

APPENDIX N

Bushfire Assessment

NORTHERN
WATER PROJECT



Northern Water Project

Department for Infrastructure and Transport

Bushfire Risk Management Plan

JBS&G 63753 | 157,591 (Rev 0)

6 July 2026



We acknowledge the Traditional Custodians of Country throughout Australia and their connection to land, sea and community.

We pay our respect to Elders past, present and emerging and in the spirit of reconciliation we commit to working together for our shared future where every person is respected, valued and has strong sense of belonging.

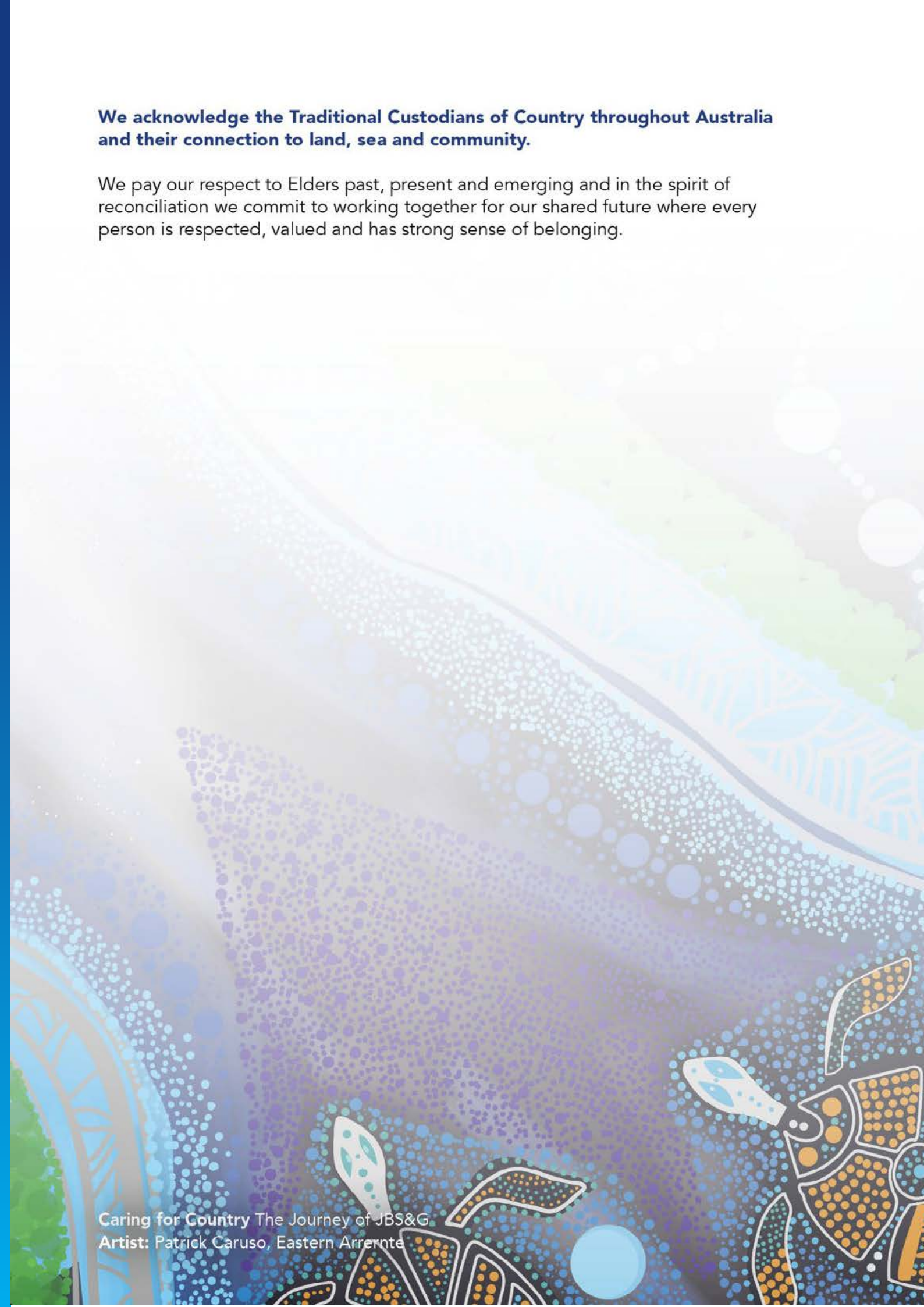


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Appendices

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Appendix B	Native Vegetation in the Project Area (map series)

Abbreviations

Term	Definition
2WD	Two wheel drive
4WD	Four wheel drive
AFDRS	Australian Fire Danger Rating System
AHD	Australian Height Datum
AIIMS	Australasian Inter-Service Incident Management System
APZ	Asset Protection Zone
AS 3959	<i>AS 3959:2018 Construction of buildings in bushfire prone areas</i>
BAL	Bushfire Attack Level
BCA	Building Code of Australia
BEP	Bushfire Emergency Plan
BHP	Broken Hill Proprietary Company
BMAP	Bushfire Management Area Plan
BMP	Bushfire Management Plan
BOM	Bureau of Meteorology
BRMP	Bushfire Risk Management Plan
CFS	Country Fire Service
DEA	Digital Earth Australia
DEH	Department of Environmental and Heritage
DENR	Department of Environment and Natural Resources
DEW	Department for Environment and Water
DICL	Ductile iron cement lined
DIT	Department for Infrastructure and Transport
ECNES	Ecological Communities of National Environmental Significance
EIS	Environmental Impact Statement
EMT	Emergency Management Team
ENA	Energy Networks Australia
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FDI	Fire Danger Index
FES Act	<i>Fire and Emergency Services Act 2005</i>
GAB	Great Artesian Basin
GIS	Geographical Information Systems
GoSA	Government of South Australia
GL/y	gigalitre per year
GRP	Glass reinforced plastic
HJP	Hydrogen Jobs Plan
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Lower Eyre Peninsula
LGA	Local Government Area

Term	Definition
MFS	Metropolitan Fire Service
ML	Mega Litres
MNES	Matters of Environmental Significance
MSCL	Mild steel cement lined
NVIS	National Vegetation Information System
PDI Act	<i>Planning, Development and Infrastructure Act 2016</i>
PPRR	Prevention, Preparedness, Response, Recovery
PUA	Pastoral Unincorporated Area
RAAF	Royal Australian Airforce
SA	South Australia
SAPN	South Australia Power Networks
SAPOL	South Australia Police
SBBC	State Bushfire Coordination Committee
SBMP	State Bushfire Management Plan
SPC	State Planning Commission
UEP	Upper Eyre Peninsula
UIA	Unincorporated Area

Executive Summary

Northern Water (the Project) aims to provide a secure climate-resilient water source for industry in South Australia's Upper Spencer Gulf and Far North. Delivery of the Project will involve the construction of a 51 GL/y seawater reverse osmosis desalination plant and associated water transfer system (including pipelines, transfer pump stations, water storages) and electricity infrastructure.

The proposed desalination plant site is on the western shore of the Upper Spencer Gulf at Mullaquana Station, a station of approximately 13,000 hectares located ~25 km south-west of Whyalla. The transfer system runs generally north from the desalination plant to Olympic Dam, passing Whyalla, Port Augusta, Woomera, and Roxby Downs, with a lateral branch pipeline proposed to a delivery point at the operational Carrapateena copper-gold mine.

This Bushfire Risk Management Plan (BRMP) has been prepared to provide overarching guidance to manage and mitigate potential bushfire impacts to life, property and environmental assets during both construction and operation of the Project. Site/stage specific Bushfire Management Plans will be prepared at the relevant stages of development in consideration of the principles and mitigation measures documented within this Plan.

This BRMP considers the potential impacts of bushfire occurring within the broader landscape surrounding the Project, as well as bushfire ignited by construction and/or operational activities on Project assets.

The bushfire risk assessment methodology is based on Australian and New Zealand Standard AS/NZS ISO 31000:2018 Risk Management—Principles and Guidelines and has been tailored towards assessing and mitigating bushfire risk. This Plan also considers requirements of relevant SA and federal legislation and codes relating to bushfire management, environmental protection, and electricity network safety.

Results of the bushfire risk assessment indicate that the bushfire scenarios assessed pose a significant level of inherent risk to life, property and environmental assets with Extreme (for the construction phase) and High (for the operational phase) levels of inherent risk being identified in the absence of any bushfire mitigation treatments being applied. Following implementation of the recommended mitigation measures, the residual risk is expected to be reduced to Medium (construction) and Low (operational) levels of risk. Inherent and residual risk was identified as being higher during the construction stage, where construction activities have a greater potential to ignite a fire, and the workforce numbers are higher, compared to the operational stage of the Project.

The mitigation measures recommended to manage bushfire risk associated with construction and operation of the Project have been structured using the widely recognised Prevention, Preparedness, Response, Recovery (PPRR) framework in order to provide a holistic approach to bushfire hazard mitigation and management. The recommended mitigation measures include vegetation management adjacent to life and property assets; adoption of bushfire construction standards for habitable buildings; asset inspections and maintenance; Total Fire Ban controls; pre-emptive de-energisation of the power network; suitable access; development of bushfire emergency evacuation, bushfire monitoring and communication procedures; training of personnel; pre-bushfire season audits; direct firefighting response and continual review of bushfire risk management measures in place.

1. Introduction

1.1 Project Overview

Northern Water (the Project) aims to provide a secure climate-resilient water source for industry in South Australia's Upper Spencer Gulf and Far North. Delivery of the Project will involve the construction of a 51 GL/y seawater reverse osmosis desalination plant and associated water transfer system (including pipelines, transfer pump stations, water storages) and electricity infrastructure.

The proposed desalination plant site is on the western shore of the Upper Spencer Gulf at Mullaquana Station, a station of approximately 13,000 hectares located 25 km south-west of Whyalla. The transfer system runs generally north from the desalination plant to Olympic Dam, passing Whyalla, Port Augusta, Woomera, and Roxby Downs, with a lateral branch pipeline proposed to a delivery point at the operational Carrapateena copper-gold mine. The Project Footprint and key elements are depicted in Figure 1-1.

This Bushfire Risk Management Plan (BRMP) has been prepared as a technical addendum to the Environmental Impact Statement (EIS).

