and external

electric and magnetic fields that causes adverse effects within the body cannot be reached.

The Project is not located in a designated Bushfire Protection Area. However, the DEW Last Fire mapping (2021) shows bushfires have recently occurred in the region, including the Blackford bushfire (January 2021) and the Keilira bushfire (December 2019).

Potential impacts

- **Exposure to unsafe conditions:**

Offshore wind Project presents unique risks to construction workers because of the nature of offshore construction (i.e. working at height and offshore, falls, electrical risks, subsea works and extreme weather experience in vast open spaces off the coast). In extreme circumstances this may result in death or serious injury of construction personnel. Therefore, the highest risk to human health is the exposure of personnel or the public to unsafe conditions as a result of pre-construction and construction works and/or onsite practice. The wider community is not expected to be impacted as access to construction sites on and offshore will be restricted. The inherent risk rating for this aspect is 'high' for construction phase and 'moderate' for operation and decommissioning phase.

- **Leaks and spills:**

The storage and handling of dangerous goods and hazardous materials have the potential to impact construction workers and the surrounding environment if leaks and spills occur, resulting in the potential contamination of air, soils, surface water, and/or groundwater. The inherent risk rating for leaks and spills is 'moderate' for all three phases of the Project.

- **Electro-magnetic fields (EMF):**

It is expected that there would be a low risk of exceeding the levels recommended by ARPANSA. Exposure time would also be limited and therefore the inherent risk rating for EMF exposure is considered 'low' for all three phases of the Project.

- **Increased fire and bushfire:**

Construction, maintenance and decommissioning works may increase risk of fire and bushfire from accidental ignition from construction equipment, fuels and chemicals. However, as the Project is not located in a Bushfire Protection Area, the risk rating for fire/bushfire is considered 'low' for all three phases of the Project.

- **Natural hazards:**

Climate induced risks include increased dust generation during drier weather, increased construction delays due to wet weather, increased rainfall resulting in increased flow events in watercourses, temporary flooding and risk of failure of erosion and sediment controls and potential for construction workers to experience heatstroke as a result of extreme heat and hot weather events. The risk rating for natural hazards is 'low' for all three phases of the Project.

Further assessment

- **Leaks and spills:**

Standard construction management measures such as storage of dangerous goods in accordance with the relevant guidance would be included in the CEMP/OEMP/DEMP and would reduce potential risks.

- **Electro-magnetic:**

Site OHS plans would manage the risk of EMF exposure.

- **Bush fire:**

Standard construction management measures such as management plans addressing these issues would be included in the CEMP/OEMP/DEMP and would reduce the risk of the Project increasing fires and bushfires in the local region.

- **Natural hazards:**

Standard management measures such as management plans addressing these issues would be included in the CEMP/OEMP/DEMP and would reduce the impact on the Project, including adequate training and personal protective equipment (PPE) being provided to construction or maintenance workers.

- **Exposure to unsafe conditions:**

Stringent site OHS plans would be developed and implemented to manage the risk of death or serious injury during construction on and offshore. Standard construction management measures would also reduce the likelihood of occurrence, including compulsory training and PPE provided to construction or maintenance workers.

6.2.11 Hydrology, flooding and water quality (Construction-Operation-Decommissioning)

Existing environment

There are a number of wetland complexes mapped in the area, some falling within the Project Area. Some of the wetlands in the areas are mapped as Priority Wetland Complexes LUT- Lower Limestone Coast PWA - Water Allocation Plan 2010 (DEW).

There are also a number of wetlands of international importance outside the Project Area in the region, including the Coorong, and Lakes Alexandrina and Albert wetland (Ramsar site).

Potential impacts

Impacts to surface water quality may have indirect impacts on potential threatened species which may be supported by these environments. There are also potential indirect water quality impacts to the Ramsar wetlands due to runoffs generated from the Project works.

A moderate risk rating is precautionary for all three phases of the Project until further understanding of local wetland and surface water systems is carried out and construction/operation methods are further developed.

Further assessment

Further investigations will be carried out during the EIS phase to understand the value of surface water environments in the area and to inform appropriate management measures to be applied. Design development would seek to minimise impacts through siting of infrastructure and construction methodology. Early installation of drainage controls and erosion and sedimentation monitoring during pre-construction and construction works would assist in managing and mitigating impacts to land processes. Standard construction management measures in accordance with the SA EPA requirements, such as bunding around earthworks and chemical storages and implementation of a CEMP/DEMP, would reduce the risk of increased nutrient runoff or accidental spills and the potential impact on any waterways. Construction, operation or decommissioning during dryer periods would also avoid runoff impacts to receiving freshwater and marine environments from degradation of water quality.

6.2.12 Ports and harbour (Construction & Decommissioning)

Existing environment

Existing port facilities will be used to support the transport and marshalling of equipment and Project components from globally distributed supply chains, as well as construction and maintenance vessels and activities. The nearest port is Adelaide Port, about 300 km by road north west of the Project Area. There are other ports in the area including Port Giles on the eastern side of Yorke Peninsula, located approximately 500 km north west of Kingston SE. A suitable port or harbour would be chosen depending on proximity to the Project, water depths, tidal conditions, dedicated or shared berthing facilities, and potential opportunity to provide local employment opportunities.

Potential impacts

The size of the WTGs and plant and equipment required for construction/decommissioning may require ports to alter berthing facilities and change existing operations to accommodate an increased amount and frequency of vessels.

Post construction, ports will be well placed to accommodate requirements of large WTGs, maintenance vessels, plant and equipment. Accordingly, no further impacts are expected to ports during operation. Decommissioning phase may require ports to change existing operations to accommodate an increased amount and frequency of vessels. The inherent risk to ports and harbour at construction and decommissioning phase is moderate.

No further impacts are expected to ports during operation, therefore the risk rating for ports and harbour at operation phase is considered low.

Further assessment

Future investigations during the EIS phase of nearby harbour and ports will identify potential risks and limitations. Future stages of the Project would involve engaging with local port operators and implementing mitigation measures to reduce impact to existing port operations as much as possible.

6.2.13 Traffic & transport (Construction & Decommissioning)

Existing environment

Existing port facilities would be used where possible to support the transport and marshalling of equipment and Project components from globally distributed supply chains, as well as construction and maintenance vessels and activities.

Potential impacts

The traffic generated during site establishment and construction or decommissioning may cause delay due to insufficient road capacity, particularly the delivery of large plant and equipment. The road links and intersections within the Project Area should be assessed to determine whether they can accommodate the additional traffic generated during construction/decommissioning (including heavy vehicles, haulage vehicles and staff access). There may be an increased risk of road accidents due to a higher level of traffic (including slow moving vehicles) on the road. Given limited detail of construction/decommissioning schedule and timing, a precautionary inherent risk rating of moderate was given.

Operation and maintenance will generate negligible operational traffic. Existing road networks will accommodate any additional traffic generated. Therefore, the inherent risk rating for traffic and transport at operation phase is considered ‘very low’.

Further assessment

A Traffic Management Plan is likely to be required for any future development to mitigate impacts to the road transport network. The use of designated roads and areas, including for deliveries, waste collection and car park and use of major roads where possible (not tracks or private access roads) should be adhered to. There may be disruption to general traffic during the movement of oversized loads along the delivery path. The Plan may also address the need for light and heavy vehicle washes installed. A Traffic Management Plan should be done in consultation with local road managers, Council and business and property owners.

Decommissioning activities such as dismantling WTGs may lead to several disruptive oversized loads on the road network, therefore decommissioning timelines and traffic route options will need to be assessed.

6.2.14 Waste and resources (Decommissioning)

Potential impacts

Early works and operation activities will require the use of energy and water and there will be some waste products (including general waste) generated. There would be limited wastewater produced during early works activities.

Decommissioning is likely to result in large amounts of waste if dismantling of WTGs is required. Waste would include the WTGs, foundations, sub-sea cables, meteorological masts, offshore and onshore substations and any scour materials. Decommissioning activities will require use of energy and water, and there will likely be both construction and general waste generated.

If decommissioning involves the repowering or refurbishment of the WTGs this would extend the life of offshore windfarm and reuse resources already established.

The inherent risk rating for waste and resources is ‘high’ at decommissioning phase and ‘low’ at construction and operation phases.

Further assessment

There are opportunities to minimise the generation of waste and the resources/materials sent to landfill by imbedding the waste hierarchy into early works practices to maximise resource efficiency. This could be outlined in the CEMP. Provisions to optimise the efficient use of water and energy during site establishment and maximise reuse and recycling i.e. use of on-site potable water tank during site establishment and sediment pond water (non-potable) for dust suppression purposes on site. All waste will be managed and disposed/recycled in accordance with applicable South Australian regulations. Any hazardous liquid waste (e.g. oily water) will be captured and removed from site using a licensed waste contractor. There will be appropriate waste storage areas at the site during early works (as required). There will be no waste disposed onsite or offshore and waste generation/disposal will be managed in accordance with the CEMP.

Opportunities to minimise the generation of waste and the resources/materials sent to landfill include embedding the waste hierarchy into overarching Project planning to maximise resource efficiency. Project resources would be utilised and reused, where possible, in other parts of the Project or reused through other channels. Where practicable, efficiency in the uses of water and energy should be considered during the decommissioning phase.

6.3 Cumulative impacts

Potential impacts

Cumulative impacts could be experienced by the community if construction or operation of the Project coincides with construction or operation of other local developments.

Key cumulative impacts during construction could include:

- Increased construction vehicle traffic on local roads causing congestion and delay
- Pressure on local accommodation and services to house and support construction staff and managing socio-economic outcomes after construction

As it is expected that the Project would employ up to 100 full-time personnel during operation and maintenance activities, associated vehicle movements and cumulative impacts during operation could be significant.

Further assessment

A review of potential cumulative impacts would be undertaken for during the EIS[phase.

Options to sustainably accommodate construction personnel would be investigated at a later stage and in close consultation with Kingston District Council. Careful consideration would be undertaken in the planning of the Project to ensure the town of Kingston SE is not significantly disrupted during construction, operation and decommissioning periods and we will work with the Council to explore opportunities for positive longer term outcomes where possible. This would be further discussed in the EIS.

Cumulative impacts would be incorporated into the project CEMP to ensure they are adequately managed by the construction contractor.

6.4 Other environmental aspects

Other environmental aspects that are relevant to the Project, but are not considered key aspects, are described in Table 7 below. These considerations would also be subject to further assessment as part of the EIS and would be managed through appropriate mitigation and management measures.

Table 7: Other environmental aspects

Aspects	Existing environment	Potential impacts	Further assessment required
Air quality	Generation of air emissions and dust from Project activities impacting on sensitive receptors and local air quality. A preliminary land use assessment indicates there are limited sensitive receptors within the Project Area.	Proposed pre-construction, construction and decommissioning works are expected to generate some air emissions (e.g. dust and grit through land disturbance and GHG and exhaust fumes etc from construction vessels and vehicles), however this would be localised and of limited duration. Operation of the Project is not expected to generate air emissions. Any dust or odour emissions in relation to maintenance of the Project would be localised, negligible and below levels of detection.	A future air quality assessment would inform the requirements for a CEMP or DEMP. Dust monitoring programmes and equipment (if required) could be used to determine when activities need to be altered to reduce dust emissions. Actions such as watercarts on haul roads and main construction sites could be used to generate less dust. Standard measures to limit the generation of dust and other air emissions (such as most efficient use of construction equipment and planning to reduce vessel and vehicle use and movements) would also be included in the CEMP/DEMP. Operation will need to comply with EPA performance requirements, and any standards and licences for air emissions. Air quality monitoring programmes and equipment could be used determine when activities need to be altered to reduce emissions.
Aviation and radar (including EMI)	There are no commercial airports or military bases in proximity to the Project (proposed turbine locations), with the closest commercial airport being Mount Gambier Airport approx. 130 km away. Kingston SE airport, owned by Kingston District Council, is located adjacent to the Project Area, and is used for emergency services and handling regional flights to a number of destinations, including Adelaide and Mount Gambier. Scenic flights over the Coorong National Park form part of the local tourism industry. Scenic flights depart from Strathalbyn, north of the Coorong.	Interference to aircraft radar during pre-construction and construction works is considered low due to the anticipated construction methodologies. While the TV transmitter is a fair distance, there may be interference to radio transmitter during construction works. Tower and blades may obstruct, reflect or refract the electromagnetic waves. The degree and nature of the interference will depend on: The location of the wind turbine between receiver and transmitter • Characteristics of the rotor blades • Characteristics of receiver • Signal frequency	A future radar impact assessment would inform of any requirements to minimise impacts during construction, operation and decommissioning. A future study of scenic, emergency, and scenic flight routes and OLS, including engagement with local flight operators, would inform of any requirements to minimise impacts during construction, operation and decommissioning. Technical mitigation measures on radio interference can be applied during the planning stage, siting the turbine away from line-of-sight of the broadcaster transmitter or applying appropriate construction methodologies. Future study of potential electromagnetic interferences is required to inform design and reduce impacts of radio signal.

Aspects	Existing environment	Potential impacts	Further assessment required
	Telstra owns a digital TV transmitter located approximately 38 km south of the Southern Ports Hwy at Mount Benson, which services the Kingston SE/Robe area. There is currently a 87.6 FM Low Powered transmitter located at Kingston SE within the Project Area. LPFM or Low power FM transmitters generally range between 50-1000 watts.	• The radio wave propagation in the local atmosphere. Obstruction to scenic flight paths could be possible during operation and de-commission of the WTGs and would be further investigated and determined. As scenic flights are expected to be largely carried out during day-light hours, impact from any night-lighting utilised during construction, operation or decommissioning is anticipated to be low. This would be localised and of limited duration. Interference to aircraft or radars is not expected during decommissioning. Where necessary, changes to flight routes will have been established during earlier phases of the Project. Interference to local television and radio is also not expected during operation and decommissioning. Potential disruptions are likely to have been identified during earlier phases of the Project. The residual risk rating for aviation and radar aspect is considered 'low' (impact to aviation and aircraft and local television/radio) and 'very low' (interference to civil and military radar).	
Ground conditions and contamination	The Acid Sulfate Soil Potential mapping (DEW 2009) shows some areas within the Project Area have up to and more than a 60% chance of Acid Sulfate Soils being present. Agricultural and other previous disturbance and land uses within the Project Area have potentially resulted in soil contamination. The potential for Acid Sulfate Soils and contaminated land within the construction footprint would be ascertained through on-site assessment during design development and pre-construction stages.	Spoil and excavated material is expected to be generated during construction and decommissioning, particularly for the underground components (cable bays and u/g cables). In line with the South Australian Environment Protection (Waste to Resources) Policy 2010, it is proposed that spoil and material be assessed for reuse on-site. This would require stockpiling on-site in the interim. Refer to 'Hydrology, flooding and water quality ' for potential impacts from construction/decommissioning to freshwater receiving environments.	A contamination assessment would establish baseline indicators of material at site, which would be used to inform the CEMP/DEMP, particularly in relation to management and disposal of spoil. Spoil from earthworks would be reused on-site where possible or disposed of in accordance with EPA requirements. Careful consideration would be given to the location for the temporary stockpiling of spoil and excavated material, which may be required over the short term. Stockpiles would be managed in accordance with the South Australian EPA Guideline for stockpile management (EPA 2020), which would reduce risk.

Aspects	Existing environment	Potential impacts	Further assessment required
	The Wind Erosion Potential mapping (DEW 2009) shows some areas (mainly along the coast) have a high to extreme wind erosion potential, with most areas mapped as having a moderately low to low wind erosion potential.	Operation of the Project is not expected to change ground conditions or generate risks related to contamination. Operation of the Project has the potential to result in contamination of soils due to any spills and leaks of fuel, oils and other hazardous materials from routine traffic. The potential for contamination as a result of general maintenance activities is considered to be low, based on the number of vehicles and equipment which would likely be used during maintenance.	Vegetation and dense land cover clearance would be minimised as much as practicable during design development. Areas containing significant drainage patterns or heavy water flows would be avoided. A CEMP/DEMP would establish management measures for cleared areas to ensure impacts to soil and water quality are reduced. This would include installation of temporary drainage routes, sediment control measures and the progressive revegetation of disturbed areas, where practicable. An OEMP would establish management measures to ensure impacts to soil and water quality are reduced. This would include installation of temporary drainage routes, sediment control measures and the progressive revegetation of disturbed areas, where practicable.
Groundwater	The Project would be located in the Murray Groundwater Basin, with some transmission infrastructure also potentially located in the Otway Basin, both of which are classified as shallow sedimentary ground water basins. The Department for Environment and Water (DEW) Depth to Water Table mapping (2009) shows a range of water table depths within the Project Area, from some areas where the water table is above the surface for more than 10 months to others where the water table is greater than 200cm below the surface. The Department for Environment and Water (DEW) Recharge Potential mapping (2009) shows most areas within the Project Area have a recharge potential of more than 60%, with few areas having less than 30%.	Shallower water depths, and those above the surface, have a higher risk of local ground water quality being impacted during pre-construction, construction, operation and decommissioning. Local ground water quality may deteriorate through turbidity, salinity, colour, odour, temperature, nutrients or pollutants such as chemicals and materials required during maintenance. However deep excavation extending below regional groundwater level is unlikely to occur during operation and therefore risks of impact is low. Lowering of water table is not required during operation. Further, it is unlikely that there would be changes to infiltration during operation, thereby groundwater flow and distribution are unlikely to be impacted. Excavation of the landfall site (transition pit) and other onshore transmission infrastructure may also extend below the groundwater level. Local dewatering may be necessary to manage groundwater	Further investigation and site investigation during the EIS to ground-truth water depths and quality and local uses of groundwater will be undertaken. Design development would look to avoid areas where the water table is above the surface, as far as practicable. Early installation of drainage controls and erosion and sedimentation monitoring during pre-construction, construction and decommissioning would assist in managing and mitigating impacts. Establishing appropriate procedures for handling, transporting and using potentially contaminating substances including diesel, petrol, oils, greases, cement and other construction chemicals would be included in the CEMP/DEMP. Appropriate management of temporary dewatering and groundwater control would be included in the CEMP/OEMP/DEMP, including recharge back to aquifer down gradient if required. Further investigations will be carried out to understand the value of surface water environments in the area and

Aspects	Existing environment	Potential impacts	Further assessment required
		inflows to excavation. It is considered unlikely that lowering the water tables temporarily would have a long-term impact on groundwater flows however, a precautionary risk rating of moderate has been given. Decommissioning activities are unlikely to impact the groundwater table, as onshore works will likely be highly limited.	to inform appropriate management measures to be applied during the operation phase. Early installation of drainage controls and erosion and sedimentation monitoring during early Project stages would assist in managing and mitigating impacts to land processes during operation and maintenance. Standard construction/maintenance management measures in accordance with the SA EPA requirements. Maintenance during dryer periods would also avoid runoff impacts to receiving freshwater and marine environments from degradation of water quality.
Historic heritage, including shipwreck	There are no Commonwealth listed heritage places or sites within the Project Areas or surrounds. There are no sites listed on the SA Heritage places database within the marine environment. There are a number of State-listed shipwrecks mapped in Lacepede Bay and surrounds, with the closest being approximately 3 km from the nearest turbine. There are also a number of State heritage places and local culture heritage assets mapped in the area.	Project infrastructure would be located to avoid impacts to State and local historic heritage assets. Heritage impacts are unlikely during the decommissioning phase. The residual impacts to historic heritage for all phases of the project is considered 'low risk'.	Management measures would be included in the CEMP, OEMP and DEMP (as required) to minimise any indirect impacts to mapped heritage places and sites.
Shipping and navigation	Desktop assessment indicates that no existing shipping channels that interfere with the Project Area, however there are some cargo ships using the surrounding Project Area to travel to Ports situated in north west, including Port Adelaide.	Risk to shipping and navigation are expected to low due to the short-term nature and minor change in shipping routes expected during construction, operation or decommissioning. Changes to navigation and shipping routes would be acceptable and vessel would easily adapt with minimal impact.	A future study of shipping and navigation routes, including engagement with local fisheries and port operators, would inform of any requirements to minimise impacts during construction, operation or decommissioning.
Existing infrastructure	Unexpected infrastructure interfaces would be identified during design development and construction planning through Dial-Before-You-Dig (DBYD) searches and ground surveys. Hard interfaces will be identified	The Project will require interface with a range of other significant infrastructure during pre-construction and construction, such as ports, roads, electricity networks and other services and utilities. Pro-active planning, early engagement and the	Future studies and engagement with third-parties during design development would inform of any requirements to minimise impacts to other infrastructure during pre-construction, construction, operation or decommissioning.

Aspects	Existing environment	Potential impacts	Further assessment required
	early for pro-active management and engagement with third-parties.	implementation of a governance structure with third-parties would help identify risks and associated risk management strategies. After construction, operational impacts to existing infrastructure will remain unchanged.	

7 Community and stakeholder engagement

SA Offshore Windfarm Pty Ltd values the public participation process and will proactively ensure meaningful communication and engagement between the Project, the agencies making decisions and the public.

A Stakeholder and Community Engagement Plan has been prepared for the current phase of the Project. The Plan is based on the principle that involving people from the very beginning of a project is the best way to achieve great outcomes and ensure the Project achieves and maintains a social licence to operate. The Plan will be updated for each phase of the Project and will include consultation approaches for key stakeholders such as elected officials, community groups, local businesses and community members.

The approach to engagement will be guided by the International Association of Public Participation's (IAP2) Core Values and Public Participation Spectrum. IAP2 is the peak body for community and stakeholder engagement sector and believes that engagement, when done well, improves social, environmental and economic outcomes.

The following sections detail the consultation that has been carried out with stakeholders and the community to-date, as well as the proposed on-going and future consultation activities and tools.

7.1 Consultation to date

Recent stakeholder engagement has initially focussed on engaging with key stakeholders and a range of government agencies. Using the IAP2 Spectrum, the approach for this engagement was primarily to Inform, however there has been a level of Consult where the Project team has requested specific information or knowledge from an agency to assist with the scoping activities and Project referrals.

The objectives of the completed engagement with stakeholder was to:

- Build relationships with key stakeholders to ensure continued effective collaboration and streamlined approvals process
- Consult with decision makers to ensure their requirements are met
- Consult with key stakeholders prior to and during the preparation of the Environmental Impact Statement (EIS) so their initial issues and opportunities can be considered

Consultation tools which have been utilised to-date include:

- Letters – providing stakeholders with information about the Project allowing us to build relationships and inform them of the Project status, benefits and timelines

- Meetings – virtual presentations and discussions directly with key stakeholders to provide and introduction to the project, clarify information and gather feedback, ideas and options to feed into project planning and the EIS
- Frequently Asked Questions (FAQs) sheet– a fact sheet with a list of likely common questions has been prepared for to add to the website and in a format that could be easily downloaded by community members and key stakeholders
- Project webpage[10] – a dedicated project website has been established providing key information about the Project, including a link to the FAQ fact sheet and contact information.

7.1.1 Government agency and key stakeholders

Consultation has been carried out with a range of government agencies and key stakeholders. These stakeholders were identified as those involved in the planning approval or grid connection process, and those who may have a keen interest in the strategic planning of the Project. They include:

- Department of Industry, Science, Energy and Resources (DISER)*
- Department of Agriculture, Water and the Environment (DAWE)*
- Department of Energy and Mining (DEM)
- Department of Infrastructure and Transport (DIT)
- Department of Environment and Water (DEW)
- Department of Primary Industries and Regions
- Department of Premier and Cabinet (Aboriginal Heritage)
- Environmental Protection Authority (EPA)
- Kingston District Council
- Federal Members of Parliament*
- State Members of Parliament
- ElectraNet

* *Denotes Commonwealth agency/stakeholder*

Table 8 provides a general summary of the consultation activities and levels of engagement for the identified stakeholders for the current stage of this Project (Q1/Q2 2021) i.e. preparing Major Project application and EPBC Act referral. We will continue to consult with these stakeholders and others throughout the planning approval process as required.

[10] https://saoffshorewindfarm.com.au/

Table 8: Summary of stakeholder consultation

Stakeholder	Consultation
Department of Agriculture, Water and the Environment (DAWE)	Preliminary meetings have been held with DAWE to introduce the Project and key team members, discuss the planning framework and timing of key Project milestones, and identify the key Project issues for consideration. Follow-up meetings and consultation will be held with DAWE throughout the planning process as required.
Department of Industry, Science, Energy and Resources (DISER)	A formal letter of correspondence will be sent to DISER via email to introduce the Project, its opportunities and benefits, Project timing, current and future project planning, key milestones, website information and details on how to contact the Project team.
Department of Energy and Mining (DEM)	Preliminary meetings have been held with DEM to introduce the Project and key team members, discuss the planning framework and timing of key project milestones, and identify the key Project issues for consideration. Follow-up meetings and consultation will be held with DEM throughout the planning process as required. Consultation has also been undertaken with the Office of Technical Regulator (OTR) regarding a pre-requisite certificate to support Major Project Application.
Department of Infrastructure and Transport (DIT)	Preliminary meetings have been held with DIT to introduce the Project and key team members, discuss the planning framework and timing of key Project milestones, and identify the key project issues for consideration. Follow-up meetings and consultation will be held with DIT throughout the planning process as required.
Department of Environment and Water (DEW)	A formal letter of correspondence will be sent via email to introduce the Project, its opportunities and benefits, Project timing, current and future Project planning, key milestones, website information and details on how to contact the Project team.
Department of Primary Industries and Regions	A formal letter of correspondence will be sent via email to introduce the Project, its opportunities and benefits, Project timing, current and future Project planning, key milestones, website information and details on how to contact the Project team.
Environmental Protection Authority (EPA) South Australia	A formal letter of correspondence will be sent via email to introduce the Project, its opportunities and benefits, Project timing, current and future Project planning, key milestones, website information and details on how to contact the Project team.
Department of Premier and Cabinet	Preliminary conversations will be held with Aboriginal Affairs to introduce the project and key team members, discuss the planning framework and timing of key Project milestones, and identify the key Project issues and opportunities for consideration. Follow-up meetings and consultation will be held with the Department of

Stakeholder	Consultation
	Premier and Cabinet and other community organisations throughout the planning process as appropriate.
ElectraNet	Preliminary conversations with ElectraNet commenced in January 2021, with a number of connections options being explored. Follow-up meetings and consultation will be held throughout the Project development phase.
State MPs Member for McKillop Minister for Energy and Mining Minister for Innovation and Skills Minister for Environment and Water Minister for Planning	A formal letter of correspondence will be sent via email to introduce the Project, its opportunities and benefits, Project timing, current and future Project planning, key milestones, website information and details on how to contact the Project team.
Kingston District Council CEO Manager, Assets and Infrastructure	A formal letter of correspondence will be sent via email to introduce the Project, its opportunities and benefits, Project timing, current and future Project planning, key milestones, website information and details on how to contact the Project team.

7.1.2 Aboriginal engagement

SA Offshore Windfarm Pty Ltd acknowledges Aboriginal and Torres Strait Islander peoples as the First Australians and recognises the importance of their culture, history, diversity and their deep connection to the land, waters and seas. As part of the current phase of consultation, engagement will be carried out with the Department of Premier and Cabinet, who are the lead agency on Aboriginal affairs, to gain a deeper understanding of the connection with where the Project is planned and explore future opportunities for collaboration with the appropriate Indigenous communities. Ongoing consultation will be held with the Department of Premier and Cabinet as well as the relevant Aboriginal communities and organisations throughout the planning process and future stages of the Project.

7.2 Future planned consultation

SA Offshore Windfarm Pty Ltd is currently planning for broader consultation to begin following the submission of the State IAD and EPBC Act referrals. This consultation will take place with a broader range of stakeholders, including the wider community and local interest groups on key elements that can ultimately feed into the planning and design of the Project, as well as the EIS process.

The Community Engagement Plan will be updated and continue to be a live document that will be reviewed and updated in response to feedback received through the various Project stages.

The IAP2 Spectrum will continue to be used, with the future phases of engagement to include elements of Inform, Consult, Involve and Collaborate.

The objectives for future consultation and engagement are to:

- Inform the broader community about the Project and provide opportunities for their questions to be answered and their issues and opportunities to be considered
- Consult with key stakeholders during preparation of the EIS so their issues and opportunities can be considered
- Build relationships with key stakeholders to ensure continued effective collaboration and streamlined approvals process.

7.2.1 Community engagement

SA Offshore Windfarm Pty Ltd will undertake open and transparent consultation with stakeholders and the community to seek their feedback about the Project. It will be made clear which decisions can be influenced by community feedback and how the feedback will be incorporated into the planning and design of the Project as well as the Environmental Impact Statement (EIS).

It is expected that some concerns may arise from community and industry stakeholders, including:

- The potential for impacts on the marine environment and/or native flora and fauna
- Heritage issues including plans to protect Indigenous cultural heritage and/or artefacts
- Potential impacts on recreational boating and the fishing industry
- Potential impacts to tourism, either through construction and/or operation (including impact to local amenity)
- Visual impacts of offshore WTGs.

Implementing a comprehensive consultation program will ensure that all stakeholders have an opportunity to comment and be heard. The intention is to work with stakeholders to understand their concerns, listen to their ideas and establish solutions, mitigations and follow through on commitments where possible.

Future engagement activities will include:

- An up-to-date Project website where people can find the latest information about the proposed Project as well as relevant contact details (this is already live)
- Establishing a Community Advisory Group with people from across Coorong and southern coast area so we can share information, answer questions and seek local advice as we progress our plans for the Project
- Project fact sheets and newsletters which will be distributed amongst stakeholders at key stages
- Establishing a Project contact number and email address with agreed service levels for responding to queries received via these channels
- Setting up a Project information display at a Project office in the region

- Community information sessions (including some virtual sessions) which will be held during preparation of the EIS to provide a chance for community members to learn about the Project, ask questions and provide feedback
- Scheduling proactive meetings with stakeholders such as business and industry groups, landowners and Traditional Owners, working collaboratively on plans to minimise impacts wherever possible
- Maintaining regular communication with key stakeholders such as elected representatives and local government
- Media releases, which will be prepared at key milestones and may be included in local and/or more widespread media sources.

8 Conclusion and next steps

The SA Offshore Windfarm Project has been developed through consideration of a number of options and alternatives, and consultation has commenced with key stakeholders and the community.

The Project has the potential to generate 600 MW of renewable electricity, enough to power 400,000[11] South Australian homes. Subject to planning and environmental approvals, construction of the Project could commence in early 2025 to be generating electricity and storing energy by the Summer 2026 peak period.

This Environmental Scoping Report has outlined the planning approval pathway for the Project and has considered the potential impacts of the proposed development on a number of environmental and social values.

Key environmental aspects have been identified as:

- Aboriginal heritage (construction & O&M)
- Ecology – benthic, marine, ornithology and terrestrial
- Hydrology, flooding and water quality (all phases)
- Human health, Hazards and risks (incl. EMF, Fire, Human health, etc) (Construction)
- Land use (construction)
- Landscape, seascape and visual (construction & O&M)
- Noise and vibration (all phases)
- Ports and harbours – construction and decommissioning
- Socio economic (all phases)
- Traffic and transport (construction and decommissioning)
- Waste and resources (decommissioning)

An EIS will be prepared for the detailed site selection and design of the Project. The EIS would include a comprehensive assessment of the potential environmental, economic and social impacts of the Project and be prepared in accordance with the Environmental Assessment Guidelines issued for the Project. The EIS will detail the measures for inclusion in the Project construction, operational and decommissioning environmental management plans in order to minimise social and environment impacts.

[11] Based on average household consumption of 6570kWh / year and 50% load factor for the 600MW OWF (www.arelectrical.com.au/average-electricity-usage-in-australia)

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Appendix A

Preliminary Environmental Risk Review

SA Offshore Windfarm Project

Environmental Risk Assessment Framework

Rev 0 | 9 August 2021

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1 Introduction

1.1 Background

This environment risk assessment framework has been developed to ensure a consistent, robust and transparent approach is applied to the assessment of potential impacts as a result of the proposed South Australian (SA) Offshore Windfarm ('the Project'). The framework contains a specific set of descriptors and criteria to help describe and evaluate risks.

1.2 Methodology

This Environmental Risk Assessment Framework has been developed based on widely adopted best practice and industry standards associated with environmental impact assessment.

The consequence criteria in **Section 2.6** and **Attachment A** has been developed by technical specialists and experienced environmental practitioners, and in consideration of the South Australian factors of environmental, social and economic significance[1].

The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) significant impact criteria is also included in Attachment B.

2 Impact assessment framework

2.1 Overview

The risk assessment approach for the Project comprises evaluation of anticipated impacts with standard mitigation (e.g. statutory compliance), followed by determination of residual impacts, taking into consideration any additional mitigation measures to reduce the likelihood and/or consequence of the impact and hence the overall risk level.

Figure 1 illustrates the proposed approach to environmental risk assessment, incorporating an assessment of the 'standard mitigation' scenario, as well as the 'additional recommended mitigation' scenario.

Impacts are to be assessed for the following Project phases:

- Pre-construction and construction (including establishment and decommissioning of the construction sites)
- Operation and maintenance (including initial testing and commissioning)
- Decommissioning (including potential rehabilitation work).

[1] Appendix 3 of 'Major Development Assessment South Australia's *Development Act 1993:* A Practical Guide for Proponents' (DPTI, 2017)

2.2 Application

The framework is to be applied at any stage of the Project where an environmental risk review is carried out, including for EIA scoping and the Major Project application.

The completion of a preliminary impact summary table will help provide clarity around the level of environmental assessment likely to be required for the Project, as well as to confirm the statutory approval pathway identified for the project.

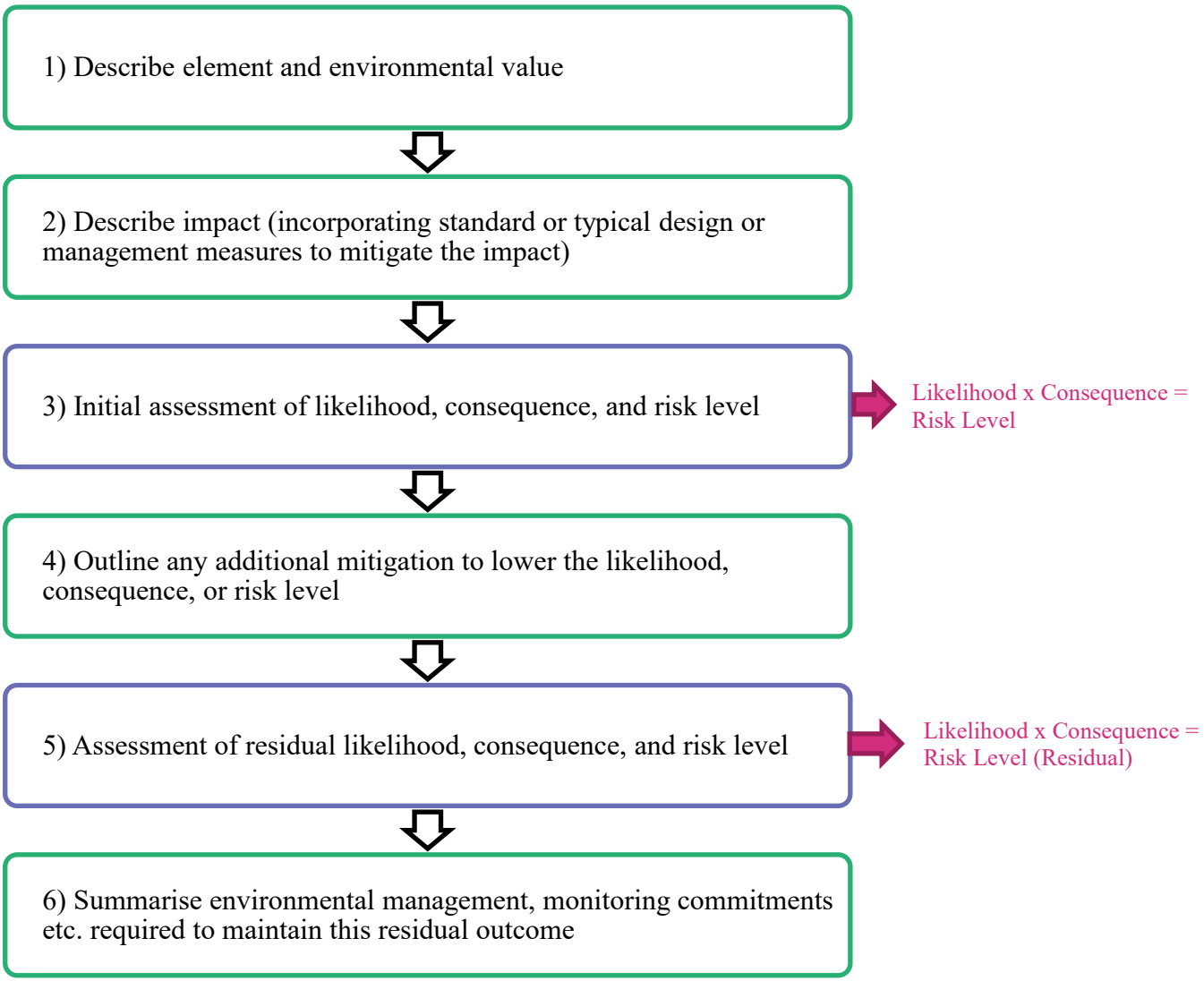

Figure 1 – Environmental impact assessment process

2.3 Risk identification

Potential impacts can be predicted by considering individual components and processes of the Project. Consideration also needs to be given to how different components and processes of the Project interact with different components of the environment. When identifying potential environmental impacts associated with the Project, both onsite and offsite and direct and indirect impacts should be considered.

2.4 Duration

Table 1 outlines the general approach to classifying timeframes. Duration is to be embedded into the consequence criteria.

Table 1 - Duration

Relative duration of environmental impacts	Description
Temporary	Days to months
Short term	Up to 1 year
Medium term	From 1 to 5 Years
Long term	From 5 to 50 Years
Permanent / irreversible	In Excess of 50 Years

2.5 Likelihood of impact

Table 2 is to be adopted for classifying the likelihood of an identified impact arising as a result of the Project.

Table 2 - Likelihood of Impact

Likelihood of impacts	Risk probability categories
Highly unlikely / rare	May occur only in exceptional circumstances - can be assumed not to occur during period of the Project (Probability <10%)
Unlikely	Event is unlikely to occur, but it is possible during period of the Project (Probability 10-30%)
Possible	Event could occur during period of the Project (Probability 30-70%)
Likely	Event likely to occur once or more during period of the Project (Probability 70-90%)
Almost certain	Very likely to occur as a result of the proposed Project construction and/or operations; could occur multiple times during relevant impacting period (Probability > 90%)

2.6 Consequence criteria

Consequence criteria has been developed for each environmental discipline (**Attachment A**). Where possible, duration has been incorporated into the criteria. **Table 3** below provides the general consequence criteria to be applied in the absence of aspect specific criteria.

Table 3 - Example significance criteria

Consequence	Criteria
Major Adverse	Impacts considered critical to the decision making process. They tend to be permanent, or irreversible, or otherwise long term, and/or can occur over large scale areas. Environmental receptors are extremely sensitive, and/or the impacts are of **national** significance. Typically mitigation measures are unlikely to remove such effects.
High Adverse	Impacts likely to be of importance in the decision making process. They tend to be permanent, or otherwise long to medium term, and/or can occur

	over large or medium scale areas. Environmental receptors are high to moderately sensitive, and/or the impacts are of **State** significance.
Moderate Adverse	Impacts relevant to decision making, particularly for determination of environmental management requirements. These impacts tend to range from long to short term, and/or occur over medium scale areas or are focused within a localised area. Environmental receptors are moderately sensitive, and/or the impacts are of **regional or local** significance.
Minor Adverse	Impacts recognisable, but acceptable within the decision making process. They are still important in the determination of environmental management requirements. These impacts tend to be short term, or temporary and at the **local** scale.
Negligible	Minimal change to the existing situation. This could include for example be impacts which are beneath levels of detection, impacts that are within the normal bounds of variation or impacts that are within the margin of forecasting error.
Beneficial	The Project results in an improvement in the baseline situation.

2.7 Risk evaluation

As shown in

Figure 1, the risk level is a product of the likelihood of occurrence and consequence. The risk matrix in **Table 4** has been adopted for this Project.

Table 4 - Risk Matrix

		Consequence				
		Negligible	Minor	Moderate	High	Major
Likelihood	Highly unlikely	Very low	Very low	Low	Low	Medium
	Unlikely	Very low	Low	Low	Medium	Medium
	Possible	Low	Low	Medium	Medium	High
	Likely	Low	Medium	Medium	High	Very High
	Almost certain	Low	Medium	High	High	Very High

2.8 Mitigation

Mitigation measures are to be identified with consideration of the following hierarchy:

1. Avoided where possible through appropriate location of Project infrastructure and planning of Project activities
2. ‘Designed-out’ where practicable, thereby minimising significant impacts to environmental values
3. Mitigated through implementation of environmental management plans to measure and minimise any impacts to the greatest practicable extent
4. Compensated for where impacts cannot be adequately mitigated and residual effects predominate.

As illustrated in

Figure 1, mitigation is addressed in two ways in the impact assessment framework.

The first assessment considers what would be the ‘standard mitigation’ approach to implementing the Project, i.e. taking account of standard practice and statutory obligations. For example the implementation of erosion and sediment control would be a standard

mitigation requirement that could reasonably be assumed to be in place for the construction phase. The initial description and assessment of impacts is to include a description of these standard measures.

The second assessment of mitigation is ‘additional mitigation’ which is aimed at reducing the likelihood, consequence, or risk of an identified impact occurring. Additional mitigation may not be necessary for all impacts but would be relevant to impacts identified as high or very high risk. For example additional mitigation may include a species specific management plan to minimise impact during construction.

2.9 Summary table

The structure in **Table 5** to be used as a summary of the impacts identified for the Project. A risk table is to be established in the early scoping stages if the Project, and then reviewed and refined as required at various key stages of Project development and reporting.

Note: that if an impacting process would be different in different parts of the site or for different aspects of the Project, it is to be addressed in separate rows in the table.

Table 5 - Example risk assessment table (please note – this is an example only and does not represent a completed assessment)

Risk ID	Aspect	Impact pathway	Project area	Project phase	Initial risk assessment with standard mitigation (i.e. statutory compliance) in place			Justification for risk rating	Possible additional mitigation measures	Residual risk assessment with additional mitigation in place (i.e. those actions recommended as part of the impact assessment)		
					Likelihood	Consequence	Risk rating			Likelihood	Consequence	Risk rating

Attachment A

Consequence criteria

	Levels of Consequence				
Discipline	**Negligible**	**Minor**	**Moderate**	**High**	**Major**
Aboriginal Heritage (incl. underwater Aboriginal heritage)	Nil impact to Aboriginal archaeological objects or sites. No impact to intangible cultural heritage values such as contemporary sites or Dreaming Places.	Partial disturbance or removal of Aboriginal archaeological objects from one archaeological site. Intrusion on one of the following values of an intangible site – aesthetic, social, religious, historic or cultural.	Complete removal of one or more Aboriginal archaeological sites or removal of numerous objects at a number of site locations. Intrusion to more than two of the following values of an intangible site – aesthetic, social, religious, historic or cultural.	Complete removal of one of a large number of Aboriginal objects or complete removal of Aboriginal sites at many locations. Disturbance/ removal of an Aboriginal archaeological/ burial site(s) of high significance to the Aboriginal community or of high scientific significance. Intrusion to multiple values (e.g. aesthetic, social, religious, historic or cultural) of more than one intangible site.	Widespread removal of Aboriginal archaeological objects and/or sites/burials across all locations. Complete destruction of numerous sites or objects of high Aboriginal significance or high scientific significance. Complete destruction of all values (e.g. aesthetic, social, religious, historic or cultural) of more than one intangible site.
Air Quality	No, or insignificant, impact to existing air quality. Local residents unlikely to notice a change in local air quality and there is unlikely to be adverse effects on human health or the environment.	Local, short term and minor exceedance of the nominated air quality criteria. Some local residents may notice a short term minor decrease in air quality, although no adverse effects on human health or the environment are predicted.	Local, long-term minor exceedance of the nominated air quality criteria OR local, short term major exceedance of the nominated air quality criteria. Local residents will notice a decrease in air quality and there may be adverse effects on the environment. Toxic or adverse effects on human health are unlikely, however some sensitive individuals may raise complaints.	Local short term and major exceedance of the nominated air quality criteria. Without mitigation, regional and local residents will experience a short term decrease in air quality and there may be toxic or adverse effects on human health or the environment. Regulator intervention is likely and sensitive individuals are likely to raise complaints.	Local long-term and major predicted exceedance of the nominated air quality criteria. Without mitigation, regional and local residents will have their existing air quality significantly decreased, and there will be toxic or adverse effects on human health or the environment. Regulator intervention is very likely and sensitive individuals are likely to raise complaints.

Aviation and radar (incl. EMI)	No change to baseline aviation routes or impact to aviation radars.	Short term or minor change from baseline aviation and navigational settings, with changes deemed acceptable and minimal.	Permanent impacts with small to medium scale changes. Moderate short -term disruption to existing aviation operations and flight paths. Impacts relevant to decision making process.	Permanent impacts with large scale changes. Considerable or long-term disruption to existing aviation operations, flight paths and/or navigational radars. Impacts of importance to decision making process.	Permanent impacts with large scale changes. Permanent and unacceptable disruption to existing aviation operations, flight paths and/or navigational radars. Impacts of critical to decision making process.
Ecology	Minimal change to existing populations, species and communities, possibly a temporary effect within the bounds of natural variability. No measurable impacts on the extent of remnant vegetation and/or habitat.	Short term (up to one year) decrease in a population or subpopulation of a threatened species or community with no effect on the viability of the population or community. Minor loss of suitable habitat for a threatened species. Local short term decrease in some non-threatened or ecologically important species resulting in a change in local species composition and/or reduction in local biological diversity, however impact only expected to be temporary with no long term reduction in viability of the species, community or its habitat. Unlikely to effect the viability of the species.	Medium-term decrease of an important population or subpopulation of a threatened species or community, however, impact only expected to be temporary with no long-term reduction in viability of the population or community. Moderate loss of suitable habitat for threatened species but not of the extent that it affects the viability of the population or community. Regional medium-decrease in a number of non-threatened or ecologically important species resulting in change in regional species composition and/or reduction in biological diversity. Possible reduction in regional viability of some populations of threatened species.	Long-term decrease of an important population or subpopulation of a threatened species or community resulting in a possible reduction in viability of the population or community. Adverse impacts to habitat critical to the survival of the threatened species by fragmenting, modifying, destroying, removing or isolating or decreasing the availability or quality of habitat to the extent that the biological diversity of the species or community may possibly decline. Regional long-term decrease in a number of non-threatened or ecologically important species resulting in significant change in regional species composition and/or reduction in biological diversity. Reduction in regional viability of some species.	Permanent decrease of an important population or subpopulation of a threatened species or community resulting in significant reduction in viability of the population or community. Adverse impacts to habitat critical to the survival of threatened species by fragmenting, modifying, destroying, removing or isolating or decreasing the availability or quality of habitat to the extent that the biological diversity of the species or community is likely to decline. Regional permanent decrease in numerous non-threatened or ecologically important species resulting in severe change in regional species composition and/or reduction in biological diversity. Reduction in regional viability of numerous species populations.

Ground conditions and contamination	Potential impacts are not important to the decision-making process. No risks to human health and/or the environment. Contamination levels may be marginally above expected background levels. Minimal to no disturbance of contaminated soils/groundwater and/or acid sulfate soils. Soils at no risk of flooding, rapid run-off and/or fragile landscapes. Limited cut and fill earthworks.	Potential impacts are unlikely to be of importance in the decision-making process and tend to be short term, or temporary and at a local scale. Impacts would not present a risk to human health and/or the environment. The cause would be limited to potential disturbance of minor volumes of contaminated soil/groundwater and/or disturbance to minor volumes of acid sulfate soils, that are able to be contained and treated on-site with an EPA approved Environmental Management Plan, or disposed of as prescribed waste. Contamination levels may exceed site specific risk-based environmental and/or health-based investigation levels developed in accordance with National Environment Protection Measures or other relevant guidelines, however associated impacts are easily managed. Soils are likely to be at minimal risk of erosion due to flooding, rapid run-off and/or fragile landscapes, limited vegetation clearance. Cut and fill earthworks would be minimal and are unlikely to impact the ability the Project to manage the environment in a sustainable manner.	Potential impacts are relevant to the decision-making process and tend to range from long term to short term and occur over medium scale or localised areas. Impacts would be limited to within the Project boundary but manageable risks to human health and/or the environment. The cause would include potential disturbance to moderate volumes of contaminated soil/groundwater and/or disturbance to moderate volumes of acid sulfate soils that are able to be treated on-site with an EPA approved Environmental Management Plan, or disposed as prescribed waste. Contamination levels are likely to exceed site specific risk-based investigation levels developed in accordance with National Environment Protection Measures or other relevant guidelines. Soils are likely to be at moderate risk of erosion and sedimentation impacts due to flooding, run-off and/or fragile landscapes and excessive vegetation clearance. Moderate scale cut and fill earthworks are likely to impact the ability of the Project to manage the environment in a sustainable manner.	Potential impacts are likely to be of importance to the decision-making process and tend to be permanent, or otherwise long to medium term and occur over medium scale areas. Impacts could potentially significant widespread (outside the Project boundary) risks to human health (resulting in permanent adverse health impacts) and/or the environment. The cause would include potential disturbance to large volumes of contaminated soil/groundwater and/or large volumes of acid sulfate soils. Soils are likely to be at high risk of erosion and sedimentation impacts due to flooding, run-off and/or fragile landscapes and excessive vegetation clearance. Large scale cut and fill earthworks would impact the ability of the Project to manage the environment in a sustainable manner.	Potential impacts are considered critical to the decision-making process and tend to be permanent, or irreversible, or otherwise long term and occur over large scale areas. Impacts would include potentially widespread (outside the Project boundary) irreversible risks to human health (potentially life-threatening) and/or environment (such as acute toxicity to receptors as defined in the National Environment Protection Measures). The cause would include potential disturbance to large volumes of contaminated soil/groundwater and disturbance to large volumes of acid sulfate soils. Soils are likely to be at very high risk of erosion and sedimentation impacts due to flooding, run-off and/or fragile landscapes and excessive vegetation clearance. Large scale cut and fill earthworks are likely to significantly change the geology and soil profile of the wider area.

Groundwater	Negligible impact at local scale or minimal change to the existing situation. No change to existing groundwater quality and/or flow (changes that are beneath levels of detection).	Impacts are recognisable or detectable but deemed acceptable. These impacts are not considered as key to decision making but are relevant when considering mitigation measures. Impacts tend to be minor, short term or temporary changes to groundwater quality and/or flow and occur at local scale. Impacts can be easily mitigated.	Impact considered relevant to decision-making process (but not likely to be key decision making issues) and tend to range from short to medium and occur over medium scale areas, or otherwise represent a significant impact at local scale. Deterioration of groundwater quality and alteration of flow in the short to medium term that can be mitigated. The quality and quantity of groundwater is changed to the extent it is unusable for its purpose without treatment and regularly exceeds water quality criteria or changes in groundwater levels and flow have an impact on groundwater users or groundwater dependant environmental receptors.	Impact is considered important to the decision-making process. Impacts tend to be permanent, ranging long term to medium term, and occur over medium scale areas. Medium term loss of groundwater quality and/or changes to levels, flow and natural recharge rates that can be mitigated only over the medium-term. The quality and quantity of groundwater is changed to the extent it is unusable for its purpose without significant treatment and regularly exceeds water quality criteria or changes in groundwater levels and flow have a significant impact on groundwater users or groundwater dependent environmental receptors.	Impact is considered critical to the decision-making process. Impacts tend to be permanent or irreversible, long term and occur over large scale areas e.g. the Murray Darling system. Long-term, major irreversible change to groundwater quality and/or levels and aquifer water levels or water quality to the extent that it is unusable for the purpose it has been protected for i.e. protection of aquatic ecosystems, recreation and aesthetics or industrial use or has significant and irreversible impact to groundwater users or groundwater dependant environmental receptors.
Human health, hazards and risk (incl. EMF, Fire, Human health, etc)	No injury to the public is expected. Injury to workers requiring on-site treatment may be experienced, however unlikely to result in lost time. No fines or prosecutions expected. Unlikely risk of electromagnetic interference experienced by nearby sensitive receivers, fire or other hazards.	Moderate level of injury requiring offsite medical treatment and short term, however can be easily managed (i.e. spill and leaks can be easily isolated). Fines or prosecutions possible. Minor risk of electromagnetic interference experienced by nearby sensitive receivers, fire or other hazards. Risks can be easily mitigated.	Injury requiring hospitalisation or resulting in a temporary disability are likely and may result in investigations being conducted with some short time loss. Fines or prosecutions possible. Large risk of electromagnetic interference experienced by nearby sensitive receivers, fire or other hazards. Risks can be mitigated.	Member of the public or site workers suffer irreversible disability or serious injuries requiring long term hospitalisation. Fines and prosecutions likely. Large risk of electromagnetic interference experienced by sensitive receivers, fire or other hazards.	Death or serious injury to the public or site workers and the wider community. Fines and/or prosecutions incurred or expected. Significant risk of electromagnetic interference, fire or other hazards experienced by the wider region.
Historical heritage (incl. shipwrecks)	No or negligible impacts to heritage values.	Impacts to local heritage, but are acceptable.	Heritage values at a national or state level may be partially impacted, but not sufficient enough to remove heritage values.	Heritage values at a national or state level may be significantly impacted, but not sufficient enough to remove heritage values.	Heritage values of a site on the national, state or local heritage register will be removed.

Hydrology, flooding and water quality	No or negligible change to shoreline, intertidal and/ or benthic profiles. No or negligible change to hydrological regimes, flooding, water quality and regional productivity.	Short term or temporary change to shoreline, intertidal and/or benthic profiles including, localised short term or temporary change to hydrological regimes, flooding, water quality and regional productivity.	Short to medium term moderate change to shoreline, intertidal and/or benthic profiles including, localised short to medium term moderate change to hydrological regimes, flooding, water quality and regional productivity.	Medium to long term significant change to shoreline, intertidal and/or benthic profiles including, medium to long term significant change to hydrological regimes, flooding, water quality and regional productivity.	Long term irreversible change to shoreline, intertidal and/or benthic profiles including, long term irreversible change to hydrological regimes, flooding, water quality and wider productivity.
Land use	No impact on existing land uses and does not require any property acquisition. The Project element complies with all relevant legislative requirements and is consistent with government strategic planning studies.	Potential short term disruption to existing land use. Temporary limited access to properties but properties still able to be used for existing purpose. Minimal property acquisition that results in no land use changes. The Project element has minor inconsistencies with local planning policies.	Land use changes that would result in some inconsistencies with local planning policies. Moderate property acquisition that results in minimal land use changes. Temporary disruption of access to properties resulting in land use changes.	Land use changes that would result in significant inconsistencies with local planning policies. Major property acquisition required that results in some land use changes. Permanent disruption of access to properties resulting in some land use changes.	The Project cannot comply with all relevant legislative requirements and land use changes result in extensive conflict with state and local planning policies. Extensive property acquisition that results in significant land use changes. Permanent disruption of access to properties resulting in complete land use changes.
Landscape and visual	Minimal change to the existing visual amenity and/or landscape character of the area. Views tend to be of lower quality and where visual amenity is not a key feature or important to the viewer. Project would form only a small part of the view and would barely be noticeable.	Impacts are noticeable and tend to be short term, or temporary and at a local scale. Views are of high quality to a feature or landscape that are of local significance and a noticeable reduction in the visual amenity of the view and/or landscape character value is experienced by local receptors and recreational users of the coastline. Project is noticeable but would not alter the overall balance of elements that comprise the existing view. Impacts are still important in determining appropriate environmental management measures.	Impacts tend to range from long term to short term and occur over medium scale or localised areas. Views are of high quality to a feature or landscape that are of regional or localised significance and receptors are moderately sensitive. A noticeable reduction of the in the visual amenity of the view and/or landscape character value is experienced. Impacts are particularly important in determining appropriate environmental management measures.	Impacts tend to be permanent, or otherwise long to medium term and occur over medium scale areas. Views are of high quality to a feature or landscape that are of state significance and receptors are high to moderately sensitive. The Project would likely form a noticeable feature or element of the view which is readily apparent to the receptor.	Impacts tend to be permanent, or irreversible, or otherwise long term and occur over large scale areas. Views are of high quality to a feature or landscape that are of national significance and receptors are extremely sensitive and a substantial part of the view and /or landscape character value is altered.

Marine geology, oceanography and physical processes	No or negligible change to baseline marine geology, oceanography and physical processes. No detectable impact following disturbance.	Short term or temporary change to marine environment and physical processes. Temporary impact and natural recovery following disturbance.	Short to medium term change to marine environment and physical processes. Recovery in 1 to 2 years following disturbance.	Medium to long term change to marine environment and physical processes. Recovery in 3 to 10 years following disturbance.	Long term and possibly irreversible change to marine environment and physical processes. Potential recovery greater than 10 years following disturbance.
Marine water quality and sediment quality (incl. oil leaks and spills from vessels)	No or negligible change to marine water quality and/or sediment quality. No oil leaks or spills from vessel.	Short term or temporary change to marine water quality and/or sediment quality including localised short-term changes. No oil leaks or spills from vessel.	Short term to medium term change to marine water quality and/or sediment quality including localised short-term changes. Changes can be reversed promptly.	Medium to long term change to marine water quality and/or sediment quality. Increased sedimentation and/or change to sediment movement, wave patterns current and water quality due to dredging. Medium to long-term change to water quality as a result of oil leaks and spillage. Remediation required. Risk of prosecution and/or fine.	Long term change to marine water quality and/or sediment quality. Increased concentration of sediments and turbidity in the Project area including port area. Significant changes to sedimentation of seafloor. Long term changes to wave patterns current and water quality. Irreversible damage to marine environment and potential risk to human health due to spillage. Remediation required. Risk of prosecution and/or fine.

Noise and vibration (incl. underwater noise)	Minimal change to the existing situation and impacts are likely to be beneath levels of detection (at or below background). Noise and vibration from construction or operational activities are unlikely to result in impact and/or annoyance to sensitive receivers and/or local species.	Impacts are noticeable but acceptable and tend to be short term, or temporary (less than one week) and at a local scale and are relevant in determining standard environmental management measures. Noise levels are unlikely to exceed relevant guidelines and threshold criteria (at background + 5dB). Minor sensitivity of environmental receptors to impacts, with regular noise events that would cause minor annoyance. Noise and vibration from construction or operational activities which leads to a temporary (less than one week) disturbance of significant or non-significant species.	Impacts tend to range from long term to short term and occur over medium scale or localised areas and are important in the development of environmental management measures. Noise levels exceed relevant guidelines and threshold criteria (background + 10dB). Moderate sensitivity of environmental receptors to impacts, with regular noise events that would cause moderate annoyance and could be readily mitigated by the receptor (i.e. closing windows). Noise and vibration from construction or operational activities that result in temporary threshold shift or disruption to habitat, which leads to short term (less than five years) disappearance of non-significant species.	Impacts tend to be permanent, or otherwise long to medium term and occur over medium scale areas. High to moderate sensitivity of environmental receptors to impacts, with regular noise events that would cause significance annoyance / disturbance and could not be readily managed by the receptor (i.e. closing windows). Noise levels exceed relevant guidelines and threshold criteria (background + 20dB). Noise and vibration from construction or operational activities that result in mortality or permanent threshold shift (hearing damage) which leads to mortality or permanent disappearance of non-significant species or damage. Impacts may result in temporary threshold shift or disruption to habitat, leading to short term disappearance (less than five years) of nationally and state significant species or long term (greater than five years) disappearance of non-significant species.	Impacts tend to be permanent, or irreversible, or otherwise long term and occur over large scale areas. Very high sensitivity of environmental receptors to impacts, with regular noise events exceeding relevant guidelines and threshold criteria (background + 40 + 60 dB). Noise and vibration from construction or operational activities that leads to mortality and/or permanent or long-term (greater than five years) disappearance of nationally and state significant fauna.
Ports and harbours	Nil or minimal change to existing ports and harbours with impacts beneath levels of detection or within the normal bounds of variation.	Impacts are recognisable, but acceptable within the decision making process. Impacts tend to be short term, temporary or result in minor disturbance to existing operations.	Permanent impacts with small to medium scale changes. Moderate short -term disruption to existing operations. Impacts relevant to decision making process.	Permanent impacts with large scale changes. Considerable or long-term disruption to existing operations. Impacts of importance to decision making process.	Permanent impacts with large scale changes. Permanent and unacceptable disruption to existing operations. Impacts of critical to decision making process.

Shipping and navigation	No change to baseline shipping routes or navigational setting.	Short term or minor change from baseline shipping and navigational setting, with changes deemed acceptable and vessels able to adapt with minimal impact.	Long-term or moderate shift from baseline conditions leading to a partial loss or alteration to lower use navigable routes from baseline conditions i.e shipping routes and channels used by small and medium sized vessels using coastal routes.	Major alteration or loss of strategically important shipping lanes and navigational port approaches.	Total loss or very major alteration to internationally important shipping lanes.
Socio-economic (incl. Tourism, Commercial fisheries, Recreational activities, etc)	No change to the socio-economic environment. Impacts are likely to be beneath detection levels.	Impacts are noticeable but acceptable and tend to be short term, or temporary and at a local scale. The socio-economic environment is changed (i.e. decreased amenity and way of life) and people who live and work in the area (or its surrounds) may become annoyed by impacts associated with the project. It is expected that the community can/will adapt to changes over time and positive or negative economic impacts are easily managed or absorbed.	Impacts tend to range from long term to short term and occur over medium scale or localised areas. The socio-economic environment is changed (i.e. decreased amenity and way of life) and people who live and work in the area (or its surrounds) may be moderately annoyed by impacts associated with the project. It is expected that the community has some capacity to adapt and cope with change. Moderate or medium term impacts (positive or negative) to the economy may not be easily absorbed.	Impacts tend to be permanent, or otherwise long to medium term and occur over large or medium scale areas. The socio-economic environment is damaged and people no longer want to live and work in the area (or its surrounds). The community has limited capacity to adapt and cope with change. The negative public perception of the project is difficult to manage. Major or medium term impacts (positive or negative) to the economy may not be easily absorbed.	Impacts are permanent and occur over large scale areas. The socio-economic environment is damaged, and people no longer want to live and work in the area (or its surrounds). The community is highly sensitive to change and has limited capacity to adapt. The negative public perception of the project is difficult to manage. Major impacts (positive or negative) to the economy would not be easily absorbed.
Traffic and transport (onshore)	No detectable change in a local transport operational setting.	Short term changes in a local transport operational setting. Impacts may cause initial annoyance to road users, but it is considered likely that that they will adapt.	Long term but limited changes to transport operational setting that are able to be managed. Impacts likely to cause initial annoyance to road users but it is considered likely that that they will adapt.	Long term, significant changes to the functioning of the transport network beyond the project area.	Long and short term changes resulting in significantly heightened road safety risk from road accidents and significant changes to the functioning of the transport network at a regional scale.

Waste and resources	No inefficiencies in resource use and waste generated by the project is negligible.	Inefficient use of resources that will impact local resource supply and generation of some waste for a short period.	Inefficient use of resources that will impact local resource supply for a short to medium period, with impacts present at either a local or wider level. Generation of some unnecessary waste for a short-medium period.	Very inefficient use of resources that will impact local resource supply for a long period. Generation of large amounts of unnecessary waste for a long period.	Very inefficient use of resources that will impact resources supply for life of the project. Generation of large amounts of unnecessary waste for the life of the project.

Attachment B

EPBC Significance Criteria – which apply to the Project

Matter of National Environmental Significance	Significant impact criteria
Listed threatened species and ecological communities	
Extinct in the wild species	An action is likely to have a significant impact on extinct in the wild species if there is a real chance or possibility that it will: • adversely affect a captive or propagated population or one recently introduced/reintroduced to the wild; or • interfere with the recovery of the species or its reintroduction into the wild.
Critically endangered and endangered species	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of a population • reduce the area of occupancy of the species • fragment an existing population into two or more populations • adversely affect habitat critical to the survival of a species • disrupt the breeding cycle of a population • modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat • introduce disease that may cause the species to decline; or • interfere with the recovery of the species
Vulnerable species	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of an important population of a species • reduce the area of occupancy of an important population • fragment an existing important population into two or more populations • adversely affect habitat critical to the survival of a species

	• disrupt the breeding cycle of an important population • modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat • introduce disease that may cause the species to decline; or • interfere substantially with the recovery of the species.
Critically endangered and endangered ecological communities	An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will: • reduce the extent of an ecological community • fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines • adversely affect habitat critical to the survival of an ecological community • modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns • cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting • cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: o assisting invasive species, that are harmful to the listed ecological community, to become established; or o causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or • interfere with the recovery of an ecological community
Listed migratory species	
	An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

	• substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species • result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or • seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.
The Commonwealth marine environment	
	An action is likely to have a significant impact on the environment in a Commonwealth marine area if there is a real chance or possibility that the action will: • result in a known or potential pest species becoming established in the Commonwealth marine area • modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results • have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution • result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity; social amenity or human health • result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected; or • have a substantial adverse impact on heritage values of the Commonwealth marine area, including damage or destruction of an historic shipwreck.

Project Name: SA Offshore Wind Farm - Preliminary Environmental Risk Review

Version: [0]

Date: 9 August 2021

Author: Giorgia Katsidonis / Lennie Le / Alia Abid

Review: Leah Howell / Damon Sutherland / John Haese

ID	Aspect	Impact description	Project phase	Initial Risk				Justification for initial risk rating	Possible mitigation measures	Residual Risk		
				Likelihood	Consequence	EPBC Significance rating	Inherent Risk Rating			Likelihood	Consequence	Residual Risk Rating
Construction (incl. pre-construction)												
1	Aboriginal heritage (incl. underwater heritage)	Disturbance of known or previously unrecorded Aboriginal cultural heritage sites during pre-construction and construction works potentially impacting on heritage values	Construction (incl. pre-construction)	Possible	Moderate		Medium	Prior to European settlement, the Coorong was one of the most densely populated areas in Australia, with the Traditional Owners, the Meintangk people, who were members of the Ngarrindjeri people having lived there for thousands of years. The Coorong remains an intrinsic part of their culture, spirituality and identity. The Project site is within the area of a Native Title claim by First Nations of the South East #1 (SAD211/2017), which covers all land within the study area to a point 500m seaward of the Mean Low Water Mark and the Ngarrindjeri and Others Native Title Claim (SAD6027/1998) which covers the Coorong and Kingston district area. It is possible that known or previously unrecorded Aboriginal cultural heritage sites could be encountered within the construction footprint. While Project infrastructure would be located to avoid impacts as much as practicable (by utilising previously disturbed land and existing infrastructure easements and corridors where possible), some disturbance to Aboriginal cultural heritage sites could be required. This will be further examined and determined as the Project progresses, with the avoid, minimise, mitigate, offset hierarchy applied during design development.	Engagement and site walkovers with Native Title claimants and local Aboriginal groups will be carried out to confirm cultural heritage values within the construction footprint and project areas. A Cultural Heritage Management Plan (CHMP) will be prepared to outline measures for the management and protection of Aboriginal heritage sites through all stages of the Project, and would include an unexpected finds procedure. Mitigation, such as salvage prior to works on-site, may be carried out for impact to areas containing large artefact scatters.	Possible	Moderate	Medium
2	Aboriginal heritage (incl. underwater heritage)	Impact to culturally sensitive landforms (Dreaming sites) during pre-construction and construction works resulting in long-term loss of connection to land	Construction (incl. pre-construction)	Possible	Moderate		Medium	Prior to European settlement, the Coorong was one of the most densely populated areas in Australia, with the Traditional Owners, the Meintangk people, who were members of the Ngarrindjeri people having lived there for thousands of years. The Coorong remains an intrinsic part of their culture, spirituality and identity. The Project site is within the area of a Native Title claim by First Nations of the South East #1 (SAD211/2017), which covers all land within the study area to a point 500m seaward of the Mean Low Water Mark and the Ngarrindjeri and Others Native Title Claim (SAD6027/1998) which covers the Coorong and Kingston district area. Desktop assessments have not been able to identify culturally sensitive sites and consultation with Aboriginal representatives is required. If present, there is a risk that construction activities could temporarily restrict access to some culturally sensitive sites.	Engagement with Native Title claimants and local Aboriginal groups will be carried out to confirm intangible cultural heritage values in the study area. Design would avoid sites / minimise impacts to sites of cultural significance where practicable.	Possible	Minor	Low
3	Air quality	Generation of air emissions and dust from pre-construction and construction works impacting on sensitive receptors and local air quality	Construction (incl. pre-construction)	Likely	Minor		Medium	Proposed pre-construction and construction works are expected to generate some air emissions (e.g. dust and grit through land disturbance and GHG and exhaust fumes etc from construction vessels and vehicles), however this would be localised and of limited duration. A preliminary land use assessment indicates there are limited sensitive receptors within the study area.	A future air quality assessment would inform the requirements for a Construction Environmental Management Plan (CEMP). Dust monitoring programmes and equipment (if required) could be used to determine when activities need to be altered to reduce dust emissions. Actions such as watercarts on haul roads and main construction sites could be used to generate less dust. Standard measures to limit the generation of dust and other air emissions (such as most efficient use of construction equipment and planning to reduce vessel and vehicle use and movements) would also be included in the CEMP.	Possible	Minor	Low
4	Aviation and radar (incl. EMI)	Interference to civil and military radar during pre-construction and construction works	Construction (incl. pre-construction)	Unlikely	Negligible		Very Low	There are no commercial airports or military bases in proximity to the Project (proposed turbine locations), with the closest commercial airport being Mount Gambier Airport approx. 130km away. Kingston airport, owned by Kingston District Council, is located adjacent to the Project area, and is used for emergency services and handling regional flights to a number of destinations; including Adelaide and Mount Gambier. Scenic flights over the Coorong National Park form part of the local tourism industry. Scenic flights depart from Strathalbyn, north of the Coorong. However, interference to aircraft radar during pre-construction and construction works is considered low due to the anticipated construction methodologies.	A future radar impact assessment would inform of any requirements to minimise impacts during construction.	Unlikely	Negligible	Very Low
5	Aviation and radar (incl. EMI)	Impact to aviation and aircraft from obstruction of obstacle limitation surfaces (OLS) and night lighting during pre-construction and construction works	Construction (incl. pre-construction)	Possible	Moderate		Medium	Kingston airport, owned by Kingston District Council, is located adjacent to the Project area, and is used for emergency services and handling regional flights to a number of destinations; including Adelaide and Mount Gambier. Scenic flights over the Coorong National Park form part of the local tourism industry. Scenic flights depart from Strathalbyn, north of the Coorong. As scenic flights and emergency and regional services are expected to be largely carried our during day-light hours, impact from any night-lighting utilised during pre-construction or construction is anticipated to be low. This would be localised and of limited duration.	A future study of scenic, emergency and scenic flight routes and OLS, including engagement with local flight operators, would inform of any requirements to minimise impacts during construction.	Possible	Minor	Low
6	Aviation and radar (incl. EMI)	EMI during pre-construction and construction works impacting local television and radio	Construction (incl. pre-construction)	Possible	Minor		Medium	Telstra owns a digital TV transmitter located approximately 38 km south of the Southern Ports Hwy at Mount Benson, which services the Kingston SE/Robe area. There is currently a 87.6 FM Low Powered transmitter located at Kingston SE within the Project area. LPFM or Low power FM transmitters generally range between 50-1000 watts. While the TV transmitter is a fair distance, interference to radio transmitters would need to be investigated further. Tower and blades could obstruct, reflect or refract the electromagnetic waves. The degree and nature of the interference will depend on: - The location of the wind turbine between receiver and transmitter. - Characteristics of the rotor blades. - Characteristics of receiver. - Signal frequency. - The radio wave propagation in the local atmosphere.	Technical mitigation measures on radio interference can be applied during the planning stage, siting the turbine away from line-of-sight of the broadcaster transmitter or applying appropriate construction methodologies. Future study of potential electromagnetic interferences is required to inform design and reduce impacts of radio signal.	Unlikely	Minor	Low
7	Ecology - State benthic and marine	Potential impact on South Australian listed or threatened benthic or marine species and communities, or their habitat	Construction (incl. pre-construction)	Likely	Moderate		Medium	**Listed or threatened:** There are nine South Australian *National Parks and Wildlife Act 1972* (NPW Act) listed Marine species known or likely to occur within the Project area. These include five whale species, three turtle species and Australian Sea Lion (*Neophoca cinerea*). **Non-threatened:** There are eight species listed under the *Fisheries Management Act 2007* that may be present in the Project area. These include the Southern Rock Lobster and Abalone. The Project sits within areas significant to the Southern Rock Lobster (Jasus edwardsii) population. The study area is also part of the southern zone of the South Australia Abalone Fishery. There are up to 26 species of seadragon and pipefish known to occur within the region. Broad-scale Seamap benthic habitat mapping identifies almost half of the study area as low profile reef with macroalgae. Areas outside the site but within the study area contain a mosaic of seagrass meadows, reefs (notably Margaret Brock and North Reefs) and unconsolidated substrate. The reefs within the study area support the most western extent of giant kelp (*Macrocystis angustifolia*) and bull kelp (*Durvillea potatorum*).	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Pre-clearance flora and fauna surveys will be carried out to confirm the presence of any threatened species and/or habitat that may support listed communities or species at the site prior to works, and will inform management measures to be applied in the Construction Environmental Management Plan. If smaller areas within the Project area are found to contain habitat for terrestrial fauna, these areas may be avoided.	Possible	Minor	Low

8	Ecology - State terrestrial	Potential impact on South Australian species and communities, or their habitat	Construction (incl. pre-construction)	Possible	Moderate		Medium	**Listed or threatened:** There are seven non-migratory bird species within the Project area. There are potentially a total of 27 flora and 33 fauna NPW listed threatened species known or likely within/surround the Project area including areas of work such as the Black Range substation (Option 1), Reedy-Ck-Lucindale Rd (Option 2) and the potential corridors for transmission lines from the Black Range Substation to the South East Substation. **Non-threatened:** The Coorong, and Lakes Alexandrina and Albert Wetlands System (Ramsar wetland), are adjacent to the marine boundary 20km west of the land-based section of the Project area. While the boundary does not directly intersect this region, there are several wetland features that continue along the coast that intersect with regions that are likely to be inhabited by the same species that would be present within the Ramsar site. The inland environment consists of ephemeral wetland networks which provide habitat to several species requiring freshwater habitats for foraging and breeding. Some of these high environmental values include parts of the southern extend of the Watervalley Wetlands. There is potential for the powerline corridor (Black range and Reedy Ck-Lucindale Rd) to clear, fragment and interrupt existing habitat associated with the wetlands. In addition, the existing corridor that heads south to the south east substation may require widening and may impact a number of forestry, conservation and protected area.	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Pre-clearance flora and fauna surveys will be carried out to confirm the presence of any threatened species and/or habitat that may support listed communities or species at the site prior to works, and will inform management measures to be applied in the Construction Environmental Management Plan. If smaller areas within the Project area are found to contain habitat for terrestrial fauna, these areas may be avoided.	Possible	Minor	Low
9	Ecology - State migratory birds	Potential impact on South Australian listed migratory birds, or their habitat	Construction (incl. pre-construction)	Possible	Moderate		Medium	There are potentially 23 bird species (not all migratory) of SA listed threatened species known or likely within/surround the Project area including areas of work such as the Black Range substation (Option 1), Reedy-Ck-Lucindale Rd (Option 2) and the potential corridors for transmission lines from the Black Range Substation to the South East Substation. Many of these species are already listed at a Commonwealth level under the EPBC Act, however there are 14 migratory bird species within or adjacent to the Project area that are listed on the NPW Act. There are also threatened NPW Act listed non-migratory populations known to occur within the area. There is potential for the East Asian-Australasian Flyway to be present in the Project area during the summer period. It is unlikely that construction activities would interact with any threatened and/or migratory birds however further assessment is required to plan for placement of offshore and onshore infrastructure. Marine birds may be exposed to noise impacts from piling when diving. The Coorong, and Lakes Alexandrina and Albert Wetlands System (Ramsar wetland), are adjacent to the marine boundary 20km west of the land-based section of the Project area. While the boundary does not directly intersect this region, there are several wetland features that continue along the coast that intersect with regions that are likely to be inhabited by the same species that would be present within the Ramsar site. The inland environment consists of ephemeral wetland networks which provide habitat to several species requiring freshwater habitats for foraging and breeding. Some of these high environmental values include parts of the southern extend of the Watervalley Wetlands. There is potential for the powerline corridor (Black range and Reedy Ck-Lucindale Rd) to clear, fragment and interrupt existing habitat associated with the wetlands. In addition, the existing corridor that heads south to the south east substation may require widening and may impact a number of forestry, conservation and protected area.	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Pre-clearance flora and fauna surveys will be carried out to confirm the presence of any threatened species and/or habitat that may support listed communities or species at the site prior to works, and will inform management measures to be applied in the Construction Environmental Management Plan. If smaller areas within the Project area are found to contain habitat for terrestrial fauna, these areas may be avoided. additional controls may be required on seasonality of work as to not disturb nesting and or foraging behaviour of some of theses species if the areas of habitat can not be avoided.	Possible	Minor	Low
10	Ecology - EPBC listed ecological communities	Potential impact on Commonwealth listed communities, or their habitat	Construction (incl. pre-construction)	Likely	Major	Yes	Very High	The EPBC listed threatened ecological community Giant Kelp Marine Forests of South East Australia have the potential to occur within the study area. The reef within the study area support the westner extent of giant kelp and bulk kelp, which are both EPBC listed. Further site surveys will be required to confirm their presence. There are potentially 2 Terrestrial TEC new connection Black Range substation (Option 1) that are likely and or are known in the Project area. There are 2 known TECs including Seasonal herbaceous Wetlands (freshwater) of the temperate lowland plains (Critically Endangered) and Subtropical and temperate Coastal Saltmarsh (Vulnerable). Within the new connection Reedy Ck- Lucindale Rd (Option 2) that are likely and or are known in the Project area. There are 1 known TECs including Seasonal herbaceous Wetlands(freshwater) of the temperate lowland plains.	Pre-clearance flora and fauna surveys will be carried out to confirm the presence of any threatened species and/or habitat that may support listed communities or species at the site prior to works, and will inform management measures to be applied in the CEMP. If smaller areas within the Project area are found to contain habitat for terrestrial fauna, these areas will be avoided and no-go-zones applied. If impact is unavoidable, other options will be explored such as biodiversity offsetting and other management measures. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables.	Possible	Moderate	Medium
11	Ecology - EPBC migratory species (terrestrial)	Potential impact on Commonwealth listed migratory species, or their habitat	Construction (incl. pre-construction)	Possible	Moderate	Yes	Medium	There are 37 EPBC listed threatened species known or likely within/surround the Project area including areas of work such as the Black Range substation (Option 1), Reedy-Ck-Lucindale Rd (Option 2) and the potential corridors for transmission lines from the Black Range Substation to the South East Substation. There are thirteen EPBC listed migratory bird species known or likely to occur within the Project area. There are eleven EPBC threatened listed bird species. Four of these species are listed as Critically Endangered. It is unlikely that construction activities would interact with any threatened and/or migratory birds however further assessment is required to plan for placement of offshore and onshore infrastructure. Marine birds may be exposed to noise impacts from piling when diving. Furthermore, The Coorong, and Lakes Alexandrina and Albert Wetlands System (Ramsar wetland), are adjacent to the marine boundary 20km west of the land-based section of the Project area. While the boundary does not directly intersect this region, there are several wetland features that continue along the coast that intersect with regions that are likely to be inhabited by the same species that would be present within the Ramsar site. The inland environment consists of ephemeral wetland networks which provide habitat to several species requiring freshwater habitats for foraging and breeding. Some of these high environmental values include parts of the southern extend of the Watervalley Wetlands. There is potential for the powerline corridor (Black range and Reedy Ck-Lucindale Rd) to clear, fragment and interrupt existing habitat associated with the wetlands. In addition, the existing corridor that heads south to the south east substation may require widening and may impact a number of forestry, conservation and protected area. The impact is considered to be a significant impact under the EPBC criteria because the Project is likely to modify, destroy, fragment, isolate or disturb important areas of habitat that would have an adverse impact on the marine ecosystem functioning.	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables.	Possible	Minor	Low
12	Ecology - EPBC migratory species (marine)	Potential impact on Commonwealth listed migratory birds, or their habitat	Construction (incl. pre-construction)	Possible	Moderate	Yes	Medium	There are 13 EPBC listed threatened Marine species known or likely to occur within the Project area. These include six whale species, three turtle species, Dusky Dolphin, Porbeagle and White Shark. There are also two seadragon species listed under the EPBC Act as 'marine' species, leafy seadragon (Phycodurus eques) and weedy seadragon (Phyllopteryx taeniolatus) known to occur within the region. The impact is considered to be a significant impact under the EPBC criteria because the Project is likely to modify, destroy, fragment, isolate or disturb important areas of habitat that would have an adverse impact on the marine ecosystem functioning.	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables.	Possible	Minor	Low
13	Ecology - EPBC Cth marine environment	Potential direct or non-direct impacts to Commonwealth Marine Areas	Construction (incl. pre-construction)	Almost Certain	High	No	High	Commonwealth waters are outside the Project area but within the study area. Bonney Coast Upswelling is listed as a Key Ecological Feature of the Commonwealth Marine area MNES. Further design considerations of the turbine location once studies have been completed if there is potential to adjust the pile locations to avoid areas of high ecological value.	Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables.	Likely	Moderate	Medium
14	Existing infrastructure	Potential impact to existing local, regional or state significant infrastructure during pre-construction and construction works	Construction (incl. pre-construction)	Likely	High	Yes	High	The Project will require interface with a range of other significant infrastructure during pre-construction and construction, such as ports, roads, electricity networks and other services and utilities. Pro-active planning, early engagement and the implementation of a governance structure with third-parties would help identify risks and associated risk management strategies. Unexpected infrastructure interfaces would be identified during design development and construction planning through Dial-Before-You-Dig (DBYD) searches and ground surveys. Hard interfaces will be identified early for pro-active management and engagement with third-parties. Refer to 'Ports and harbours' for risk of potential impacts to existing port assets.	Future studies and engagement with third-parties during design development would inform of any requirements to minimise impacts to other infrastructure during pre-construction and construction.	Possible	Minor	Low
15	Ground conditions and contamination	Land excavation, stockpiling, transport or disposal of contaminated material (including or acid sulfate soils) produced during pre-construction and construction works leading to potential risks to public health and the environment	Construction (incl. pre-construction)	Likely	Minor		Medium	The Department for Environment and Water (DEW) Acid Sulfate Soil Potential mapping (2009) shows some areas within the study area have up to and more than a 60% chance of Acid Sulfate Soils being present. Agricultural and other previous disturbance and lands uses within the study area have potentially resulted in soil contamination. The potential for Acid Sulfate Soils and contaminated land within the construction footprint would be ascertained through on- site assessment during design development and pre-construction stages. Spoil and excavated material is expected to be generated during construction, particularly for the underground components (cable bays and u/g cables). In line with the South Australian *Environment Protection (Waste to Resources) Policy 2010* , it is proposed that spoil and material be assessed for reuse on-site. This would require stockpiling on-site in the interim.	A contamination assessment would establish baseline indicators of material at site, which would be used to inform the CEMP, particularly in relation to management and disposal of spoil. Spoil from earthworks would be reused on-site where possible or disposed of in accordance with EPA requirements. Careful consideration would be given to the location for the temporary stockpiling of spoil and excavated material, which may be required over the short term. Stockpiles would be managed in accordance with the South Australian EPA *Guideline for stockpile management* (2020), which would reduce risk.	Unlikely	Moderate	Low
16	Ground conditions and contamination	Land disturbance, erosion, alteration of water courses and drainage patterns, vegetation removal, land clearing or modification during pre-construction and construction works impacting soil and water quality	Construction (incl. pre-construction)	Likely	Minor		Medium	The Department for Environment and Water (DEW) Wind Erosion Potential mapping (2009) shows some areas (mainly along the coast) have a high to extreme wind erosion potential, with most areas mapped as having a moderately low to Low wind erosion potential. Construction will require excavation and some land cover and vegetation clearance, having the potential to impact on soils, drainage patterns and surface water quality. Refer to 'Hydrology, flooding and water quality ' for potential impacts to freshwater receiving environments.	Vegetation and dense land cover clearance would be minimised as much as practicable during design development. Areas containing significant drainage patterns or heavy water flows would be avoided. A CEMP would establish management measures for cleared areas to ensure impacts to soil and water quality are reduced. This would include installation of temporary drainage routes, sediment control measures and the progressive revegetation of disturbed areas, where practicable.	Unlikely	Minor	Low