1.2 Project Description

The Department for Infrastructure and Transport (the Department) is seeking approval to construct and operate the Project following the Impact Assessed development pathway under the *Planning, Development and Infrastructure Act 2016* (PDI Act), which requires preparation of an EIS.

The proposed main transfer pipeline between the proposed desalination plant site in the south and Roxby Downs in the north will extend north along eastern Eyre Peninsula via Lincoln Gap and Woomera, passing west of Whyalla. The alignment travels through predominantly non-urban, agricultural (livestock grazing) and remote areas and will (wherever possible and practicable) follow the alignment of existing road reserves and other utility corridors.

Based on the Reference Design (prepared by GHD for the Project in 2025), the Project is proposed to comprise the following key elements:

- a 51 GL/y seawater reverse osmosis desalination plant located at Mullaquana Station approximately 25 km south-west of Whyalla
- marine intake and outfall tunnels extending underneath the seabed and into the Spencer Gulf
- diffuser structures for discharge of return water into the Spencer Gulf
- a transfer system consisting of:
 - a ~360 km main transfer pipeline, largely constructed underground terminating at the delivery point at the Olympic Dam copper-gold mine
 - a ~46 km lateral branch pipeline (which may be constructed above or below ground) to a delivery point at the Carrapateena copper-gold mine
 - associated transfer pump stations and storage tanks
- high voltage electricity supply including powerlines, network substations and facility substations to provide power to the desalination plant and transfer pump stations
- associated temporary construction-related infrastructure (e.g. construction camps, site offices and amenities, yards, storages and laydown areas)
- access tracks including establishing new tracks and upgrading existing tracks
- enabling roadworks and road upgrades.

The above listed proposed Project assets are discussed in further detail in Section 2.

Corridors have been nominated for the transfer system and electricity transmission lines with the final alignments and easements being confirmed during detailed design. The Project traverses the local government areas (LGA) of Whyalla, Port Augusta and Roxby Downs as well as the Unincorporated Area (UIA) of Whyalla and large areas of Pastoral Unincorporated Area (PUA). The Project also extends through Department of Defence land, including the Cultana Training Area near Whyalla and Port Augusta, and is located adjacent to Woomera Commonwealth Land east of Woomera (Figure 1-2).

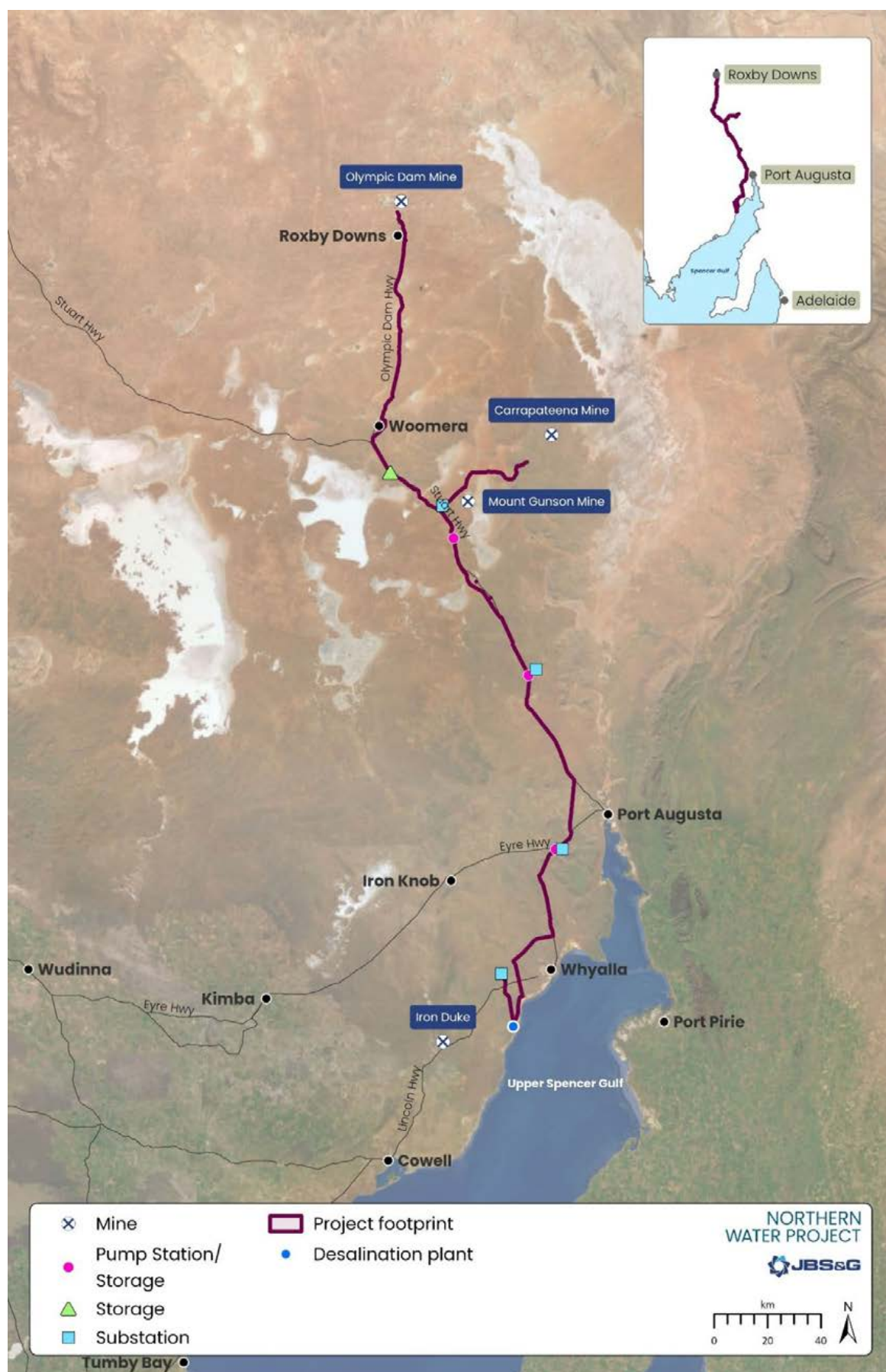


Figure 1-1: Northern Water location

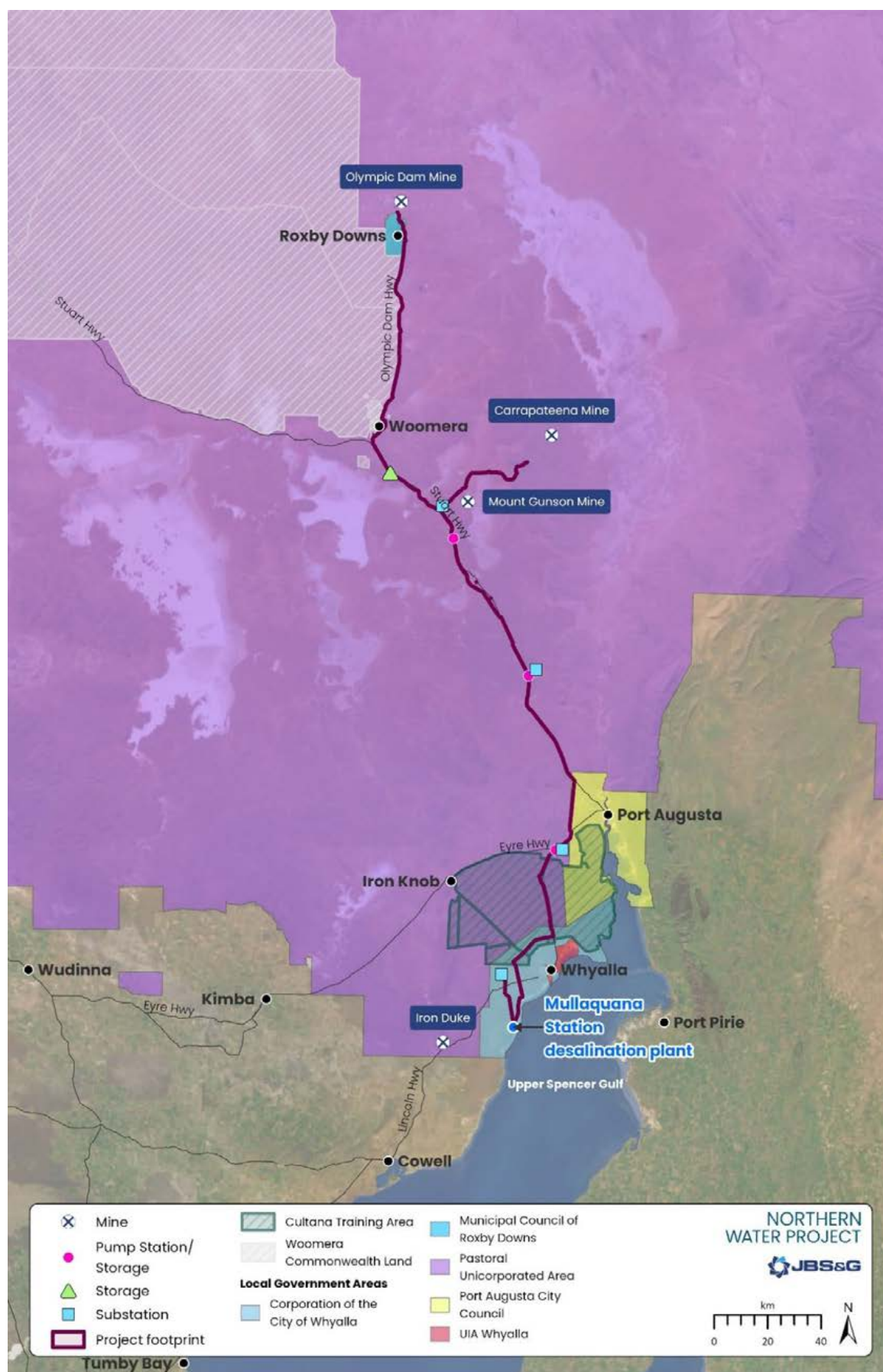


Figure 1-2: LGA and Department of Defence land

1.3 Purpose of BRMP

This BRMP has been prepared by JBS&G and forms part of the EIS prepared for the Project.

The BRMP has considered the Plan SA (2022) Assessment Requirements Library and the Assessment Requirements (issued in 2026 for the EIS) for Environmental Attribute 5 Hazards and Risks (HR1 Bushfire).

1.3.1 Objectives

The aim of this BRMP is to identify and adopt best practice and emergency response management procedures and mitigation actions throughout the life of the Project, including during construction, to reduce potential risk to life, property and environmental assets. The BRMP also provides an overview of bushfire risk mitigation and emergency management strategies that should be considered and adopted at future stages of the Project.

These bushfire risk mitigation measures have been developed based on the Prevention, Preparedness, Response, Recovery (PPRR) framework to provide a holistic approach to reducing the likelihood of a bushfire occurring and the consequences for proposed Project assets and the surrounding landscape.

The specific objectives of this BRMP are to:

- Review legislation, standards, planning controls and regional Bushfire Management Plans applicable to the Project.
- Identify potential bushfire hazards and scenarios that could impact the Project, as well as surrounding life, property and environment assets.
- Assess the inherent and residual bushfire risk to life, property and environmental assets both during the construction and operational phases of the Project through a risk-based assessment.
- Document bushfire risk mitigation measures to minimise risk of bushfire to and from the proposal and/or surrounding areas both during the construction and operational phases of the Project.

1.3.2 Scope

This BRMP is a high-level document that has a broad scope and provides an overview of the bushfire hazards and risks across an area to determine wider impacts irrespective of land tenure and ownership.

The Department acknowledges the potential risk of bushfire to contractors and staff and the importance of their safety during construction. The lives and communities, property, and ecological values surrounding the Project are respected and valued and the potential risk of construction and operational activities starting a bushfire and the impact on these values is an important factor in Project design and planning.

The scope of this BRMP encompasses the Project footprint (including permanent and temporary assets) as well as the broader vegetation extent, to ensure the full scale of bushfire risk to on-site and off-site personnel, property and environment assets is assessed and managed accordingly.

This BRMP has been prepared primarily to assess the potential bushfire risk to the life, property and environmental assets listed below:

- Life assets:
 - Construction and operational workforces
 - Adjacent communities.
- Property assets:
 - Power, water and telecommunications infrastructure, laydowns, and temporary facilities
 - Adjacent private properties and settlements.
- Environmental assets:

- o Vegetation associated with Ecological Communities of National Environmental Significance (ECNES), or other Matters of Environmental Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), adjoining or in proximity to the Project alignment.
- o Vegetation within Whyalla Conservation Park which is located within 2.5 km of the Project alignment, as well as Munyaroo Conservation Park and Ironstone Hill Conservation Park, located approximately 12.5 km to the south and 29 km east of the desalination plant respectively.
- o Vegetation within Vegetation Heritage Agreement areas in proximity to the Project alignment.
- o Wetlands and estuaries adjoining or in proximity to the Project alignment.

This is an initial overarching BRMP consisting of high-level bushfire mitigation strategies and provides guidance for the preparation of future Bushfire Management Plans at the relevant stage/s of development (be it construction or operational). Mitigation and strategies set out in this report are recommendations only and for the purpose of the EIS. Final mitigations and strategies are to be confirmed as part of development of post-approval management plans.

1.4 Report Terminology

The following terms are used within this report and are defined as:

- **Project area** – the proposed linear infrastructure corridor, including transfer system and electrical supply corridors and associated infrastructure. (Note: for the specific purposes of this bushfire risk assessment report (and the methodology set out in section 5.2), the Project area does not include the 2.5 km buffer either side of the linear infrastructure which is included in definition used within the broader EIS).
- **Project footprint** – this comprises the area of temporary and permanent disturbance due to construction of all Project components.
- **Transfer system** – the main transfer pipeline, the Carrapateena lateral branch and associated transfer pump stations and storage tanks.
- **Main transfer pipeline** – the main transfer pipeline which extends between the Mullaquana Station desalination plant in the south and the Olympic Dam delivery point in the north.
- **Lateral branch** – lateral branch from the main transfer pipeline to the operational Carrapateena mine.
- **Transmission line** – includes electricity supply transmission and distribution lines with associated poles and towers.

1.5 Relevant Legislation, Planning Control and Standards

This section summarises the relevant legislation, policy, planning controls, standards and guidance documents that are relevant to preparing this bushfire risk assessment report.

1.5.1 Planning, Development and Infrastructure Act 2016 (PDI Act)

The *Planning, Development and Infrastructure Act 2016* (PDI Act) governs the planning system in South Australia (SA) and sets out the process and pathways for granting development approvals, including approvals for major developments.

The Project is being assessed under the Impact Assessed development pathway which requires preparation of an EIS, the process for which is set out in sections 111-115 (inclusive) of the PDI Act.

1.5.2 Fire and Emergency Services Act 2005

The *Fire and Emergency Services Act 2005* (FES Act) establishes the SA Fire and Emergency Services Commission and provides for the metropolitan and country fire and emergency services as well as the State Emergency Service.

The FES Act outlines the governance, structure and areas of responsibility including for the SA Country Fire Service (CFS), which maintains responsibility for the Project area, including:

- Establishment and function of the State Bushfire Coordination Committee and Bushfire Management Committees
- State Bushfire Management Plans and Bushfire Management Area Plans
- Fire prevention (fire danger season, total fire bans and permits to burn)
- Duties relating to fires and emergencies.

Part 4A, Division 3 of the FES Act sets out the requirement for bushfire fuels to be managed on both private and public land to prevent or inhibit the outbreak and spread of fire; protect property; and minimise the threat to human lives. The FES Act also provides for declaration of fire danger seasons and total fire ban restrictions which must be adhered to by Project operations (Part 4, Division 8, Subdivisions 1 & 2).

1.5.3 State Bushfire Management Plan

The State Bushfire Management Plan (SBMP) identifies the major bushfire risks in the State and recommends appropriate action that will provide protection to life, property and the environment from the effects of bushfire. The SBMP sets out principles, policies and standards for bushfire management in the State from a high level or strategic perspective, including a strategic approach to hazard reduction, and strategies for state-wide coordination and integration of bushfire management activities.

1.5.4 Bushfire Management Area Plans

South Australia is divided into nine Bushfire Management Areas for which a Bushfire Management Area Plan (BMAP) has been developed as part of a project funded by the Natural Disaster Resilience Program in partnership with the Commonwealth and State Governments.

The Project crosses two BMAP areas, which are indicated in Figure 1-3.

- Upper Eyre Peninsula (UEP) BMAP
- Flinders and Outback BMAP.

Each BMAP contains a risk assessment in respect of human settlement, economic, cultural heritage and environmental assets and consists of a spatial on-line map, an explanatory text document (the plan) and risk treatment registers for specific assets. BMAPs also identify Bushfire Safer Places and Last Resort Refuges within the BMA.

The purpose of each BMAP is to:

- Identify assets at risk from bushfire.
- Outline bushfire prevention and mitigation strategies.
- Identify responsibilities for implementation of risk mitigation treatments.
- Establish principles and standard to guide the success of the bushfire management strategies.

Bushfire Management Zones are identified within each BMAP to designate areas where fuel management activities are regularly undertaken with the aim of reducing the risk and impacts of bushfire on life, property and environmental assets identified in the risk register. The three bushfire management zones are:

- Asset Protection Zones (A-zones).
- Bushfire Buffer Zones (B-zones).
- Conservation Zones (C-zones).

Asset Protection Zones should be maintained on an annual basis to ensure that the Overall Fuel Hazard levels are reduced to a level of Moderate or below throughout the fire season. The *Native Vegetation Act 1991* allows for the clearing of understorey vegetation up to 20 m around a residence and can be extended in response to down slopes and higher vegetation classifications to achieve BAL-12.5 in accordance with *AS 3959-2018 Construction of buildings in bushfire prone areas* (AS 3959; SA 2018a) methodology. Maintaining BAL-12.5 (<12.5 kW/m²) is designed to prevent ignition of structures from low to moderate levels of radiant heat and ember attack.

The Bushfire Management Zone Standard and Guide for Use publication (SBCC 2020) prescribes standards for establishment and maintenance for each of the three zones.

1.5.5 Bushfire Protection Overlays

The SA Planning and Design Code (the Code) designates bushfire protection overlays which are subject to bushfire related planning and building requirements according to the level of bushfire risk determined for a site. Under the Code, SA has been mapped based on six categories of bushfire protection: General Risk, Medium Risk, High Risk, Outback, Regional and Urban Interface. The proposed Project footprint is located within two of the six bushfire hazard overlays: Regional Risk and Outback, as shown in Figure 1-4.

The development controls in place provide guidance as to how bushfire risk should be considered / addressed on such land.

The Code bushfire policies are very similar across all the overlays. Appendix A contains an extract of the bushfire overlay Code policy that applies to the Project. The overlay policy seeks to ensure that development considers the level of bushfire risk, including the increased frequency and intensity of bushfires as a result of climate change. The location of structures, such as pump stations, water storage, transmission towers, substations, above-ground pipeline, camps and laydowns should ensure the threat and impact of bushfires on life and property is minimised as much as possible and ensures appropriate access for emergency service vehicles.

1.5.6 SACFS Guide *Renewable Energy Facilities* – Solar, Battery Storage Systems & Wind Generation

The SACFS Guide *Renewable Energy Facilities* (CFS 2026) provides a risk-based framework for the planning, design, construction and operation of renewable energy infrastructure, with the objective of reducing the occurrence and consequences of fire, improving bushfire resilience, and supporting safe and effective emergency response. The Guide focuses on key bushfire protection measures including the siting of infrastructure, emergency access, vegetation management, firefighting water supplies and emergency response planning. Although developed for renewable energy facilities, these principles are equally applicable to other forms of critical infrastructure, and have been applied as a strategic, risk-based framework to inform the bushfire management principles adopted by this BRMP.

The detailed design of individual project components will be undertaken during subsequent project phases, with the following principles guiding the siting, design, construction and operation of project infrastructure, where applicable:

- **Siting**
Locating critical infrastructure, where practicable, to achieve a bushfire exposure of BAL-12.5 or lower, supported by the provision of appropriately designed Asset Protection Zones (APZs). As a guiding principle, APZs of at least 20 m will be considered where appropriate, with final widths determined during detailed design based on vegetation classification, effective slope and AS 3959.
- **Access/egress**

Providing safe and reliable emergency access to critical infrastructure through all-weather access roads, appropriate road widths, turning facilities and multiple access/egress opportunities where warranted by the scale and function of the infrastructure.