17	Groundwater	Impacts to ground water quality during pre-construction and construction works	Construction (incl. pre-construction)	Likely	Moderate		Medium	The Project would be located in the Murray Groundwater Basin, with some transmission infrastructure also potentially located in the Otway Basin, both of which are classified as shallow sedimentary ground water basins. The Department for Environment and Water (DEW) Depth to Water Table mapping (2009) shows a range of water table depths within the study area, from some areas where the water table is above the surface for more than 10 months to others where the water table is greater than 200cm below the surface. Shallower water depths, and those above the surface, have a higher risk of local ground water quality being impacted during pre-construction and construction. Further investigation to ground-truth water depths and quality and local uses of groundwater will be	Design development would look to avoid areas where the water table is above the surface, as far as practicable. Early installation of drainage controls and erosion and sedimentation monitoring during pre-construction and construction would assist in managing and mitigating impacts. Establishing appropriate procedures for handling, transporting and using potentially contaminating substances including diesel, petrol, oils, greases, cement and other construction chemicals would be included in the CEMP.	Possible	Minor	Low
18	Groundwater	Impacts to ground water levels or flow during pre-construction and construction works	Construction (incl. pre-construction)	Likely	Moderate		Medium	The Project would be located in the Murray Groundwater Basin, with some transmission infrastructure also potentially located in the Otway Basin, both of which are classified as shallow sedimentary ground water basins. Excavation of the landfall site (transition pit) and other onshore transmission infrastructure may also extend below the groundwater level. Local dewatering may be necessary to manage groundwater inflows to excavation. It is considered unlikely that lowering the water tables temporarily would have a long-term impact on groundwater flows however, a precautionary risk rating has been given. The Department for Environment and Water (DEW) Recharge Potential mapping (2009) shows most areas within the study area have a recharge potential of more than 60%, with few areas having less than 30%.	Appropriate management of temporary dewatering and groundwater control would be included in the CEMP, including recharge back to aquifer down gradient if required	Possible	Minor	Low
19	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Potential for leaks and spills during pre-construction and construction works as a result of storage, handling and use of dangerous goods and construction equipment	Construction (incl. pre-construction)	Possible	Moderate		Medium	The storage and handling of dangerous goods and hazardous materials have the potential to impact construction workers and the surrounding environment if leaks and spills occur, resulting in the potential contamination of air, soils, surface water, and/or groundwater.	Standard construction management measures such as storage of dangerous goods in accordance with the relevant guidance would be included in the CEMP and would reduce potential risks.	Unlikely	Minor	Low
20	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Human exposure to unsafe levels of Electro-magnetic fields (EMF) during pre-construction and construction works	Construction (incl. pre-construction)	Highly unlikely/rare	Moderate		Low	Electro-magnetic fields are produced wherever electricity is used or transmitted. Therefore, the electricity supply to support work at the site is expected to be a source of Electro-magnetic fields. While there is no established evidence that exposure to Electro-magnetic fields from power lines, substations, transformers or other electrical sources, regardless of proximity, causes any health effects, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) still refers to guidelines that recommend the limiting of exposure to Electro-magnetic fields so that the threshold at which the interactions between the human body and external electric and magnetic fields that causes adverse effects within the body cannot be reached. It is expected that there would be a low risk of exceeding the levels recommended by ARPANSA. Exposure time would also be limited.	Site OHS plans would manage the risk of exposure to Electro-magnetic fields.	Highly unlikely/rare	High	Low
21	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Potential for fire and increased bushfire risk during pre-construction and construction works	Construction (incl. pre-construction)	Unlikely	Moderate		Low	The Project is not located in a designated Bushfire Protection Area, as brought in under the Ministerial Bushfire Management Plan Amendment Report in 2006/2007. However, the DEW Last Fire mapping (2021) shows bushfires have recently occurred in the region, including the Blackford bushfire (Jan 2021) and the Kerilira bushfire (2019). Construction works may increase risk of fire and bushfire from accidental ignition from construction equipment, fuels and chemicals.	Standard construction management measures such as management plans addressing these issues would be included in the CEMP and would reduce the risk of the Project increasing fires and bushfires in the local region.	Highly unlikely/rare	Moderate	Low
22	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Vulnerability of the Project to natural hazards, extreme weather and climate change during pre-construction and construction works	Construction (incl. pre-construction)	Unlikely	Moderate		Low	Climate induced risks include increased dust generation during drier weather, increased construction delays due to wet weather, increased rainfall resulting in increased flow events in watercourses, temporary flooding and risk of failure of erosion and sediment controls and potential for construction workers to experience heatstroke as a result of extreme heat and hot weather events.	Standard management measures such as management plans addressing these issues would be included in the CEMP and would reduce the impact on the Project, including adequate training and PPE being provided to construction workers.	Highly unlikely/rare	Moderate	Low
23	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Exposure of construction personnel or the public to unsafe conditions as a result of pre-construction and construction works and on-site practices	Construction (incl. pre-construction)	Possible	Major		High	Offshore wind project presents unique risks to construction workers because of the nature of offshore construction (i.e. working at height and offshore, falls, electrical risks, subsea works and extreme weather experience in vast open spaces off the coast). In extreme circumstances this may result in death or serious injury of construction personnel. The wider community is not expected to be impacted as access to construction sites on and offshore will be restricted.	Stringent site OHS plans would be developed and implemented to manage the risk of death or serious injury during construction on and offshore. Standard construction management measures would also reduce the likelihood of occurrence, including compulsory training and PPE provided to construction workers.	Unlikely	Major	Medium
24	Historic heritage (incl. shipwrecks)	Impact to listed and non-listed heritage places and/or objects (maritime and terrestrial) during pre-construction and construction works	Construction (incl. pre-construction)	Unlikely	Moderate		Low	There are no Commonwealth listed heritage places or sites within the study areas or surrounds. There are a number of State-listed shipwrecks mapped in Lacepede Bay. and surrounds, the closest being approximately 3km from the nearest turbine. There are also a number of State heritage places and local culture heritage assets mapped in the area. These are namely buildings.	Project infrastructure would be located to avoid impacts to State and local historic heritage assets. Management measures would be included in the CEMP (as required) to minimise any indirect impacts to mapped heritage places and sites.	Highly unlikely/rare	Moderate	Low
25	Hydrology, flooding and water quality	Potential impacts to surface water quality during pre-construction and construction works (onshore)	Construction (incl. pre-construction)	Possible	High		Medium	There are a number of wetland complexes mapped in the area, some falling within the study area. Some of the wetlands in the areas are mapped as Priority Wetland Complexes LUT- Lower Limestone Coast PWA - Water Allocation Plan 2010 (DEW). There are also a number of wetland of international importance outside the study area in the region, including the Coorong, and Lakes Alexandrina and Albert wetland (Ramsar site). Pre-construction and construction activities such as earthworks and vegetation clearing could potentially impact on nearby waterways (i.e. increased nutrients entering waterways). There is also the potential for leaks and spills during construction, which could potentially impact on surface water quality as a result of pollutants reaching waterways. Impacts to surface water quality may also have indirect impacts on potential threatened species which may be supported by these environments. This risk rating is precautionary until further understanding of local wetland and surface water systems is carried out and construction methods are further developed.	Further investigations will be carried out to understand the value of surface water environments in the area and to inform appropriate management measures to be applied. Design development would look to minimise impacts through siting of infrastructure and construction methodology. Early installation of drainage controls and erosion and sedimentation monitoring during pre-construction and construction works would assist in managing and mitigating impacts to land processes. Standard construction management measures in accordance with the SA EPA requirements, such as bunding around earthworks and chemical storages and implementation of a CEMP, would reduce the risk of increased nutrient runoff or accidental spills and the potential impact on any waterways. Construction during dryer periods would also avoid runoff impacts to receiving freshwater and marine environments from degradation of water quality.	Unlikely	High	Medium
27	Land use	Potential impact or major change to existing and planned future residential, recreational, commercial and industrial land uses during pre-construction and construction works	Construction (incl. pre-construction)	Almost Certain	Moderate		High	The onshore section of the Project area covers approximately 1,800 km2 and intersects various land uses zoned by the Kingston District Council. Outside of the Town of Rosetown and Kingston S.E, the majority of the Project area is within a Rural Zone, with small pockets of Conservation Zone, namely along the coastline. The construction of the Project (namely ancillary sites) would be significantly inconsistent with these planning zones. This is a precautionary risk rating. As the design of the Project progresses the Project area will be further refined and would exclude/avoid residential areas. Project infrastructure, such as the transmission line connecting to the electricity network, would look to utilise existing electricity easements or other infrastructure corridors as much as practicable.	Further assessment will identify specific land use impacts and in particular, any impacts to property. Further design development will aim to reduce land use impacts by refining the Project area and construction boundary to avoid sensitive land uses. Consultation with local council and other stakeholders will take place during detailed design, to ensure impacts are managed and appropriate consideration is given to future developments planned in the area. Management measures will be included in the CEMP, including ancillary sites to be rehabilitated to their pre-construction condition.	Likely	Minor	Medium
28	Land use	Property acquisition or tenure of land or waters during pre-construction and construction works	Construction (incl. pre-construction)	Possible	Moderate		Medium	Currently a wide corridor is being investigated for the landfall site and onshore transmission infrastructure, with final locations to be determined during design development, and subject to further technical and environmental studies, and discussions with Project stakeholders. The landfall site would be located landward of the mean high-water mark (MHWM) on land suitable to accommodate an underground joint pit. The transmission infrastructure is anticipated to be predominately above ground. Existing electricity easements and other infrastructure corridors would be utilised as much as practicable to minimise impact. Onshore ancillary infrastructure associated with the Project includes operation and maintenance facilities comprising a control room, site offices, storage facilities, and personnel facilities. These will be sited remote to the Project area. Key construction activities would be carried out within state waters, including the transport of monopile foundations by supply vessels, piling works, and seabed excavation for installation of offshore cables. For onshore construction, acquisition of freehold land is unknown. This is a precautionary risk rating. As the design of the Project progresses the Project area will be further refined and may exclude/avoid residential areas.	Further consultation with the SA Government will determine key risks and impacts to acquiring access to State waters for offshore construction. The Project will be developed in accordance with the Coastal Adaptation Strategy, that applies to the Project area.	Possible	Moderate	Medium
29	Landscape & visual	Potential adverse impacts during pre-construction and construction works on visual and/or landscape values experienced from public open space (coast) or residential areas	Construction (incl. pre-construction)	Almost Certain	Moderate		High	The natural landscape of Kingston District Council, being a major recreational (e.g. fishing) and recreation and tourism node (wine-making) , is highly valued by the local, regional and state community. The construction equipment and activities will likely form a noticeable feature on the landscape that is currently untouched oceans views. However, potential impacts to landscape and visual amenity associated with construction phase are considered to be of a temporary nature. The site itself was selected being of the lower population density of the area, to reduce impacts as much as possible. The WTG have been indicatively placed as far off the coast (approximately as possible to reduce visual impacts.	Further visual assessments will be carried out to understand the magnitude of change for landscape character and impact to visual amenity at various viewpoints along the coastline and residential areas. Landscaping and revegetation would be used to minimise onshore impacts.	Almost Certain	Moderate	High
30	Marine geology, oceanography and physical processes	Changes to coastal and marine processes (such as tides, currents, water flow and wave patterns) potentially impacting on coastal land and assets, and the marine environment during pre-construction and construction works	Construction (incl. pre-construction)	Unlikely	Negligible		Very Low	At this coastal location, tides and tidal currents, waves, wave-driven currents, and wave current interaction would determine the driving condition for sediment movement. The Coorong Region is classified as microtidal with a tidal range of 0.7m from lowest to highest astronomical tide. Tides are predominantly semi-diurnal, with a single tide cycle on most days. The installation of temporary marine structures could alter local hydrodynamic processes, however, it is unlikely to be significant in the far-field with only minor and temporary influences related to localised scour in the near field.	Appropriate computer modelling methods using tidal, wave and sediment modelling scenarios are required to assess hydrodynamic impacts to seafloor habitats and coastal geomorphological processes during the construction phase – both inside the wind farm and further afield (near shore).	Unlikely	Negligible	Very Low

31	Marine water quality and sediment quality	Potential impacts to marine water and sediment quality during pre-construction and construction works	Construction (incl. pre-construction)	Possible	Moderate		Medium	**Water quality -** Seagrass meadows are a good indicator of water quality; previous monitoring of quality of the seagrass meadows within the Coorong found a number of drains were impacted by an excess of nutrient runoff (Wear et al 2006). Overall, soluble and total nutrient levels are relatively low throughout Coorong, with impact on seagrass meadows potentially a result of the recovery time of Posidonia species during episodic high rainfall events. Pressures that may result in increased nutrients within the area include discharge from agricultural drains, urban stormwater and septic tank leakage. Construction/decommissioning activities are likely to increase these levels. **Turbidity/sediments -** Modelling will be required to assess turbidity generated by construction and decommissioning activities. Pile driving or dredging to install cabling in clean sands is expected to generate a short-term, low intensity sediment plume. Any blasting of rock will also release sediments into the water column, creating a temporary turbid plume. It is likely that the plume would dissipate rapidly and would be unlikely to impact on adjacent light sensitive habitats or impede fauna vision. **Spills -** Vessels, turbines and facilities utilise use and store a variety of fuels, oils, lubricants and other chemicals. These substances can have lethal and sub-lethal effects to organisms (Yuewen and Adzigbli 2018) and can persist in the environment for long periods of time. An uncontrolled release could occur from (for example) vessel collision, equipment failure, leaks, etc. If trenching is required there may be significant disturbance to the seabed and will likely increase turbidity of the water and reduce clarity dependent on the method of trenching deployed. The water quality will be impacted with in the immediate region and potentially further a field dependent on the strength od the current movements. Adjacent to the site is the Giant Kelp TEC, this community may become impacted by increased turbidity and have residual effects of smothering in the wider region.	A marine pollution risk assessment will be undertaken to inform the development of spill management strategies for the CEMP. Standard chemical storage, handling and maintenance procedures will be required. Further studies are required to understand the benthic substrates. Where possible look to minimise disturbance of the seabed where possible and apply methods that would minimise the dispersion of the sediment. Also controls should be in place to limit works if the currents will move the sediment outside the Project area.	Unlikely	Moderate	Low
32	Noise and vibration	Noise and/or vibration from pre-construction and construction activities exceeding thresholds/limits potentially impacting residential or other sensitive receptors (onshore)	Construction (incl. pre-construction)	Possible	Minor		Low	Construction of the onshore substation, landfall site and underground cables may cause noise and vibration impacts to nearby sensitive receptors. Some minor noise will be generated by heavy vehicles using haulage routes. Sensitive receptors within the Project area may be sensitive to noise particularly as it is likely the ambient noise level will be low given the remoteness of the coastal area. Site selection was determined due to lower sensitive receptors in the area, with the nearest town being Kingston SE. Area surrounding Kingston SE is largely rural and therefore it is expected that noise impacts may be minimal further afield. Construction would take place over a 24 month period and would be staged.	Further noise modelling and monitoring would identify areas where construction noise and vibration may exceed acceptable levels for sensitive receptors. Potential impacts shall be assessed against Statutory and guideline noise and vibration targets for operational noise and vibration. Mitigations strategies include use of noise suppression devices, noise barriers where appropriate and limiting time frames for noisy works.	Possible	Minor	Low
33	Noise and vibration	Underwater noise and/or vibration from pre-construction and construction activities exceeding thresholds/limits potentially impacting sensitive marine receptors and species (offshore)	Construction (incl. pre-construction)	Almost Certain	High		High	Recent vessel traffic data (AMSA, 2021) shows that vessel traffic is quite low, with boating only limited to recreational fishing and crayfishing in the area, indicating that background noise levels are likely to also be low. Port Adelaide is the closest main port, located approximately 300 km to the north west. Driving of monopiles into seabed during construction will be sequential, and although of short duration (estimated to be 6 hours per monopile) would generate noises and vibrations which may cause a behavioural response in marine species up to several kilometres away (for impulsive and continuous generation of noise in extreme circumstances of continuous piling). However piling may need to occur seasonally to reduce interactions with listed threatened species likely to occur in the area. Noises from construction vessels will depend on the speed/power of travel, the type, size of vessel and the proximity of the marine species to the noise source.	Further underwater noise monitoring and modelling of piling works and vessel noise would identify risks and potential impacts to marine species. This work would inform stop work distance and be implemented in general accordance with the Underwater Piling Noise Guidelines (Government of South Australia, 2012) and other internationally best practice guidelines. Mitigation measures would be incorporated into the CEMP including engaging a marine species-spotter to check there were no sensitive species in the work zone before construction work starts. Any recreational groups or tourism operators would be notified about the piling works before they start. Further, mitigation measures to reduce impacts include seasonal construction windows (vary depending on species), safety zones/lookout, pingers etc. (e.g. SA DTI 2012). Blasting is to be avoided as high priority.	Possible	Major	High
34	Ports and harbours	Modification of existing ports and harbours causing disruption to existing operations	Construction (incl. pre-construction)	Likely	Moderate		Medium	Existing port facilities will be used to support the transport and marshalling of equipment and Project components from globally distributed supply chains, as well as construction and maintenance vessels and activities. The nearest port is Adelaide Port, about 300 km by road north west of the Project area. There are other ports in the area including Port Giles on the eastern side of Yorke Peninsula, located approximately 500 km north west of Kingston SE. A suitable port or harbour would be chosen depending on proximity to the Project, water depths, tidal conditions, dedicated or shared berthing facilities, and potential opportunity to provide local employment opportunities. The size of the WTGs and plant and equipment required for construction may require ports to alter berthing facilities and change existing operations to accommodate an increased amount and frequency of vessels.	A future study of nearby harbour and ports will identify risks and limitations. Future stages of the project would involve engaging with local port operators and implementing mitigation measures to reduce impact to existing port operations as much as possible.	Likely	Moderate	Medium
35	Shipping and navigation	Impact to shipping lanes, navigational setting or port approaches during pre-construction and construction works	Construction (incl. pre-construction)	Possible	Minor		Low	Recent vessel traffic data (AMSA, 2021) shows that vessel traffic is quite low, with boating only limited to recreational fishing and crayfishing in the area. Risks to shipping and navigation are expected to be low due to the short term nature and minor change in shipping routes expected during construction. Desktop assessment indicates that no existing shipping channels that interfere with the Project area, however there are some cargo ships using the surrounding study area to travel to Ports situated in north west, including Port Adelaide. Changes to navigation and shipping routes would be acceptable and vessel would easily adapt with minimal impact.	A future study of shipping and navigation routes, including engagement with local fisheries and port operators, would inform of any requirements to minimise impacts during construction.	Highly unlikely/rare	Negligible	Very Low
36	Socio-economic (incl. Tourism, Commercial fisheries, Recreational activities etc)	Potential impact (or benefit) to local, regional or state economic development and/or economic value of land and water during pre-construction and construction works	Construction (incl. pre-construction)	Highly unlikely/rare	Negligible		Very Low	Construction is not expected to have an impact on regional or state economic development. There could be employment opportunities for the wider region which would benefit the regional economy. This is a positive risk rating.	The intent of the Project is to maximise benefits to the State and regional economy. Opportunities for this would be further explored throughout the planning and development process.	Highly unlikely/rare	Negligible	Very Low
37	Socio-economic (incl. Tourism, Commercial fisheries, Recreational activities etc)	Residential displacement, access restrictions and/or impact to community facilities, places of work, recreational uses or public open space during pre-construction and construction works	Construction (incl. pre-construction)	Likely	Moderate		Medium	Although residential displacement and access to community facilities is unlikely to be impacted, the community's access to recreational and open space will be restricted during construction. Kingston SE is a major recreational node and popular tourist destination along the south coast of South Australia. The beaches at Kingston SE, including Wyomi Beach and Pink Beach are utilised by local residents and tourists for recreational activities such as swimming, kite/wind surfing, surfing, sailing, boating and fishing. The rocky outcrops of the continental shelf are frequently used for recreational rock lobster fishing from November to June each year. Considering the recreational assets of the Project area are highly valued by the community this may cause frustration and angst among the local residents. However, construction is expected to take 24 months and therefore these impacts to access will be short term.	Consultation with PIRSA is required to understand the importance of the study area to the Southern Rock Lobster , how the construction of wind towers might affect the population, and whether any compensation might be required if access is impacted. Further, a Stakeholder Engagement Plan will be developed to manage the construction phases of the project. Consultation would occur with the community regarding construction activities that may cause impacts to access to community facilities, residential areas, recreational activities and public open space. The environmental assessment would further identify and address community perception of the project and determine the predicted impacts based on existing conditions. Where potential impacts are identified, methods to avoid, manage or mitigate these impacts would be incorporated into a project Construction Environmental Management Plan. Further stages of design will consider staging construction to avoid the peak fishing season (e.g. November-June) where feasible. Where usual accesses are impeded, an alternate access route will be provided if it is safe to do so.	Likely	Minor	Medium
38	Socio-economic (incl. Tourism, Commercial fisheries, Recreational activities etc)	Disruption or impact to local or regional businesses through direct or indirect impacts during pre-construction and construction works	Construction (incl. pre-construction)	Likely	Moderate		Medium	Tourism operators will likely experience decreased trade during construction if certain recreational activities are restricted including swimming, surfing kitesurfing, boating and fishing. Even if there is no actual decrease in access or amenity for recreational activities the community may still perceive negative construction stage impacts and decide not to the travel to the Kingston SE beaches, resulting in indirect impacts for local hotels, restaurants, cafes and retail outlets. Some fishing activities may also be restricted resulting in lower income for professional fishing businesses. However, construction is expected to take 24 months and therefore these impacts to the local and regional businesses will be short term and can be tested through consultation with key stakeholders. On a positive note, construction works would also bring more people to the town for work and therefore could contribute to the local economy of the area.	A Stakeholder Engagement Plan will be developed to manage the construction phases of the project. Consultation would occur with coastal business owners regarding construction activities that may cause impacts e.g. business access, traffic controls. The environmental assessment would further identify and address community perception of the project and determine the predicted impacts based on existing conditions. Where potential impacts are identified, methods to avoid, manage or mitigate these impacts would be incorporated into a project CEMP. Where usual accesses are impeded, an alternate access route will be provided.	Likely	Minor	Medium
39	Traffic & transport (onshore)	Change to normal traffic and transport conditions during pre-construction and construction works including increased traffic, change to transport network connectivity, and change to road pavement conditions	Construction (incl. pre-construction)	Likely	Moderate		Medium	The traffic generated during site establishment and construction could cause temporary delays due to insufficient road capacity, particularly during the delivery of large plant and equipment. The road links and intersections within the study area will be assessed to determine whether they can accommodate the additional traffic generated during construction (including heavy vehicles, haulage vehicles and staff access). There may be an increased risk of road accidents due to a higher level of traffic (including slow moving vehicles) on the road. Given limited detail of construction schedule and timing, a precautionary initial risk rating was given.	A Traffic Management Plan is likely to be required to mitigate impacts to the road transport network. The TMP will be prepared in consultation with local road managers, Council and business and property owners.	Likely	Minor	Medium

40	Waste and resources	High water and energy use, potential impacts of wastewater or wastewater removal and generation of waste	Construction (incl. pre-construction)	Possible	Minor		Low	Early works activities will require the use of energy and water and there will be some waste products (including general waste) generated. Given the limited construction details, such as resource and waste management during works, means a precautionary initial risk rating was given. There would be limited wastewater produced during early works activities.	There are opportunities to minimise the generation of waste and the resources/materials sent to landfill by imbedding the waste hierarchy into early works practices to maximise resource efficiency. This could be outlined in the CEMP. Provisions to optimise the efficient use of water and energy during site establishment and maximise reuse and recycling i.e. use of on-site potable water tank during site establishment and sediment pond water (non-potable) for dust suppression purposes on site. All waste will be managed and disposed/recycled in accordance with applicable South Australian regulations. Any hazardous liquid waste (e.g. oily water) will be will be captured and removed from site using a licensed waste contractor. There will be appropriate waste storage area's at the site during early works (as required). There will be no waste disposed onsite and waste generation/disposal will be managed in	Unlikely	Minor	Low
Operation and maintenance (incl. testing and commissioning)												
41	Aboriginal heritage (incl. underwater heritage)	Disturbance of known or previously unrecorded Aboriginal cultural heritage sites during operation and maintenance potentially impacting on heritage values	Operation and maintenance (incl. testing and commissioning)	Unlikely	Moderate		Low	Prior to European settlement, the Coorong was one of the most densely populated areas in Australia, with the Traditional Owners, the Meintangk people, who were members of the Ngarrindjeri people having lived there for thousands of years. The Coorong remains an intrinsic part of their culture, spirituality and identity. The Project site is within the area of a Native Title claim by First Nations of the South East #1 (SAD211/2017), which covers all land within the study area to a point 500m seaward of the Mean Low Water Mark and the Ngarrindjeri and Others Native Title Claim (SAD6027/1998) which covers the Coorong and Kingston district area. It is possible that known or previously unrecorded Aboriginal cultural heritage sites could be encountered within the construction footprint. While Project infrastructure would be located to avoid impacts as much as practicable (by utilising previously disturbed land and existing infrastructure easements and corridors where possible), some disturbance to Aboriginal cultural heritage sites could be required. This will be further examined and determined as the project progresses, with the avoid, minimise, mitigate, offset hierarchy applied during design development.	Engagement and site walkovers with Native Title claimants and local Aboriginal groups will be carried out to confirm cultural heritage values within the construction footprint and project areas. A Cultural Heritage Management Plan (CHMP) will be prepared to outline measures for the management and protection of Aboriginal heritage sites through all stages of the Project, and would include an unexpected finds procedure. Mitigation, such as salvage prior to works on-site, may be carried out for impact to areas containing large artefact scatters.	Unlikely	Moderate	Low
42	Aboriginal heritage (incl. underwater heritage)	Impact to culturally sensitive landforms (Dreaming sites) during operation and maintenance works resulting in long-term loss of connection to land	Operation and maintenance (incl. testing and commissioning)	Possible	Moderate		Medium	Prior to European settlement, the Coorong was one of the most densely populated areas in Australia, with the Traditional Owners, the Meintangk people, who were members of the Ngarrindjeri people having lived there for thousands of years. The Coorong remains an intrinsic part of their culture, spirituality and identity. The Project site is within the area of a Native Title claim by First Nations of the South East #1 (SAD211/2017), which covers all land within the study area to a point 500m seaward of the Mean Low Water Mark (MLWM) and the Ngarrindjeri and Others Native Title Claim (SAD6027/1998) which covers the Coorong and Kingston district area. It is unknown whether any culturally sensitive sites exist in the Project area, however the Project has the potential to alter landforms permanently and this may impact on the Aboriginal cultural value of the area. This is a precautionary risk rating due the unknown existing environment and the potential long-term impact the Project could have if culturally sensitive landforms are identified within the Project area.	Engagement with Native Title claimants and local Aboriginal groups will be carried out to confirm intangible cultural heritage values in the study area. Design would avoid sites / minimise impacts to sites of cultural significance where practicable.	Possible	Moderate	Medium
43	Air quality	Generation of air emissions and dust from operation and maintenance impacting on sensitive receptors and local air quality	Operation and maintenance (incl. testing and commissioning)	Highly unlikely/rare	Negligible		Very Low	Operation of the Project is not expected to generate air emissions. Any dust or odour emissions in relation to maintenance of the Project would be localised, negligible and below levels of detection.	Operation will need to comply with EPA performance requirements, and any standards and licences for air emissions. Air quality monitoring programmes and equipment could be used determine when activities need to be altered to reduce emissions.	Highly unlikely/rare	Negligible	Very Low
44	Aviation and radar (incl. EMI)	Interference to civil and military radar during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Highly unlikely/rare	Negligible		Very Low	There are no commercial airports or military bases in proximity to the Project (proposed turbine locations), with the closest commercial airport being Mount Gambier Airport approx. 130km away). However, Kingston airport, owned by Kingston District Council, is located adjacent to the Project area, and is used for emergency services. Further, Scenic flights over the Coorong form part of the local tourism industry.	A future radar impact assessment would inform of any requirements to minimise impacts during operation.	Highly unlikely/rare	Negligible	Very Low
45	Aviation and radar (incl. EMI)	Impact to aviation and aircraft from obstruction of obstacle limitation surfaces (OLS) and night lighting during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Possible	Minor		Low	Kingston airport, owned by Kingston District Council, is located adjacent to the Project area, and is used for emergency services and handling regional flights to a number of destinations; including Adelaide and Mount Gambier. Scenic flights over the Coorong National Park form part of the local tourism industry. Scenic flights depart from Strathalbyn, north of the Coorong. Obstruction to scenic flight paths could be possible due to the Wind Turbine Generators (WTGs) and would be further investigated and determined.	A future study of scenic flight routes and OLS, including engagement with local flight operators, would inform of any requirements to minimise impacts during operation.	Possible	Minor	Low
46	Aviation and radar (incl. EMI)	EMI during operation and maintenance impacting local television and radio	Operation and maintenance (incl. testing and commissioning)	Possible	Minor		Low	Interference to local television and radio is not expected during operation. Potential disruptions are likely to have been identified and mitigated during earlier phases of the Project.	Future study of potential electromagnetic interferences is required to inform design and reduce impacts of radio signal.	Unlikely	Minor	Low
47	Ecology - State benthic and marine	Potential impact on South Australian benthic or marine species and communities, or their habitat	Operation and maintenance (incl. testing and commissioning)	Likely	High		High	The Project area potentially intersects with marine species habitat, migration routes and feeding areas. The turbine structures may impact migration patterns and feeding grounds, resulting in habitat displacement and altered movement patterns. Further, responses to electrical fields can include behavioural changes (attacking on the source of the field), physiological changes, and effects to the ability to orientate. **Listed or threatened**: There are nine South Australian *National Parks and Wildlife Act 1972* (NPW Act) listed Marine species known or likely to occur within the Project area. These include five whale species, three turtle species and Australian Sea Lion (*Neophoca cinerea*). **Non-threatened**: There are eight species listed under the *Fisheries Management Act 2007* that may be present in the Project area. These include the Southern Rock Lobster and Abalone. The Project sits within areas significant to the Southern Rock Lobster (Jasus edwardsii) population. The study area is also part of the southern zone of the South Australia Abalone Fishery. There are up to 26 species of seadragon and pipefish known to occur within the region. Broad-scale Seamap benthic habitat mapping identifies almost half of the study area as low profile reef with macroalgae. Areas outside	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables. Laying of unshielded cables directly on the seafloor will be avoided as priority. This will need to consider exposure and sensitivity of receptors most be exposed to EMF (i.e. benthic invertebrates such as lobsters, abalone and crabs, and demersal (bottom living fish) and marine fauna living overlying water column (e.g. most sharks, fish, marine mammals).	Likely	Moderate	Medium
48	Ecology - State terrestrial	Potential impact on South Australian species and communities, or their habitat	Operation and maintenance (incl. testing and commissioning)	Possible	Moderate		Medium	The Project area is likely to be transverse by migratory bird species, including species listed under the EPBC Act. There is risk of birds colliding with WTG rotors, resulting in injury or death. Birds may also avoid areas near the rotors, resulting in habitat displacement and altered movement patterns. At most risk are large pelagic seabirds, which feed in offshore waters and, being slow fliers, may be unable to evade the moving rotors. For shorebirds, as the WTGs will be located offshore, the Project will avoid nearshore areas commonly frequented by shorebirds. There are seven non-migratory bird species within the Project area. Once the wind farm is operational a few impact risk remain including with the collision/ entanglement risk with powerlines, maintenance clearing and bush fire risk . Additional terrestrial dominate EPBC listed species are also present from the coastal reaches of the site in land. A number of these migratory bird species may move out along the coast as they migrate before coming inland. The turbines may interfere with migratory paths and behaviour. The Project area is likely to be traversed by migratory bird species, including species listed under the EPBC Act. There is risk of birds colliding with WTG rotors, resulting in injury or death. Birds may also avoid areas near the rotors, resulting in habitat displacement and altered movement patterns.	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to WTG tower height and flight paths of critically endangered or threatened birds and their relative movement patterns.	Possible	Minor	Low
49	Ecology - State migratory birds	Potential impact on South Australian listed migratory birds, or their habitat	Operation and maintenance (incl. testing and commissioning)	Likely	High		High	The Project area is likely to be transverse by migratory bird species, including species listed under the EPBC Act. There is risk of birds colliding with WTG rotors, resulting in injury or death. Birds may also avoid areas near the rotors, resulting in habitat displacement and altered movement patterns. At most risk are large pelagic seabirds, which feed in offshore waters and, being slow fliers, may be unable to evade the moving rotors. For shorebirds, as the WTGs will be located offshore, the Project will avoid nearshore areas commonly frequented by shorebirds. There are 14 migratory bird species within or adjacent to the Project area that are listed on the NPW Act. There is potential for the East Asian-Australasian Flyway to be present in the Project area during the summer period. Additional terrestrial dominates EPBC listed species are also present from the coastal reaches of the site in land. A number of these migratory bird species may move out along the coast as they migrate before coming inland. The turbines may interfere with migratory paths and behaviour. Once the wind farm is operational a few impact risk remain including with the collision/ entanglement risk with powerlines, maintenance, clearing and bush fire risk.	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to WTG tower height and flight paths of critically endangered or threatened birds and their relative movement patterns.	Likely	Moderate	Medium
50	Ecology - EPBC listed ecological communities	Potential impact on Commonwealth listed communities, or their habitat	Operation and maintenance (incl. testing and commissioning)	Likely	High	Yes	High	The EPBC listed threatened ecological community Giant Kelp Marine Forests of South East Australia have the potential to occur within the study area. The reef within the study area support the western extent of giant kelp and bulk kelp, which are both EPBC listed. Further site surveys will be required to confirm their presence. Turbine tower operation may pose some impact to these communities. There is the potential for the TEC Giant Kelp Marine Forests of South East Australia to occur within the study area. Further site investigations are required to determine if the ecological community occurs and if so, whether it may be disturbed. It is most likely to occur around the Margaret Brock Reef area where conditions are most suited to the presence of giant kelp. Currently no turbines are planned in this location. Margaret Brock Reef is at the further western range of the TEC and forms only a small area of the total extent of the community. Provided turbines and cabling can avoid direct disturbance to habitat likely to support the TEC, the action is unlikely to have a	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Further marine studies are required to collect baseline data and characterise existing conditions Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables.	Likely	Moderate	Medium

51	Ecology - EPBC migratory species (terrestrial)	Potential impact on Commonwealth listed migratory species, or their habitat	Operation and maintenance (incl. testing and commissioning)	Possible	Major	Yes	High	The Project area is likely to be transverse by migratory bird species, including species listed under the EPBC Act. There is risk of birds colliding with WTG rotors, resulting in injury or death. Birds may also avoid areas near the rotors, resulting in habitat displacement and altered movement patterns. At most risk are large pelagic seabirds, which feed in offshore waters and, being slow fliers, may be unable to evade the moving rotors. For shorebirds, as the WTGs will be located offshore, the Project will avoid nearshore areas commonly frequented by shorebirds. There are 13 migratory bird species in the project area that are listed on the EPBC Act. There are also 11 threatened EPBC listed non-migratory populations known to occur within the area. Furthermore, The Coorong, and Lakes Alexandrina and Albert Wetlands System (Ramsar wetland), are adjacent to the marine boundary and within 20km of the land-based section of the Project area. While the boundary does not directly intersect this region, there are several wetland features that continue along the coast that intersect with regions that are likely to be inhabited by the same species that would be present within the Ramsar site. The inland environment consists of ephemeral wetland networks which provide habitat to several species requiring freshwater habitats for foraging and breeding. Some of these high environmental values include parts of the southern extend of the Watervalley Wetlands. There is potential for the powerline corridor (Black range and Reedy Ck-Lucindale Rd) to clear, fragment and interrupt existing habitat associated with the wetlands. In addition, the existing corridor that heads south to the south east substation may require widening and may impact a number of forestry, conservation and protected area.	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to WTG tower height and flight paths of critically endangered or threatened birds and their relative movement patterns.	Unlikely	Major	Medium
52	Ecology - EPBC migratory species (marine)	Potential impact on Commonwealth listed migratory birds, or their habitat	Operation and maintenance (incl. testing and commissioning)	Likely	Major	Yes	Very High	The Project area potentially intersects with marine species habitat, migration routes and feeding areas. The turbine structures may impact migration patterns and feeding grounds, resulting in habitat displacement and altered movement patterns. Further, responses to electrical fields can include behavioural changes (attacking on the source of the field), physiological changes, and effects to the ability to orientate. There are 13 EPBC listed threatened Marine species known or likely to occur within the Project area. These include six whale species, three turtle species, Dusky Dolphin, Porbeagle and White Shark. There are also two seadragon species listed under the EPBC Act as 'marine' species, leafy seadragon (*Phycodurus eques*) and weedy seadragon (*Phyllopteryx taeniolatus*) known to occur within the region. The impact is considered to be a significant impact under the EPBC criteria because the Project is likely to modify, destroy, fragment, isolate or disturb important areas of habitat that would have an adverse impact on the marine ecosystem functioning.	Additional survey effort is required to confirm the species present likely on site and with the regions of known habitat. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables. Laying of unshielded cables directly on the seafloor will be avoided as priority to minimise exposure and sensitivity of benthic invertebrates such as lobsters, abalone and crabs and demersal (bottom living fish) and marine fauna living overlying water column (e.g. most sharks, fish, marine mammals).	Likely	High	High
53	Ecology - EPBC Cth marine environment	Potential direct or non-direct impacts to Commonwealth Marine Areas	Operation and maintenance (incl. testing and commissioning)	Almost Certain	High	No	High	The operation of the Project is likely to have impact on Commonwealth Marine Areas and associated industries such as fisheries. Commonwealth waters are outside the Project area but within the study area. Bonney Coast Upswelling is listed as a Key Ecological Feature of the Commonwealth Marine area MNES.	Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables. Laying of unshielded cables directly on the seafloor will be avoided as priority to minimise exposure and sensitivity of benthic invertebrates such as lobsters, abalone and crabs and demersal (bottom living fish) and marine fauna living overlying water column (e.g. most sharks, fish, marine mammals).	Likely	Moderate	Medium
54	Existing infrastructure	Potential impact to existing local, regional or state significant infrastructure during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Unlikely	Minor		Low	After construction, operational impacts to existing infrastructure will remain unchanged. Refer to 'Ports and harbours' for risk of potential impacts to existing port assets.	Future studies and engagement with third-parties during design development would inform of any requirements to minimise impacts to other infrastructure during operation.	Unlikely	Minor	Low
55	Ground conditions and contamination	Land excavation, stockpiling, transport or disposal of contaminated material (including or acid sulfate soils) produced during operation and maintenance leading to potential risks to public health and the environment	Operation and maintenance (incl. testing and commissioning)	Unlikely	Minor		Low	Operation of the Project is not expected to change ground conditions or generate risks related to contamination.	A contamination assessment would establish baseline indicators of material at site, which would be used to inform management and disposal of spoil. Spoil from any maintenance earthworks would be reused on-site where possible or disposed of in accordance with South Australian EPA *Guideline for stockpile management* (2020), which would reduce risk.	Unlikely	Negligible	Very Low
56	Ground conditions and contamination	Land disturbance, erosion, alteration of water courses and drainage patterns, vegetation removal, land clearing or modification during operation and maintenance impacting soil and water quality	Operation and maintenance (incl. testing and commissioning)	Possible	Minor		Low	Operation of the Project has the potential to result in contamination of soils due to any spills and leaks of fuel, oils and other hazardous materials. The potential for contamination as a result of operation and general maintenance activities is considered to be low and manageable.	An OEMP (Operational Environment Management Plan) would establish management measures to ensure impacts to soil and water quality are reduced. This would include installation of temporary drainage routes, sediment control measures and the progressive revegetation of disturbed areas, where practicable.	Possible	Negligible	Low
57	Groundwater	Impacts to ground water quality during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Possible	Moderate		Medium	The Project would be located in the Murray Groundwater Basin, with some transmission infrastructure also potentially located in the Otway Basin, both of which are classified as shallow sedimentary ground water basins. The Department for Environment and Water (DEW) Depth to Water Table mapping (2009) shows a range of water table depths within the study area, from some areas where the water table is above the surface for more than 10 months to others where the water table is greater than 200cm below the surface. Shallower water depths, and those above the surface, have a higher risk of local ground water quality being impacted during maintenance. Local ground water quality may deteriorate through turbidity, salinity, colour, odour, temperature, nutrients or pollutants such as chemicals and materials required during maintenance. However deep excavation extending below regional groundwater level is unlikely to occur during operation and therefore risks of impact is low. Further investigation to ground-truth water depths and quality	Further investigations will be carried out to understand the value of surface water environments in the area and to inform appropriate management measures to be applied during the operation phase. Early installation of drainage controls and erosion and sedimentation monitoring during early project stages would assist in managing and mitigating impacts to land processes during operation and maintenance. Standard construction/maintenance management measures in accordance with the SA EPA requirements. Maintenance during dryer periods would also avoid runoff impacts to receiving freshwater and marine environments from degradation of water quality.	Possible	Minor	Low
58	Groundwater	Impacts to ground water levels or flow during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Likely	Moderate		Medium	The Project would be located in the Murray Groundwater Basin, with some transmission infrastructure also potentially located in the Otway Basin, both of which are classified as shallow sedimentary ground water basins. Lowering of water table is not required during operation. Further, it is unlikely that there would be changes to infiltration during operation, thereby groundwater flow and distribution are unlikely to be impacted. Further investigation to ground-truth water depths and quality and local uses of groundwater will be undertaken.	Appropriate management of temporary dewatering and groundwater control would be included in the OEMP, including recharge back to aquifer down gradient if required	Possible	Minor	Low
59	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Potential for leaks and spills during operation and maintenance as a result of storage, handling and use of dangerous goods and equipment	Operation and maintenance (incl. testing and commissioning)	Possible	Moderate		Medium	The storage and handling of dangerous goods and hazardous materials have the potential to impact operational workers and the surrounding environment if leaks and spills occur, resulting in the potential contamination of air, soils, surface water, and/or groundwater.	Standard management measures such as storage of dangerous goods in accordance with the relevant guidance would be included in the OEMP and would reduce potential risks.	Unlikely	Minor	Low
60	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Human exposure to unsafe levels of Electro-magnetic fields (EMF) during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Highly unlikely/rare	Moderate		Low	Electro-magnetic fields are produced wherever electricity is used or transmitted. While there is no established evidence that exposure to Electro-magnetic fields from power lines, substations, transformers or other electrical sources, regardless of proximity, causes any health effects, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) still refers to guidelines that recommend the limiting of exposure to Electro-magnetic fields so that the threshold at which the interactions between the human body and external electric and magnetic fields that causes adverse effects within the body cannot be reached. It is expected that there would be a low risk of exceeding the levels recommended by ARPANSA. Exposure time would also be limited.	Site OHS plans would manage the risk of exposure to Electro-magnetic fields.	Highly unlikely/rare	High	Low
61	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Potential for fire and increased bushfire risk during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Unlikely	Moderate		Low	The Project is not located in a designated Bushfire Protection Area, as brought in under the Ministerial Bushfire Management Plan Amendment Report in 2006/2007. However, the DEW Last Fire mapping (2021) shows bushfires have recently occurred in the region, including the Blackford bushfire (Jan 2021) and the Kerilira bushfire (2019). Operational and maintenance works may increase risk of fire and bushfire from accidental ignition from equipment, fuels and chemicals.	Standard management measures addressing these issues would be included in the OEMP and would reduce the risk of the Project increasing fires and bushfires in the local region.	Highly unlikely/rare	Moderate	Low
62	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Vulnerability of the project to natural hazards, extreme weather and climate change during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Unlikely	Moderate		Low	Climate induced risks include increased dust generation during drier weather, increased rainfall resulting in increased flow events in watercourses, temporary flooding and risk of failure of erosion and sediment controls and potential for maintenance workers to experience heatstroke as a result of extreme heat and hot weather events.	Standard management measures such as management plans addressing these issues would be included in the OEMP and would reduce the impact on the Project, including adequate training and PPE being provided to maintenance workers.	Highly unlikely/rare	Moderate	Low
63	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Exposure of personnel or the public to unsafe conditions as a result of operation and maintenance and on-site practices	Operation and maintenance (incl. testing and commissioning)	Possible	High		Medium	Offshore wind project presents unique risks to construction workers because of the nature of offshore construction (i.e.. working at height and offshore, falls, electrical risks, subsea works and extreme weather experience in vast open spaces off the coast). In extreme circumstances this may result in death or serious injury of construction personnel. The wider community is not expected to be impacted as access to construction sites on and offshore will be restricted.	Stringent site OHS plans would be developed and implemented to manage the risk of death or serious injury during construction on and offshore. Standard construction management measures would also reduce the likelihood of occurrence, including compulsory training and PPE provided to maintenance workers.	Unlikely	Moderate	Low

64	Historic heritage (incl. shipwrecks)	Impact to listed and non-listed heritage places and/or objects (maritime and terrestrial) during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Unlikely	Moderate		Low	There are no Commonwealth listed heritage places or sites within the study areas or surrounds. There are a number of State-listed shipwrecks mapped in Lacepede Bay and surrounds, the closest being approximately 3km from the nearest turbine. There are also a number of State heritage places and local culture heritage assets mapped in the area. These are namely buildings.	Project infrastructure would be located to avoid impacts to State and local historic heritage assets. Management measures would be included in the OEMP (as required) to minimise any indirect impacts to mapped heritage places and sites.	Highly unlikely/rare	Moderate	Low
65	Hydrology, flooding and water quality	Potential impacts to surface water quality during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Possible	High		Medium	There are a number of wetland complexes mapped in the area, some falling within the study area. Some of the wetlands in the areas are mapped as Priority Wetland Complexes LUT- Lower Limestone Coast PWA - Water Allocation Plan 2010 (DEW). There are also a number of wetland of international importance outside the study area in the region, including the Coorong, and Lakes Alexandrina and Albert wetland (Ramsar site). Maintenance activities such as earthworks and vegetation clearing could potentially impact on nearby waterways (i.e. increased nutrients entering waterways). There is also the potential for leaks and spills during maintenance, which could potentially impact on surface water quality as a result of pollutants reaching waterways. Impacts to surface water quality may also have indirect impacts on potential threatened species which may be supported by these environments. This risk rating is precautionary until further understanding of local wetland and surface water systems is carried out.	Further investigations will be carried out to understand the value of surface water environments in the area and to inform appropriate management measures during maintenance and operation to be applied. Early installation of drainage controls and erosion and sedimentation monitoring during maintenance works would assist in managing and mitigating impacts to land processes. Maintenance works during dryer periods would also avoid runoff impacts to receiving freshwater and marine environments from degradation of water quality.	Unlikely	High	Medium
66	Land use	Potential impact or major change to existing and planned future residential, recreational, commercial and industrial land uses during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Highly unlikely/rare	Negligible		Very Low	The onshore section of the Project area covers approximately 1,800 km2 and intersects various land uses zoned by the Kingston District Council. Around half of the onshore project area is zoned for Conservation/Protection, currently used for general farming and regional open space. Changes to land use would occur during construction, and as such there would be no further land use impacts during operation.	Not Applicable	Highly unlikely/rare	Negligible	Very Low
67	Land use	Property acquisition or tenure of land or waters during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Highly unlikely/rare	Negligible		Very Low	Currently a wide corridor is being investigated for the landfall site and onshore transmission infrastructure, with final locations to be determined during design development, and subject to further technical and environmental studies, and discussions with Project stakeholders. The landfall site would be located landward of the mean high-water mark (MHWM) on land suitable to accommodate an underground joint pit. The transmission infrastructure is anticipated to be predominately above ground. Existing electricity easements and other infrastructure corridors would be utilised as much as practicable to minimise impact. Any acquisition or tenure changes would occur during construction, and as such there would be no further changes during operation.	Not Applicable	Highly unlikely/rare	Negligible	Very Low
68	Landscape & visual	Potential adverse impacts during operation and maintenance on visual and/or landscape values experienced from public open space (coast) or residential areas	Operation and maintenance (incl. testing and commissioning)	Almost Certain	High		High	Although onshore infrastructure is adjacent to some existing infrastructure the offshore WTGs will create permanent change to the landscape character and visual amenity of Kingston SE. The natural landscape of Kingston District Council, being a major recreational (e.g. fishing) and recreation and tourism node (wine-making) , is highly valued by the local, regional and state community. The WTGs will likely form a noticeable feature on the landscape that is currently untouched oceans views. The site itself was selected being of the lower population density of the area, to reduce impacts as much as possible. The WTG have been indicatively placed as far off the coast (approximately as possible to reduce visual impacts). The landscape character of the surrounding area holds ecological, scientific and social significance to the community. Accordingly, impacts to landform is considered to be significant. Potential impacts to the local landscape are considered to be of permanent nature due to the expected long duration of the project lifespan (up to 60 years in operation phase).	Further visual assessments will be carried out to understand the magnitude of change for landscape character and impact to visual amenity at various viewpoints along the coastline and residential areas. Landscaping and revegetation would be used to minimise onshore impacts.	Almost Certain	High	High
69	Marine geology, oceanography and physical processes	Changes to coastal and marine processes (such as tides, currents, water flow and wave patterns) potentially impacting on coastal land and assets, and the marine environment during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Possible	Minor		Low	At this coastal location, tides and tidal currents, waves, wave-driven currents, and wave current interaction would determine the driving condition for sediment movement. The Coorong Region is classified as microtidal with a tidal range of 0.7m from lowest to highest astronomical tide. Tides are predominantly semi-diurnal, with a single tide cycle on most days. The permanent marine structures (e.g. turbine foundations, array spacing and sea bed cable connections) could alter local hydrodynamic processes. These impacts are likely to be associated with localised scour in the immediate vicinity of the structures, and potentially scour around cables could occur if care is not taken to secure adequate protection during and after laying. The presence of the windfarm is unlikely to be significant in the far-field with only small influences in the near field. It is expected that localised scour would be more pronounced during operation due to the permanent nature of turbine structues and cables.	Appropriate computer modelling methods using tidal, wave and sediment modelling scenarios are required to assess hydrodynamic impacts to seafloor habitats and coastal geomorphological processes during the operational phase – both inside the wind farm and further afield (near shore).	Possible	Minor	Low
70	Marine water quality and sediment quality	Potential impacts to marine water and sediment quality during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Possible	Moderate		Medium	**Water quality -** Seagrass meadows are a good indicator of water quality; previous monitoring of quality of the seagrass meadows within the Coorong found a number of drains were impacted by an excess of nutrient runoff (Wear et al 2006). Overall, soluble and total nutrient levels are relatively low throughout Coorong, with impact on seagrass meadows potentially a result of the recovery time of Posidonia species during episodic high rainfall events. Pressures that may result in increased nutrients within the area include discharge from agricultural drains, urban stormwater and septic tank leakage. Operation and maintenance activities may increase these levels. **Turbidity/sediments -** Operational activities should not create any plumes, therefore there is unlikely to be an operational impacts on turbidity/sediment. **Spills -** Vessels, turbines and facilities utilise use and store a variety of fuels, oils, lubricants and other chemicals. These substances can have lethal and sub-lethal effects to organisms (Yuewen and Adzigbli 2018) and can persist in the environment for long periods of time. An uncontrolled release could occur from (for example) vessel collision, equipment failure, leaks, etc.	A marine pollution risk assessment will be undertaken to inform the development of spill management strategies for the OEMP. Standard chemical storage, handling and maintenance procedures will be required.	Possible	Minor	Low
71	Noise and vibration	Noise and/or vibration from operation and maintenance activities exceeding thresholds/limits potentially impacting residential or other sensitive receptors (onshore)	Operation and maintenance (incl. testing and commissioning)	Possible	Minor		Low	Maintenance of the onshore substation, landfall site and underground cables may cause noise and vibration impacts to nearby sensitive receptors. Sensitive receptors within the Project area may be sensitive to noise particularly as it is likely the ambient noise level will be low given the remoteness of the coastal area. Site selection was determined due to lower sensitive receptors in the area, with the nearest town being Kingston SE. Area surrounding Kingston SE is largely rural and therefore it is expected that noise impacts may be minimal further afield.	Further noise modelling and monitoring would identify areas where operational noise and vibration may exceed acceptable levels for sensitive receptors. Potential impacts shall be assessed against Statutory and guideline noise and vibration targets for operational noise and vibration. Appropriate mitigations strategies would be developed accordingly.	Unlikely	Negligible	Very Low
72	Noise and vibration	Underwater noise and/or vibration from operation and maintenance activities exceeding thresholds/limits potentially impacting sensitive marine receptors and species (offshore)	Operation and maintenance (incl. testing and commissioning)	Likely	High		High	Recent vessel traffic data (AMSA, 2021) shows that vessel traffic is quite low, with boating only limited to recreational fishing and crayfishing in the area, indicating that background noise levels are likely to also be low. Port Adelaide is the closest main port, located approximately 300 km to the north west. Operation of the WTGs is likely to generate low frequency underwater noise that are unlikely to cause acute impacts to marine fauna. However the noise and vibration is more continuous than noise throughout construction and may cause changes to behaviour of fauna. The scale of impact is dependent on the size and cumulative noise impact of the WTG array. Given that the Project area contains important marine species and likely has low background noise levels, the inherent risk of underwater noise impacts is very high.	Further underwater noise modelling and monitoring would identify risks and potential impacts to marine species. Further work required to assess whether this could affect multiple individuals of a threatened species, as well as design measures that can be taken to minimise impact. Consideration of impacts would be incorporated into design development, and any residual impacts would be incorporated into the OEMP.	Possible	Major	High
73	Ports and harbours	Modification of existing ports and harbours causing disruption to existing operations	Operation and maintenance (incl. testing and commissioning)	Unlikely	Minor		Low	Existing port facilities will be used to support the transport and marshalling of equipment and Project components from globally distributed supply chains, as well as construction and maintenance vessels and activities. The nearest port is Adelaide Port, about 300 km by road north west of the Project area. There are other ports in the area including Port Giles on the eastern side of Yorke Peninsula, located approximately 500 km north west of Kingston SE. A suitable port or harbour would be chosen depending on proximity to the Project, water depths, tidal conditions, dedicated or shared berthing facilities, and potential opportunity to provide local employment opportunities. Post construction, ports will be well placed to accommodate requirements of large WTGs, maintenance vessels, plant and equipment. Accordingly, no further impacts are expected to ports during operation.	A future study of nearby harbour and ports will identify risks and limitations. Future stages of the project would involve engaging with local port operators and implementing mitigation measures to reduce impact to existing port operations as much as possible.	Unlikely	Minor	Low
74	Shipping and navigation	Impact to shipping lanes, navigational setting or port approaches during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Possible	Minor		Low	Recent vessel traffic data (AMSA, 2021) shows that vessel traffic is quite low, with boating only limited to recreational fishing and crayfishing in the area. Risks to shipping and navigation are not expected during operation, and will be very limited during maintenance activities. Desktop assessment indicates that no existing shipping channels that interfere with the Project area, however there are some cargo ships using the surrounding study area to travel to Ports situated in north west, including Port Adelaide. Any changes to navigation and shipping routes would be acceptable and vessel would easily adapt with minimal impact.	A future study of shipping and navigation routes, including engagement with local fisheries and port operators, would inform of any requirements to minimise impacts during operation and maintenance.	Highly unlikely/rare	Negligible	Very Low

75	Socio-economic (incl. Tourism, Commercial fisheries, Recreational activities etc)	Potential impact (or benefit) to local, regional or state economic development and/or economic value of land and water during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Highly unlikely/rare	Negligible		Very Low	Operation and maintenance is not expected to have an impact on regional or state economic development. There could be employment opportunities for the wider region which would benefit the regional economy. This is a positive risk rating.	The intent of the Project is to maximise benefits to the State and regional economy. Opportunities for this would be further explored throughout the planning and development process.	Highly unlikely/rare	Negligible	Very Low
76	Socio-economic (incl. Tourism, Commercial fisheries, Recreational activities etc)	Residential displacement, access restrictions and/or impact to community facilities, places of work, recreational uses or public open space during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Likely	High		High	There will be no residential displacement during operation and maintenance. There may be some disruption to access for locals and tourism during maintenance works. Although these maintenance impacts would occur over a short limited duration, it has the potential to impact on recreational and commercial fisheries. The beaches at Kingston SE, including Wyomi Beach and Pink Beach are utilised by local residents and tourists for recreational activities, including fishing. The rocky outcrops of the continental shelf are frequently used for recreational rock lobster fishing from November to June each year. Considering the recreational assets of the Project area are highly valued by the community this may cause frustration and angst among the local residents. On a positive note, operation works would also bring more people to the town for work and therefore could contribute to the local economy of the area.	A Stakeholder Engagement Plan will be developed for all the phases of the Project. Consultation would occur with the community regarding maintenance and operational activities that may cause impacts to access to community facilities, residential areas, recreational activities and public open space. Where potential impacts are identified, methods to avoid, manage or mitigate these impacts would be incorporated into a Project OEMP. Further stages of design will consider staging maintenance activities to avoid the peak fishing season (e.g. Nov-June) where feasible. Where usual accesses are impeded, an alternate access route will be provided if it is safe to do so.	Likely	Moderate	Medium
77	Socio-economic (incl. Tourism, Commercial fisheries, Recreational activities etc)	Disruption or impact to local or regional businesses through direct or indirect impacts during operation and maintenance	Operation and maintenance (incl. testing and commissioning)	Likely	High		High	Tourism operators will likely experience decreased trade due to impacts to recreation and amenity in the area. Although a navigational safety zone would restrict some recreational activities, such as boating and fishing from coming close to the WTGs, all other recreational activities will be restored and experience limited amenity impacts (including swimming, surfing kitesurfing). Even if there is no actual decrease in access or amenity for recreational activities the community may still perceive negative operational stage impacts and decide not to the travel to the Kingston SE beaches, resulting in indirect impacts for local hotels, restaurants, cafes and retail outlets. Some fishing activities may also be restricted resulting in lower income for professional fishing businesses.	A Stakeholder Engagement Plan will be developed for all the phases of the Project. Consultation would occur with coastal business owners regarding maintenance and operational activities that may cause impacts e.g. business access, traffic controls. Where potential impacts are identified, methods to avoid, manage or mitigate these impacts would be incorporated into a Project OEMP. Where usual accesses are impeded, an alternate access route will be provided.	Likely	Moderate	Medium
78	Traffic & transport (onshore)	Change to normal traffic and transport conditions during operation and maintenance including increased traffic, change to transport network connectivity, and change to road pavement conditions	Operation and maintenance (incl. testing and commissioning)	Unlikely	Negligible		Very Low	Operation and maintenance will generate negligible operational traffic. Existing road networks will accommodate any additional traffic generated.	A Traffic Management Plan will be prepared in consultation with local road managers, Council and business and property owners.	Unlikely	Negligible	Very Low
79	Waste and resources	High water and energy use, potential impacts of wastewater or wastewater removal and generation of waste	Operation and maintenance (incl. testing and commissioning)	Possible	Minor		Low	Operation will require the use of energy and water and there will be some waste products (including general waste) generated. Further operation details are required, therefore a precautionary initial risk rating has been given.	Opportunities to minimise the generation of waste and the resources/materials sent to landfill include imbedding the waste hierarchy into overarching project planning to maximise resource efficiency. All waste will be managed and disposed/recycled in accordance with applicable South Australian regulations. Any hazardous liquid waste (e.g. oily water) will be will be captured and removed from site using a licensed waste contractor. There will be appropriate waste storage area's at the site during operation and maintenance (as required). There will be no waste disposed onsite or offshore.	Unlikely	Minor	Low
Decommissioning (and site rehabilitation)													
80	Aboriginal heritage (incl. underwater heritage)	Disturbance of known or previously unrecorded Aboriginal cultural heritage sites during decommissioning potentially impacting on heritage values	Decommissioning (and site rehabilitation)	Unlikely	Moderate		Low	Prior to European settlement, the Coorong was one of the most densely populated areas in Australia, with the Traditional Owners, the Meintangk people, who were members of the Ngarrindjeri people having lived there for thousands of years. The Coorong remains an intrinsic part of their culture, spirituality and identity. The Project site is within the area of a Native Title claim by First Nations of the South East #1 (SAD211/2017), which covers all land within the study area to a point 500m seaward of the Mean Low Water Mark and the Ngarrindjeri and Others Native Title Claim (SAD6027/1998) which covers the Coorong and Kingston district area. It is not likely Aboriginal sites and objects would be affected during decommissioning as all ground disturbance activities would occur during site establishment and construction work.	Engagement and site walkovers with Native Title claimants and local Aboriginal groups will be carried out to confirm cultural heritage values within the project areas. A Cultural Heritage Management Plan (CHMP) will be prepared to outline measures for the management and protection of Aboriginal cultural heritage.	Unlikely	Moderate	Low
81	Aboriginal heritage (incl. underwater heritage)	Impact to culturally sensitive landforms (Dreaming sites) during decommissioning resulting in long-term loss of connection to land	Decommissioning (and site rehabilitation)	Possible	Moderate		Medium	Prior to European settlement, the Coorong was one of the most densely populated areas in Australia, with the Traditional Owners, the Meintangk people, who were members of the Ngarrindjeri people having lived there for thousands of years. The Coorong remains an intrinsic part of their culture, spirituality and identity. The Project site is within the area of a Native Title claim by First Nations of the South East #1 (SAD211/2017), which covers all land within the study area to a point 500m seaward of the Mean Low Water Mark and the Ngarrindjeri and Others Native Title Claim (SAD6027/1998) which covers the Coorong and Kingston district area. Desktop assessments have not been able to identify culturally sensitive sites and consultation with Aboriginal representatives is required. If present, there is a risk that decommissioning activities could temporarily restrict access to some culturally sensitive sites.	Engagement with Native Title claimants and local Aboriginal groups will be carried out to confirm intangible cultural heritage values in the study area. Design would avoid sites / minimise impacts to sites of cultural significance where practicable.	Possible	Minor	Low
82	Air quality	Generation of air emissions and dust from decommissioning impacting on sensitive receptors and local air quality	Decommissioning (and site rehabilitation)	Likely	Minor		Medium	Decommissioning works are expected to generate some air emissions (e.g. dust and grit through land disturbance and GHG and exhaust fumes etc from construction vessels and vehicles), however this would be localised and of limited duration. A preliminary land use assessment indicates there are limited sensitive receptors within the study area.	A future air quality assessment would inform the requirements for a Decommissioning Environmental Management Plan (DEMP). Dust monitoring programmes and equipment (if required) could be used to determine when activities need to be altered to reduce dust emissions. Actions such as watercarts on haul roads and main construction sites could be used to generate less dust. Standard measures to limit the generation of dust and other air emissions (such as most efficient use of construction equipment and planning to reduce vessel and vehicle use and movements) would also be included in the DEMP.	Possible	Minor	Low
83	Aviation and radar (incl. EMI)	Interference to civil and military radar during decommissioning	Decommissioning (and site rehabilitation)	Highly unlikely/rare	Negligible		Very Low	Interference to aircraft or radars is not expected during decommissioning. Where necessary, changes to flight routes will have been established during earlier phases of the Project.	A future radar impact assessment would inform of any requirements to minimise impacts during decommissioning.	Highly unlikely/rare	Negligible	Very Low
84	Aviation and radar (incl. EMI)	Impact to aviation and aircraft from obstruction of obstacle limitation surfaces (OLS) and night lighting during decommissioning	Decommissioning (and site rehabilitation)	Possible	Minor		Low	Obstruction to scenic flight paths could be possible during de-construction of the Wind Turbine Generators (WTGs) and would be further investigated and determined. As scenic flights are expected to be largely carried our during day-light hours, impact from any night-lighting utilised during decommissioning is anticipated to be low. This would be localised and of limited duration.	A future study of scenic flight routes and OLS, including engagement with local flight operators, would inform of any requirements to minimise impacts during decommissioning.	Possible	Minor	Low
85	Aviation and radar (incl. EMI)	EMI during decommissioning impacting local television and radio	Decommissioning (and site rehabilitation)	Possible	Minor		Low	Interference to local television and radio is not expected during decommissioning. Potential disruptions are likely to have been identified and mitigated during earlier phases of the Project.	Future study of potential electromagnetic interferences is required to inform design and reduce impacts of radio signal.	Unlikely	Minor	Low
86	Ecology - State benthic and marine	Potential impact on South Australian benthic or marine species and communities, or their habitat	Decommissioning (and site rehabilitation)	Possible	Moderate		Medium	Decommissioning works are not expected to impact on groundwater or perched aquifers where benthic fauna occurs. This risk rating is precautionary until further assessment of local groundwater systems is carried out and decommissioning methods are further developed. Other decommissioning activities may impact benthic and marine wildlife; however the effects are likely to be temporary. **Listed or threatened:** There are nine South Australian *National Parks and Wildlife Act 1972* (NPW Act) listed Marine species known or likely to occur within the Project area. These include five whale species, three turtle species and Australian Sea Lion (Neophoca cinerea). **Non-threatened:** There are eight species listed under the *Fisheries Management Act 2007* that may be present in the Project area. These include the Southern Rock Lobster and Abalone. The Project sits within areas significant to the Southern Rock Lobster (Jasus edwardsii) population. The study area is also part of the southern zone of the South Australia Abalone Fishery. There are up to 26 species of seadragon and pipefish known to occur within the region. Broad-scale Seamap benthic habitat mapping identifies almost half of the study area as low profile reef with macroalgae. Areas outside the site but within the study area contain a mosaic of seagrass meadows, reefs (notably Margaret Brock and North Reefs) and unconsolidated substrate. The reefs within the study area support the most western extent of giant kelp (Macrocystis angustifolia) and bull kelp (Durvillea potatorum).	Pre-clearance flora and fauna surveys will be carried out to confirm if any threatened species and/or habitat has re-established since construction clearing for the Project. Surveys will in for the Decommissioning Environmental Management Plan. This DEMP will identify rehabilitation requirements, including revegetating the area as much as possible to pre-construction levels.	Possible	Minor	Low
87	Ecology - State terrestrial	Potential impact on South Australian species and communities, or their habitat	Decommissioning (and site rehabilitation)	Possible	Moderate		Medium	Decommissioning works are not expected to have a large impact on terrestrial species. The risk rating is precautionary until further assessment on decommissioning methods are developed. **Listed or threatened:** There are seven non-migratory bird species within the project area. There are potentially a total of 27 flora and 33 fauna NPW listed threatened species known or likely within/surround the Project area including areas of work such as the Black Range substation (Option 1), Reedy-Ck-Lucindale Rd (Option 2) and the potential corridors for transmission lines from the Black Range Substation to the South East Substation. **Non-threatened:** The Coorong, and Lakes Alexandrina and Albert Wetlands System (Ramsar wetland), are adjacent to the marine boundary. While the boundary does not directly intersect this region, there are several wetland features that continue along the coast that intersect that are likely to be inhabited by the same species that would be present within the Ramsar site. The inland environment consists of ephemeral wetland networks which provide habitat to several species requiring freshwater habitats for foraging and breeding. Removal of supporting infrastructure on land is mostly above ground and will have likely have minimal impact on the species present	Pre-clearance flora and fauna surveys will be carried out to confirm if any threatened species and/or habitat has re-established since construction clearing for the Project. Surveys will in for the Decommissioning Environmental Management Plan. This DEMP will identify rehabilitation requirements, including revegetating the area as much as possible to pre-construction levels.	Possible	Minor	Low

88	Ecology - State migratory birds	Potential impact on South Australian listed migratory birds, or their habitat	Decommissioning (and site rehabilitation)	Possible	Moderate		Medium	There are 13 migratory bird species in or within the Project area that are listed on the NPW Act. There are also threatened NPW Act listed non-migratory populations known to occur within the area. There is potential for the East Asian-Australasian Flyway to be present in the Project area during the summer period. It is unlikely that decommissioning activities would interact with any threatened and/or migratory birds however further assessment is required to plan for placement of offshore and onshore infrastructure. Marine birds may be exposed to noise impacts from piling when diving. Desktop studies do not identify impacts that would have a significant impact on migratory species under the EPBC significance criteria. Decommissioning is not expected to substantially modify or fragment species distribution, result in increase invasive species or	Pre-clearance flora and fauna surveys will be carried out to confirm if any threatened species and/or habitat has re-established since construction clearing for the Project. Surveys will in for the Decommissioning Environmental Management Plan. This DEMP will identify rehabilitation requirements, including revegetating the area as much as possible to pre-construction levels.	Possible	Minor	Low
89	Ecology - EPBC listed ecological communities	Potential impact on Commonwealth listed communities, or their habitat	Decommissioning (and site rehabilitation)	Possible	Moderate	Yes	Medium	The EPBC listed threatened ecological community Giant Kelp Marine Forests of South East Australia have the potential to occur within the study area. The reef within the study area support the westner extent of giant kelp and bulk kelp, which are both EPBC listed. Further site surveys will be required to confirm their presence. The impact is considered to be a significant impact under the EPBC criteria because the Project is likely to modify, destroy, fragment, isolate or disturb important areas of habitat that would have an adverse impact on the marine ecosystem functioning. Decommissioning may impact new communities that have formed around the base of the turbines and along the underground cable networks in the seabed. On land Rehabilitation work should include native vegetation communities that were originally cleared and or the historic vegetation communities and ensure habitat is suitable for species the would inhabit the region also weed/ pest control will be required to ensure the success of the rehabilitation efforts.	Pre-clearance flora and fauna surveys will be carried out to confirm if any threatened species and/or habitat has re-established since construction clearing for the Project. Surveys will in for the Decommissioning Environmental Management Plan. This DEMP will identify rehabilitation requirements, including revegetating the area as much as possible to pre-construction levels. If smaller areas within the Project area are found to contain habitat for terrestrial fauna, these areas may be avoided. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cable, as these will likely be removed during decommissioning.	Possible	Minor	Low
90	Ecology - EPBC migratory species (terrestrial)	Potential impact on Commonwealth listed migratory species, or their habitat	Decommissioning (and site rehabilitation)	Possible	Moderate	Yes	Medium	There are thirteen EPBC listed migratory bird species known or likely to occur within the Project area. There are eleven EPBC threatened listed bird species. Four of these species are listed as Critically Endangered. It is unlikely that decommissioning activities would interact with any threatened and/or migratory birds however further assessment is required to plan for placement of offshore and onshore infrastructure. Marine birds may be exposed to noise impacts from piling when diving. Desktop studies do not identify impacts that would have a significant impact on migratory species under the EPBC significance criteria. Decommissioning is not expected to substantially modify or fragment species distribution, result in increased invasive species or seriously disrupt the lifecycle. There are a total of 37 EPBC listed threatened species known or likely within the Project area including areas of work such as the Black Range substation (Option 1), Reedy-Ck-Lucindale Rd (Option 2) and the potential corridors for transmission lines from the Black Range Substation to the South East Substation. On land Rehabilitation work should include native vegetation communities that were originally cleared and or the historic vegetation communities and ensure habitat is suitable for species that would inhabit the region also weed/ pest control will be required to ensure	Pre-clearance flora and fauna surveys will be carried out to confirm if any threatened species and/or habitat has re-established since construction clearing for the Project. Surveys will in for the Decommissioning Environmental Management Plan. This DEMP will identify rehabilitation requirements, including revegetating the area as much as possible to pre-construction levels. If smaller areas within the Project area are found to contain habitat for terrestrial fauna, these areas may be avoided. Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cable, as these will likely be removed during decommissioning.	Possible	Minor	Low
91	Ecology - EPBC migratory species (marine)	Potential impact on Commonwealth listed migratory birds, or their habitat	Decommissioning (and site rehabilitation)	Possible	Moderate	Yes	Medium	There are 13 EPBC listed threatened Marine species known or likely to occur within the Project area. These include six whale species, three turtle species, Dusky Dolphin, Porbeagle and White Shark. There are also two seadragon species listed under the EPBC Act as 'marine' species, leafy seadragon (*Phycodurus eques*) and weedy seadragon (*Phyllopteryx taeniolatus*) known to occur within the region. The impact is considered to be a significant impact under the EPBC criteria because the Project is likely to modify, destroy, fragment, isolate or disturb important areas of habitat that would have an adverse impact on the marine ecosystem functioning.	Further marine studies are required to collect baseline data and characterise existing conditions. Particular focus will be given to areas of seabed disturbance, including locations of turbine platforms and cables, as these will likely be removed during decommissioning.	Possible	Minor	Low
92	Ecology - EPBC Cth marine environment	Potential direct or non-direct impacts to Commonwealth Marine Areas	Decommissioning (and site rehabilitation)	Possible	Moderate	No	Medium	Commonwealth waters are outside the Project area but within the study area. Bonney Coast Upswelling is listed as a Key Ecological Feature of the Commonwealth Marine area MNES. At present, no direct physical disturbance of the Commonwealth marine area is proposed, however indirect impacts may potentially occuras a result of spills, cable removal, the introduction of pest species or changes to hydrodynamics. With appropriate controls in place, these impacts are considered to be a low risk, which is localised. They are unlikely to have a 'substantial' or 'persistent' adverse impact on the Commonwealth marine environment. Impacts to Commonwealth Marine Areas is expected to be Not Significant.	Pre-clearance flora and fauna surveys will be carried out to confirm if any threatened species and/or habitat has re-established since construction clearing for the Project. Surveys will in for the Decommissioning Environmental Management Plan. This DEMP will identify rehabilitation requirements, including revegetating the area as much as possible to pre-construction levels.	Possible	Minor	Low
93	Existing infrastructure	Potential impact to existing local, regional or state significant infrastructure during decommissioning	Decommissioning (and site rehabilitation)	Unlikely	Minor		Low	Unexpected infrastructure interfaces would be identified earlier in the Project. Refer to 'Ports and harbours' for risk of potential impacts to existing port assets	Future studies and engagement with third-parties during design development would inform of any requirements to minimise impacts to other infrastructure during decommissioning.	Unlikely	Minor	Low
94	Ground conditions and contamination	Land excavation, stockpiling, transport or disposal of contaminated material (including or acid sulfate soils) produced during decommissioning leading to potential risks to public health and the environment	Decommissioning (and site rehabilitation)	Likely	Minor		Medium	The Department for Environment and Water (DEW) Acid Sulfate Soil Potential mapping (2009) shows some areas within the study area have up to and more than a 60% chance of Acid Sulfate Soils being present. Agricultural and other previous disturbance and lands uses within the study area have potentially resulted in soil contamination. The potential for Acid Sulfate Soils and contaminated land within the construction footprint would be ascertained much earlier during the Project. Spoil and excavated material is expected to be generated during decommissioning, particularly for the underground components (cable bays and u/g cables). In line with the South Australian *Environment Protection (Waste to Resources) Policy 2010* , it is proposed that spoil and material be assessed for reuse on-site. This would require stockpiling on-site in the interim.	A contamination assessment would establish baseline indicators of material at site, which would be used to inform the DEMP, particularly in relation to management and disposal of spoil. Spoil from earthworks would be reused on-site where possible or disposed of in accordance with SA EPA requirements. Careful consideration would be given to the location for the temporary stockpiling of spoil and excavated material, which may be required over the short term. Stockpiles would be managed in accordance with the South Australian EPA *Guideline for stockpile management* (2020), which would reduce risk.	Unlikely	Moderate	Low
95	Ground conditions and contamination	Land disturbance, erosion, alteration of water courses and drainage patterns, vegetation removal, land clearing or modification during decommissioning impacting soil and water quality	Decommissioning (and site rehabilitation)	Likely	Minor		Medium	The Department for Environment and Water (DEW) Wind Erosion Potential mapping (2009) shows some areas (mainly along the coast) have a High to extreme wind erosion potential, with most areas mapped as having a moderately low to Low wind erosion potential. Decommissioning will require excavation and some land cover and vegetation clearance, having the potential to impact on soils, drainage patterns and surface water quality. Refer to 'Hydrology, flooding and water quality' for potential impacts to freshwater receiving environments	Vegetation and dense land cover clearance would be minimised as much as practicable during design development. Areas containing significant drainage patterns or heavy water flows would be avoided. A DEMP would establish management measures for cleared areas to ensure impacts to soil and water quality are reduced. This would include installation of temporary drainage routes, sediment control measures and the progressive revegetation of disturbed areas, where practicable.	Unlikely	Minor	Low
96	Groundwater	Impacts to ground water quality during decommissioning	Decommissioning (and site rehabilitation)	Likely	Moderate		Medium	The Project would be located in the Murray Groundwater Basin, with some transmission infrastructure also potentially located in the Otway Basin, both of which are classified as shallow sedimentary ground water basins. Shallower water depths, and those above the surface, have a higher risk of local ground water quality being impacted during decommissioning. Further investigation to ground-truth water depths and quality and local uses of groundwater will be undertaken.	Early installation of drainage controls and erosion and sedimentation monitoring during decommissioning would assist in managing and mitigating impacts. Establishing appropriate procedures for handling, transporting and using potentially contaminating substances including diesel, petrol, oils, greases, cement and other construction chemicals would be included in the DEMP.	Possible	Minor	Low
97	Groundwater	Impacts to ground water levels or flow during decommissioning	Decommissioning (and site rehabilitation)	Unlikely	Moderate		Low	The Project would be located in the Murray Groundwater Basin, with some transmission infrastructure also potentially located in the Otway Basin, both of which are classified as shallow sedimentary ground water basins. Decommissioning activities are unlikely to impact the groundwater table, as onshore works will likely be highly limited.	Appropriate management of temporary dewatering and groundwater control would be included in the DEMP, including recharge back to aquifer down gradient if required	Unlikely	Minor	Low
98	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Potential for leaks and spills during decommissioning as a result of storage, handling and use of dangerous goods and equipment	Decommissioning (and site rehabilitation)	Possible	Moderate		Medium	The storage and handling of dangerous goods and hazardous materials have the potential to impact construction workers and the surrounding environment if leaks and spills occur, resulting in the potential contamination of air, soils, surface water, and/or groundwater.	Standard management measures such as storage of dangerous goods in accordance with the relevant guidance would be included in the DEMP and would reduce potential risks.	Unlikely	Minor	Low
99	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Human exposure to unsafe levels of Electro-magnetic fields (EMF) during decommissioning	Decommissioning (and site rehabilitation)	Highly unlikely/rare	Moderate		Low	Electro-magnetic fields are produced wherever electricity is used or transmitted. While there is no established evidence that exposure to Electro-magnetic fields from power lines, substations, transformers or other electrical sources, regardless of proximity, causes any health effects, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) still refers to guidelines that recommend the limiting of exposure to Electro-magnetic fields so that the threshold at which the interactions between the human body and external electric and magnetic fields that causes adverse effects within the body cannot be reached. It is expected that there would be a low risk of exceeding the levels recommended by ARPANSA. Exposure time would also be limited.	Site OHS plans would manage the risk of exposure to Electro-magnetic fields.	Highly unlikely/rare	High	Low
100	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Potential for fire and increased bushfire risk during decommissioning	Decommissioning (and site rehabilitation)	Unlikely	Moderate		Low	The Project is not located in a designated Bushfire Protection Area, as brought in under the Ministerial Bushfire Management Plan Amendment Report in 2006/2007. However, the DEW Last Fire mapping (2021) shows bushfires have recently occurred in the region, including the Blackford bushfire (Jan 2021) and the Kerilira bushfire (2019). Decommissioning works may increase risk of fire and bushfire from accidental ignition from equipment, fuels and chemicals.	Standard management measures such as management plans addressing these issues would be included in the DEMP and would reduce the risk of the Project increasing fires and bushfires in the local region.	Highly unlikely/rare	Moderate	Low
101	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Vulnerability of the project to natural hazards, extreme weather and climate change during decommissioning	Decommissioning (and site rehabilitation)	Unlikely	Moderate		Low	Climate induced risks include increased dust generation during drier weather, increased construction delays due to wet weather, increased rainfall resulting in increased flow events in watercourses, temporary flooding and risk of failure of erosion and sediment controls and potential for construction workers to experience heatstroke as a result of extreme heat and hot weather events.	Standard management measures such as management plans addressing these issues would be included in the DEMP and would reduce the impact on the Project, including adequate training and PPE being provided to construction workers.	Highly unlikely/rare	Moderate	Low