- **Vegetation management (within the APZ)**

Establishing and maintaining low-fuel APZs around critical infrastructure through appropriate vegetation management, including reducing fuel continuity, managing understorey vegetation and maintaining defensible space to support firefighter access and reduce bushfire intensity.

- **Fire water supply**

Providing dedicated firefighting water supplies, access arrangements and supporting infrastructure at permanent facilities where appropriate, having regard to the operational function and bushfire risk of each asset.

- **Emergency response planning**

Incorporating bushfire emergency preparedness into the design, construction and operation of the Project through emergency response procedures, access arrangements, firefighting resources, communication protocols and coordination with emergency services, commensurate with the nature of the operations.

1.5.7 Code of Practice for Fire Management on Public Land in South Australia

The Code of Practice for Fire Management on Public Land in South Australia (GoSA 2018) provides a framework for fire management on public land in order to reduce the occurrence, severity and impacts of bushfires on life, property and the environment and promote improved ecological and biodiversity outcomes using the PPRR framework.

The Code applies to all public land managed by the CFS, Department for Environment and Water (DEW), ForestrySA and SA Water. As the Project extends through land under management by DEW, the Project will be required to adopt this code as part of its bushfire management measures in accordance with Agency requirements.

1.5.8 South Australian Firebreaks, Fire Access Tracks and Sign Standards Guidelines

The South Australian Firebreaks, Fire Access Tracks and Sign Standards Guidelines (CFS 2018) guides government agencies to achieve a consistent approach in the establishment and maintenance of firebreaks and tracks used for fire access. The document also aims to provide a guide for private landholders.

The Guidelines state that:

- *Firebreaks are an area or strip of land where vegetation has been removed or modified to reduce the risk of fires starting and reduce the intensity and rate of spread of fires that may occur; and*
- *Fire access tracks are tracks used for fire access that are designed, constructed and maintained for the safe passage of fire fighting vehicles undertaking fire suppression activities. All designated tracks will permit access by standard 34 units (4WD vehicles capable of carrying up to 3,500 Litres).*

The following guidance is provided for firebreaks and fire access tracks:

- *Firebreaks and fire access tracks should complement any existing or planned firebreaks or tracks on adjoining lands specified in Regional and District Bushfire Prevention Plans.*
- *Wherever possible, firebreaks and fire access tracks should be established on previously cleared land to minimise the impact on native vegetation and reduce establishment and maintenance costs.*
- *Firebreaks should be strategically placed to aid in the protection of fixed assets including dwellings and other building.*

- *Firebreaks and fire access tracks should be positioned to aid fire suppression and should be as straight as practicable.*
- *As firebreaks normally include access tracks, ease of vehicle access in difficult terrain needs to be considered.*
- *Firebreaks should, where practicable, be located in vegetation of least fuel load to improve the chance of fire control.*
- *The range of firebreak treatments can extend from total removal to partial modification of components of its vegetation; leaving trees and only reducing the understorey and fine litter fuel may achieve a significant reduction in fire intensity while retaining some vegetation to maintain soil stability and aesthetic value.*

A summary of technical requirements for firebreaks and fire access tracks under the Guidelines is provided in Table 1-1. Proposed fire access tracks will meet CFS requirements at detailed design stage and will engage in any necessary consultant with CFS.

Table 1-1: Firebreak and fire access track requirements (CFS 2018)

Firebreak and fire access track requirements		
Firebreaks		Requirements
General		• Where practicable and environmentally acceptable, a firebreak should incorporate a fuel-free strip of a minimum width of 1.8 metres.
Grassland firebreaks		• 4 to 10 m width, including a track used for fire access. • In native grasses a firebreak up to 5 m wide is permitted, greater width requires approval of the Native Vegetation Council.
Native vegetation firebreaks		• The Native Vegetation Act allows for firebreaks up to 5 m wide to be established through native vegetation without the need for consent from the Native Vegetation Council. • For areas of native vegetation under Heritage Agreement, a perimeter firebreak up to 5 m width may be established during boundary fencing. Any additional clearance for firebreak purposes requires the specific approval of the Native Vegetation Council.
Firebreaks for building protection	New dwellings	• New dwellings should be established in existing cleared areas to maximise setback from native vegetation.
	Existing dwellings	• The CFS recommends a firebreak around an existing dwelling of 20 m minimum width.
Fire access tracks		Requirements
Major fire tracks		• Minimum 7 m width. • Sufficiently clear of vegetation (both sides and overhead) to allow ready and safe two-way access.
Standard fire tracks		• 4 to 5 m width. • Sufficiently clear of vegetation (both sides and overhead) to allow ready and safe access. • Constructed with passing bays permitting two-way access (minimum length of 17 m, minimum width of 6 m, maximum width in native vegetation of 8 m). • Maximum intervals between opportunities to pass of 400 metres.
Minor fire tracks		• 4 to 5 m width. • Sufficiently clear of vegetation (both sides and overhead) to allow ready and safe access.

Firebreak and fire access track requirements

	• Single lane access is permitted on through roads.
Service tracks (restricted access)	• Not maintained to any standard for access or clearance and may not be trafficable. • Marked on maps but may only be used with the approval of the Incident Controller. • Should only be used during emergency operations with absolute caution under suitable fire behaviour or weather conditions.

1.5.9 South Australia Electricity (Principles of Vegetation Clearance) Regulations 2021

The South Australia Electricity (Principles of Vegetation Clearance) Regulations 2021 set out vegetation clearance standards in accordance with Part 5 of the Electricity Act 1996.

The regulations provide specifications for overhead powerlines up to 275 kV in areas designated by the State as being within a bushfire risk area. The Project is proposed to construct electricity transmission lines between 33 kV and 275 kV which will need to adhere vegetation clearance requirements of the policy.

The regulations include provision of clearance and buffer zones around overhead powerlines on public and private land and provisions for planting and maintaining vegetation near powerlines in bushfire prone areas.

1.5.10 National Electricity Network Safety Code

The National Codes National Electricity Network Safety Code (ENA 2019) provides information on safety clearances for overhead transmission lines. The Code states that trees should be kept clear of transmission lines to minimise risk of fire caused by contact between trees and the lines. Clearance requirements also aim to protect the public and reduce the number of power interruptions and damage to assets. These initiatives will be adopted for proposed transmission line corridors.

1.5.11 Overall Fuel Hazard Guide for South Australia

The Overall Fuel Hazard Guide for South Australia (GoSA 2011) provides a means of assessing bushfire hazard through the assessment of Bark Fuel, Elevated Fuel, and Surface Fine Fuel in forest, woodland and shrubland fuels). The Guide is designed to be used during fire management planning, before and after prescribed burning and during fire suppression operations. The Guide will assist with determining the hazard adjacent to the proposed infrastructure during the preparation of future BMPs at construction and operational stages of the Project.

1.5.12 AS 3959 Construction of buildings in bushfire prone areas

AS 3959 outlines the methodology for determining Bushfire Attack Levels (BALs). BALs provide a measure of a building or assets potential exposure to ember attack, radiant heat and direct flame contact based on vegetation type, proximity of vegetation and effective slope under the vegetation.

The BAL ratings assigned within AS 3959 are outlined in Table 1-2.

Table 1-2: Bushfire Attack Levels under AS 3959

BAL	Bushfire impact
BAL-LOW	Insufficient risk to warrant specific construction requirements.
BAL-12.5 $\leq 12.5 \text{ kW/m}^2$	Ember attack with minor radiant heat flux
BAL-19 $\leq 19 \text{ kW/m}^2$	Increasing ember attack with increasing radiant heat flux.
BAL-29 $\leq 29 \text{ kW/m}^2$	Increasing ember attack with increasing radiant heat flux.
BAL-40 $\leq 40 \text{ kW/m}^2$	Increasing ember attack with increasing radiant heat flux and increased likelihood of exposure to flames.

BAL-FZ	>40 kW/m ²	Direct exposure to flames in addition to radiant heat flux and ember attack.
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The BMAPs relevant to the Project area specify that that Asset Protection Zones (A-zones) should be of a width sufficient to achieve BAL-12.5 to prevent ignition of structures from low to moderate levels of radiant heat and ember attack.



Figure 1-3: Bushfire Management Areas



Figure 1-4: Hazards (Bushfire) Overlays in the Planning and Design Code

2. Assets

2.1 Project Assets

A Reference Design has been completed for the Project and supports the definition of the Project for the purpose of this report. The Project design is preliminary and is expected to change through the detailed design process, or in response to cultural heritage matters or other refinements to minimise impacts as design and technical studies continue.

2.1.1 Desalination plant

A desalination plant is proposed to be constructed at Mullaquana Station, at the southern end of the Project area, as shown in Figure 2-4. Land at Mullaquana Station and the adjoining station properties are currently utilised for sheep grazing but has not been cleared of native vegetation. The site is relatively flat and low lying, sloping gently from the coast in the east to the escarpment in the far west. Saline plains, low coastal dunes and areas of mangroves lie to the east of the site moving to sandy loam saltbush / bluebush plains to the west, as depicted in Plate 2-1.



Plate 2-1: Photos of proposed location of desalination plant at Mullaquana Station

Infrastructure proposed at the desalination plant includes:

- Sea water intake and outfall tunnels and pipes extending offshore (underground) into the Spencer Gulf, intake pump station and marine infrastructure.
- Desalination treatment process systems.
- Product water storage.
- Ancillary equipment, facilities and power infrastructure.
- Administration buildings, workshops, parking, fencing, entry points and security.
- Temporary construction laydown area.