102	Human health, Hazards and risks (incl. EMF, Fire, Human health, etc)	Exposure of personnel or the public to unsafe conditions as a result of decommissioning and on-site practices	Decommissioning (and site rehabilitation)	Possible	High		Medium	Offshore wind project presents unique risks to construction workers because of the nature of offshore construction (i.e.. working at height and offshore, falls, electrical risks, subsea works and extreme weather experience in vast open spaces off the coast). In extreme circumstances this may result in death or serious injury of construction personnel. The wider community is not expected to be impacted as access to construction sites on and offshore will be restricted.	Stringent site OHS plans would be developed and implemented to manage the risk of death or serious injury during construction on and offshore. Standard construction management measures would also reduce the likelihood of occurrence, including compulsory training and PPE provided to construction workers.	Unlikely	Moderate	Low
103	Historic heritage (incl. shipwrecks)	Impact to listed and non-listed heritage places and/or objects (maritime and terrestrial) during decommissioning	Decommissioning (and site rehabilitation)	Unlikely	Moderate		Low	Heritage impacts are unlikely during the decommissioning phase. There are no Commonwealth listed heritage places or sites within the study areas or surrounds. There are a number of State-listed shipwrecks mapped in Lacepede Bay. and surrounds, the closest being approximately 3km from the nearest turbine. There are also a number of State heritage places and local culture heritage assets mapped in the area.	Management measures would be included in the DEMP (as required) to minimise any indirect impacts to mapped heritage places and sites.	Highly unlikely/rare	Moderate	Low
104	Hydrology, flooding and water quality	Potential impacts to surface water quality during decommissioning	Decommissioning (and site rehabilitation)	Possible	High		Medium	Decommissioning activities such as earthworks and vegetation clearing could potentially impact on nearby waterways (i.e. increased nutrients entering waterways). There is also the potential for leaks and spills during decommissioning, which could potentially impact on surface water quality as a result of pollutants reaching waterways. Impacts to surface water quality may also have indirect impacts on potential threatened species which may be supported by these environments. This risk rating is precautionary until further understanding of local wetland and surface water systems is carried out and construction methods are further developed.	Further investigations will be carried out to understand the value of surface water environments in the area and to inform appropriate management measures to be applied. Early installation of drainage controls and erosion and sedimentation monitoring during all stages of works would assist in managing and mitigating impacts to land processes. Standard management measures in accordance with the SA EPA requirements, such as the implementation of a DEMP, would reduce the risk of increased nutrient runoff or accidental spills and the potential impact on any waterways. Decommissioning during dryer periods would also avoid runoff impacts to receiving freshwater and marine environments from degradation of	Unlikely	High	Medium
105	Land use	Potential impact or major change to existing and planned future residential, recreational, commercial and industrial land uses during decommissioning	Decommissioning (and site rehabilitation)	Unlikely	Minor		Low	The onshore section of the Project area covers approximately 1,800 km2 and intersects various land uses zoned by the Kingston District Council. Around half of the onshore project area is zoned for Conservation/Protection, currently used for general farming and regional open space. Changes to land use would occur during construction, and as such there would be no further land use impacts during decommissioning. This is a precautionary risk rating. As the design of the Project progresses the Project area will be further refined and may exclude/avoid residential areas.	Management measures will be included in the DEMP, including ancillary sites to be rehabilitated to their pre-construction condition.	Highly unlikely/rare	Minor	Very Low
106	Land use	Property acquisition or tenure of land or waters during decommissioning	Decommissioning (and site rehabilitation)	Unlikely	Minor		Low	Issues relating to land acquisition n and tenure will have been addressed during earlier stages of the Project. Decommissioning activities are unlikely to have an impact.	Consultation with the state government and local councils will be required during planning and executing of the decommissioning phase.	Highly unlikely/rare	Minor	Very Low
107	Landscape & visual	Potential adverse impacts during decommissioning on visual and/or landscape values experienced from public open space (coast) or residential areas	Decommissioning (and site rehabilitation)	Almost Certain	High		High	Decommissioning would have similar impacts to those identified during construction i.e. temporary. Although onshore infrastructure is adjacent to some existing infrastructure, the offshore WTGs will create permanent change to the landscape character and visual amenity of Kingston. The natural landscape of Kingston District Council, being a major recreational (e.g. fishing) and recreation and tourism node (wine-making) , is highly valued by the local, regional and state community. The WTGs and construction equipment will likely form a noticeable feature on the landscape that is currently untouched oceans views. Potential impacts to landscape and visual amenity are associated with decomissioning works are likley to be of short duration.	Further visual assessments will be carried out to understand the magnitude of change for landscape character and impact to visual amenity at various viewpoints along the coastline and residential areas. Landscaping and revegetation would be used to minimise onshore impacts.	Possible	Minor	Low
108	Marine geology, oceanography and physical processes	Changes to coastal and marine processes (such as tides, currents, water flow and wave patterns) potentially impacting on coastal land and assets, and the marine environment during decommissioning	Decommissioning (and site rehabilitation)	Unlikely	Negligible		Very Low	At this coastal location, tides and tidal currents, waves, wave-driven currents, and wave current interaction would determine the driving condition for sediment movement. The Coorong Region is classified as microtidal with a tidal range of 0.7m from lowest to highest astronomical tide. Tides are predominantly semi-diurnal, with a single tide cycle on most days.Decommissioning equipment is unlikely to alter local hydrodynamic processes. Further, it is unlikely to be significant in the far-field with only minor and temporary influences related to localised scour in the near field.	Appropriate computer modelling methods using tidal, wave and sediment modelling scenarios are required to assess hydrodynamic impacts to seafloor habitats and coastal geomorphological processes during the decommissioning phase – both inside the wind farm and further afield (near shore).	Unlikely	Negligible	Very Low
109	Marine water quality and sediment quality	Potential impacts to marine water and sediment quality during decommissioning	Decommissioning (and site rehabilitation)	Possible	Moderate		Medium	**Water quality -** Seagrass meadows are a good indicator of water quality; previous monitoring of quality of the seagrass meadows within the Coorong found a number of drains were impacted by an excess of nutrient runoff (Wear et al 2006). Overall, soluble and total nutrient levels are relatively low throughout Coorong, with impact on seagrass meadows potentially a result of the recovery time of Posidonia species during episodic high rainfall events. Pressures that may result in increased nutrients within the area include discharge from agricultural drains, urban stormwater and septic tank leakage Decommissioning activities may increase these levels. **Turbidity/sediments -** Modelling will be required to assess turbidity generated by construction and decommissioning activities. **Spills -** Vessels, turbines and facilities utilise use and store a variety of fuels, oils, lubricants and other chemicals. These substances can have lethal and sub-lethal effects to organisms (Yuewen and Adzigbli 2018) and can persist in the environment for long periods of time. An uncontrolled release could occur from (for example) vessel collision, equipment failure, leaks, etc.	A marine pollution risk assessment will be undertaken to inform the development of spill management strategies within the DEMP. Standard chemical storage, handling and maintenance procedures will be required.	Possible	Minor	Low
110	Noise and vibration	Noise and/or vibration from decommissioning activities exceeding thresholds/limits potentially impacting residential or other sensitive receptors	Decommissioning (and site rehabilitation)	Possible	Minor		Low	Decommissioning of the onshore substation, landfall site and underground cables may cause noise and vibration impacts to nearby sensitive receptors. Some minor noise will be generated by heavy vehicles using haulage routes. Sensitive receptors within the Project area may be sensitive to noise particularly as it is likely the ambient noise level will be low given the remoteness of the coastal area.	Further noise modelling and monitoring would identify areas where noise and vibration may exceed acceptable levels for sensitive receptors. Mitigations strategies include use of noise suppression devices, noise barriers where appropriate and limiting time frames for noisy works.	Unlikely	Negligible	Very Low
111	Noise and vibration	Underwater noise and/or vibration from decommissioning activities exceeding thresholds/limits potentially impacting sensitive marine receptors and species	Decommissioning (and site rehabilitation)	Likely	Moderate		Medium	Recent vessel traffic data (AMSA, 2021) shows that vessel traffic is quite low, with boating only limited to recreational fishing and crayfishing in the area, indicating that background noise levels are likely to also be low. Port Adelaide is the closest main port, located approximately 300 km to the north west. Taking the monopiles out of the seabed during decommissioning will be sequential, and of short duration. This would generate noises and vibrations which may cause a behavioural response in marine species up to several kilometres away (for impulsive and continuous generation of noise). However, decommissioning may need to occur seasonally to reduce interactions with listed threatened species likely to occur in the area. Noises from vessels will depend on the speed/power of travel, the type, size of vessel and the proximity of	Further underwater noise monitoring would identify risks and potential impacts to marine species. Mitigation measures would be incorporated into the DEMP including engaging a marine species-spotter to check there were no sensitive species in the work zone before work starts.	Possible	High	Medium
112	Ports and harbours	Modification of existing ports and harbours causing disruption to existing operations	Decommissioning (and site rehabilitation)	Likely	Moderate		Medium	Existing port facilities will be used to support the transport and marshalling of equipment and Project components from globally distributed supply chains, as well as decommissioning activities. The nearest port is Adelaide Port, about 300 km by road north west of the Project area. There are other ports in the area including Por Giles on the eastern side of Yorke Peninsula, located approximately 500 km north west of Kingston SE \. A suitable port or harbour would be chosen depending on proximity to the Project, water depths, tidal conditions, dedicated or shared berthing facilities, and potential opportunity to provide local employment opportunities. Decommissioning may require ports to change existing operations to accommodate an increased amount and frequency of vessels.	A future study of nearby harbour and ports will identify risks and limitations. Future stages of the project would involve engaging with local port operators and implementing mitigation measures to reduce impact to existing port operations as much as possible.	Unlikely	Moderate	Low
113	Shipping and navigation	Impact to shipping lanes, navigational setting or port approaches during decommissioning	Decommissioning (and site rehabilitation)	Possible	Minor		Low	Recent vessel traffic data (AMSA, 2021) shows that vessel traffic is quite low, with boating only limited to recreational fishing and crayfishing in the area. Risks to shipping and navigation are expected to low due to the short term nature and minor change in shipping routes expected during decommissioning. Desktop assessment indicates that no existing shipping channels that interfere with the Project area, however there are some cargo ships using the surrounding study area to travel to Ports situated in north west, including Port Adelaide . Changes to navigation and shipping routes would be acceptable and vessel would easily adapt with minimal impact.	A future study of shipping and navigation routes, including engagement with local fisheries and port operators, would inform of any requirements to minimise impacts during decommissioning.	Highly unlikely/rare	Negligible	Very Low
114	Socio-economic (incl. Tourism, Commercial fisheries, Recreational activities etc)	Potential impact (or benefit) to local, regional or state economic development and/or economic value of land and water during decommissioning	Decommissioning (and site rehabilitation)	Highly unlikely/rare	Negligible		Very Low	Decommissioning works are not expected to have an impact on regional or state economic development. There could be employment opportunities for the wider region which would benefit the regional economy. This is a positive risk rating.	The intent of the Project is to maximise benefits to the State and regional economy. Opportunities for this would be further explored throughout the planning and development process.	Highly unlikely/rare	Negligible	Very Low
115	Socio-economic (incl. Tourism, Commercial fisheries, Recreational activities etc)	Residential displacement, access restrictions and/or impact to community facilities, places of work, recreational uses or public open space during decommissioning	Decommissioning (and site rehabilitation)	Likely	Moderate		Medium	Although residential displacement and access to community facilities is unlikely to be impacted, the community's access to recreational and open space will be restricted during decommissioning. Kingston SE is a major recreational node and popular tourist destination along the south coast of South Australia. The beaches at Kingston SE, including Wyomi Beach and Pink Beach are utilised by local residents and tourists for recreational activities such as swimming, kite/wind surfing, surfing, sailing, boating and fishing. The rocky outcrops of the continental shelf are frequently used for recreational rock lobster fishing from November to June each year. Considering the recreational assets of the Project area are highly valued by the community this may cause frustration and angst among the local residents. However, decommissioning activities will be short term.	A Stakeholder Engagement Plan will be developed to manage the decommissioning phases of the project. Consultation would occur with the community regarding activities that may cause impacts to access to community facilities, residential areas, recreational activities and public open space. The environmental assessment would further identify and address community perception of the project and determine the predicted impacts based on existing conditions. Where potential impacts are identified, methods to avoid, manage or mitigate these impacts would be incorporated into a project DEMP. Decommissioning activities should be staged to avoid the peak fishing season (e.g. Nov-June) where feasible. Where usual accesses are impeded, an alternate access route will be provided if it is safe to do so.	Likely	Minor	Medium

116	Socio-economic (incl. Tourism, Commercial fisheries, Recreational activities etc)	Disruption or impact to local or regional businesses through direct or indirect impacts during decommissioning	Decommissioning (and site rehabilitation)	Likely	Moderate		Medium	Tourism operators will likely experience decreased trade during decommissioning if certain recreational activities are restricted including swimming, surfing kitesurfing, boating and fishing. Even if there is no actual decrease in access or amenity for recreational activities the community may still perceive negative impacts and decide not to the travel to the Kingston SE beaches, resulting in indirect impacts for local hotels, restaurants, cafes and retail outlets. Some fishing activities may also be restricted resulting in lower income for professional fishing businesses. However, decommissioning activities will be short term.	A Stakeholder Engagement Plan will be developed to manage the decommissioning phases of the project. Consultation would occur with coastal business owners regarding decommissioning activities that may cause impacts e.g. business access, traffic controls. The environmental assessment would further identify and address community perception of the project and determine the predicted impacts based on existing conditions. Where potential impacts are identified, methods to avoid, manage or mitigate these impacts would be incorporated into a project DEMP. Where usual accesses are impeded, an alternate access route will be provided.	Likely	Minor	Medium
117	Traffic & transport (onshore)	Change to normal traffic and transport conditions during decommissioning including increased traffic, change to transport network connectivity, and change to road pavement conditions	Decommissioning (and site rehabilitation)	Likely	Moderate		Medium	Decommissioning activities may lead to several disruptive oversized loads on the road network, therefore decommissioning timelines and traffic route options will need to be assessed.	A Traffic Management Plan is likely to be required to mitigate impacts to the road transport network. The TMP will be prepared in consultation with local road managers, Council and business and property owners.	Likely	Minor	Medium
118	Waste and resources	High water and energy use, potential impacts of wastewater or wastewater removal and generation of waste	Decommissioning (and site rehabilitation)	Likely	High		High	Decommissioning is likely to result in large amounts of waste due if dismantling of WTGs is required. Waste would include the wind turbines, foundations, sub-sea cables, meteorological masts, offshore and onshore substations and any scour materials. Decommissioning activities will require use of energy and water, and there will likely be both construction and general waste generated. If decommissioning involve the repowering or refurbishment of the WTGs this would extend the life of offshore wind farm and reuse resources already established.	Opportunities to minimise the generation of waste and the resources/materials sent to landfill include imbedding the waste hierarchy into overarching project planning to maximise resource efficiency. Project resources would be utilised and reused, where possible, in other parts of the Project or reused through other channels. Where practicable, efficiency in the uses of water and energy should be considered during the decommissioning phase. All waste will be managed and disposed/recycled in accordance with applicable South Australian regulations.	Possible	Moderate	Medium

Appendix B

Preliminary Marine Environment Assessment

South Australian Offshore Windfarm: Preliminary Marine Environment Assessment

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1 Introduction

1.1 Background

South Australia Offshore Windfarm Pty Ltd is planning to develop offshore wind energy within South Australian coastal waters, approximately 10km offshore of Kingston SE, and partly within the Upper South East Marine Park, as illustrated in Figure 1-1. If constructed, the windfarm will have a generation capacity of up to 600MW, and involve the installation of up to 75 offshore wind turbine generators.

This preliminary scoping study of the marine environmental attributes and values supports:

- A referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for potential impacts to Matters of National Environmental Significance (MNES)
- An application for 'Major Project' status under Section 111 of the *Planning, Development and Infrastructure Act 2016* (PDI Act).

There is an opportunity for the project to be assessed under the draft EPBC Act bilateral agreement (2008), which allows for a coordinated assessment between the Commonwealth and State, with a joint Environmental Impact Statement (EIS) and public consultation process, if allowable under legislation.

1.2 Study Objectives

The objectives of this scoping study are to:

- develop a first-pass assessment of marine environmental, social and economic values and associated constraints for the study area
- undertake a first-pass assessment of potential impacts to the marine environment as a result of planning, construction, operation and decommissioning of the project at both a Commonwealth and State level
- inform decision-making about the form of assessment required once the project receives 'major project' status
- inform the development of Assessment Guidelines or 'Terms of Reference' for further environmental assessment of the project.

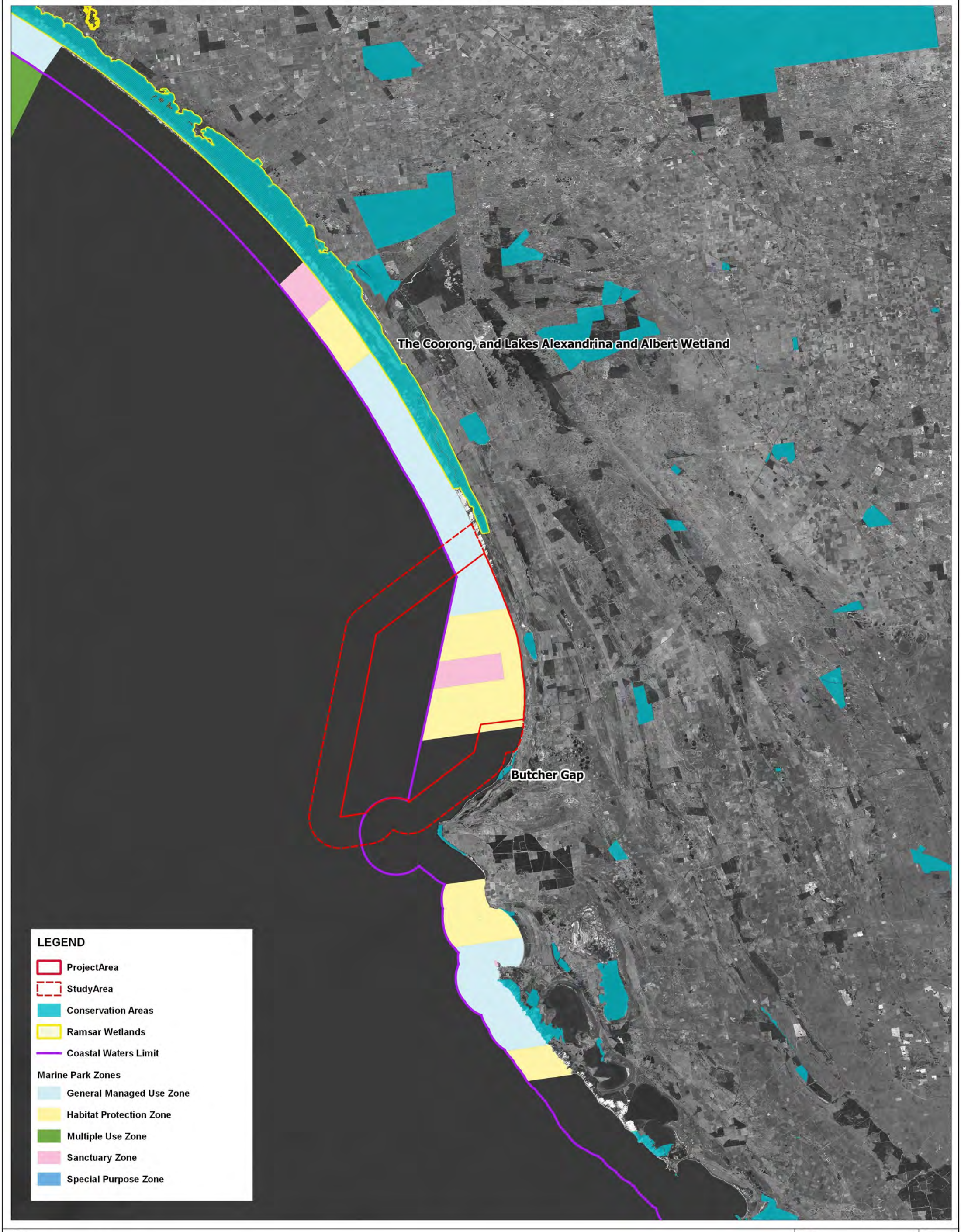
1.3 Terminology

The term *marine environment* is defined as marine waters up to the Highest Astronomical Tide (HAT) boundary.

Within this report, the conservation status of a species is defined in accordance with the provisions of relevant state legislation and its regulations and amendments (e.g. *National Parks and Wildlife Act 1972*), and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). *Threatened* is a common use term to collectively describe endangered and vulnerable species.

The following terms are used frequently in this report:

- The *project area* is comprised of the proposed disturbance footprint of marine infrastructure, including turbines, underwater cabling and offshore sub-stations, as provided by ARUP. This area will be investigated in the next stage to identify precise locations of infrastructure; it does not signify that the entire area will be disturbed.
- The *study area* encompasses the site and an additional 5km buffer, up to HAT.



Title:

Protected Areas South Australia

Figure: 1-1

Rev: A

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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2 Project Description

The following project description has been provided by SA Windfarm Pty Ltd, based on current global industry standards and practices. The project description will be refined as design, engineering and assessment of the project progresses. It is preliminary only and will be subject to change as the design and assessment process progresses.

The Project comprises the construction, operation and decommissioning of an offshore windfarm with generating capacity of up to 600 MW connected to the existing electricity network.

2.1 Offshore Components

The Project is likely to involve the following major offshore components:

- Up to 75 offshore wind turbines (WTGs) supported by monopile (or similar) foundations
- A network of buried or mechanically protected subsea cables along the seabed connecting the WTGs together and connecting the strings of WTGs to the offshore substation (known as inter-array cables)
- An offshore substation and substructure supported by monopile (or similar) foundations to collect and transform the output to a higher voltage
- Subsea cables buried or mechanically protected transmitting electricity generated from the windfarm to the onshore substation (known as the offshore export cable).

The offshore windfarm assets will be located within State waters. At this stage, it is anticipated that individual turbines (WTGs) delivering between 8 MW and 15 MW WTGs will be installed, however the ultimate number and final location of the WTGs will be determined prior to construction and based on the Project approval and commercial and supply chain considerations.

The WTGs are expected to be supported by monopile structures. Monopiles may be installed from a jack-up vessel or a floating vessel. The transition piece is usually lifted and grouted or bolted in place from the same vessel.

Monopiles (up to 10m diameter) are generally moved into position using the main crane and upending tool and held in position by a gripper tool. They are the driven into the seabed before mounting and grouting transition pieces.

Transition pieces are usually carried and installed by the same vessel, although a two-vessel strategy in which transition pieces are installed by a separate vessel has been used on several occasions.

An approximate timetable for installation once at the windfarm site is:

- Transport and positioning: 2 hours for floating vessels; 4 hours for jack-ups
- Preparations: 1 hour
- Lifting and pile positioning: 1 hour
- Driving: 6 hours, and
- Grouting: 2 hours.

Under some ground conditions, monopiles are grouted into a pre-drilled rock socket. Under conditions with boulders, a combination of drilling and driving may be required.

Cable installation activities will be preceded with a survey to define the route. This will be followed by a pre-lay grapnel run (or alternative method) to clear any debris from the cable route.

Different strategies for cable laying may be employed involving one or two vessels, and the chosen approach depends on seabed conditions, and equipment available to the contractor and presence of any benthic communities and habitat.

Burial will provide protection to the cables, however additional protection (rock dumping, or grout bags, etc) may be required at key locations (e.g. where cables enter the WTG or offshore substation platform or when ground conditions or crossings result in the cable being laid near to or on the seabed surface). Burial of cables will also assist in avoiding impacts to marine species (sharks, rays, bony fish, turtles and crustaceans) from electromagnetic fields (EMF). Burial depths for the offshore export cable will be subject to detailed assessment but is likely to be in the range of 1-3 m below seabed.

Pre-trenching and simultaneous lay and burial using a cable plough is preferred if the soil is suitable, as immediate burial and protection is obtained in a single pass which reduces costs and seabed disturbance. If seabed conditions are not suitable then a two-stage process will be used where the cable is laid on the seabed, after which a vessel with trenching vertical injector or jetting sled, undertakes the burial.

Cable ploughs can bury the cable down to 3-4m below seabed level. The plough requires a tow force to pull the plough through the soil depending on the soil conditions and the required burial depth. Using a barge (for shallow water operations), this force is supplied by an anchor or a tow tug. For a dynamically positioned vessel, a specialist vessel with an appropriate bollard pull will be required. It is often not possible to plough close to the turbine or substation. In that case, a trenching remotely operated vehicle (ROV) may be used.

ROVs can have either a jetting system or a mechanical cutter. A high-pressure jetting system is used to fluidise the seabed and allow the cable to sink to the required depth (only in sandy sediments and softer clays). For rocky or hard clay seabed conditions, a mechanical cutter will be used.

Shore crossing is typically undertaken via trenching at shallow relief beach sites, such as those seen at this location. In hard (non-sand) coastal beach lithologies, and or steeper or cliff related coastal settings horizonal directional drilling is undertaken to create the cable shore crossing conduit.

Offshore ancillary components may also be required during pre-construction, construction and operation, such as navigational aids, meteorological and oceanographic monitoring devices. The type, number and positions will be confirmed during development of the Project, and in consultation with the relevant authorities. It is anticipated these will be located within both State and Commonwealth waters.

2.2 Coastal and Onshore Assets

The following assets will be situated within the coastal and onshore environments:

- A landfall site with a transition joint pit connecting the marine cables from the offshore substation to the onshore cables that will run to the onshore substation

- An onshore substation, which may include further transformers
- A new overhead transmission line supplying energy generated from windfarm to the National Electricity Market (NEM), with additional equipment as required, which may include battery storage for fast frequency response to provide stability to the grid
- A battery system connected to the NEM
- Temporary construction areas and upgrade to access roads.

2.3 Construction and Maintenance Vessels

Turbine installation is normally undertaken with a self-propelled jack-up vessel designed primarily for the purpose, though in some cases, jack-up barges have been towed with tugs. The use of a floating vessel is also possible, avoiding impacts to the seabed.

Different specialist vessels will normally be used for export and array cable installation, as export cable-laying vessels will typically have larger carousels to accommodate longer cables.

Simultaneous lay and burial can be carried out with a variety of burial tools. In that case, the cable is buried during the lay to obtain immediate protection. Otherwise, a post-lay burial is required.

Cable-laying vessels will be approximately 140m in length and have a carrying capacity of 7,000t.

CTVs and service operation vessels (SOVs) may be used to support construction and maintenance activities. SOVs are larger vessels than CTVs and can fulfil a wider range of functions being capable of operating offshore for weeks rather than a single day.

Specialist vessels are used for crew transfer to the windfarm for installation and commissioning tasks. These are typically 15-20m workboats of the kind regularly used during windfarm maintenance.

Where possible, vessel movements and mooring will be limited to State waters. However, some navigation may be required through Commonwealth waters.

2.4 Existing port and harbour modifications

Existing port facilities would be used where possible to support the transport and marshalling of equipment and Project components from globally distributed supply chains, as well as construction and maintenance vessels and activities.

Suitable port and harbour facilities are currently being investigated based on the following criteria:

- Proximity to the Project, to allow for efficient vessel movements and transportation during construction and maintenance
- Water depths and tidal conditions suitable to the proposed Project vessels and activities
- Dedicated or shared berthing facilities
- Portside facilities and land availability for construction and maintenance activities (including laydown, storage and assembly of WTG components)
- Potential opportunity to provide local employment benefits.

Construction port requirements are typically:

- At least 8 hectares suitable for lay down and pre-assembly of product
- Quayside of length 200-300m length with high load bearing capacity and adjacent access
- Water access to accommodate vessels up to 140m length, 45m beam and 6m draft with no tidal or other access restrictions
- Overhead clearance to sea of 100m minimum (to allow vertical shipment of towers)
- Sites with greater weather restrictions or for larger scale construction may require an additional lay-down area, up to 30 hectares
- Large areas of land are required due to the space taken when turbines are stored lying down on the ground.

Ancillary components at existing ports to support with construction and maintenance activities may include staff car parking areas, waste handling and refuelling facilities, staff office areas and a marine control centre for directing activities, and storage facilities for minor components).

A schematic of the Project is shown in Figure 2-1 below.

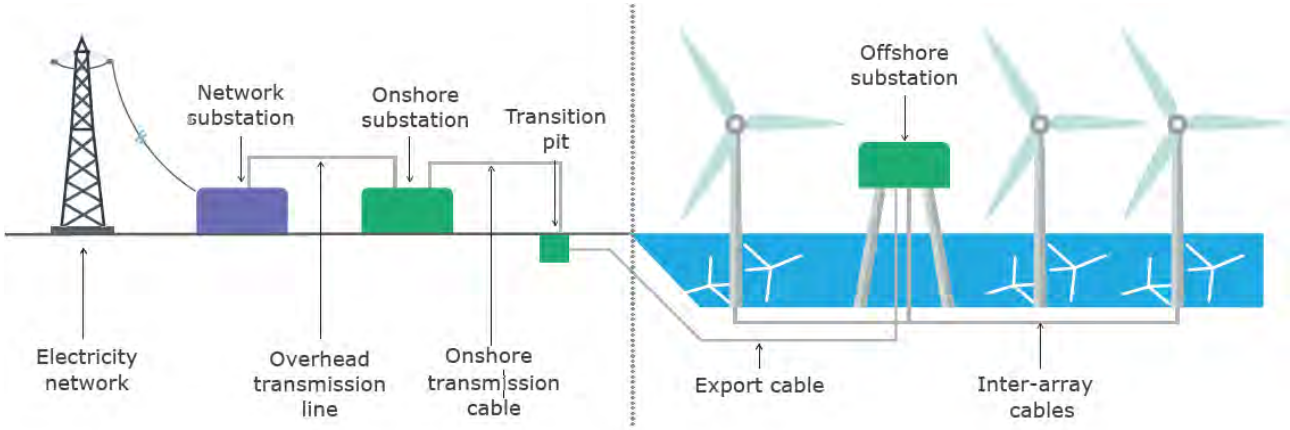


Figure 2-1 Project schematic

2.5 Project specifications

The indicative offshore Project characteristics are detailed in Table 2-1 below, along with anticipated location in State and/or Commonwealth waters.

Table 2-1 Indicative offshore characteristics

Feature	Parameters	State waters	Commonwealth waters
Wind Turbine Generators (WTGs)		✓	
Maximum generation capacity	600 MW		
Number of turbines	40 - 75		
WTG capacity	8 – 15 MW		
Max. rotor diameter	220 m		
Max. hub height	154 m		
Design. life	30 years		
Separation between WTG	825 – 1100 m (5 x rotor diameter)		
Spacing between rows	2 – 2.5 km		
Max. water depth at turbine locations	25 m		
Monopile foundations dimensions	6.5 – 8 m		
Monopile foundations depth	30 – 50 m		
Offshore substation		✓	
Platform size	800m^2		
Format	i.e. 66 - 132 - 275kV		
Monopile foundations depth	30 – 50 m		
Inter-array cables		✓	
Total length (dependent upon WTG size)	400km to 700km		
Format	i.e. 66 kV		
Offshore export cable		✓	
Length	15km		
Format	275kV		
Burial depth	1 – 4 m		
Offshore construction platforms (J/U)		✓	
Number	1 or 2 dependent upon WTG size		
Size	up to length: 260m, beam: 50m, draft: 12m		
Construction vessels		✓	✓
Number	3-5		
Size	15-20m (CTV)		

Feature	Parameters	State waters	Commonwealth waters
	80-100m (ROV support)		
Service Operation Vessels (SOV)		✓	✓
Number	1		
Size	x Up to 85m in length with accommodation for 60 POB		
Navigational aids and monitoring devices		✓	✓

2.6 Key construction activities

A high level overview of the key construction activities and staging is provided below.

2.6.1 Offshore

2.6.1.1 Pre construction

- Preparation of the seabed (including dredging as necessary)
- Installation of ancillary components, including navigational aids and establishment of temporary 500m exclusion zones around WTGs locations.

2.6.1.2 Construction

- Transport of WTGs and offshore substation monopiles and foundation components to site to marshalling site or sites
- Sequential driving of monopiles into seabed followed by fixing of transition pieces to the monopiles
- Installation of scour protection, as required
- Erection of WTG towers and nacelles, either pre-erected or erected individually at the site
- Installation of the turbine blades
- Construction of the offshore substation platform and installation of substation components and equipment
- Pre-trenching and simultaneous lay and burial of the array cables using a cable plough or trenching ROV
- Installation of the offshore export cable using a cable plough or trenching ROV.

2.7 Key operational and maintenance activities

Operation generally refers to activities contributing to the high level management of the windfarm, which will include remote monitoring, environmental monitoring, electricity sales, and administration and other back office tasks. There may be a possible 50m exclusion zone around offshore assets

during operation to maintain safety of key maintenance personnel and equipment as well the public, as in other jurisdictions.

Maintenance refers to the up-keep and repair of the physical assets and systems, which can be divided into preventative maintenance and corrective maintenance. Preventative maintenance will include the proactive repair and replacement of known wearing components based on routine inspections or information from condition monitoring systems, and corrective maintenance will include the reactive repair or replacement of failed or damaged components. Typical O&M activities include:

- Onshore and offshore logistics
- Turbine and blade maintenance, inspection, and service
- Foundation inspection and repair
- Cable inspection and repair
- Scour monitoring and management
- Substation maintenance and service.

2.8 Key decommissioning activities

It is expected that offshore structures (such as the WTGs) will be removed to just below the seabed as part of the decommissioning process, with cables and onshore infrastructure most likely to remain. Requirements for decommissioning will be established through the planning approvals for the Project and a decommissioning management plan will be developed prior to the commencement of decommissioning, in consultation with the relevant authorities. The decommissioning plan will include:

- Rehabilitation strategies and objectives
- Timeframes for rehabilitation
- Infrastructure (if any) agreed to remain in place
- Monitoring and mitigation measures.

3 Methodology

Publicly available information relating to the marine environmental features and values for the study area (refer to Section 1.3) was collated and reviewed, specifically:

- Matters of National Environmental Significance (MNES), as defined under the EPBC Act
- Threatened and other conservation-dependent species (e.g. rare, protected etc.) listed under the *National Parks and Wildlife Act 1972.*

Primary data sources were as follows:

- EPBC Protected Matters Search, undertaken for the study area and a 5km radius
- Species sightings records and/or benthic habitat mapping:
  - South Australia NatureMaps
  - Atlas of Living Australia
- Marine Park, Ramsar Wetland and National Park listing criteria and/or Management Plans, which include descriptions of the values of these areas
- Species Profile and Threats Database (SPRAT) for mapping of the distribution and occurrence of species and/or their habitats, together with life-history information
- Species Recovery Plans for various threatened species prepared under the EPBC Act
- Previous environmental studies within or in proximity to the study area.

An assessment was made of the likelihood of occurrence of listed species in the study area[1]. Where known, important life-history functions supported by the study area (i.e., breeding, foraging, nesting etc.) and other notable values supported were described based on mapping of *Biologically Important Areas for regionally significant marine species* (BIAs) (https://www.environment.gov.au/marine/marine-species/bias)[2] and Important Bird Areas[3] (IBA's)

Potential project threats to marine environmental values within the study area was made using a risk assessment process, provided by Arup, as illustrated in Figure 3-1. The criteria used for impact assessment (i.e. duration, likelihood, and consequence) are provided in Table 3-1 to Table 3-4. Note this is considered a first-pass assessment based on project concepts that will be further evaluated as the project evolves.

A further assessment was made to determine whether an impact had the potential to be significant, in accordance with the criteria within the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* or relevant State guidance.

[1] (i) known to occur = good quality, contemporary records; (ii) habitat/species likely to occur = as defined in SPRAT; (iii) possible occurrence = habitat/species 'may occur', as defined in SPRAT; (iv) unlikely to occur within the study area because there are insufficient records or habitat does not exist
[2] BIAs are defined as areas where aggregations of individuals of a species are known to display biologically important behaviour such as breeding, foraging, resting or migration. BIA's are designed to assist decision-making under the EPBC Act. They are identified using expert scientific knowledge about species distribution, abundance and behaviour in a region.
[3] IBAs are defined as places of international significance for birds, and are determined by an internationally agreed set of criteria by BirdLife International.

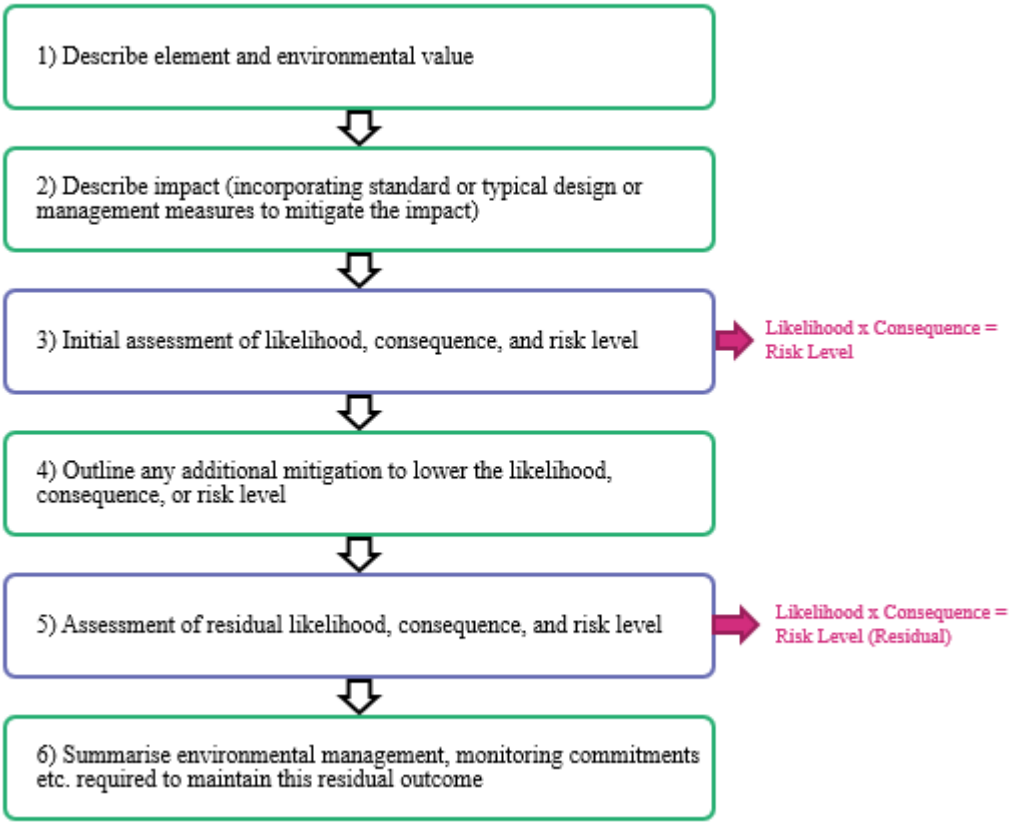


Figure 3-1 Environmental Impact Assessment Process

Table 3-1 Duration of Impact

Relative duration of environmental impacts	Description
Temporary	Days to months
Short term	Up to 1 year
Medium term	From 1 to 5 Years
Long term	From 5 to 50 Years
Permanent / irreversible	In Excess of 50 Years

Table 3-2 Likelihood of Impact

Likelihood of impacts	Risk probability categories
Highly unlikely / rare	May occur only in exceptional circumstances - can be assumed not to occur during period of the Project (Probability <10%)
Unlikely	Event is unlikely to occur, but it is possible during period of the Project (Probability 10-30%)
Possible	Event could occur during period of the Project (Probability 30-70%)
Likely	Event likely to occur once or more during period of the Project (Probability 70-90%)
Almost certain	Very likely to occur as a result of the proposed Project construction and/or operations; could occur multiple times during relevant impacting period (Probability > 90%)

Table 3-3 Consequence Criteria

Consequence	Criteria
Major Adverse	Impacts considered critical to the decision making process. They tend to be permanent, or irreversible, or otherwise long term, and/or can occur over large scale areas. Environmental receptors are extremely sensitive, and/or the impacts are of national significance. Typically mitigation measures are unlikely to remove such effects.
High Adverse	Impacts likely to be of importance in the decision making process. They tend to be permanent, or otherwise long to medium term, and/or can occur over large or medium scale areas. Environmental receptors are high to moderately sensitive, and/or the impacts are of State significance.
Moderate Adverse	Impacts relevant to decision making, particularly for determination of environmental management requirements. These impacts tend to range from long to short term, and/or occur over medium scale areas or are focused within a localised area. Environmental receptors are moderately sensitive, and/or the impacts are of regional or local significance.
Minor Adverse	Impacts recognisable, but acceptable within the decision-making process. They are still important in the determination of environmental management requirements. These impacts tend to be short term, or temporary and at the local scale.
Negligible	Minimal change to the existing situation. This could include for example be impacts which are beneath levels of detection, impacts that are within the normal bounds of variation or impacts that are within the margin of forecasting error.
Beneficial	The Project results in an improvement in the baseline situation.

Table 3-4 Risk Matrix

		Consequence				
		Negligible	**Minor**	**Moderate**	**High**	**Major**
Likelihood	**Highly unlikely**	Very low	Very low	Low	Low	Medium
	Unlikely	Very low	Low	Low	Medium	Medium
	Possible	Low	Low	Medium	Medium	High
	Likely	Low	Medium	Medium	High	Very High
	Almost certain	Low	Medium	High	High	Very High

4 Description of the Existing Environment

4.1 General Description of the Study Area

4.1.1 Protected Areas

The site is located in the South Australian Upper South East Marine Park (Figure 4-1), within the Habitat Protection Zone (HPZ) and Sanctuary Zone (Lacepede Bay SZ-2). The marine park supports a diverse range of habitats including high-energy sandy beaches, fringing limestone and platform reefs, dense seagrass beds and kelp forests. SZ-2 has been set aside to protect the largest area of seagrass meadows outside of the Gulf St Vincent and Spencer Gulf and supports an important nursery for species of commercial and recreational fisheries value (DENR, 2010).

HPZs enables areas to be managed to provide protection for habitats and biodiversity, while allowing for activities and uses that do not harm habitats or the functioning of ecosystems. Allowable activities within a HPZ include aquaculture, coastal infrastructure (i.e. pontoons, marinas, breakwaters, renewable energy infrastructure (including wind)), recreational and commercial fishing, general navigation and dredging, operating aircraft, recreational activities (i.e. diving, motorised sports, surfing, animal feeding, research and tourism operations) and active surveying (physical or chemical). No mining or processing activities are allowed.

SZs enable areas to be managed to provide protection and conservation for habitats and biodiversity, especially by prohibiting the removal or harm of plants, animals or marine products. Activities within the SZ are limited to traditional owner fishing, vessel mooring (with permit), recreational activity and tourism operations (with permit), however other activities may be considered on a case-by-case basis.

4.1.1.1 Coorong National Park

Immediately adjacent to the Marine Park are the Little Dip Conservation Park and Coorong National Park, which are well known and populous migration stop-over points for large numbers of shorebird and marine birds (Department of Environment and Planning, 1990). The purpose of the national park designation is primarily to preserve coastal ecosystems and refuge areas for waterfowl and migratory bird species, some of which breed within the Coorong. It is considered one of the most important wetland areas in the southern region of Southern Australia and acts as a refuge for many bird species in drought conditions. Of note are the following values:

- It provides habitat for the orange-bellied parrot (*Neophema chrysogaster*) (Critically Endangered and Marine under the EPBC Act; Endangered under the *National Parks and Wildlife Act 1972 (*NPWA). This species breeds in south-west Tasmania in summer, migrating to southern-eastern mainland (including the Coorong) for the rest of the year. The species is subject to an Emergency Plan, with fewer than 50 birds remaining in the wild.
- It is the world's largest permanent breeding ground for the Australian pelican (*Pelecanus conspicillatus*) with up to 3000 to 4000 pelicans gathering in island nurseries in good years
- Other significant bird species that contribute to the values of the Park include:

- Hooded plover (*Thinornis rubricollis rubricollis*) (Vulnerable - NPWA), which breeds on beach and foredunes of the Coorong
- Rufous bristle bird (*Dasyornis broadbenti*) (Vulnerable - NPWA), which breeds in coastal heath vegetation
- Little tern (*Sternula albifrons*) (Endangered - NPWA), although there are limited breeding observations
- Crested and fairy terns (*Thalasseus bergii* and *Sternula nereis*) - significant breeding habitat present on lagoon islands and coastal sections
- Mallee fowl (*Leipoa ocellata)* – breeds in southern mainland sections of the park
- Chestnut teal (*Anas castanea)* – significant breeding habitat in southern lagoons.

The southern end of the national park is zoned as a 'Natural Zone', which has the objective of *'maintaining the environment as close as possible to its natural state while enabling dispersed use by visitors'.*

4.1.1.2 The Coorong, Lakes Alexandrina and Albert Ramsar Wetland

The study area is located immediately adjacent to the Coorong and Lakes Alexandrina and Albert Ramsar Wetland. This wetland met the following criteria at the time of listing as a wetland of international significance:

- Regularly supports more than 122,000 waders as a summer population
- Regularly supports more than 1% of the total cape barren goose (*Cereopsis novaehollandiae)* population as a summer refuge area
- Regularly supports more than 1% of all breeding pairs of black swan (*Cygnus atratus)*
- Regularly supports the largest breeding habitat of the Australian pelican and species such as crested tern, fairy tern, pied oyster catcher, chestnut teal.

This Ramsar wetland is valued due to its diversity of habitats that support a range of waders and waterfowl including several threatened species. It also contains the endangered swamps of the Fleurieu Peninsula. The Ramsar site has community and cultural values including Aboriginal, historic and geological sites (DEWHA 2010). Wetland flats (areas subject to inundation) also line the coastline adjacent to the study area, as shown in Figure 4-1.