2.1.2 Transfer system infrastructure

Main transfer pipeline

The main transfer pipeline is proposed to extend approximately 360 km from the desalination plant at Mullaquana Station in the south to Olympic Dam mine delivery point in the north (see Figure 2-4 to Figure 2-5) with a lateral branch to a delivery point at the Carrapateena mine. The transfer system can be described in five main sections:

- **Desalination plant (Mullaquana Station) to Whyalla**
 - Alignment heads generally north following Eight Mile Creek Road and other existing tracks/fencelines on rural land.
 - The route skirts Whyalla to the west, crosses Iron Knob Road and veers north-east to where it meets the Lincoln Highway approximately 2 km north of Whyalla Conservation Park.
- **Whyalla to Port Augusta**
 - The alignment then travels north along Lincoln Highway, traversing a section of the Cultana Training Area, following the Lincoln Highway heading north before meeting the Stuart Highway via a short section of the Eyre Highway.
- **Port Augusta to Pimba**
 - From the intersection of Eyre Highway and Stuart Highway, alignment generally follows the Stuart Highway, with portions following the old Stuart Highway and paralleling the existing Department of Defence Port Augusta to Woomera water pipeline.
 - The Carrapateena mine lateral branch heads north-west from the main transfer pipeline south of Lake Windabout.
- **Pimba to Olympic Dam (BHP)**
 - Generally follows the Olympic Dam Highway, although the alignment diverts to the east to avoid the Woomera township.

Pipeline design

The main transfer pipeline and lateral branch will be predominantly buried underground where they will be primarily protected from the effects of a bushfire (noting that the Carrapateena lateral pipeline may be constructed above or below ground). There may also be locations where the pipeline is required to be located above ground level for discrete sections where crossing of environments sensitive to excavation.

The construction material adopted for planning purposes is mild steel cement lined pipe (MSCL), however glass reinforced plastic (GRP) pipes or ductile iron cement lined (DICL) pipes are also being considered. All three types of construction materials have fire resistance properties.

The pipelines will have isolation valves approximately every 20 km and air valves (high points) and scour valves (low points) at regular intervals.

Pipeline construction

A maximum pipeline alignment construction corridor width of 40 m has been specified, in order to minimise impacts to native vegetation and habitat. This corridor width is subject to various construction constraints in some locations (typically due to cultural heritage, environment or design constraints) where narrowing of the disturbance footprint is required. The ultimate construction corridor width will be dependent on the outcomes of detailed design and related construction methodology. It may be reduced in some locations, however, there may also be instances where extra workspace is required e.g. adjacent to highly constrained sections.

Allowance for a 3 m wide access track along the pipeline alignment has been included in permanent disturbance area estimates to account for an unformed track that may result from occasional vehicle access along the alignment for operational and maintenance services and for established access tracks to infrastructure such as air valves, scour valves and water meters.

Pump stations and storage tanks

Four new pump stations with associated water storage and power supply will be required to move water along the pipeline corridor. One new additional water storage will be utilised for the Project at Pimba, which is a high point along the main transfer pipeline. The location of new pump stations and storage tanks are shown

in Figure 2-4 to Figure 2-5 and listed in Table 2-1. Locations for the new pump stations and tanks are indicative only at this stage and will be refined during detailed design.

Table 2-1: Proposed pump stations, storages and tanks

Pump station / storage / tank
Southern section - Mullaquana Station to Port Augusta (Figure 2-4)
Mullaquana Station pump station and storage (located at the desalination plant)
Lincoln Gap pump station and storage
Kalaya (Kootaberra) pump station
Northern section - Port Augusta to Olympic Dam (Figure 2-5)
Mangata (Oakden Hills) pump station
Bimba (Pimba) water storage

Each pump station is likely to contain a pump room, high-voltage and low-voltage rooms, battery room, transformers, store room, crib room and ablutions, as shown in Figure 2-1. Water storage tanks will be constructed of concrete with a fixed steel roof. The stations will either be powered by a small solar farm or local low-voltage power supply. Access to the pump stations will be via unsealed access roads, with unsealed hard stand.

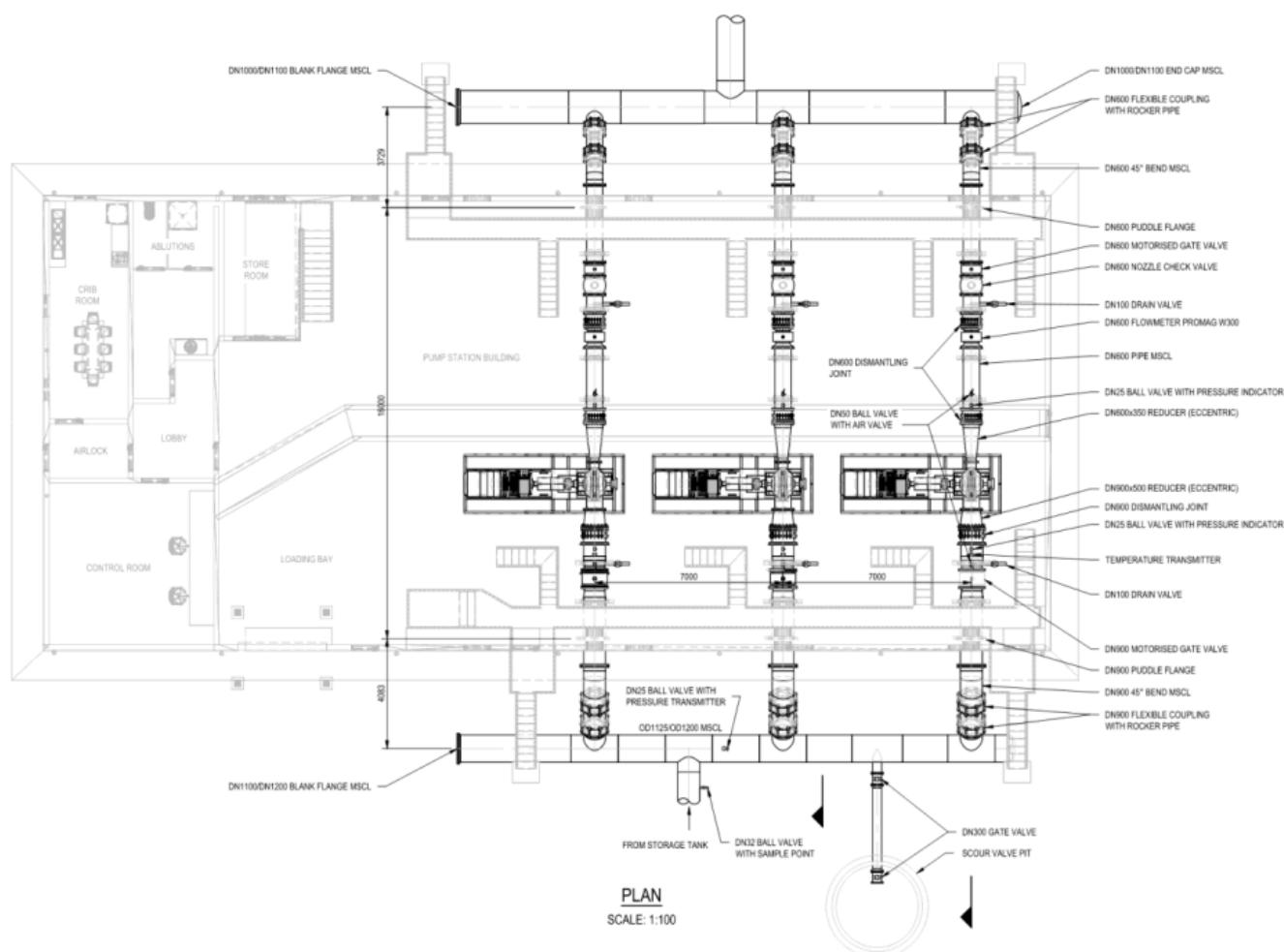


Figure 2-1: Reference design Layout of proposed pump stations

2.1.3 Electricity supply infrastructure

Electricity infrastructure assets required to power the Project and surrounding power network include transmission lines and substations at various locations along the alignment (see Figure 2-4 and Figure 2-5). The assets comprise a combination of new lines and substations and upgraded existing substations, as detailed in Table 2-2. The infrastructure will be constructed and operated by various parties including ElectraNet and South Australia Power Networks (SAPN).

Table 2-2: Proposed Project electricity transmission infrastructure

Project electricity transmission infrastructure	Voltage
New transmission lines	
Mullaquana – Mullaquana Station to Mullaquana substation (~20 km)	132kV
Pandurra – Lincoln Gap pump station to Corraberra Hill substation (~3 km)	275kV
Bookaloo – Kalaya pump station to Kootaberra substation (~3.8 km)	132kV
Oakden Hills – Mangata pump station to Mount Gunson substation (~14.5 km)	33kV
New network substations	
Mullaquana substation	132kV
Kootaberra substation	275kV
Upgraded existing network substation	
Corraberra Hill substation (ElectraNet)	275kV
Mount Gunson substation (SAPN)	33 kV

Transmission lines

Key components of transmission lines include towers or poles, conductors (wires) and insulators. The lower voltage lines will be provided with poles and the higher voltage lines with steel lattice towers (refer to Figure 2-2). The structure height will be designed around canopy height to minimise vegetation clearance. Overhead transmissions lines will be provided within easements.