Figure 4-1 Upper South East Marine Park Zoning Plan (Government of South Australia, 2012)

4.1.2 Substrate Types

The area between Cape Jaffa and Cape Northumberland consists of low profile, platform reef with heavy limestone or calcarenite and few patches of bare sand (Edyvane 1998). These sand patches typically constitute a shallow layer of sand over hard substrate (Butler *et al.,* 2002). The navigation chart for Lacepede Bay shows the substrate as being largely sand or shell, with some areas of rock, coral and gravel closer to Cape Jaffa.

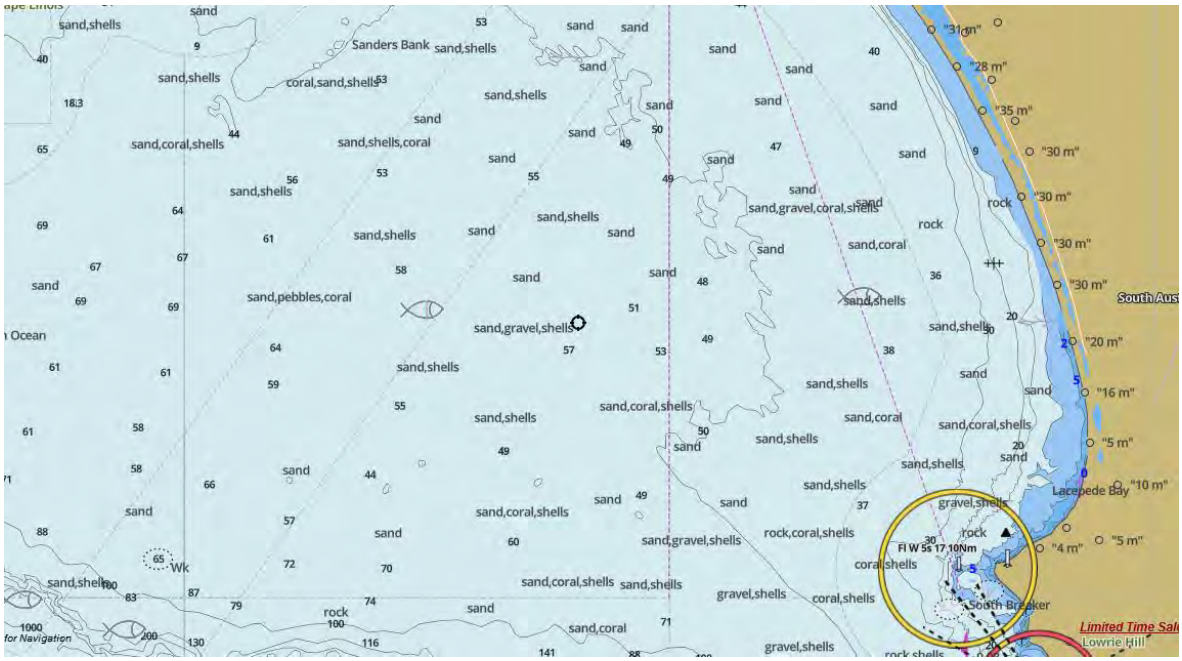


Figure 4-2 Navigational Chart for Lacepede Bay (Source: GPS Nautical Charts)

4.1.3 Benthic Habitats and Communities

The Coorong biounit is predominately comprised of high energy coastal waters that are located in the Bonney Coast Upwelling. The nutrient enriched waters of the Bonney Coast Upwelling support some of the most diverse macroalgae and seagrass communities in the world (PIRSA 2005). Dense seagrass meadows occur on the lee side of offshore reefs, which are uncommon elsewhere on the southern Australian coastline due to high wave energy. The broader coastal area is a transitional zone of warm to cool water, providing favourable growing conditions for a number of seagrass species.

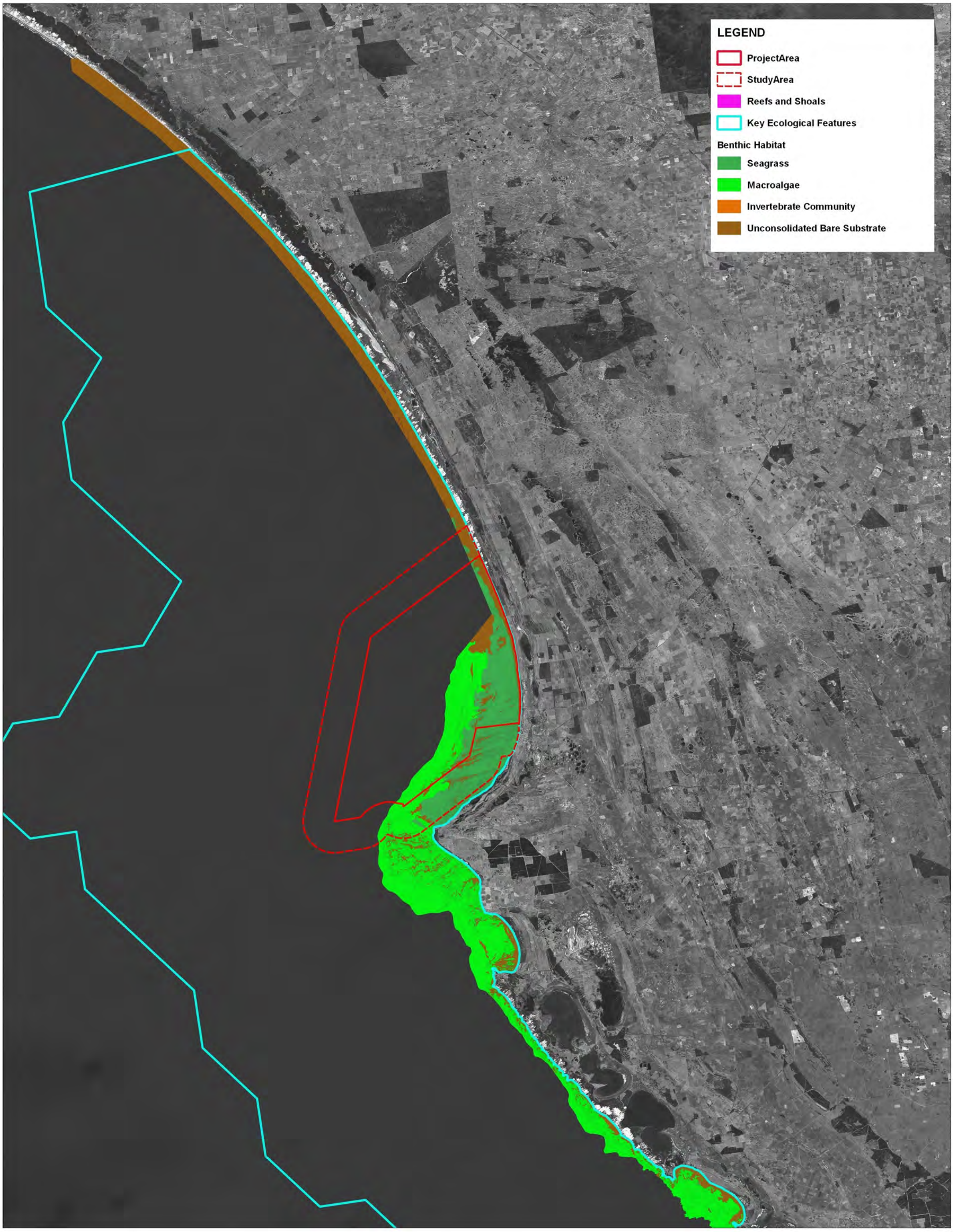
Benthic habitats of the study area are a mosaic of seagrass meadows, reefs (notably Margaret Brock and North Reefs) and unconsolidated substrate, as shown in Figure 4-3 and Table 4-1. Broad-scale Seamap benthic habitat mapping, which is only available for nearshore sections of the study area, identifies almost half of the study area as low-profile reef with macroalgae. There is no available seabed habitat mapping for deeper sections of the study area (see Figure 4-3 for limits of mapping).

The reefs within the study area support the most western extent of giant kelp (*Macrocystis angustifolia*) and bull kelp (*Durvillea potatorum*) (PIRSA 2005). These kelp areas may be classified as the EPBC-listed TEC Giant Kelp Marine Forests of South East Australia, however ground-truthing

will be required to confirm whether the characteristics and habitat quality meet the TEC criteria are present.

Table 4-1 Areas of macroalgae and seagrass habitat within the project site and study area (based on available mapping)

Benthic Habitat Type	Area (sq. kms)	
	Project Site	Study Area
Macroalgae	106	170
Seagrass	97	187



Title:

Protected Areas
Benthic Habitat

Figure: 4-3

Rev: A

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

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4.2 Matters of National Environmental Significance

Under the EPBC Act, an action will require approval if the action has, will have, or is likely to have, a significant impact on a Matter of National Environmental Significance (MNES):

- World Heritage Properties
- National Heritage Places
- Wetlands of international importance (Ramsar wetlands)
- Nationally threatened species and ecological communities
- Listed migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear action
- A water resource, in relation to coal seam gas development and large coal mining development.

A search of the Protected Matters Search Tool has identified that Nationally Threatened Species and Ecological Communities, migratory species and Commonwealth marine areas may occur within the study area or immediately adjacent. These matters are further described below.

4.2.1 Threatened Ecological Community

The EPBC-listed Threatened Ecological Community (TEC) *Giant Kelp Marine Forests of South East Australia* has the potential to occur within the eastern section of the study area, around Cape Jaffa. Commonwealth mapping of the likely extent of this TEC identifies an area to the eastern end of the study area as 'maybe occurring', as shown in Figure 4-4. Benthic habitat mapping shows approximately 170 sq. km's of macroalgae exists within the study area, which may meet the criteria for the TEC; site surveys will be required to confirm the area of TEC potentially impacted.

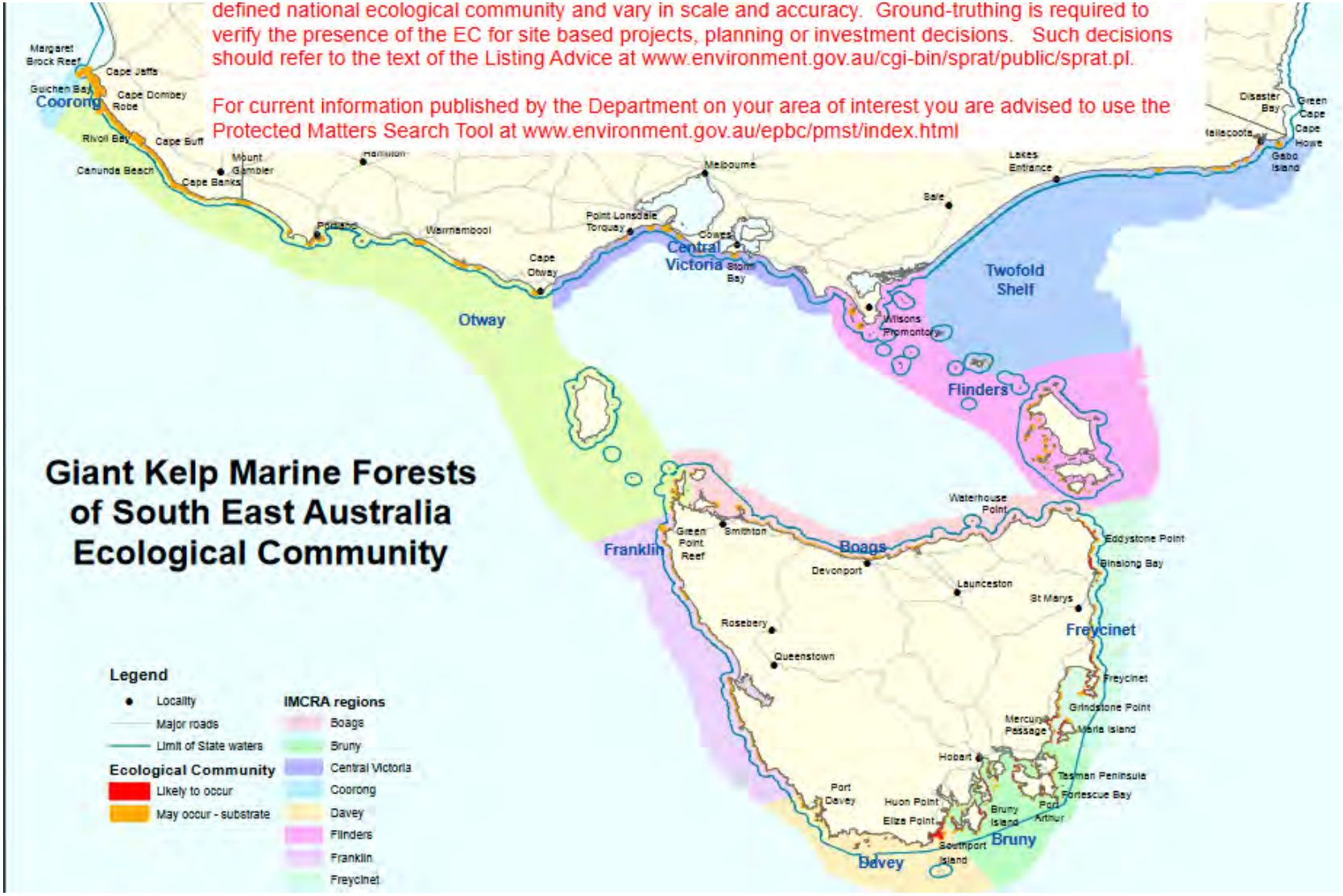


Figure 4-4 Potential extent of the Threatened Ecological Community Giant Kelp Marine Forests of South East Australia (Source: SPRAT Database)

4.2.2 Commonwealth Marine Areas

The Commonwealth marine area commences three nautical miles (defined as three nautical miles from Lowest Astronomical Tide (LAT) under the *Seas and Submerged Lands Act 1973)* from the coastline, also known as the Territorial Sea Baseline (TSB).

The nearest Commonwealth Marine Park is the Murray Marine Park (approximately 60km west of the study area). The marine park stretches from the mouth of the Murray River to 400km south of the coastline across the continental slope and deeper water ecosystems and provides foraging habitat for seabirds and blue whales.

A large portion of the South Australia coastline, including the study area, falls within the Bonney Coast Upwelling. This upwelling is listed by the Commonwealth as a Key Ecological Feature, which while not a MNES in its own right, forms a component of the Commonwealth marine area MNES. The Bonney Coast Upwelling is a highly productive area provide important habitat to a wide range of species, including an important feeding area for blue whales (Butler *et al.,* 2002), seabirds, penguins, pinnipeds and fish.

At present, no direct physical disturbance of the Commonwealth marine area is proposed (immediately adjacent to proposed wind turbines and cabling), however indirect impacts may potentially occur, such as poor water quality or the generation of underwater noise extending beyond state waters.

4.2.3 Nationally Threatened Species

The protected matters search tool for the study area identified 37 listed threatened species. Table 4-2 lists the threatened species (i.e. Critically Endangered, Endangered or Vulnerable) under either the EPBC or South Australian *National Parks and Wildlife Act 1972* that have been recorded as occurring, or potentially occurring, within or adjacent to the study area. Species records have been drawn from available databases, including NatureMaps (South Australia's database of fauna records) and the Atlas of Living Australia. Table 4-2 includes marine species, or species that may traverse/migrate through the marine environment (e.g. migratory birds travelling to feeding areas). Because of the relative isolation of the site, the species records are not expected to be complete.

There are four EPBC-listed Critically Endangered species potentially occurring within the study area:

Critically Endangered

- Curlew sandpiper (*Calidris ferruginea)*
- Northern Siberian bar-tailed godwit (*Limosa lapponica mezbieri*)
- Orange-bellied parrot (*Neophema chrysogaster*)
- Eastern curlew (*Numenius Madagascariensis*).

Biologically important areas (BIAs) are areas where species are known to perform important behaviour such as breeding, foraging resting or migration. Important bird areas (IBAs) are internationally recognised sites that are important for bird conservation and known to support key bird species. Coorong IBA is adjacent to the proposed area and is included as of the Ramsar wetland.

The study area is nominated to be a BIA for the following species:

- Whales: southern right whale, pygmy blue whale, blue whale.
- Seabirds: black-browed albatross, Campbell albatross, Indian yellow-nosed albatross, shy albatross, wandering albatross, antipodean albatross; and
- Mammals: Australian sea lion.

Further commentary on how these species may utilise the marine environment is provided in the following sections.

Table 4-2 Listed species for the SA Offshore Windfarm

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Type of presence within Study Area
Bird Species				
Actitis hypoleucos	Common Sandpiper	Migratory, Marine	Rare	Species or species habitat **likely** to occur within area
Apus pacificus	Fork-tailed swift	Migratory, Marine	-	Species or species habitat **likely** to occur within area
Ardenna carneipes	Flesh-footed shearwater	Migratory, Marine	Rare	Species or species habitat **likely** to occur within area
Ardenna grisea	Sooty shearwater	Migratory, Marine	-	Species or species habitat **likely** to occur within area
Botaurus poiciloptilus	Australasian bittern	Endangered	Endangered	Species or species habitat **likely** to occur within area
Calidris acuminata	Sharp-tailed sandpiper	Migratory, Marine	-	Species or species habitat **likely** to occur within area
Calidris canutus	Red knot	Endangered, Migratory, Marine	Endangered	Species or species habitat **known** to occur within area
Calidris ferruginea	Curlew sandpiper	Critically Endangered, Migratory, Marine	Endangered	Species or species habitat **known** to occur within area
Calidris melanotos	Pectoral sandpiper	Migratory, Marine	-	Species or species habitat **likely** to occur within area
Diomedea antipodensis	Antipodean albatross	Vulnerable, Migratory, Marine	-	Foraging, feeding or related behaviour **likel**y to occur within area
Diomedea epomophora	Southern royal albatross	Vulnerable, Migratory, Marine	Vulnerable	Foraging, feeding or related behaviour **likel**y to occur within area

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Type of presence within Study Area
Diomedea exulans	Wandering albatross	Vulnerable, Migratory, Marine	Vulnerable	Foraging, feeding or related behaviour **likel**y to occur within area
Diomedea sanfordi	Northern royal albatross	Endangered, Migratory	Endangered	Foraging, feeding or related behaviour **likel**y to occur within area
Haematopus longirostris	Pied oystercatcher	-	Rare	Species or species habitat **known** to occur within area
Halobaena caerulea	Blue petrel	Vulnerable	-	Species or species habitat **may** occur within area
Hydroprogne caspia	Caspian Tern	Migratory, Marine	-	Species or species habitat **likely** to occur within area
Limosa lapponica baueri	Bar-tailed godwit	Vulnerable, Migratory, Marine	Rare	Species or species habitat **may** occur within area
Limosa lapponica menzbieri	Northern siberian bar-tailed godwit	Critically Endangered	-	Species or species habitat **may** occur within area
Macronectes giganteus	Southern Giant Petrel	Endangered, Migratory, Marine	Vulnerable	Species or species habitat **may** occur within area
Macronectes halli	Northern Giant Petrel	Vulnerable, Migratory, Marine	-	Species or species habitat **may** occur within area
Neophema chrysogaster	Orange-bellied Parrot	Critically endangered	Endangered	Species or species habitat **known** to occur within area
Numenius madagascariensis	Eastern Curlew	Critically Endangered, Migratory, Marine	Endangered	Species or species habitat **known** to occur within area
Pachyptila turtur subantarctica	Fairy Prion	Vulnerable, Marine	-	Species or species habitat **likely** to occur within area

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Type of presence within Study Area
Pandion haliaetus	Osprey	Migratory, Marine	Endangered	Species or species habitat **likely** to occur within area
Phoebetria fusca	Sooty Albatross	Vulnerable, Marine	Endangered	Species or species habitat **likely** to occur within area
Pterodroma mollis	Soft-plumaged Petrel	Vulnerable, Marine	-	Species or species habitat **may** occur within area
Rostratula australis	Australian Painted Snipe	Endangered	Endangered	Species or species habitat **likely** to occur within area
Sternula nereis nereis	Australian Fairy Tern	Vulnerable	Endangered	Breeding **likely** to occur within area
Thalassarche cauta	Shy Albatross	Endangered, Migratory, Marine	Vulnerable	Foraging, feeding or related behaviour **likely** to occur within area
Thalassarche carteri	Indian Yellow-nosed Albatross	Vulnerable	Endangered	Species or species habitat **known** to occur within area
Thalassarche chrysostoma	Grey-headed Albatross	Endangered	Vulnerable	Species or species habitat **known** to occur within area
Thalassarche impavida	Campbell Albatross	Vulnerable, Migratory, Marine	Vulnerable	Species or species habitat **may** occur within area
Thalassarche melanophris	Black-browed Albatross	Vulnerable, Migratory, Marine	-	Species or species habitat **may** occur within area
Thalassarche salvini	Salvin's Albatross	Vulnerable, Migratory, Marine	Vulnerable	Foraging, feeding or related behaviour **likely** to occur within area
Thalassarche steadi	White-capped Albatross	Vulnerable, Migratory, Marine	-	Foraging, feeding or related behaviour **likely** to occur

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Type of presence within Study Area
				within area
Thinornis cucullatus cucullatus	Eastern Hooded Plover	Vulnerable, Marine	Vulnerable	Species or species habitat **known** to occur within area
Cetaceans				
Balaenoptera borealis	Sei Whale	Vulnerable, Migratory, Marine	Vulnerable	Foraging, feeding or related behaviour **known** to occur within area
Balaenoptera musculus	Blue Whale	Endangered, Migratory, Marine	Endangered	Foraging, feeding or related behaviour **known** to occur within area
Balaenoptera physalus	Fin Whale	Vulnerable, Migratory, Marine	Vulnerable	Foraging, feeding or related behaviour **known** to occur within area
Eubalaena australis	Southern Right Whale	Endangered, Migratory, Marine	Vulnerable	Species or species habitat **known** to occur
Megaptera novaeangliae	Humpback Whale	Vulnerable, Migratory, Marine	Vulnerable	Species or species habitat **likely** to occur within area
Orcinus orca	Killer Whale	Migratory, Marine	-	Species or species habitat **may** occur within area
Lagenorhynchus obscurus	Dusky Dolphin	Migratory, Marine	-	Species or species habitat **may** occur within area
Turtles				
Caretta caretta	Loggerhead Turtle	Endangered, Migratory, Marine	Endangered	Foraging activity likely to occur within the area
Chelonia mydas	Green Turtle	Vulnerable, Migratory, Marine	Vulnerable	Foraging activity likely to occur within the area

Scientific Name	Common Name	EPBC Act Status	NPW Act Status	Type of presence within Study Area
Dermochelys coriacea	Leatherback Turtle	Endangered, Migratory, Marine	Vulnerable	Foraging activity likely to occur within the area
Fishes				
Carcharodon carcharias	White Shark	Vulnerable, Migratory	-	Species or species habitat **known** to occur within area
Lamna nasus	Porbeagle	Migratory	-	Species or species habitat **may** occur within area
Pinnipeds				
Neophoca cinerea	Australian Sea Lion	Endangered, Marine	Vulnerable	Species or species habitat **known** to occur within area

4.2.3.1 Seabirds

There are records of several threatened seabirds within the study area, although there are limited siting records in recent years. Figure 4-5 and 4-7 show species records and BIAs for seabirds.

Albatross and petrel species largely breed in Antarctica and islands south of Australia (Australian Government, 2016). Albatross and giant petrel species exhibit a broad range of diets and foraging behaviours, and hence their at-sea distributions are broad and diverse. Combined with their ability to cover vast oceanic distances, all waters within Australian jurisdiction can be considered foraging habitat, however the most critical foraging habitat is considered to be those waters south of 25 degrees where most species spend most of their foraging time. It is unlikely the study area would be considered critical to the survival of threatened seabird species due to their large foraging range; further detailed assessment of their use of the area and the risks posed by turbine strike will be required however.

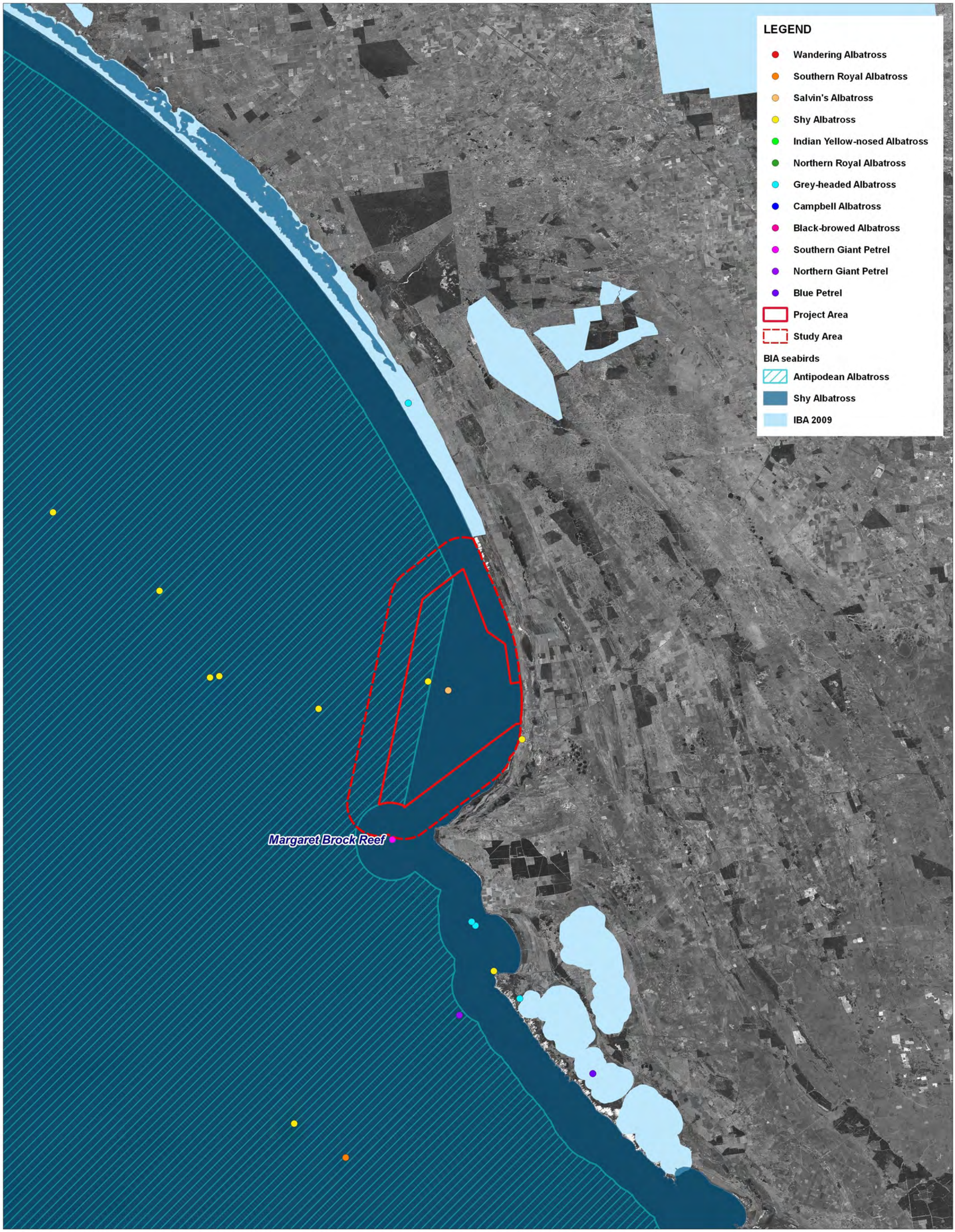
4.2.3.2 International Migratory Shorebirds

International migratory shorebirds refer to shorebirds and waders that typically migrate on an annual basis through the East Asian-Australasian Flyway (Bamford *et al.,* 2008). These species breed in wetland environments in the northern hemisphere during the northern summer, before migrating south to Australia and other locations over winter (Australian summer).

As part of the annual migration, shorebirds tend to aggregate at significant coastal wetland and intertidal sites across Australia, with smaller aggregations occurring in inland habitats. The nearshore (intertidal, supratidal) sections of the study area and surrounds provide suitable roosting and foraging habitat for shorebirds, including intertidal flats, shoals, mangroves, and beach habitats. Coastal neritic waters also provide potential foraging habitat for piscivorous shorebirds.

The broader Coorong Wetlands system is likely to be considered important habitat (i.e. habitat that supports an ecologically significant proportion of the population of a species and/or habitat that is of critical importance to the species at particular life-cycle stages) for a number of migratory shorebirds.

It is noted that the shoreline is considered a nesting site for the hooded plover (*Thinornis cucullatus*), which is listed as Vulnerable under the South Australian *National Parks and Wildlife Act 1972*.



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Protected Species - Seabirds
South Australia

Figure: 4-5

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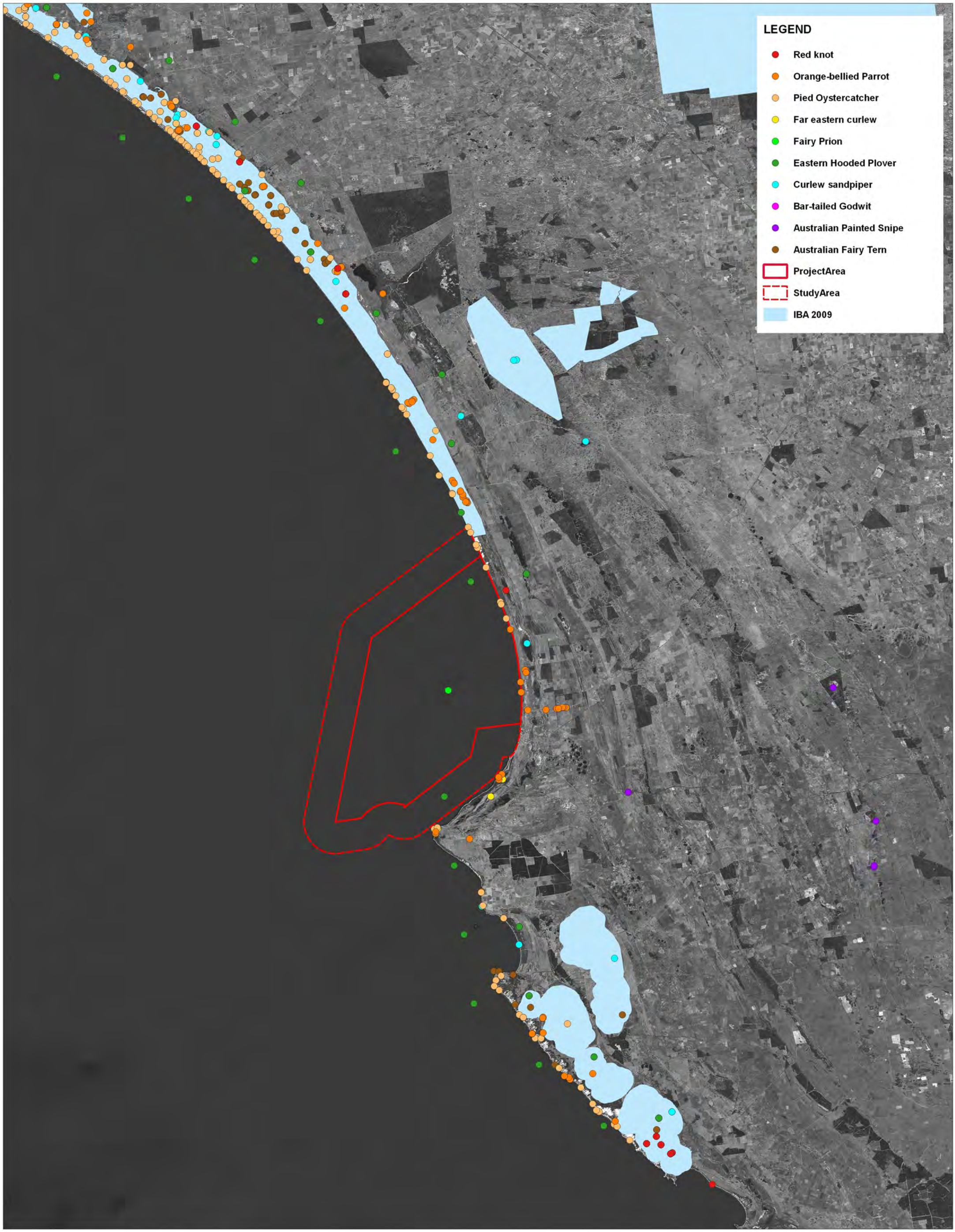

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Protected Species - Shorebirds South Australia

Figure: 4-6

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4.2.3.3 Orange-bellied parrot

The orange-bellied parrot (*Neophema chrysogaster*) inhabits coastal and surrounding areas including saltmarshes, littoral heathlands and scrublands. It is listed as Critically Endangered, with less than 50 birds remaining in the wild.

The orange-bellied parrot breeds in Tasmania and then migrates to southern mainland Australian for winter. Typically, the birds migrate to Victoria, then disperse east and west, into South Australia, as shown in Figure 4-7.

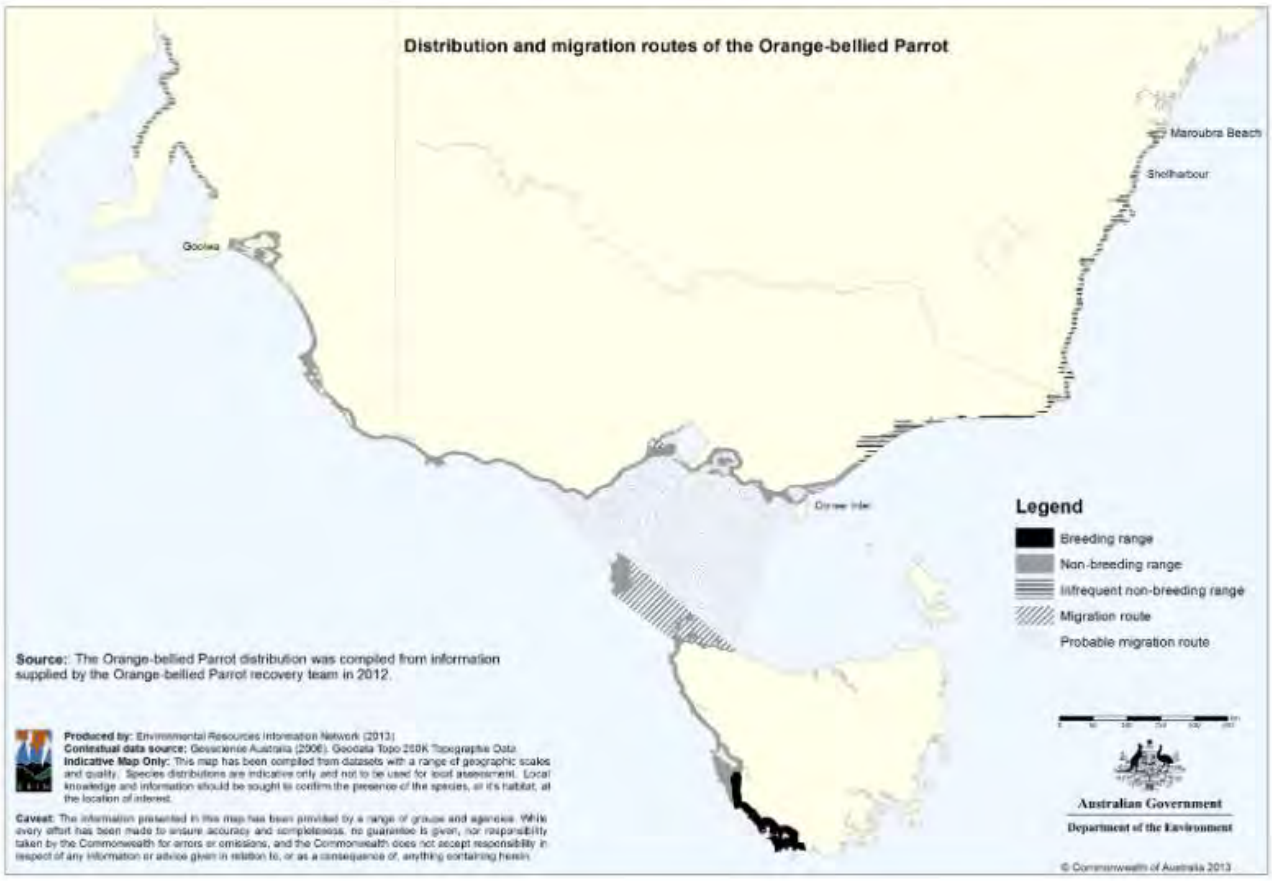


Figure 4-7 Known distribution of the orange-bellied parrot (Australian Government, 2016)

Sightings of the orange-bellied parrot in South Australia are very rare. A ranger reported a sighting in the Canunda National Park in 2017 (approximately 100 km south-east of the site); the last reported sighting prior to that was in 2012 at Port MacDonnell (approximately 150 km south east). Sightings within the study area were relatively common through the 80's and 90's; the last reported sighting (Naturemaps, 2021) was in 2001, near Pinks Beach. Sighting records are illustrated in Figure 4-5).

The Ecological Character Description for the Coorong Ramsar site (Department of Environment and Heritage, 2006), lists critical habitat in South Australia for the species as Canunda National Park, Lake Bonney, Nora Creina, Robe, Butchers Gap, Blackford Drain, Woods Well, Magrath Flat and Lake Alexandrina.

While suitable habitat exists within the study area, the absence of contemporary records suggest that it is not presently using the area, and would potentially not be considered habitat critical to its survival as a species.

4.2.3.4 Cetaceans

The southern right whale (*Eubalaena australis*), which is listed as Endangered under the EPBC Act, migrates between summer feeding areas in the Southern Ocean to inshore coastal waters off Australia. The whales migrate past the study area during May and June during its migration from Tasmania to the Great Australian Bight (PIRSA 2005) to the important aggregation areas of Head of the Bight and around the mouth of the Gulf St Vincent. Existing records of whale sightings are prese in Figure 4-11.

The study area was previously noted as being adjacent to an emerging aggregation with historical evidence of high use (see Figure 4-8 DSEWPC 2012), however with increasing whale population size, this emerging aggregation may be spreading. The Bonney Coast Upwelling is also known to be a feeding habitat for this species (Butler *et al.,* 2002). The Conservation Management Plan for the Southern Right Whale (Commonwealth of Australia, 2012), suggests that the species will occur within two kilometres of the shoreline, and tend to congregate in aggregation areas. Areas with some degree of protection from prevailing weather conditions are generally preferred. Calving occurs in the southern waters of Australia between May to October, usually in depths of less than 10 m. Movement along the coastline between aggregation areas suggest that connectivity of coastal habitat is important. For this reason, the site is defined as a Biologically Important Area for the species, due to its relative proximity to the Encounter Bay aggregation area (near Goolwa, approximately 120km away).

Noise interference (loud noises or long exposure) is cited by Commonwealth of Australia (2012) as being a potential threat to the species, which may cause avoidance behaviour. Potential forms of noise interference listed by Commonwealth of Australia (2012) include seismic and drilling operations, mining, some types of dredging, infrastructure construction and operation, vessel noise and low flying planes, chronic vessel noise. The Conservation Plan also states that '*new forms of industry with the potential to create underwater noise include near-shore renewable energy technologies such as wind farms and tidal turbines, and further work on the underwater noise levels produced from these developments is needed'*.

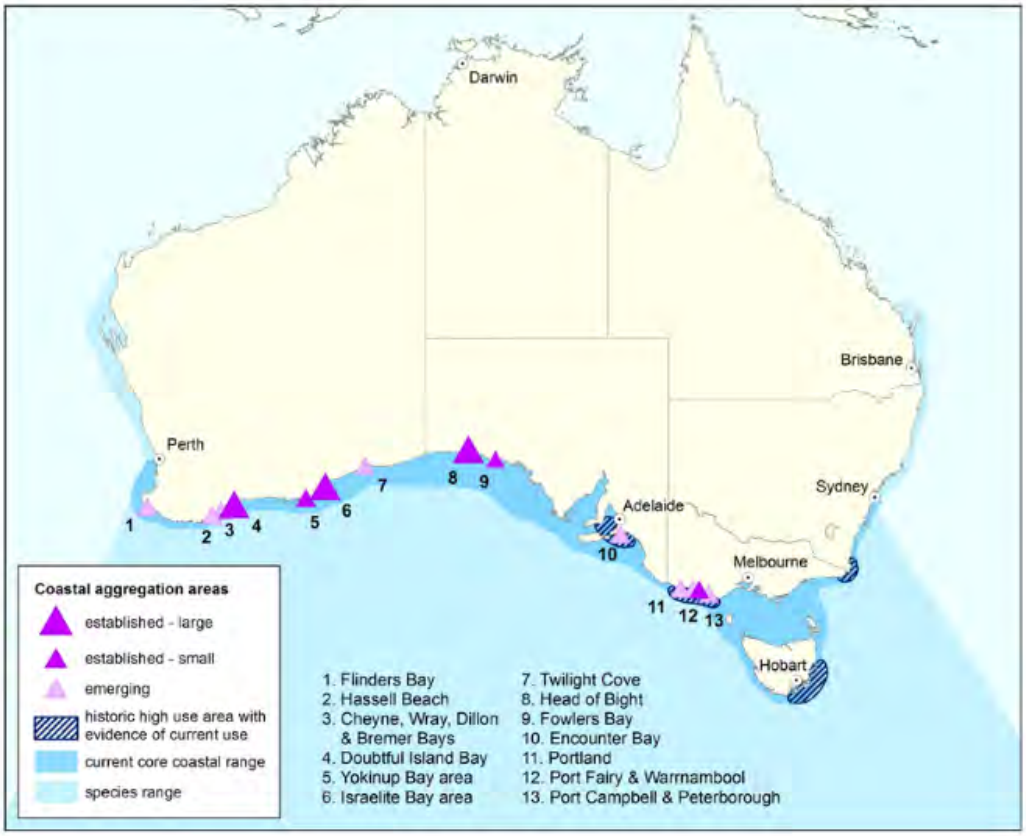


Figure 4-8 Southern Right Whales Coastal Aggregation (DSEWPC 2012)

The humpback whale (*Megaptera novaeangliae*) has not been recorded in the study area. There are regular sightings around the entrance to the Gulf St Vincent, where the South Australian Whale Centre is located. The study area is not considered part of the core range for the species (refer to Figure 4-9).

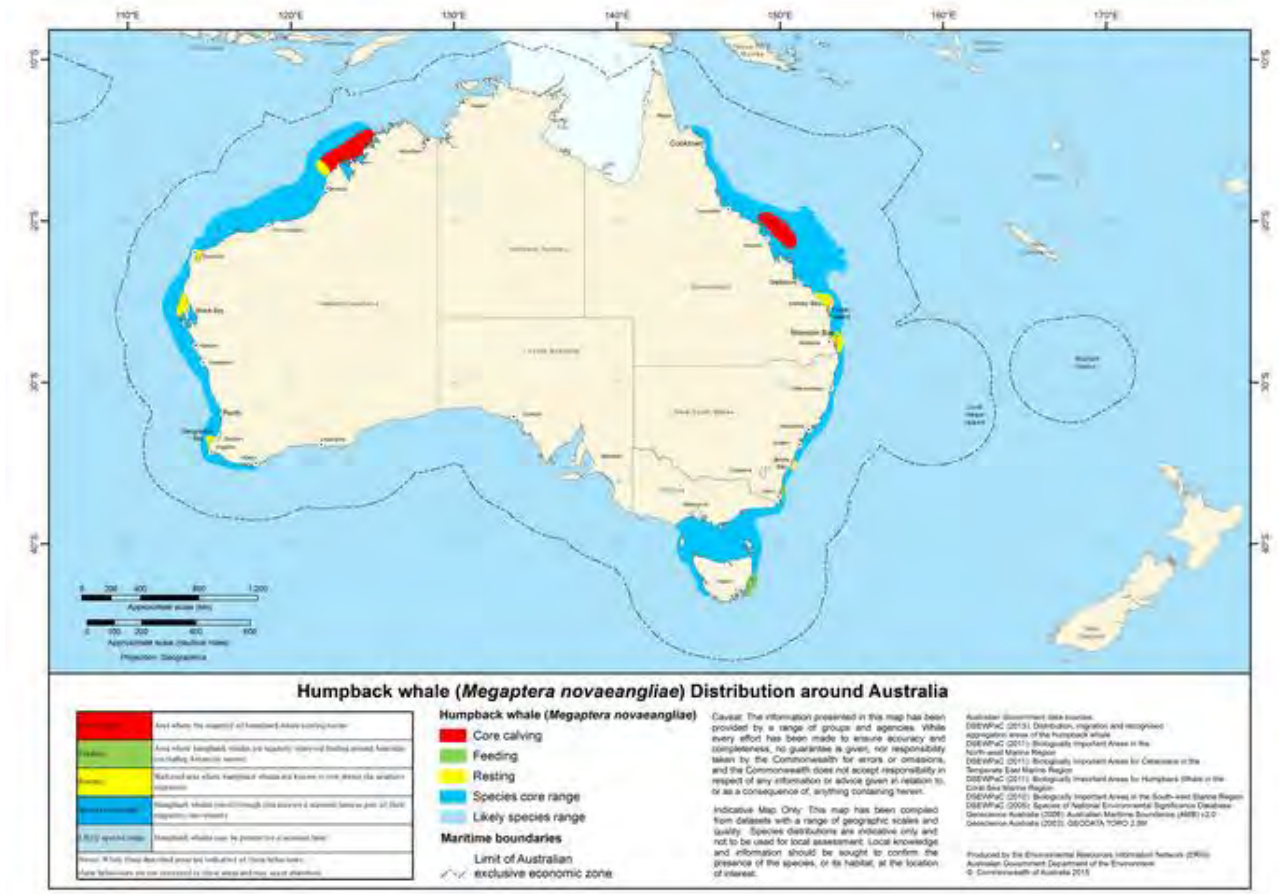


Figure 1 Distribution of the humpback whale in waters off the Australian mainland (taken from TSSC 2015).

Figure 4-9 Distribution of the humpback whale in Australia (SPRAT, 2015)

The Antarctic blue whale (a sub-species of the blue whale) tends to remain at higher latitudes and migrate to lower latitudes for feeding, breeding and calving during the Australian summer (Branch 2007, Širovic *et al.,* 2009, Woinarski *et al.,* 2014). Aggregation areas were confirmed during an International Whaling Commission (IWC) survey in late 1995 (Kato *et al.,* 1996). The Bonney Upwelling and Perth Canyon are the best-known Blue Whale aggregation areas in Australian waters.

The pygmy blue whale (a second sub-species) is known to aggregate each year during the summer off southern Australia due to seasonal upwellings that concentrate high densities of prey (Attard *et al.,* 2010, Gill *et al.,* 2011). Key areas of aggregation include the Perth Canyon off Western Australia, the Bonney Upwelling and adjacent waters off South Australian and Victoria (Rennie *et al.,* 2009, Attard *et al.,* 2010, Gill *et al.,* 2011). The eastern portion of the study area is mapped as an annual high use foraging area (Figure 4-10).

The pygmy blue whale aggregates between Cape Otway, Victoria, and Robe, South Australia, in relatively shallow shelf waters enriched by seasonal cold-water upwelling driven by south-east winds. Aggregation in the Bonney Upwelling between the Great Australian Bight and Bass Strait occurs November–May (Gill *et al.,* 2011).

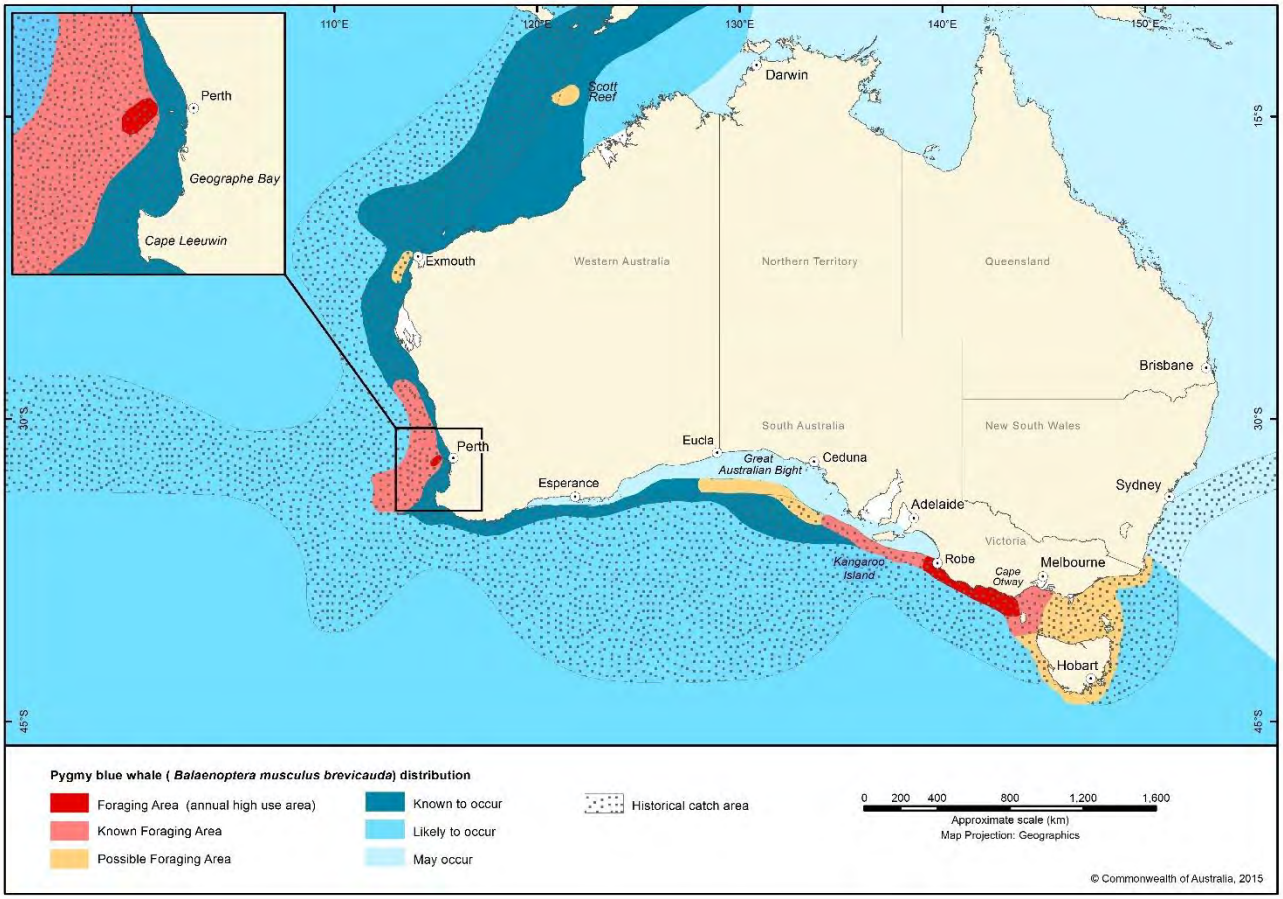
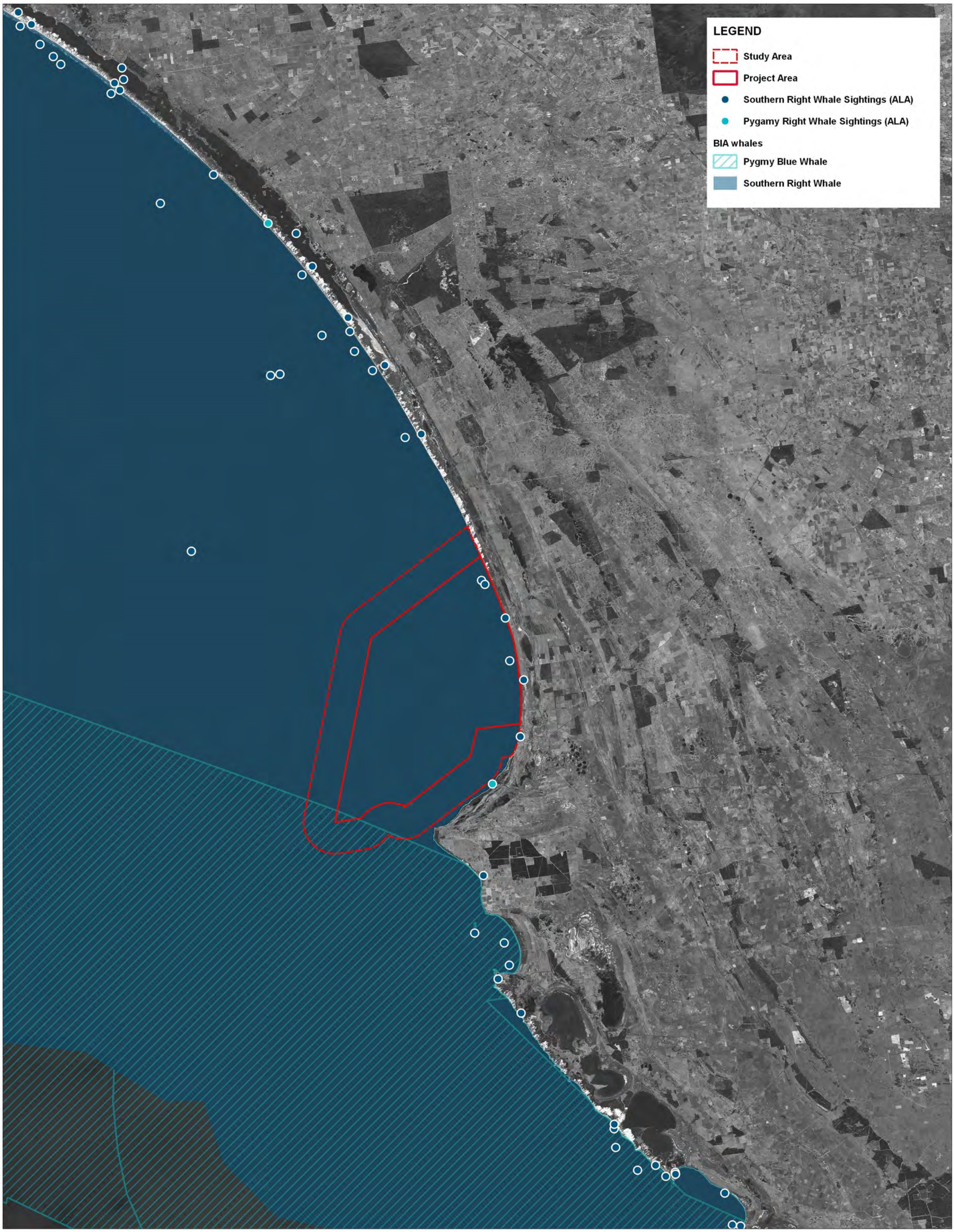


Figure 4-10 Area of distribution for the pygmy blue whale



Title:

Protected Species - Whales
Benthic Habitat

Figure: 4-11

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The Australian sea lion is listed as Endangered under the EPBC Act. There are several records of within the study area (Atlas of Living Australia, 2021), and the site is mapped as a Biologically Important Area for the species (DoEE, 2016). There is no mapped haul out areas or colonies within the study area (NatureMaps, 2021); the closest haul out area (refer to Figure 4-12) is at Cape Jaffa. It is assumed sea lions are regular visitors to the study area, particularly around areas of seagrass, kelp beds and food sources.

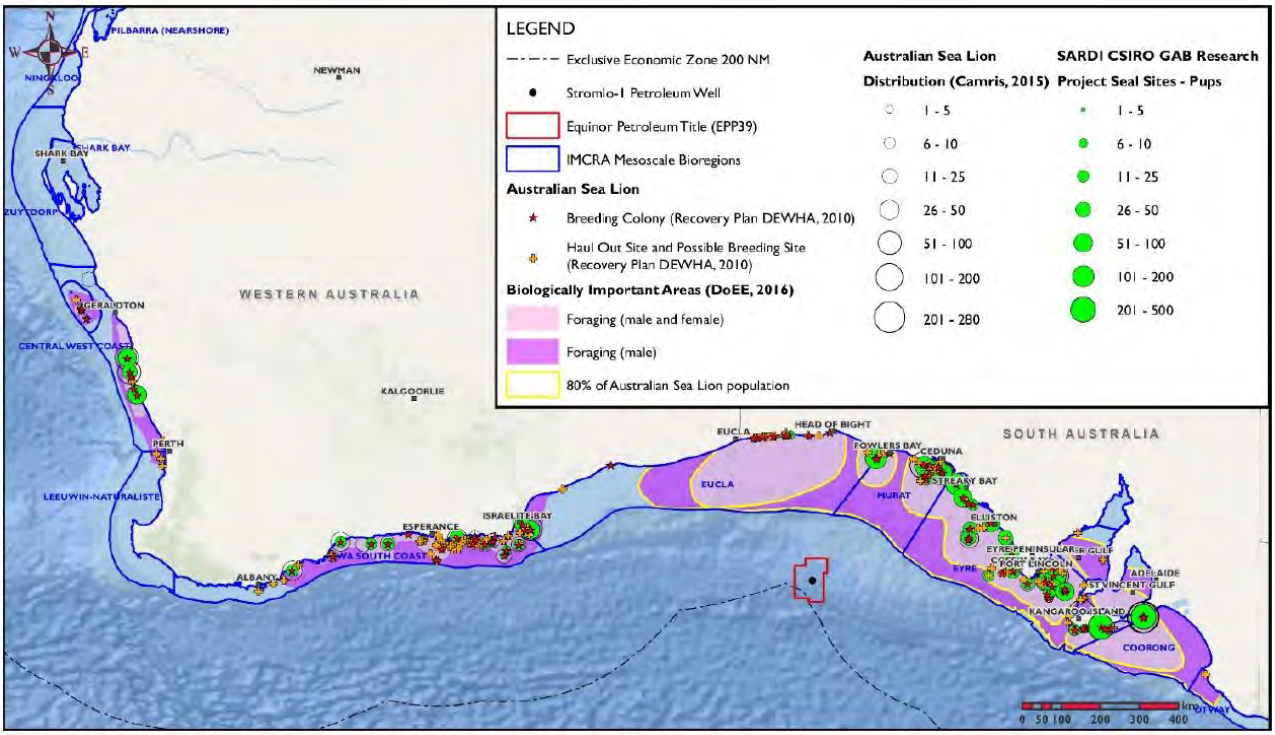

Figure 4-12 Biologically Important Areas, haul out and pupping sites for Australian Sea Lions in South-West Australia (Equinor, 2019)

4.2.3.5 Turtles

There are occasional sightings of turtles within the broader area, including the leatherback and loggerhead turtles. The nutrient rich waters of the study area and surrounds provide potential feeding habitat for both species. Both species nest outside the bioregion, in tropical and subtropical waters. The study area is not likely to be considered key habitat for turtles.

4.2.3.6 Sharks

The great white shark (*Carcharodon carcharias*) is widely distributed in Australian waters (Australian Government, 2014). Adults are often observed in waters in and around some fur seal and Australian sea lion colonies such as the Neptune Islands (South Australia), areas of the Great Australian Bight as well as the Recherche Archipelago and the islands off the lower west coast of Western Australia (Malcolm *et al*., 2001; EA, 2002). The study area is not mapped as a foraging, nursery or high-density area for the species, as illustrated in Figure 4-13.

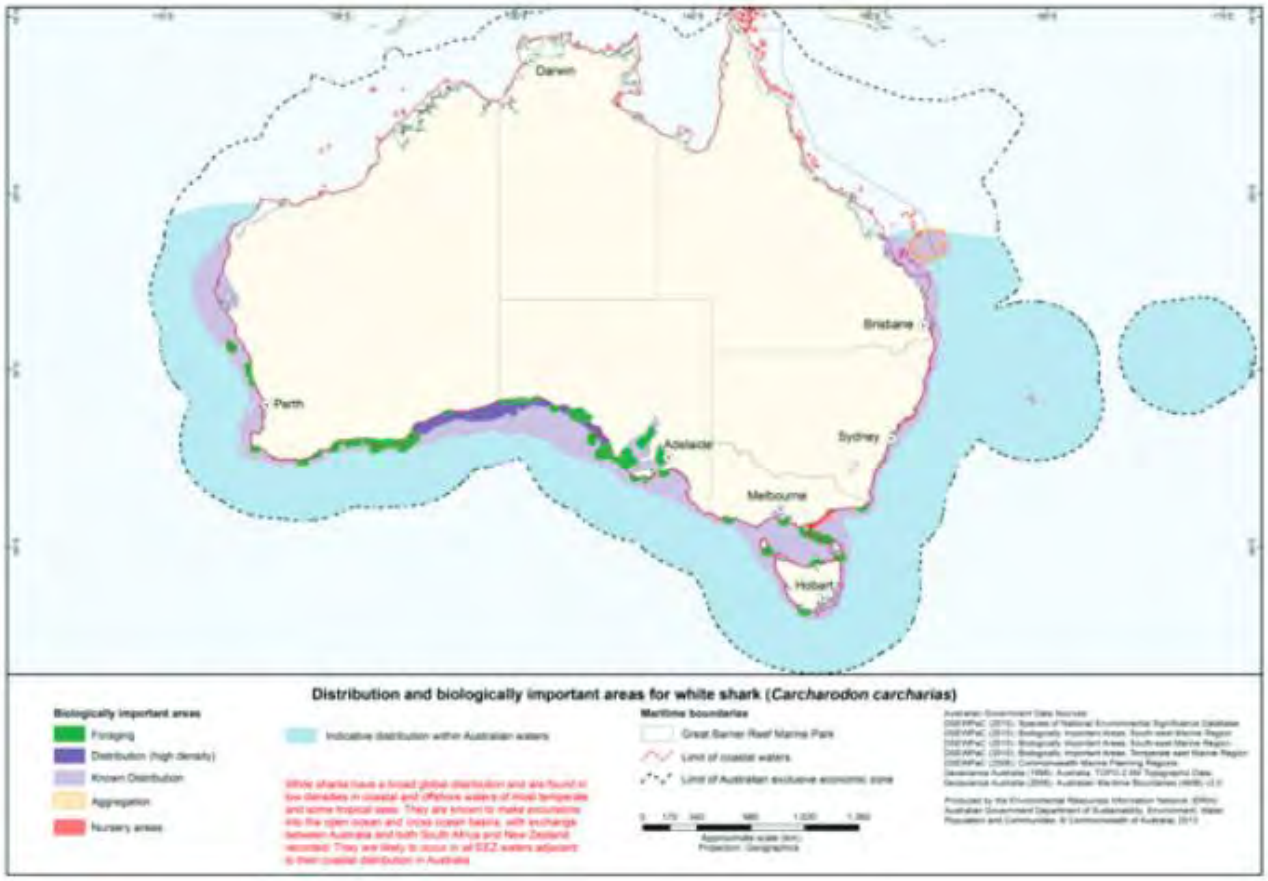

Figure 4-13 Distribution and biologically important areas for the white shark (Australian Government, 2013)

4.2.4 Migratory Species

Table 4-2 shows species that are listed as Migratory under the EPBC Act. Most of these species are also listed as threatened species, as described in Section 4.2.3.

4.3 State Matters

4.3.1.1 Protected Areas

As described in Section 4.1.1, the study area lies within a state Marine Park and adjacent to the Coorong National Park. There is potential to disturb both the HPZ and Sanctuary zones of the park during wind turbine and cabling installation.

4.3.1.2 State-listed fauna and flora

The *National Parks and Wildlife Act 1972* (NPW Act) provides a schedule of plant and animal species that are protected at a state level. Many of these species are already listed at a Commonwealth level under the EPBC Act, however there are some additional species that are relevant to South Australia only, as provided in Table 4-2. These species are all shorebird species, and include the common sandpiper, flesh-footed shearwater, pied oystercatcher, osprey and hooded plover. It is likely there are additional species, however a site survey would be required to confirm any additional state species.

Under the Act, a person must not *'take a protected animal or the eggs of a protected animal'*, without permission. Activity that could impact on listed state fauna or interfered would breeding activity potentially require approval.

4.3.1.3 Marine fish, invertebrates and crustaceans

In addition to species listed in under the NPW Act, a number of additional species are listed as threatened under the *Fisheries Management Act 2007 (*FMA), however these do not have legal conservation status. A person must not '*injure, damage or otherwise harm an aquatic mammal or aquatic resource of a protected species'* in accordance with Section 71 (1) of the FMA.

Species listed under the *Fisheries Management Regulation 2017* that are likely to occur in the study area include:

- Blue swimmer crab
- Giant crab
- Sand crab
- Rock lobster
- Abalone
- Cockles
- Scallops
- King George whiting.

A permit will be required if works are considered likely to impact upon the life cycle or habitat of any of the above listed species.

4.3.1.3.1 Southern Rock Lobster

The Southern Zone Rock Lobster Fishery Zone stretches from the Murray river mouth to the Victorian Border. Dedicated sanctuary zones are located at Cape Jaffa and Margaret Brock Reef immediately adjacent to the study area. The limestone reefs off the southern coast of South Australia have eroded over time and create ledges and crevices that provide ideal habitat for lobsters. Mating occurs from April to July and eggs are brooded over the winter for about 3-4 months (MacDiarmid 1989). The larvae hatch in early spring, pass through a brief (10-14 days) nauplius phase into a planktonic, leaf-like phase called phyllosoma. Phyllosoma develop over 12-23 months in offshore waters before they

metamorphose into the puerulus (settlement) stage near the continental shelf break (Booth *et al.,* 1991). The puerulus actively swims inshore to settle onto reef habitat in depths from 50 m to the intertidal zone (Booth *et al.,* 1991). Any areas of limestone or reef located within the study area are considered an important part of the life cycle of the species.

The Southern Zone Rock Lobster Fishery is South Australia's most valuable commercial fishery with an estimated Gross Value of Production in 2017/18 of $98.2million (PIRSA, 2020). The fishery contributes around $157 million annually to the Gross State Product, most in the Limestone Coast region (Econsearch 2019). Around 1,189 full time equivalent jobs are generated by the fishery.

Further consultation with PIRSA is required to understand the importance of the study area to the species, and how the construction and operation of wind towers might affect the Southern Rock Lobster population.

4.3.1.3.2 Abalone

The study area is also part of the southern zone of the South Australia Abalone Fishery (PIRSA, 2011). Green lip abalone are often found in low reef areas (in part sand/part rock), at depths ranging from 5 to 40m. Abundance is usually highest on the leeward side of reefs, headlands and islands where abalone are protected from wave action. In calmer waters, they can occur in shallower water, on rocky habitat near seagrass beds. Black lip abalone are typically found on sheltered reefs, hidden in caves, fissures and narrow crevices, generally in waters ranging between 5 and 20 metres in depth.

South Australia is one of the few abalone resources worldwide that have yielded sustainable wild commercial harvests over long periods. The southern zone fishery contributes between $3-6 million per year to the South Australia economy (based on 2011 data).

4.3.1.4 Native Vegetation

The *Native Vegetation Act 1991* (NVA) provides protection for native vegetation and areas of high conservation value, however in some circumstances, a permit to clear native vegetation can be sought. Native vegetation is defined as any naturally occurring local plant species that is indigenous to South Australia and includes marine plants. Generally, a Significant Environment Benefit (SEB) or 'offset' is required if any marine plants (including seagrass, kelp, other macroalgae, saltmarsh or mangrove vegetation) will require approval to remove (whether impacted directly or indirectly). As outlined in Section 4.1.3, substantial areas of seagrass and macroalgae are mapped within the study area and be disturbed during construction of wind turbines and associated infrastructure.

4.3.1.5 Pollution

The *Environment Protection Act 1993* (EP Act) is the main legislation addressing pollution and waste. It sets out a general framework for managing the environment and sets the standard for environmental protection. Under the Act, a person has a general duty to 'take all reasonable and practicable measures to protect, restore and enhance the quality of the environment'.

There are two prescribed activities under the Act which are relevant to the marine environment and will require approval:

- Maritime Construction Works: the conduct of works for the construction or repair of ships, vessels or floating platforms or structures, being works with the capacity to construct or repair ships, vessels or floating platforms or structures of a mass exceeding 80 tonnes
- Dredging: removing solid matter from the bed of any marine waters or inland waters by any digging or suction apparatus, but excluding works carried out for the establishment of a visual aid to navigation and any lawful fishing or recreational activity.

These two activities may potentially cause pollution in the marine environment.

The EPA monitors South Australian waters (creeks, rivers, marine) to assess their condition and provide information that can be used to guide management decisions.

Monitoring data are used to produce aquatic ecosystem condition reports (AECRs) every year (Wear *et al.*, 2006). For the Coorong Biounit, the water quality condition has been ranked as 'Very Good'. Whilst the area between Port Elliot and Cape Jaffa (Lacapede Bay) is relatively undeveloped, there is increasing urbanisation of the towns of Kingston and Cape Jaffa which see influxes of tourists during holiday periods. This is likely to be increasing stormwater runoff carrying nutrients and sediment to the nearshore environment. Broad-scale land clearance in the southeast region for agricultural purposes has contributed elevated nutrients and sediment to the marine environment. Seagrass within the biounit is extensive and considered to be in good condition, although high amounts of epiphytic algae was observed on seagrass leaves, which can be an indicator of deteriorating health and suggests nutrient pollution.

The last reported water quality sampling event was undertaken in 2015; the published water quality data for Lacepede Bay identifies low levels of nutrients and turbidity (Wear *et al.*, 2015).

4.3.1.6 State Heritage

There are no sites listed on the South Australian Heritage Places database within the marine environment.

4.3.2 Summary of Values

Table 4-3 summarises the Commonwealth and State values contained within the study area.

Table 4-3 Summary of values for the study area

Attribute	Relevance	South Australia
Marine Park	State	Within Upper South East Marine Park, zoned HPZ and SPZ
Ramsar Wetland	MNES	Immediately adjacent to, but outside Coorong, Lakes Alexandrina and Albert Ramsar Wetland (on land)
Other Protected Areas	State	Immediately adjacent to, but outside Little Dip Conservation Park and Coorong National Park (on land)
Commonwealth Marine Areas	MNES	Commonwealth waters outside site but in study area. Bonney Coast Upwelling listed as a Key Ecological Feature of Commonwealth Marine area.
Habitat Types	MNES and State	Nearshore sections of the site and sections of study outside the site comprised of low profile reef, seagrass meadows and subtidal sands No habitat mapping data for deeper waters of the study area, but navigation chart shows areas of reef, gravel, shells and sand.
Threatened Ecological Communities	MNES	Endangered Giant Kelp Marine Forests of South East Australia may occur.
Threatened and Migratory Species	MNES, State	BIA: • Whales: southern right whale, pygmy blue whale, blue whale • Seabirds: black-browed albatross, Campbell albatross, Indian yellow-nosed albatross, shy albatross, wandering albatross, antipodean albatross • Mammals: Australian sea lion Study area may be part of migratory pathway of Critically Endangered orange-bellied parrot, but values undefined Also supports known and potential habitat for many other threatened and listed migratory species.
Important Fisheries Habitat or Function	State	Seagrass provide important finfish and shellfish habitat Reefs provide habitat for important fisheries species (especially southern rock lobster, as well as abalone etc.)

5 Impacts and Mitigation

A general description of potential impacts, risks and mitigation measures is provided below. The assessment of risk is preliminary, based on the high-level (and evolving) project description (Section 2). Section 6 provides a more detailed risk assessment against Commonwealth and State significance criteria.

5.1 Pile Driving – Construction/Decommissioning

Pile driving generates intense pulses of noise that have the potential to impact marine fauna including threatened and listed migratory species (whales/dolphins, pinnipeds, turtles, sharks), and species of high fisheries significance (finfish, rock lobster etc.).

The study areas support high value habitat for a range of threatened/migratory marine species, including cetaceans (whales/dolphin species), pinnipeds and marine turtles. The mosaic of rock outcrops, reefs, and sandy substrates in all three study areas provide high value fisheries habitat for shellfish (e.g. rock lobsters, abalone) and finfish species. These species are sensitive to high noise levels generated by pile driving (SA DPTI 2012; Madsen *et al.,* 2006; Vella *et al.,* 2001; Tida and Brtiffa 2016). Marine birds can also be exposed to underwear noise when diving.

Impacts can be permanent (death/injury), long-term (e.g. permanent hearing loss) or short-term (behavioural, including avoidance or short terms shifts e.g. temporary hearing loss), depending on exposure and sensitivity of species. The degree of noise exposure depends on the nature of works (i.e. depth of piles, duration/timing of works, application of mitigation strategies) and local environmental conditions (i.e. bathymetry, physical properties of the water column). Piles will need to be driven deep into the seafloor, which can produce an effects range (hearing loss or displacement) many kilometres from the works site (Madsen *et al.,* 2006; SA DTI 2012; Muller *et al.,* 2019).

The unmitigated preliminary risk rating for noise impacts to threatened/migratory and fisheries species in all three study areas is Very High, assuming impacts to endangered species (Consequence Major x Likelihood Likely).

Mitigation measures to reduce impacts include seasonal construction windows (vary depending on species), safety zones/lookout, pingers etc. (e.g. SA DTI 2012). With the application of best practice mitigation measures, Likelihood may reduce to Unlikely, and the preliminary risk rating is therefore Medium. Further detailed underwater noise modelling will be required to confirm the likely noise impact contours and whether mitigation measures will significantly reduce these.

5.2 Noise Generated by Vessels – construction and maintenance

Whale, dolphin and other marine species may be impacted by the noise generated by vessels, causing behavioural changes (i.e. resting, swimming times and breathing patterns, communications) (Sprogis, K., Videsen, S and Madsen, P. 2020 and Dunlop, 2019). Frequent vessel movement during the construction phase can cause changes in behaviour, including avoidance of an area. This is particularly of concern for whale species that are known to breed in Lacepede Bay.

It is assumed that the unmitigated noise risk rating for marine fauna impacted by vessel noise is High (Consequence High x Likelihood likely). If the whale migration period can be avoided, spotter procedures put in place when approaching whales or vessel amendments made to lower noise emissions then the risk may be reduced to Medium (Consequence Moderate x Likelihood Moderate).

5.3 Habitat Loss – Construction/Operation

Seabed areas in the construction footprint (turbines, cables etc.) will be likely permanently removed, although if cabling is buried, seagrass may recover slowly from disturbance. The study area contains subtidal sands, rock outcrops and deepwater reefs. Seagrass meadows are also present in sections of the study areas. The study area may also support the TEC *Giant Kelp Marine Forests of South East Australia*.

Habitats in the study areas are contiguous with those in adjacent areas, and there is a high degree of connectivity in ecosystem processes. However, given the extent of habitat loss is relatively small (extent to be determined), it is unlikely that habitat loss will physically fragment habitats to the extent that major flow-on impacts to benthic communities and the values they support will occur. It is also unlikely that habitat loss would result in significant displacement of listed threatened/migratory species and high value fisheries species, except at localised scales (i.e. at and directly adjacent to the turbines or cables). Burying cabling will likely assist in habitat recovery, assuming installation occurs in soft substrate habitat.

Assuming pylons cannot avoid direct impacts to any TEC (if present), the preliminary risk rating for direct habitat loss and fragmentation is Very High (Consequence Major x Likelihood Almost Certain).

Assuming pylons are constructed to avoid direct impacts to any TEC (if present), seagrass or reef habitat, the preliminary risk rating for direct habitat loss and fragmentation is Medium (Consequence Minor x Likelihood Almost Certain).

5.4 Turbidity – Construction/Decommissioning

Modelling will be required to assess turbidity generated by construction and decommissioning activities. Pile driving or dredging to prepare the seabed or install cabling in clean sands is expected to generate a short-term, low intensity sediment plume. It is likely that the plume would dissipate rapidly and would be unlikely to impact on adjacent light sensitive habitats or impede fauna vision.

There are few practical ways of reducing turbidity. The unmitigated and mitigated preliminary risk rating for turbidity impacts to any sensitive receptors (e.g. seagrass, macroalgae) is Low (Consequence Moderate x Likelihood Unlikely).

5.5 Vessel Strike – Construction/Operation/Decommissioning

Vessel movements pose a risk of fauna strike, especially for large, slow-moving fauna near the surface such as whales. Whales are vulnerable due to their slow swimming speed and lack of awareness of the threats posed by vessel (DoEE 2017). Pinnipeds and dolphins are also at risk of collision with high spend vessels. Further details will be required to determine vessel traffic intensities, but it would be higher during the construction and decommissioning stages than operations.

The unmitigated preliminary risk rating for vessel strike impacts to threatened/migratory species in all three study areas is Medium (Consequence High x Likelihood Unlikely).

Potential mitigation measures include for example, seasonal windows to avoid peak periods for whales, go slow procedures etc. Through the application of these measures, the preliminary risk rating for vessel strike impacts is Low (Consequence High x Likelihood Highly Unlikely).

5.6 Marine Pests – Construction/Operation

Construction and maintenance vessels may introduce marine pests to the Study areas. There are two key vectors for introduced marine pests entering a port: biofouling of the vessel hull, or the release of pests into the marine environment via ballast waters (Hewitt and Campbell, 2010). The turbines also provide a surface for fouling pest species.

Translocation of exotic marine pests into a new environment is a potentially important issue for the project. The environmental and economic impacts due to the introduction of exotic marine pests can be significant. Marine pests, once established, can be difficult to eradicate and can have serious and permanent consequences for the marine environment, fisheries productivity and public health.

In addition to standard statutory measures, additional mitigation measures could be adopted (e.g. hull inspections, local sourcing of vessels etc.). The unmitigated and mitigated preliminary risk ratings for introduced pests are Medium (Consequence Major or High[4] x Likelihood Unlikely).

5.7 Spills – Construction/Operation/Decommissioning

Vessels, turbines and facilities utilise use and store a variety of fuels, oils, lubricants, bio-fouling paints and other chemicals. These substances can have lethal and sub-lethal effects to organisms (Yuewen and Adzigbli, 2018) and can persist in the environment for long periods of time. An uncontrolled release could occur from (for example) vessel collision, equipment failure, leaks etc.

A marine pollution risk assessment should be undertaken to inform the development of spill management strategies within contingency plan. The Project is unlikely to involve the storage and handling of large quantities of chemicals, nor generate frequent vessel movements.

Standard chemical storage, handling and maintenance procedures will be required. The preliminary risk rating for spills to the marine environment is Low (Consequence Moderate x Likelihood Unlikely) for both the mitigated and unmitigated case.

5.8 Noise/Vibration Generated by Turbine – Operation

Noise and vibration levels generated by turbines is lower than pile driving and unlikely to cause acute impacts (injury/ mortality) to marine fauna (Madsen *et al.,* 2006; Tougaard *et al.,* 2020). The noise and vibration generated by turbines is persistent (but dependent on wind speeds) which may result in changes to the behaviour of fauna. This may include for example avoidance or attraction responses, increases in intensity of vocal communication, and masking of noises used by fauna (Vella *et al.,* 2001).

[4] depending on pest species and their potential to affect sensitive habitat, such as seagrass, kelp TEC etc.

The degree of impact is dependent on cumulative noise and vibration levels generated by the windfarm array (varies depending on foundation type), background noise levels, and the sensitivity of fauna (Vella *et al.,* 2001; Madsen *et al.,* 2006). Background noise sources in the study areas include environmental (biological, waves etc.) and vessel traffic (ships, fishing boats etc.). Further work will be required to characterise background and Project generated noise, and potential impacts to fauna.

Given that the study area is an important area for many noise sensitive species, and assuming background noise levels are low, it is conservatively assumed that the unmitigated noise risk rating for marine fauna is High (Consequence High x Likelihood Likely). Further work would be required to assess this risk, and the effectiveness of any mitigation measures.

5.9 Electromagnetic Fields - Operation

Electrical cables between the turbine, transformer and shore-based facilities will produce electromagnetic fields (EMF). Many marine invertebrate and vertebrate fauna species are sensitive to EMF (reviewed by Francis and Lyon, 2013), which summarised as follows:

- Elasmobranchs (sharks, rays) are sensitive to low frequency electrical fields, which they use for prey detection. Responses to electrical fields can include behavioural changes (attacking on the source of the field), physiological changes, and effects to the ability to orientate.
- Bony fish respond to changes in electrical fields but have less developed detection systems than elasmobranchs.
- Many marine species use magnetic fields for navigation (e.g. seasonal migrations), including many sea turtles, whales, sharks, fishes and crustaceans (Fisher *et al.,* 2010; Hutchinson *et al.,* 2020). Spurious magnetic fields could theoretically interfere with navigation of these species, depending on magnetic field properties and biological traits that determine sensitivity.

While studies indicate that many marine fauna species can respond to EMF, there is little field evidence that EMF emissions from undersea cables cause significant impacts to marine fauna (e.g. avoidance of an area). Impacts will largely depend on cable configuration (e.g. bundled to reduce current, shielding etc.) and whether the laid on the seafloor or buried (and burial depth).

The unmitigated preliminary risk (assuming cables of seafloor, unshielded cables etc.) to threatened species (especially sharks, but also other species) is Medium (Consequence High x Likelihood Possible). Further analysis will be required if laying unshielded cables directly on the seafloor is proposed. This will need to consider exposure and sensitivity of receptors most be exposed to EMF (i.e. benthic invertebrates such as lobsters and crabs, and demersal (bottom living) fish) and marine fauna living overlying water column (e.g. most sharks, fish, marine mammals).

Impacts can be mitigated to very low levels if the cable is buried sufficient deep (e.g. 1.0 to 1.5 metres) and cables are well designed (e.g. Bundesamt für Seeschifffahrt und Hydrographie 2019). Should cables be buried at a sufficient depth and/or be designed to reduce EMF fields, the mitigated preliminary risk rating is Low (Consequence High x Likelihood Highly Unlikely).

5.10 Hydrodynamic Impacts - Operation

The marine structures will alter local hydrodynamic processes. This may result in localised changes to sedimentary processes (i.e. scour and sediment deposition). Modelling will be required to assess hydrodynamic impacts to seafloor habitats and coastal geomorphological processes.

Assuming impacts are highly localised and structures are located away from TECs or other sensitive habitats, the unmitigated risk rating to benthic habitats is Medium (Consequence High x Likelihood Possible). Further work is required to properly assess this risk.

5.11 Bird Strike and Avoidance of Rotors - Operation

The study area provide potential feeding areas for seabirds and piscivorous shorebirds. The study area is also likely to be traversed by migratory bird species. There is a risk of birds colliding with rotors, resulting in injury or mortality. Birds may also avoid areas near the rotors, resulting in habitat displacement and altered movement patterns.

- Migratory species - The turbines are proposed to be located in offshore waters, avoiding nearshore areas commonly frequented by shorebirds for feeding and roosting. Shorebirds may pass through offshore waters when moving to and from other sites, particularly the adjacent Ramsar wetland. In the case of migrants, flights once underway tend to be at high altitude, well above turbine height, to maximise flight and energy efficiency. Birds wait for suitable conditions before embarking on migration, but may be forced to lower their flight altitude if they encounter bad weather during migration (Newton 2007). Therefore, migrants are at risk of collision with windfarm turbines mainly during takeoff and descent, when their flight paths take them through the height range of the rotor-sweep zone (Drewitt & Langston 2008).
- Large pelagic seabirds - At most risk are large pelagic seabirds, which feed in offshore waters and, being slow fliers, may be unable to evade the moving rotors.
- Orange bellied parrot migrates from mainland Australia to Tasmania to breed, potentially intersecting the study area, although no recent records of the species exist. The flight height while on land is just above vegetation height (Shepherd 1994 in Hokley undated), however their flight height over the ocean is unresolved.

While the likelihood of impact could be Possible, the consequence is Major (especially for endangered and critically endangered species if multiple individuals are impacted). On this basis the preliminary risk rating is High. Further assessment will be required, taking into consideration issues raised in *EPBC Act Policy Statement 2.3 Wind Farm Industry* (DEWHA 2009). This will need to consider design measures to reduce risk (e.g. turbine tower height, location relative to any important areas etc.).

5.12 Light Pollution

Vision is a critical cue for wildlife, including seabirds, turtles and fish species to orient themselves in terms of finding food, avoiding predation and communicating (Australian Government, 2020). Artificial light is known to adversely affect many species in the marine environment and can result in behavioural changes such as avoidance, disorientation or reduced reproductive effort. It can also attract predators or change the availability of habitat or food resources. Artificial light can disorient

flying birds during migration, and potentially will avoid roosting sites in brighter areas. The National Light Pollution Guidelines (Australian Government, 2020) suggest that light mitigation may be necessary within 20 km of a BIA for a listed species.

Navigational or hazard lighting on offshore wind turbines may potentially cause impact to marine species, however mitigation measures such as minimising lighting, the use of lights that appear red to the eye and avoiding lighting the water surface can assist in reducing impacts. With mitigation, the preliminary risk rating is Medium (Likelihood Possible x Consequence Moderate).