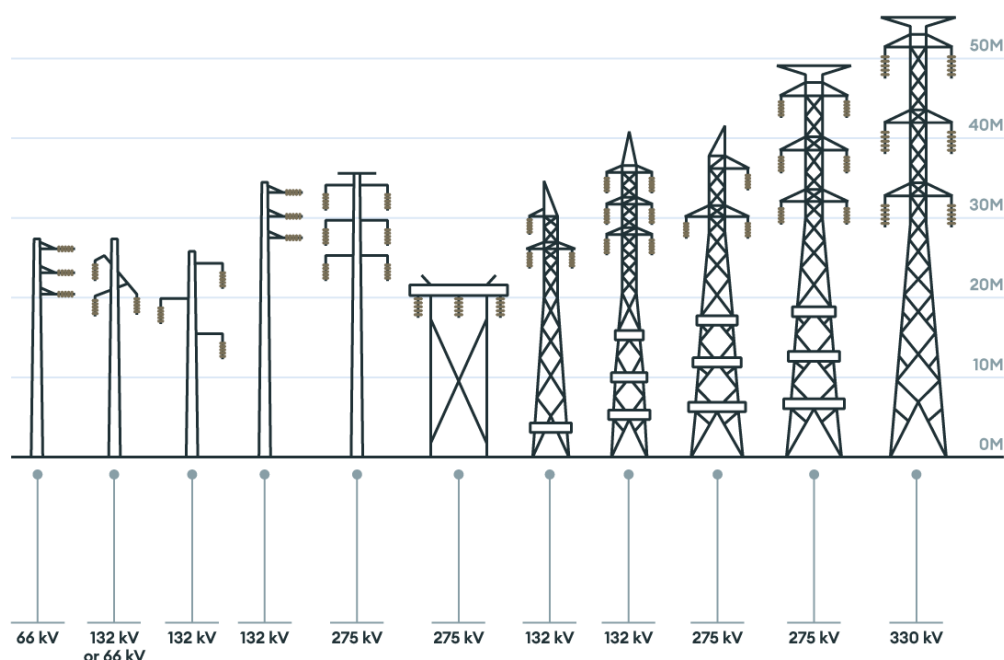


Figure 2-2: Transmission line voltages and structure types

[Source: <https://www.electra.net.com.au/our-approach/safety/transmission-lines/>]

Vegetation clearance distances adjacent to transmission lines is to be in line with *Electricity (Principles of Vegetation Clearance) Regulations 2021*. As much of the open woodland and scrubland vegetation (where present on the alignment) is relatively low, slow growing and at mature height, it is possible that the transmission lines can be spanned across with minimal clearance required. If this is not possible, some clearing or lopping of trees may be required under the conductors in some areas.

Maintenance and inspections along the transmission easements would be carried out by the electricity network operator on an ongoing basis via vehicular access tracks, constructed as part of the Project, and potentially utilising helicopter-based assessment. Extensive vegetation maintenance on linear infrastructure easements during operations is not expected to be required as vegetation present is generally slow-growing and at mature height and therefore can be considered into the design of the transmission line. Vegetation trimming is typically carried out every three to four years with trimming to allow for a three-year growth period. This may vary depending on the type of vegetation and speed of growth.

Permanent disturbance areas for lattice tower structures will be 15 m x 15 m footprint following completion of construction and any rehabilitation works.

2.1.4 Telecommunications infrastructure

Communications towers of approximately 30 m – 40 m height will be constructed at the desalination plant, pump station / storage and substation sites to provide a data communications network along the Project alignment (refer to Figure 2-3). Towers are likely to be connected to local power but could also be serviced by a solar panel and battery system. The locations of towers will be surveyed at detailed design stage.

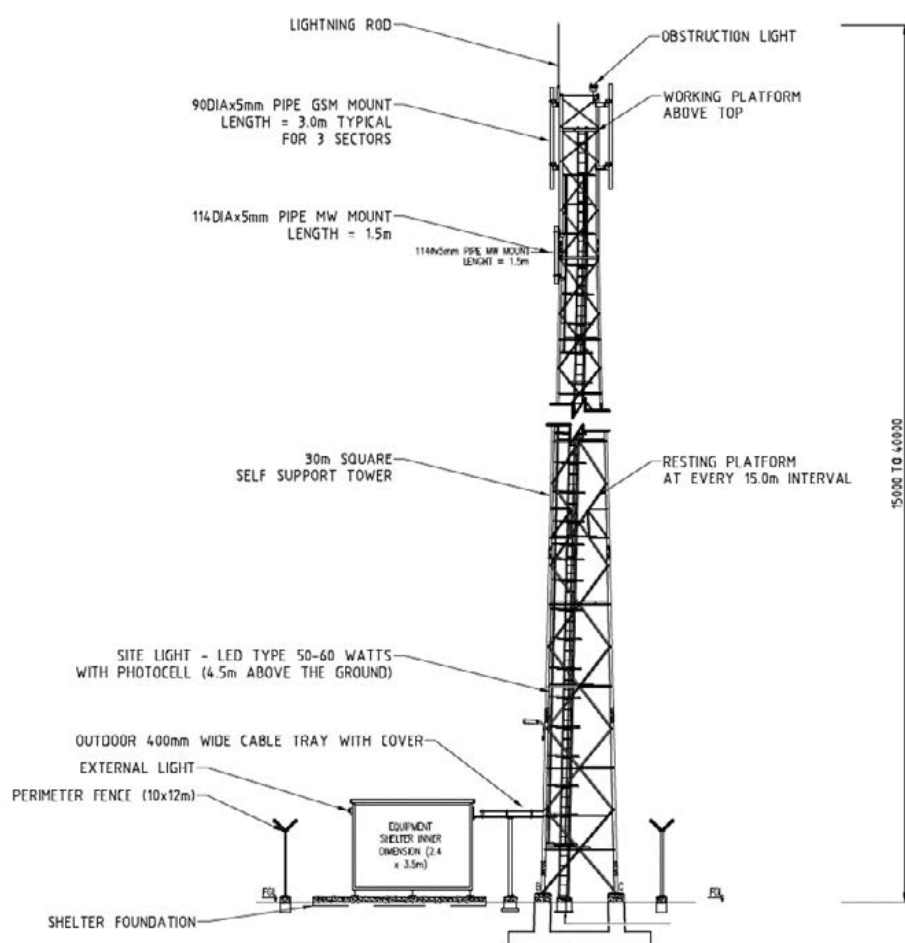


Figure 2-3: Typical communications tower

2.1.5 Temporary construction camps

Labour requirements will vary over the course of the Project, peaking when the full range of construction activities are occurring across the alignment. Workforce crews are expected to be transported to construction sites by bus, with the workday operating 7am to 7 pm Monday to Saturday.

Temporary camps are expected to comprise temporary accommodation and office buildings, sewage treatment systems and possibly a mobile reverse osmosis plant for water treatment. The number and location of temporary construction camps will be determined during detailed design.

2.1.6 Laydown and storage areas

Temporary laydown and staging areas will be constructed at various locations along the alignment. These areas will be used to store heavy vehicles, equipment and bulk materials during the construction phase of the Project.

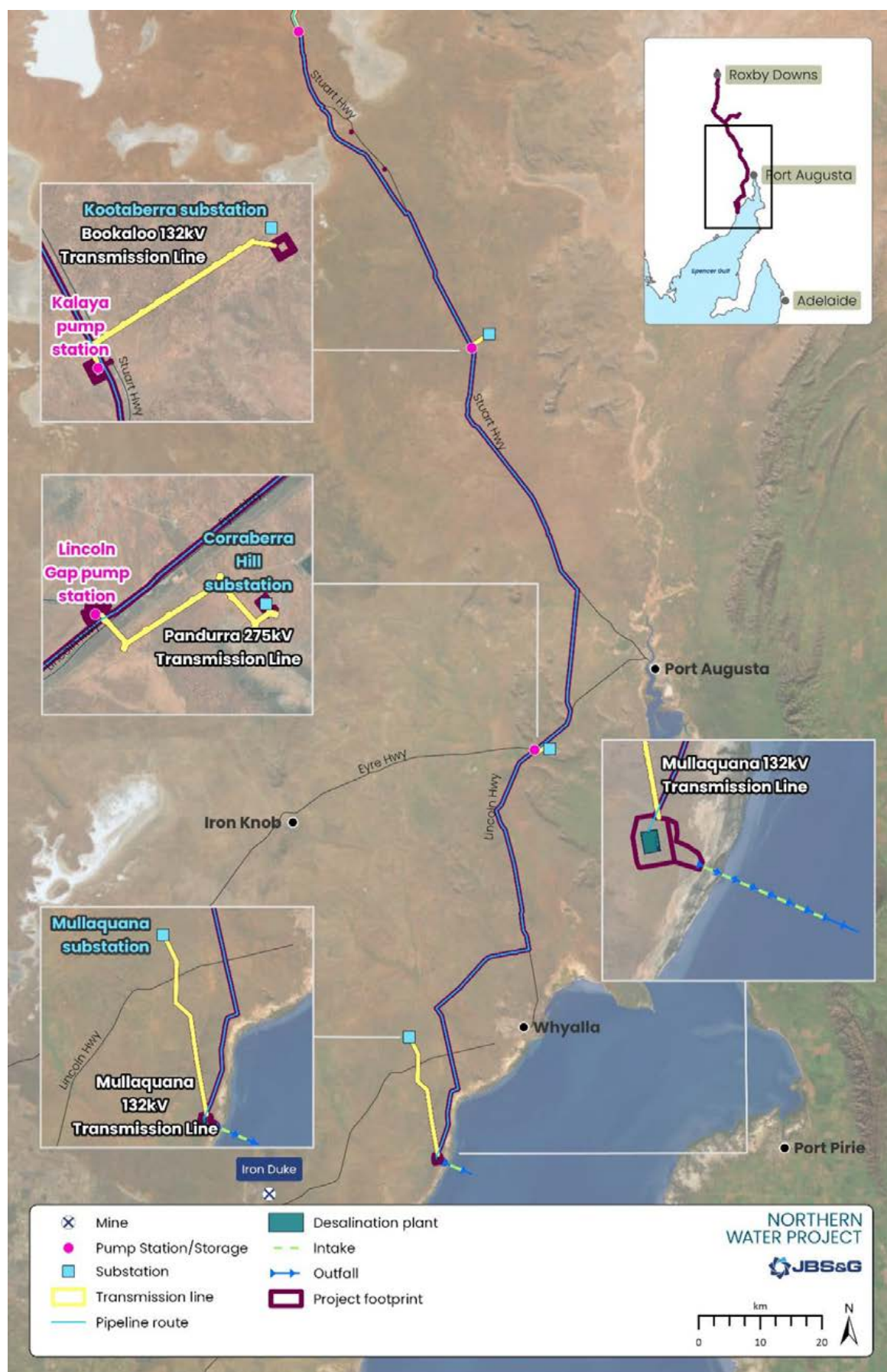


Figure 2-4: Proposed location of Project infrastructure (southern section)

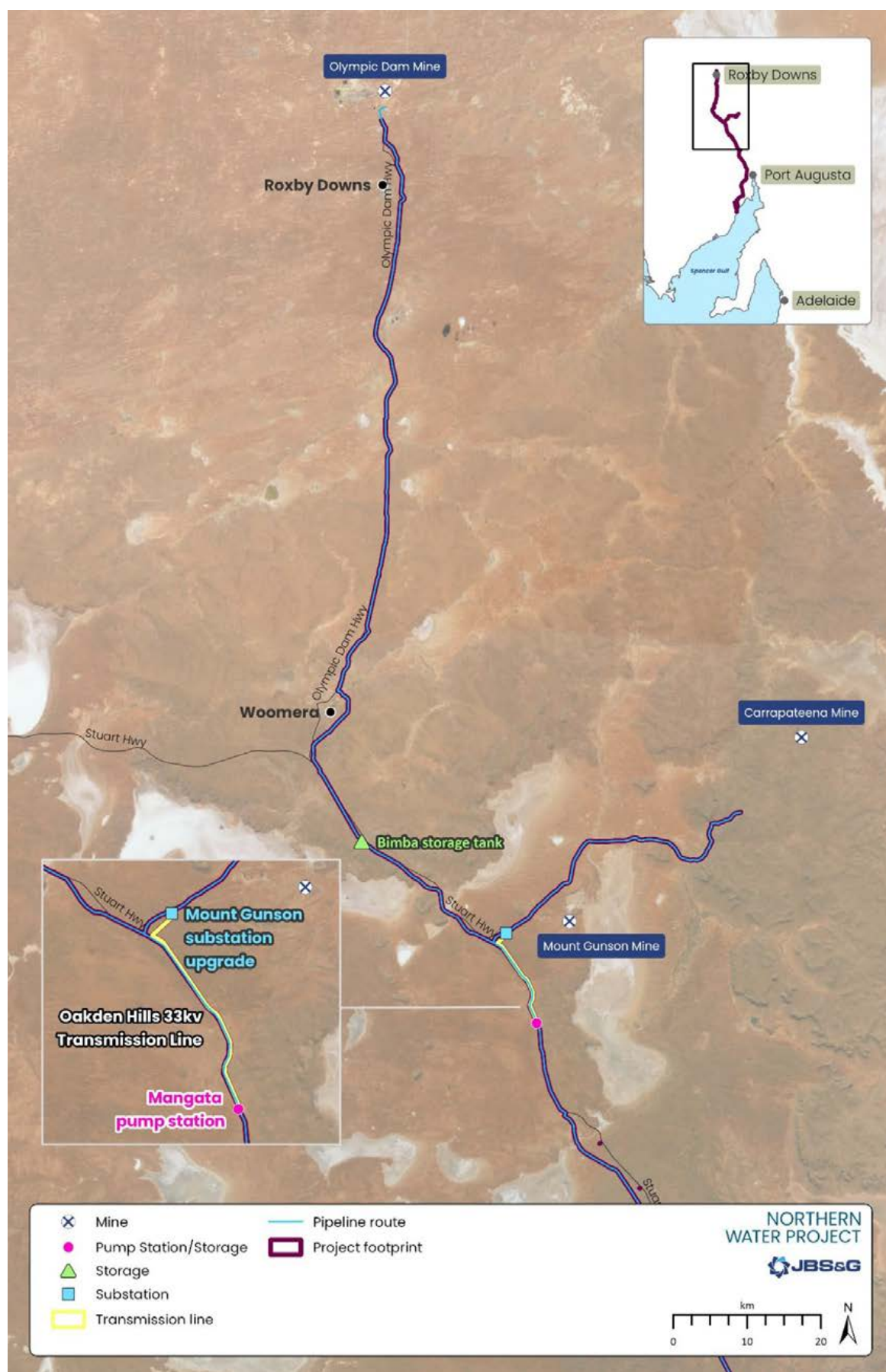


Figure 2-5: Proposed location of Project infrastructure (northern section)

2.2 Assets on Surrounding Land

The potential risk of bushfire to surrounding communities and the environment and asset installation and management responsibilities are significant considerations for the Project. This BRMP provides an overview of key bushfire mitigation measures to be adopted and further developed to reduce the risks to these adjacent assets.

2.2.1 Life and property assets

There are several settlements and mine sites located along or near the Project corridor, as follows (refer to Figure 2-4).

- Whyalla – major port town in the north of the Spencer Gulf, with approximately 22,000 residents.
- Port Augusta – coastal town at the top of the Spencer Gulf, with approximately 14,000 residents.
- Woomera Village – domestic area of Royal Australian Airforce (RAAF) Base Woomera (Department of Defence owned land), with a population varying between 150 and 200 people.
- Pimba – small settlement of approximately 50 people on the transcontinental railway line.
- Roxby Downs – town of approximately 4,000 servicing the Olympic Dam mine.
- Carrapateena mine – underground copper mine with up accommodation for up to 2,000 transient workers.
- Mount Gunson mine – dormant open cut copper mine with retained infrastructure and some extant industrial operations.
- Olympic Dam mine – poly-metallic underground and surface mine with workforce located in Roxby Downs.
- Iron Duke mine – open cut iron mine on Lincoln Highway, south of Whyalla (with the workforce located in Whyalla).

Inhabited land within the wider landscape is predominantly pastoral and supports private farm assets, rural properties and pastoral leases.

2.2.2 Environmental assets

Environmental assets surrounding the Project area are depicted in Figure 2-6 and Figure 2-7.

The Project traverses the SA Arid Lands and Eyre Peninsula landscape regions. These landscapes contain a variety of Interim Biogeographic Regionalisation for Australia (IBRA) sub-regions that support vegetation types such as low open woodland, mallee, chenopod shrubland, samphire shrubland and hummock grasslands which contain habitat for conservation significant flora and fauna species.

Land across the alignment is predominantly used for pastoral purposes (livestock grazing), consisting of remnant chenopod shrubland, hummock grassland and areas of mallee scrub. The Mullaquana transmission line and southernmost extent of the main transfer pipeline extends through 'Subtropical and Temperate Coastal Saltmarsh', a 'Vulnerable' Ecological Community of National Environmental Significance. This community is also present near Whyalla and Port Augusta. Conservation important wetlands are located along the coastline near Whyalla and Port Augusta, in proximity to the transfer system corridor.

The desalination plant is approximately 13 km north of Munyaroo Conservation Park and 29 km east of Ironstone Hill Conservation Park. The main transfer pipeline is located approximately 2.4 km north of the Whyalla Conservation Park.

2.3 Existing Infrastructure

2.3.1 Water supply

The communities of Whyalla, Port Augusta, Woomera and Pimba are currently supplied by reticulated water from the River Murray via the Morgan-Whyalla pipeline and the Port Augusta-Woomera pipeline. Groundwater extraction is the key source of water for mining and agricultural land uses.

2.3.2 Access roads

The alignment for the main transfer pipeline has been situated adjacent to existing roads and access tracks where possible, to avoid disturbance to uncleared areas and increase access to the infrastructure assets. These access routes include the Lincoln Highway, Eyre Highway, Stuart Highway and Olympic Way Highway, as shown in Figure 2-8. The local public road network also provides access opportunities along the infrastructure alignment.

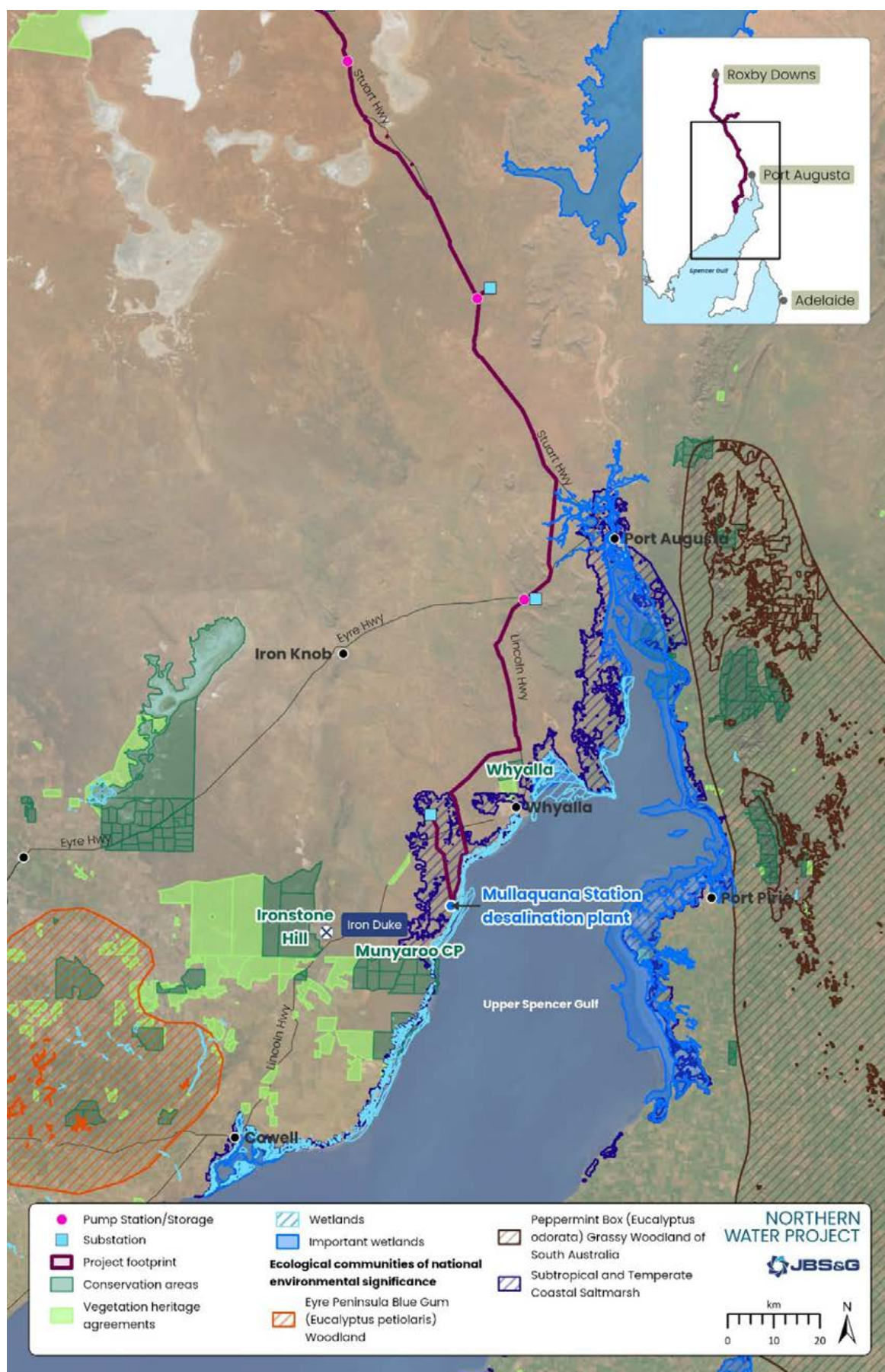


Figure 2-6: Environmental assets in the area of the Project (southern section)



Figure 2-7: Environmental assets in the area of the Project (northern section)



Figure 2-8: Existing access roads/tracks and settlements in the Project area

3. Local Bushfire Environment

This section provides an overview of the local bushfire environment in order to assess the level of inherent risk associated with the proposed Project. Overarching management and mitigation measures to address the risks associated with the potential ignition sources, vegetation, topography and bushfire weather conditions are detailed in Section 6.