5.13 Artificial Reef Creation and Fishing Exclusion – Operation

The turbine towers will provide hard substrate that will be colonised by a diverse range of benthic flora and fauna species. The structures will also act as fish aggregation devices for fish. A fish 'sanctuary' would also be created if fishing activities are prohibited around the structures (Linley *et al.,* 2007). Cabling between towers could potentially create a navigational hazard, which could exclude trawling activity. It is expected that the windfarm would lead to localised increase in fish biomass in the study area. The increase fish biomass could attract predators to the area (pinnipeds, sharks, dolphins), assuming they acclimatise to the sound emissions from the turbines. This could lead to localised changes to marine communities in the vicinity of the turbines, including beneficial effects to many reef-associated species, but potential adverse effects to other species due to changes in biological interactions (competition, predation etc.).

The preliminary risk rating associated with changes to communities in the vicinity of the towers is Low (Consequence Minor x Likelihood Possible) to Beneficial.

Table 5-1 Marine assets – preliminary general risk summary

Risk ID	Aspect	Impact pathway	Project phase	Initial risk assessment with standard mitigation (i.e. statutory compliance) in place			Justification for risk rating	Possible additional mitigation measures	Residual risk assessment with additional mitigation in place (i.e. those actions recommended as part of the impact assessment)		
				Likelihood	Consequence	Risk rating			Likelihood	Consequence	Risk rating
Pile driving causing injury/death of listed threatened/migratory species	Sharks, whales, dolphins, seals, turtles	Construction noise	Construction	Likely	Major	Very High	Permanent impacts to multiple individuals, including endangered species Modelling required	Seasonal construction window, bubble curtains etc.	Unlikely	Major	Medium
Pile driving causing injury/death of high value fisheries species	Lobsters, finfish, prawns, crabs	Construction noise	Construction	Likely	Minor	Medium	Impacts to individuals, whose populations are secure Impacts unlikely to cascade to population level (short or long term) Modelling required	Bubble curtain etc.	Possible	Minor	Low
Underwater noise generated by vessel movement	Whales, turtles, seals, dolphins and other fauna	Construction vessels, maintenance vessels	Construction/ operation/ decommissioning	Likely	High	High	Particularly a concern for resting whale species who may avoid the area temporarily (mainly during construction, when vessel traffic high)	Noise controls, megafauna spotters, seasonal construction.	Possible	Moderate	Medium
Habitat loss resulting in impacts to TECs and high value habitats	Kelp TEC (if present) High value benthic habitats	Installation of cables, structures	Construction/ operation	Almost Certain	Major	Very High	Permanent impacts to Endangered TEC and other benthic habitat supporting threatened species	Design avoids TEC or high value habitat or buries calbles, allowing recovery.	Almost Certain	Minor	Medium
Turbidity generated by construction impacts to sensitive receptors	Kelp TEC (if present) Threatened/migratory species High value fisheries habitat and species Commonwealth waters	Installation of cables, structures	Construction/ decommissioning	Unlikely	Moderate	Low	Plumes expected to be temporary, low magnitude features (modelling required)	-	Unlikely	Moderate	Low
Vessel strike causing injury/death of listed threatened/migratory species	Whales, turtles, seals	Construction vessels, maintenance vessels	Construction/ operation/ decommissioning	Unlikely	High	Medium	Low vessel traffic Unlikely to affect multiple individuals → cascading impacts to populations	Seasonal construction windows, go slow measures etc.	Highly Unlikely	High	Low
Marine pest introductions	Kelp TEC (if present) Threatened/migratory species High value fisheries habitat and species Commonwealth waters	Construction vessels, maintenance vessels	Construction/ operation/ decommissioning	Unlikely	High	Medium	Potential long-term impact to TECs	Hull inspections, local sourcing of vessels from pest free areas etc.	Unlikely	High	Medium
Spills	Kelp TEC (if present) Threatened/migratory species High value fisheries habitat and species Commonwealth waters	Construction vessels, maintenance vessels, turbines etc.	Construction/ operation/ decommissioning	Unlikely	Moderate	Low	Low vessel traffic Statutory measures minimise risk	Additional house-keeping measures	Unlikely	Moderate	Low
Low frequency noise from turbines	Threatened/migratory species	Turbine noise	Operation	Likely	Major	Very High	Behavioural changes, potentially avoiding waters near turbines. Further work required to assess whether	-	Likely	High	High

Risk ID	Aspect	Impact pathway	Project phase	Initial risk assessment with standard mitigation (i.e. statutory compliance) in place			Justification for risk rating	Possible additional mitigation measures	Residual risk assessment with additional mitigation in place (i.e. those actions recommended as part of the impact assessment)		
				Likelihood	Consequence	Risk rating			Likelihood	Consequence	Risk rating
							this could affect multiple individuals of a threatened species, as well as design measures that can be taken to minimise underwater noise.				
EMF - change to movement patterns, behavioural changes	Threatened/migratory species High value fisheries habitat and species	Cables/plant	Operation	Possible	High	Medium	Potential for behavioural changes to individuals near the seafloor. Assumed not to affect multiple individuals in population, - requires further assessment	Cabe buried Cable design to reduce EMF	Highly Unlikely	High	Low
Hydrodynamic impacts to TEC or important habitats	TEC High value seagrass	Turbine tower operation	Operation	Possible	High	Medium	Potential for localised impacts to any nearby TEC (to be assessed by modelling)	Design measures to avoid impacts to TEC (e.g. placement/ design of pylons)	Unlikely	High	Medium
Bird strike	Threatened / migratory species	Turbine operation	Operation	Possible	Major	High	Potential to multiple impact individuals in a population (including endangered species)	Tower design and placement to minimise exposure	Unlikely	Major	Medium
Artificial Lighting	Threatened/migratory species	Turbine operation	Operation	Likely	Moderate	Medium	Potential to cause avoidance behaviour, or disorientate some species	Using red lights, minimising lighting, avoiding lights that shine on water	Possible	Minor	Low
Artificial reef creation + fishing exclusion	Threatened/migratory species High value fisheries habitat and species	Turbine operation	Operation/ Decommissioning	Possible	Minor	Low to Beneficial	Natural reefs present, therefore not introducing a new substrate type to area which would change species composition	-	Possible	Minor	Low to Beneficial

6 Preliminary Impact Assessment

6.1 Matters of National Environmental Significance

Under the EPBC Act, a significant environmental impact is defined as 'an impact which is important, notable, or of consequence, having regard to its context or intensity'. Whether or not an action is likely to have a significant impact depends on the sensitivity, value and quality of the environment that is impacted, and upon the intensity, duration, magnitude and geographic extent of the impact.

For an impact to be considered 'likely', it is not necessary for the impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility.

If there is scientific uncertainty about the impacts of an action, and potential impacts are serious or irreversible, the precautionary principle is applicable. A lack of scientific certainty will not itself justify a decision that an action is not likely to have a significant impact on the environment.

The Commonwealth has provided 'significant impact criteria' for each MNES, as described below in the following sections.

6.1.1 Threatened Ecological Community

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- Reduce the extent of an ecological community
- Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
- Adversely affect habitat critical to the survival of an ecological community
- Modify or destroy abiotic (non-living) factors (such as water, nutrients or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
- Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example, through regular burning or flora or fauna harvesting
- Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
    - assisting invasive species, that are harmful to the listed ecological community, to become established, or
    - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or
    - interfere with the recovery of an ecological community.

There is the potential for the TEC *Giant Kelp Marine Forests of South East Australia* to occur within the study area. Further site investigations are required to determine if the ecological community occurs and if so, whether it may be disturbed. It is mostly likely to occur around the Margaret Brock Reef area where conditions are most suited to presence of giant kelp; currently no turbines are planned in this location.

Margaret Brock Reef is at the furthest western range of the TEC and forms only a small area of the total extent of the community. Provided turbines and cabling can avoid direct disturbance to habitat likely to support the TEC, the action is unlikely to have a significant impact to a TEC.

6.1.2 Critically Endangered or Endangered Species

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population
- reduce the area of occupancy of the species
- fragment an existing population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of a population
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
- introduce disease that may cause the species to decline
- interfere with the recovery of the species.

Critically Endangered or Endangered Species that are likely to occur in the study area, and the potential impact of the project on this species is provided in Table 6-1. The assessment herein considers potential impacts related to the marine environment only (i.e. terrestrial infrastructure impacts are not considered). The assessment is preliminary only. Further site-specific studies are required to confirm the use and values of the study area by critically endangered or endangered species.

Table 6-1 Potential Impacts to Critically Endangered or Endangered Species known to, or likely to occur, within the study area

Species	Potential Impacts	Potential Significance of Impact
Australasian Bittern (*Botaurus poiciloptilus)*	The species freshwater wetlands with tall dense vegetation, and rarely tidal wetlands (Marchant and Higgins 1990). Neither habitat is supported in study area. It is largely a sedentary species that moves only short distances between wetlands. Low likelihood of bird strike or other interactions (e.g. artificial light) with marine project elements. The construction, operation and decommissioning of wind turbines in the marine environment are unlikely to lead to a long-term decrease in the population, its area of occupancy or modification of its habitat.	Not Significant
Curlew sandpiper (*Calidris ferruginea)*	Preferred habitat is not present (intertidal mudflats, and freshwater and brackish wetlands near the coast including swamps, lakes and lagoons; Higgins and Davies 1996). The adjacent Coorong Wetlands are however an Important Site for the species. This species may occasionally traverse marine environments of the study area. Potential hazards therefore include strike by wind turbines and light pollution. The construction, operation and decommissioning of wind turbines in the marine environment are unlikely to lead to a long-term decrease in the population, its area of occupancy or modification of its habitat.	Not Significant
Northern Siberian bar-tailed godwit (*Limosa lapponica menzbieri*)	This species forages near the edge of water in shallow water, especially exposed sandy or soft mud substrates on intertidal flats and beaches. The study area is not known as a major habitat for the species. This species may occasionally traverse marine environments in the study area. Potential hazards therefore include strike by wind turbines and light pollution. The construction, operation and decommissioning of wind turbines in the marine environment are unlikely to lead to a long-term decrease in the population, its area of occupancy or modification of its habitat.	Not significant.
Albatross and petrel species (northern royal, shy and grey albatross, northern giant petrel)	The study area is mapped as an area of Biological Importance for albatross species. These species are known to forage within the study area and adjacent marine environments. The foraging behaviour and specific values of the study area for these species are not well known. These species spend a large proportion of time at sea for foraging. It is conservatively assumed that bird strike by wind turbines has the potential to cause direct bird mortality, which may lead to a long term decrease in size of a population. Further research into the occupancy area of the species, and the risk of bird strike is required.	Potentially significant
Orange-bellied parrot (*Neophema chrysogaster)*	This species utilises coastal terrestrial and wetland communities, and suitable habitats occur directly adjacent to the study area. There are historical records of this species in the vicinity of the study area, but the absence of contemporary records suggest it may not occur here at present. The study area may have formed a historical movement corridor for this species. Should local populations recover, wind turbines could have the potential to modify, destroy, remove, isolate or decrease the availability of habitat as a result of bird strike.	Potentially significant

Species	Potential Impacts	Potential Significance of Impact
Blue whale (*Balaenoptera musculus*)	The eastern study area is mapped as a high use area and BIA for the species. Underwater noise (construction and operation) could lead to avoidance behaviour. This may reduce the area of occupancy available to a population. Further investigation is required to understand the potential for underwater noise to be generated during construction or operation and the potential for this to impact the use of the area by the blue whale.	Potentially significant
Southern right whale (*Eubalaena australis*)	The study area is mapped as a BIA for the species. The study area is not a known aggregation area, but it does regularly move through the area. Underwater noise (construction and operation) could lead to avoidance behaviour. This may reduce the area of occupancy available to a population. Further investigation is required to understand the potential for underwater noise to be generated during construction or operation and the potential for this to impact the use of the area by southern right whale.	Potentially significant
Loggerhead and leatherback turtles (*Caretta caretta* and *Dermochelys coriacea*)	These species may occasionally forage within the study area. Foraging activity could potentially be interrupted by underwater noise. Further investigation is required to understand the potential for underwater noise to be generated during construction or operation and the potential for this to impact the use of the area by turtles.	Potentially significant
Australian sea lion (*Neophoca cinerea)*	The study area is located within a BIA for the species and feeding habitat is present (i.e. seagrass/reef/macroalgae). Foraging activity may potentially be interrupted by underwater noise or artificial lighting. This may reduce the area of occupancy for the species. Further investigation is required to understand the potential for underwater noise to be generated during construction or operation and the potential for this to impact the use of the area by the Australian sea lion.	Potentially significant

6.1.3 Vulnerable species

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species
- reduce the area of occupancy of an important population
- fragment an existing important population into two or more populations
- adversely affect habitat critical to the survival of a species
- disrupt the breeding cycle of an important population
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
- introduce disease that may cause the species to decline, or
- interfere substantially with the recovery of the species.

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Vulnerable species that are likely to occur in the study area, and the potential impact of the project on these species is provided in Table 6-2. The assessment considers potential impacts related to the marine environment only (i.e. terrestrial infrastructure impacts are not considered). The assessment is preliminary only. Further site-specific studies are required to confirm the use of the study area by vulnerable species.

Table 6-2 Potential Impacts to Vulnerable species known to, or likely to occur, within the study area

Species	Potential Impacts	Potential Significance of Impact
Albatross and petrel species (salvins, white-capped, Campbell, black-browed, antipodean, southern royal, wandering, sooty and Indian yellow-nose Albatross and blue, northern giant petrels)	Whilst these species are known to occasionally forage within the study area, it is unlikely that the site supports an important population or would be critical to the survival of the species. Potential impacts to seabirds are bird strike and artificial light.	Not Significant
Shorebird species (bar-tailed godwit, fairy prion, Australian fairy tern, eastern hooded plover)	Whilst these species may forage on the foreshore, they would only occasionally utilise the marine environment. Potential impacts to shorebirds include bird strike or artificial light. It is unlikely that the study area supports an important population or would be critical to the survival of shorebird species.	Potentially significant (eastern plover only, as potentially more than 1% of the population supported in adjacent Ramsar wetland)
Whale species (sie, fin, humpback)	Whilst these species occasionally utilise the study area, it is not identified as a BIA or an area supporting an important population. Potential impacts to whales mostly relate to underwater noise.	Not significant.
Green turtle (*Chelonia mydas*)	Green turtles nest, forage and migrate in northern Australia, although vagrants can occur in temperate waters. The study area is unlikely to support an important population of the species.	Not significant
White shark (*Carcharodon carcharias)*	Although the white shark is known to utilise the study area, it is not mapped as a key nursery or foraging area for the species. It is unlikely the project would have a significant impact on an important population.	Not significant

6.1.4 Listed Migratory Species

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species,
- result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

An area of 'important habitat' for a migratory species is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- habitat that is of critical importance to the species at particular life-cycle stages, and/or
- habitat utilised by a migratory species which is at the limit of the species range, and/or
- habitat within an area where the species is declining.

Table 4-2 lists migratory species that occur, or are likely to occur in the study area. These are mostly critically endangered, endangered or vulnerable species already considered above, including a number of shorebirds and whale species.

Table 6-3 Potential Impacts to migratory species known to, or likely to occur, within the study area

Species	Potential Impacts	Potential Significance of Impact
Shorebird species	Whilst these species may forage on the foreshore, they would only occasionally utilise the marine environment. Potential impacts to shorebirds include bird strike and possibly artificial light. It is unlikely that the study area supports an important habitat for a migratory shorebird species.	Not Significant
Whale and dolphin species	The study area may possibly be a considered important habitat for the southern right whale or blue whale, although is unlikely to support an ecologically significant proportion of a population for either of these species. Potential impacts mostly relate to underwater noise.	Potentially significant
Turtle species	The study area is unlikely to support an ecologically significant proportion of a population for any turtle species.	Not significant
Fish (porbeagle)	The porbeagle primarily inhabits oceanic waters, occasionally moving into coastal waters. The study area is unlikely to support an ecologically significant proportion for any migratory fish species.	Not significant

6.1.5 Commonwealth Marine Area

An action is likely to have a significant impact on the environment in a Commonwealth marine area if there is a real chance or possibility that the action will:

- result in a known or potential pest species becoming established in the Commonwealth marine area
- modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results
- have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution
- result in a substantial change in air quality[4] or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity; social amenity or human health
- result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected, or
- have a substantial adverse impact on heritage values of the Commonwealth marine area, including damage or destruction of an historic shipwreck.

Although works do not take place in Commonwealth waters, there is potential for indirect impacts to waters, as a result of spills, cable laying (or removal), piling activity the introduction of pest species or changes to hydrodynamics. With appropriate controls in place, these impacts are considered to be a low risk and highly localised. They are unlikely to have a ‘substantial’ or ‘persistent’ adverse impact on the Commonwealth marine environment. Impacts to Commonwealth Marine Areas is expected to be Not Significant.

6.2 State Matters

There are no environmental significance guidelines or criteria published for South Australia. In the absence of such guidelines, the general risk criteria (refer to Section 3) have been used to establish whether impacts to state environmental values are significant.

6.2.1 State Marine Park

HPZs enable areas to be managed to provide protection for habitats and biodiversity, while allowing for activities and uses that do not harm habitats or the functioning of ecosystems. Allowable activities within a HPZ do include renewable energy infrastructure, provided it does not have a significant impact on marine park values i.e. habitat and biodiversity.

Provided works can be undertaken in a manner that avoids permanent impact to key habitats i.e. seagrass, kelp beds or reef, the project may be allowable under the Act.

6.2.2 Protected Species

The majority of species that are listed as threatened under the NPW Act, are also listed under the EPBC Act, and will therefore be assessed under that legislation. The only additional species, that may occur within the study area is the osprey (*Pandion haliaetus).* The species is more common in northern Australia, but limited numbers in South Australia. Active breeding areas occur along the eastern coast of Spencer Gulf and Kangaroo Island, and the study area is not known to support breeding habitat. It is possible individuals would be subject to bird strike, but operation of the wind towers would be unlikely to have a significant impact on a population.

6.2.3 Fisheries Values

The study area supports habitat that is important to several commercial fishing species. Life-history functions of these species could be disrupted by piling activity (construction), cabling (construction) or EMF (operation). Project activities represent a potential risk to individuals, but at this stage, it is considered unlikely that this would result in significant impacts to species populations or breeding cycle. Further research is required to understand the significance of the impact. The additional infrastructure can provide additional habitat for fish and crustacean species.

6.2.4 Native Vegetation

The study area contains approximately 360 km sq. of seagrass and macro algae that would meet the definition of native vegetation under the NV Act; any temporary or permanent removal of this habitat would likely attract a Significant Environmental Benefit (or 'offset') payment. These vegetation communities are rare in south eastern South Australia and any permanent loss would be considered significant. It likely however that infrastructure can mostly be sighted outside of this habitat, or buried to enable recolonisation. Recolonisation timeframes of disturbed habitat could be measured in years for slow-growing seagrass such as *Posidonia.*

6.2.5 Water Quality

Dredging or trenching during cable installation (potentially 1-3m wide trenches), may lead to the production of turbid plumes, however these would be expected to be temporary and minor in nature. Other potential impacts to existing water quality arise from unexpected spills to the marine environment from fuels, oils or anti-fouling paint applied during maintenance activity or from construction/operation vessels. Similarly, these would be expected to be minor in nature with impacts localised. Potential impacts to water quality are unlikely to have a long term or consistent significant impact.

6.2.6 State Heritage Values

There are no identified state heritage values within the study area, therefore no significant impacts have been identified.

7 Next Steps

Following acceptance of the application by the South Australian Government, the proponent will commence further detailed investigations, to inform an Environmental Assessment or Review. This review will be undertaken in accordance with a scoping document or other requirements provided by the EPA and/or DAWE.

These marine studies will likely include the following as a minimum:

- Water quality monitoring – to characterise the existing marine water quality in the study area.
- Sediment quality – to characterise contaminant status of bed sediments, and their geotechnical properties that may be disturbed during turbine construction and dredging for cables.
- Metocean studies – to characterise the wave and current environment in the vicinity of the proposed turbines.
- Marine ecology – to characterise existing marine ecology values, including benthic infauna at the proposed turbines, along with presence and biodiversity of fish and marine mammals, particularly whales. This is likely to involve aerial surveys to gain a better understanding of how whales utilise the study area.
- Shorebird surveys – the study area is known to be populated by threatened and migratory shorebird species, including migratory species protected under international treaties. Detailed surveys of each study area (over representative seasons) are likely to be required, with a particular focus on take-off landing migration patterns.
- Benthic habitat assessment – to characterise benthic habitats (e.g. seagrass, reefs, kelp) in vicinity of the proposed turbine/cables and their habitat value.
- Underwater noise Assessment – to gain a greater understanding of background noise, the noise/vibration likely to be generated by the turbines and the potential disturbance this causes to marine megafauna.
- Community engagement – to gain a better understanding of how residents, visitors, user groups (i.e. commercial fishers) and first nation people use the study area.

8 References

Australian Government, 2020. *National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds.*

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BMT has a proven record in addressing today's engineering and environmental issues.

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Appendix C

PMST search

Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 15/02/21 13:16:24

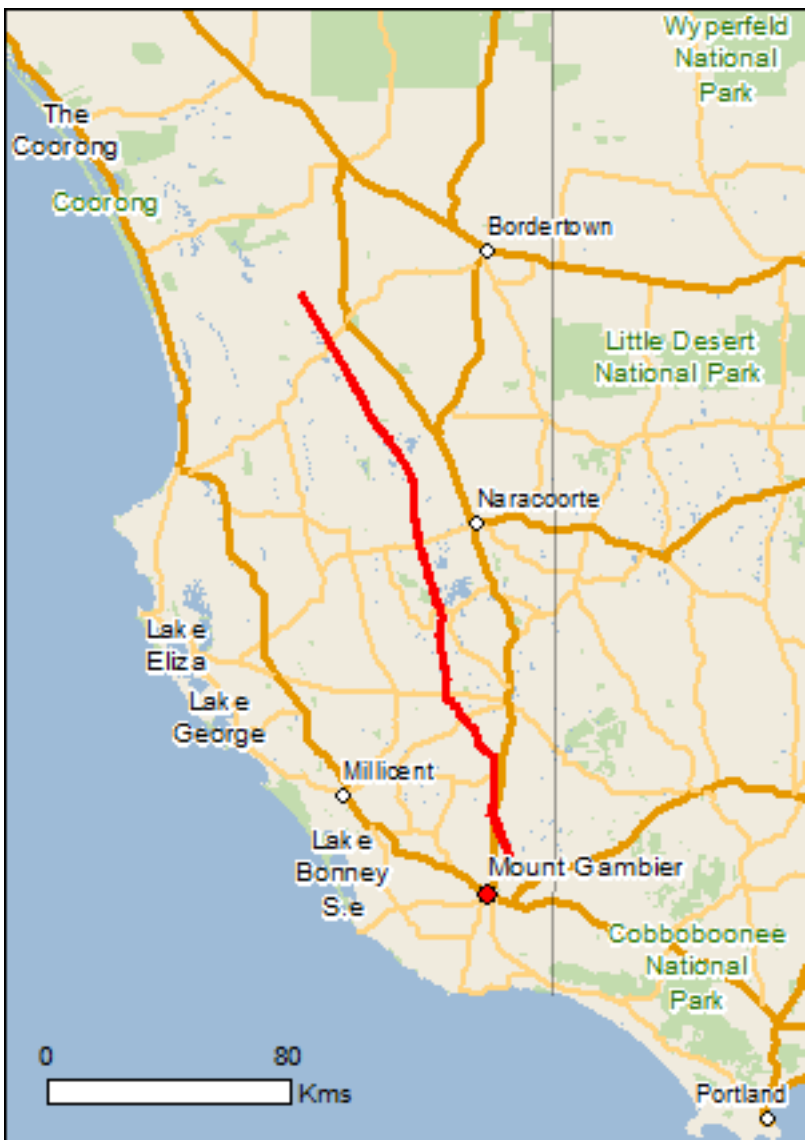
Summary

Details

- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat

Acknowledgements



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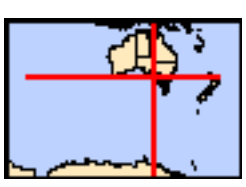

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	37
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	9
Regional Forest Agreements:	None
Invasive Species:	30
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Bool and hacks lagoons	Within 10km of Ramsar

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus banksii graptogyne South-eastern Red-tailed Black-Cockatoo [25982]	Endangered	Foraging, feeding or related behaviour known to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
[Pedionomus torquatus](#) Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
[Galaxiella pusilla](#) Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
[Litoria raniformis](#) Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Mammals		
[Antechinus minimus maritimus](#) Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat may occur within area
[Isoodon obesulus obesulus](#) Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
[Miniopterus orianae bassanii](#) Southern Bent-wing Bat [87645]	Critically Endangered	Species or species habitat likely to occur within area
[Potorous tridactylus tridactylus](#) Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat likely to occur within area
[Pteropus poliocephalus](#) Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
[Amphibromus fluitans](#) River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat may occur within area
[Caladenia colorata](#) Coloured Spider-orchid, Small Western Spider-orchid, Painted Spider-orchid [54999]	Endangered	Species or species habitat known to occur within area
[Caladenia formosa](#) Elegant Spider-orchid, Blood-red Spider-orchid [24370]	Vulnerable	Species or species habitat likely to occur within area
[Caladenia tensa](#) Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat likely to occur within area
[Caladenia versicolor](#) Candy Spider-orchid [24392]	Vulnerable	Species or species habitat may occur within area
[Cassinia tegulata](#) Avenue Cassinia [81640]	Critically Endangered	Species or species habitat likely to occur within area
[Cryptostylis hunteriana](#) Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
[Dipodium campanulatum](#) Bell Flower Hyacinth Orchid [55051]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Dodonaea procumbens		
Trailing Hop-bush [12149]	Vulnerable	Species or species habitat may occur within area
Glycine latrobeana		
Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat known to occur within area
Olearia pannosa subsp. pannosa		
Silver Daisy-bush, Silver-leaved Daisy, Velvet Daisy-bush [12348]	Vulnerable	Species or species habitat may occur within area
Prasophyllum spicatum		
Dense Leek-orchid [55146]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis chlorogramma		
Green-striped Greenhood [56510]	Vulnerable	Species or species habitat likely to occur within area
Senecio psilocarpus		
Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra epipactoides		
Metallic Sun-orchid [11896]	Endangered	Species or species habitat likely to occur within area
Thelymitra matthewsii		
Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat likely to occur within area
Xerochrysum palustre		
Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Delma impar		
Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Breeding known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Limosa lapponica		
Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Big Heath	SA
Mary Seymour	SA
Talapar	SA
Unnamed (No.HA130)	SA
Unnamed (No.HA256)	SA
Unnamed (No.HA486)	SA
Unnamed (No.HA740)	SA
Unnamed (No.HA888)	SA
Unnamed (No.HA987)	SA

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-37.733955 140.83903,-37.71773 140.829632,-37.667573 140.80444,-37.652115 140.79663,-37.638284 140.789913,-37.633119 140.787338,-37.62135 140.789527,-37.610191 140.791523,-37.598357 140.791737,-37.594157 140.792338,-37.547098 140.792724,-37.502205 140.79296,-37.494936 140.779034,-37.488926 140.76704,-37.485691 140.76101,-37.480361 140.750689,-37.474742 140.748092,-37.469428 140.746118,-37.460947 140.743071,-37.442089 140.736484,-37.436757 140.732493,-37.425034 140.717816,-37.414809 140.704426,-37.411826 140.699106,-37.400928 140.692192,-37.397417 140.689874,-37.394024 140.687707,-37.387461 140.683137,-37.386029 140.681093,-37.383548 140.677874,-37.375687 140.667403,-37.364944 140.652468,-37.334428 140.653091,-37.323934 140.653713,-37.301509 140.648971,-37.289509 140.646439,-37.28268 140.645087,-37.278378 140.643735,-37.274126 140.643241,-37.268286 140.641868,-37.246716 140.637383,-37.238448 140.63571,-37.227139 140.633307,-37.223324 140.632525,-37.219488 140.631667,-37.208458 140.633909,-37.204561 140.6348,-37.200733 140.635562,-37.197092 140.636334,-37.193212 140.637074,-37.189374 140.637965,-37.177356 140.640454,-37.160736 140.635562,-37.159146 140.633373,-37.151108 140.632107,-37.147003 140.62597,-37.141393 140.623867,-37.137716 140.622515,-37.126391 140.618417,-37.118144 140.615434,-37.113849 140.613932,-37.101443 140.609491,-37.093364 140.606487,-37.073285 140.599234,-37.060992 140.594814,-37.044877 140.58887,-37.029513 140.583291,-37.021615 140.580369,-37.003933 140.574579,-37.002434 140.573362,-36.98967 140.569269,-36.981443 140.567423,-36.973592 140.565471,-36.969761 140.564816,-36.966177 140.563979,-36.96355 140.56355,-36.960541 140.562767,-36.95658 140.561844,-36.9451 140.559205,-36.939149 140.558454,-36.932888 140.55796,-36.904222 140.556415,-36.900353 140.556299,-36.876238 140.555054,-36.871054 140.554947,-36.867398 140.554775,-36.856325 140.55514,-36.850212 140.551149,-36.847843 140.548981,-36.842657 140.546342,-36.831803 140.539433,-36.808803 140.524386,-36.779316 140.499989,-36.771651 140.495376,-36.762541 140.487308,-36.760005 140.485183,-36.758011 140.485151,-36.755999 140.480495,-36.752578 140.477201,-36.74969 140.474004,-36.746316 140.470549,-36.743393 140.467491,-36.737469 140.461129,-36.729085 140.452546,-36.725715 140.44921,-36.711628 140.434779,-36.705504 140.431089,-36.69439 140.424844,-36.686647 140.420531,-36.679093 140.416369,-36.668543 140.410382,-36.652259 140.399782,-36.648851 140.396735,-36.641861 140.390984,-36.631547 140.382401,-36.415985 140.22752,-36.41709 140.226146

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Australian Government

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

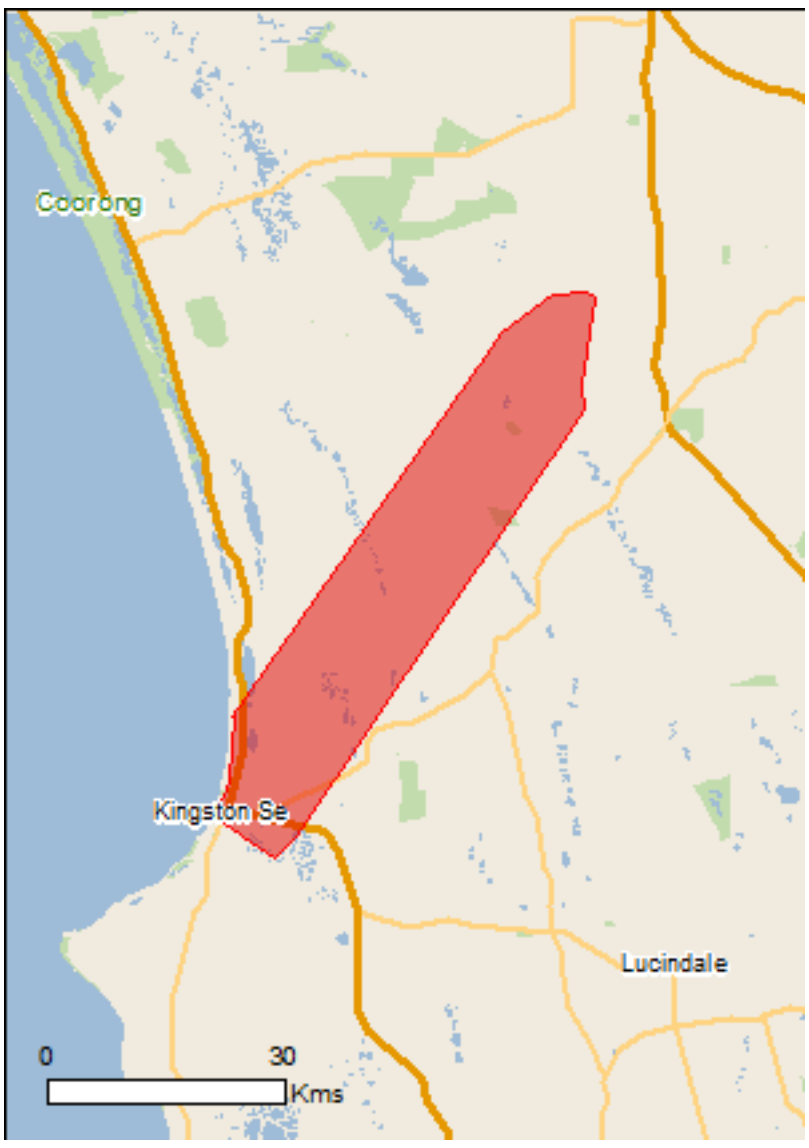
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 15/02/21 12:39:53

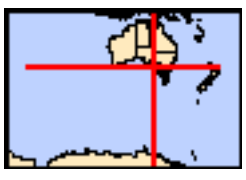
Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



Coordinates

Buffer: 0.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	39
Listed Migratory Species:	25

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	39
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	17
Regional Forest Agreements:	None
Invasive Species:	27
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities		[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii graptogyne South-eastern Red-tailed Black-Cockatoo [25982]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area
Thinornis cucullatus cucullatus Hooded Plover (eastern), Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Galaxiella pusilla Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Antechinus minimus maritimus Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat likely to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Miniopterus orianae bassanii Southern Bent-wing Bat [87645]	Critically Endangered	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Caladenia colorata Coloured Spider-orchid, Small Western Spider-orchid, Painted Spider-orchid [54999]	Endangered	Species or species habitat likely to occur within area
Caladenia tensa Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat known to occur within area
Caladenia versicolor Candy Spider-orchid [24392]	Vulnerable	Species or species habitat known to occur within area
Cassinia tegulata Avenue Cassinia [81640]	Critically Endangered	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Glycine latrobeana Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat may occur within area
Olearia pannosa subsp. pannosa Silver Daisy-bush, Silver-leaved Daisy, Velvet Daisy-bush [12348]	Vulnerable	Species or species habitat known to occur within area
Pterostylis arenicola Sandhill Greenhood Orchid [17919]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis cucullata Leafy Greenhood [15459]	Vulnerable	Species or species habitat likely to occur within area
Senecio psilocarpus Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra epipactoides Metallic Sun-orchid [11896]	Endangered	Species or species habitat known to occur within area
Thelymitra matthewsii Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Migratory Marine Species		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding likely to occur within area

Name	Threatened	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
[Tringa nebularia](#)		
Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
[Actitis hypoleucos](#)		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
[Anous stolidus](#)		
Common Noddy [825]		Species or species habitat likely to occur within area
[Apus pacificus](#)		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#)		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
[Ardea ibis](#)		
Cattle Egret [59542]		Species or species habitat may occur within area
[Calidris acuminata](#)		
Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
[Calidris canutus](#)		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
[Calidris ferruginea](#)		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Calidris melanotos](#)		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Calidris ruficollis](#)		
Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence
Charadrius ruficapillus Red-capped Plover [881]		Foraging, feeding or related behaviour known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area
Puffinus carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Recurvirostra novaehollandiae		
Red-necked Avocet [871]		Foraging, feeding or related behaviour known to occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons		
Little Tern [813]		Species or species habitat may occur within area
Thinornis rubricollis		
Hooded Plover [59510]		Species or species habitat may occur within area
Thinornis rubricollis rubricollis		
Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Hanson Scrub	SA
Jip Jip	SA
Paranki Lagoon	SA
Unnamed (No.HA1008)	SA
Unnamed (No.HA1039)	SA
Unnamed (No.HA1094)	SA
Unnamed (No.HA1220)	SA
Unnamed (No.HA1290)	SA
Unnamed (No.HA253)	SA
Unnamed (No.HA265)	SA
Unnamed (No.HA302)	SA
Unnamed (No.HA304)	SA
Unnamed (No.HA640)	SA
Unnamed (No.HA79)	SA
Unnamed (No.HA806)	SA

Name	State
Unnamed (No.HA902)	SA
Unnamed (No.HA964)	SA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Watervalley Wetlands	SA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-36.746805 139.865233,-36.417081 140.152251,-36.396081 140.17285,-36.3607 140.229155,-36.358488 140.267607,-36.362911 140.27722,-36.444704 140.263487,-36.466795 140.264861,-36.854568 139.938017,-36.874345 139.913298,-36.839183 139.84738,-36.805104 139.862486,-36.746805 139.866606,-36.746805 139.865233

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

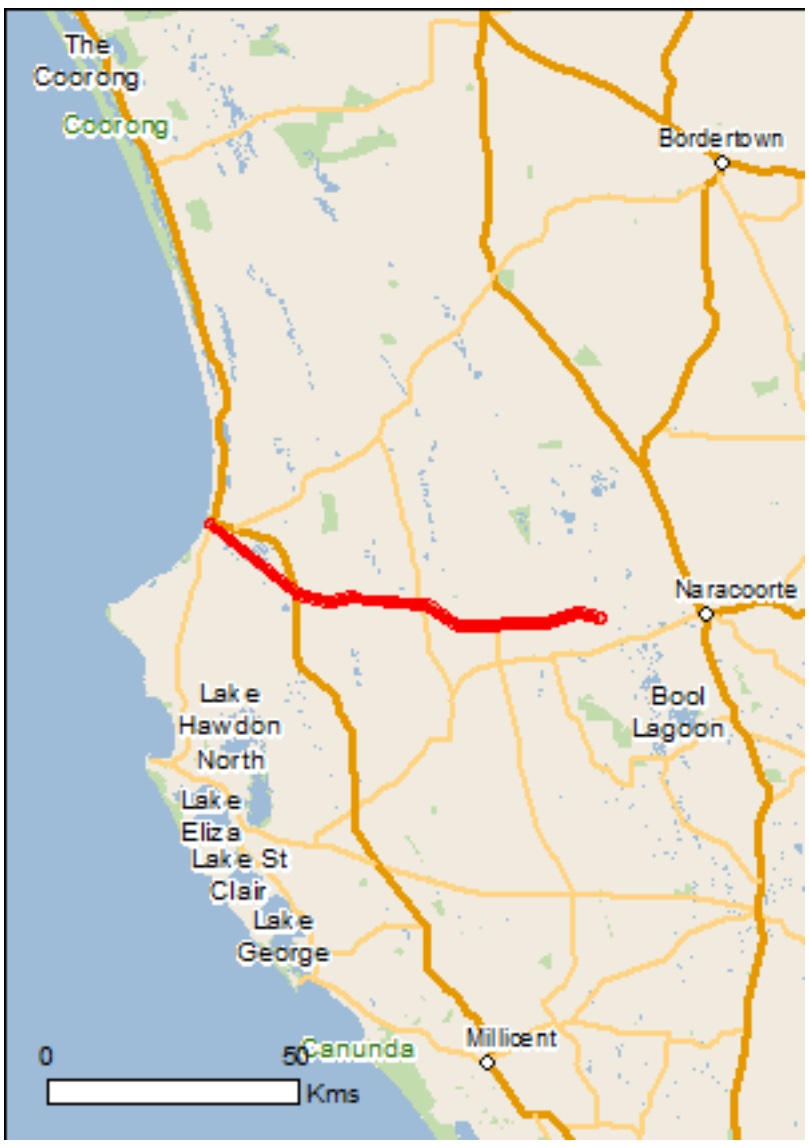
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 15/02/21 12:43:09

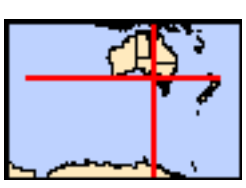
Summary
Details
Matters of NES
Other Matters Protected by the EPBC Act
Extra Information
Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	60
Listed Migratory Species:	44

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	74
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	5
Regional Forest Agreements:	None
Invasive Species:	28
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii graptogyne South-eastern Red-tailed Black-Cockatoo [25982]	Endangered	Foraging, feeding or related behaviour known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis cucullatus cucullatus Hooded Plover (eastern), Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Fish		
Galaxiella pusilla Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat known to occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Antechinus minimus maritimus Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Miniopterus orianae bassanii Southern Bent-wing Bat [87645]	Critically Endangered	Species or species habitat likely to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Caladenia colorata Coloured Spider-orchid, Small Western Spider-orchid, Painted Spider-orchid [54999]	Endangered	Species or species habitat may occur within area
Caladenia tensa Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat may occur within area
Caladenia versicolor Candy Spider-orchid [24392]	Vulnerable	Species or species habitat may occur within area
Cassinia tegulata Avenue Cassinia [81640]	Critically Endangered	Species or species habitat known to occur within area
Dodonaea procumbens Trailing Hop-bush [12149]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
[Glycine latrobeana](#) Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat may occur within area
[Pomaderris halmaturina subsp. halmaturina](#) Kangaroo Island Pomaderris [21964]	Vulnerable	Species or species habitat known to occur within area
[Prasophyllum validum](#) Sturdy Leek-orchid, Mount Remarkable Leek-orchid [10268]	Vulnerable	Species or species habitat likely to occur within area
[Pterostylis chlorogramma](#) Green-striped Greenhood [56510]	Vulnerable	Species or species habitat may occur within area
[Pterostylis cucullata](#) Leafy Greenhood [15459]	Vulnerable	Species or species habitat may occur within area
[Senecio psilocarpus](#) Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area
[Thelymitra epipactoides](#) Metallic Sun-orchid [11896]	Endangered	Species or species habitat may occur within area
[Thelymitra matthewsii](#) Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
Reptiles		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
[Delma impar](#) Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat likely to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Sharks		
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Anous stolidus](#) Common Noddy [825]		Species or species habitat likely to occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardenna carneipes](#) Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
[Ardenna grisea](#) Sooty Shearwater [82651]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Limosa lapponica		
Bar-tailed Godwit [844]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Vanacampus vercoi Verco's Pipefish [66286]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Unnamed (No.HA144)	SA
Unnamed (No.HA334)	SA
Unnamed (No.HA477)	SA
Unnamed (No.HA926)	SA
Unnamed (No.HA987)	SA

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Bonney Coast Upwelling	South-east

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-36.828466 139.855861,-36.927333 140.008296,-36.93831 140.068721,-36.932822 140.112666,-36.937212 140.140132,-36.941603 140.240383,-36.973427 140.299434,-36.970135 140.454616,-36.953676 140.515041,-36.961357 140.553493

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-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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