3.1 Bushfire History

Bushfire history within and surrounding the Project area is an important consideration in the overall risk assessment. The following key historical bushfires have been recorded in proximity to the Project alignment (see Figure 3-1).

Wirramina Bushfire (December 2023)

- Near Pimba on the Stuart Highway.
- Ignited during ‘Catastrophic’ or ‘Extreme’ conditions under the Australian Fire Danger Rating System (AFDRS) due to significant lightning strikes across the state.
- Reported as a grassland fire, travelled through vegetation types including chenopod shrub, samphire shrub, and forbland, and Acacia open woodland.
- Reached within 1,200 m of the proposed pipeline route.

Munyaroo Bushfire (November 1990)

- Significant historical bushfire within 25 km southwest of the desalination plant site and pipeline alignment, near the present-day Iron Duke mine site.
- Occurred partially within Munyaroo Conservation Park, as well as Ironstone Conservation Park.
- Travelled through mallee woodland and shrubland vegetation.

Major bushfires in the wider area

- Wangary Bushfire (January 2005)
 - Note, Wangary is on the Lower Eyre Peninsula and located approximately 230 km from the Mullaquana Station proposed desalination plant – and has been included here to document the bushfire history of the Eyre Peninsula.
 - Major bushfire burning through approximately 80,000 ha of grass and cropping land on the Lower Eyre Peninsula.
 - Known as ‘Black Tuesday’.
 - Nine people died, more than 110 people were injured, 79 houses were lost and a further 26 extensively damaged. 46,500 livestock (mainly sheep) perished in the fire.
 - Ignited from a vehicle exhaust system due to a car being parked on long grass.
- Hincks Conservation Park
 - Numerous bushfires and prescribed burns have been recorded within Hincks Conservation Park, approximately 126 km southwest of the proposed Mullaquana Station desalination plant.
- Middlecamp Hills Bushfire (December 2005)
 - Significant bushfire within Middlecamp Hills Conservation Park, approximately 65 km southwest of the proposed Mullaquana Station desalination plant.

- o Burnt through 2,324 ha of dense mallee vegetation on low hilly terrain.

3.2 Potential Ignition Sources

Ignition during construction

The following potential ignition sources have been identified during construction of the Project:

- Sparks resulting from the action of steel against rock during the use of heavy construction equipment (e.g. bulldozers, drillers, excavators) or vegetation removal equipment (e.g. mowers, slashers).
- Ignition of grassland and other dry ground fuels by motor vehicle exhaust systems (especially diesel vehicles), wheel rims or due to vehicle collisions with infrastructure or other vehicles.
- Sparks produced during 'hot works' activities such as welding or grinding.
- Electrical faults occurring during the construction of powerline infrastructure.
- Flammable materials stored at lay-down areas or construction sites with potential to ignite by an external source when not stored or used correctly.
- Arson events, especially in proximity to settlements.

Ignition during operation

The following potential ignition sources have been identified during operation of the Project:

- Transmission lines and substations
 - o Vegetation falling on or touching conductors.
 - o Extreme temperatures resulting in sagging of transmission lines and contact with vegetation, the ground or other structures.
 - o Transmission lines coming into contact with each other during high winds/extreme temperatures.
 - o Damage to transmission lines from winds, lightning, mechanical means or due to aging of equipment.
 - o Faulty installation.
 - o Bushfire smoke causing arcing to the ground or between conductors.
 - o Bird-strike.
 - o Pole-top fires due to dust build up on insulators.
 - o Electrically induced fires.
- Heat from maintenance car exhaust over Project areas that include vegetation.
- Arson events, especially in proximity to settlements.

External sources of ignition

The following potential external ignition sources have been identified:

- Lightning, especially between September to December when dry lightning storms occur frequently.
- Reignition of or escaped prescribed burns in reserve land.
- Improperly extinguished or out of season campfires within reserve land.
- Arson events, particularly in close proximity to settlements.

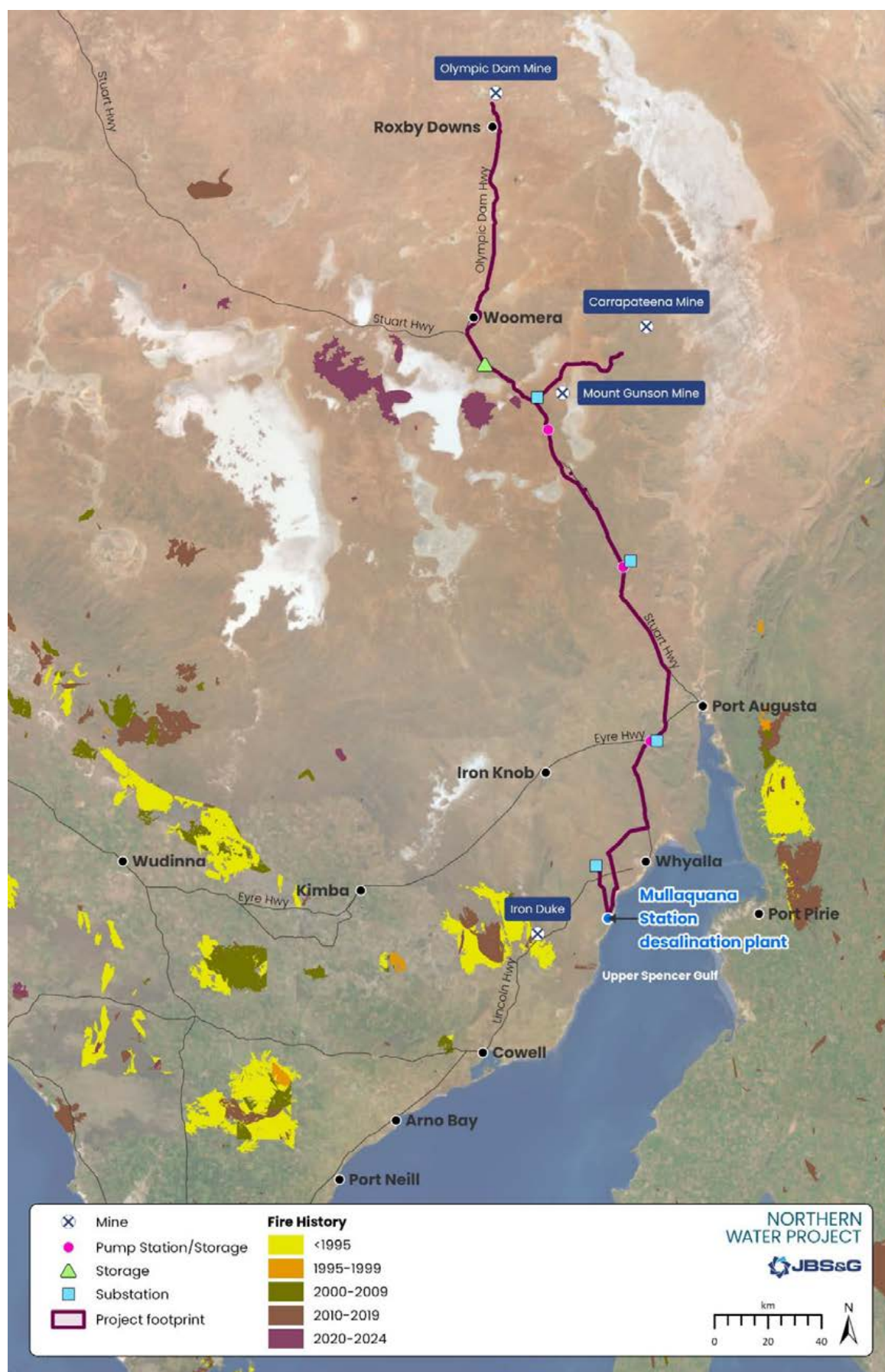


Figure 3-1: Bushfire history in the area of the Project

3.3 Vegetation and Topography

3.3.1 Vegetation

Vegetation type

The desalination plant, transfer system and electricity transmission corridors extend over various vegetation types within the Gawler IBRA bioregion, covering four different subregions (Figure 3-2; Appendix B).

The Gawler bioregion is characterised by rounded landscapes, rocky hills, plains and salt-encrusted lake beds. Vegetation types include spinifex grasslands, open woodlands and chenopod shrublands.

The National Vegetation Information System (NVIS) is a comprehensive dataset which provides information on the extent and distribution of vegetation types across Australian landscapes. This dataset has been used to assess the vegetation type and structure adjacent to the Project infrastructure. A map series showing the vegetation along the project alignment has been included in Appendix B.

The NVIS vegetation types across the Project are listed in Table 3-1 and have been categorised in accordance with the IBRA bioregion in which they are located. Example photographs of vegetation types are presented below the table.

Potential fuel loads

In order to consider potential fuel loads at a very broad level, the various NVIS vegetation types present across the alignment have been assigned a classification under *AS 3959 Construction of buildings in bushfire prone areas* (AS 3959). These are listed in Table 3-1.

Class A Forest and Class D Scrub have the highest overall fuel loads of 35 t/ha and 25 t/ha respectively, whereas the predominant Class C Shrubland and Class E Mallee/Mulga vegetation types are assigned lower fuel loads of 15 t/ha and 8 t/ha respectively.

Site specific fuel load assessments should be undertaken in the field for future development stages in accordance with the Department of Environment and Natural Resources (DENR) *Overall Fuel Hazard Guide for South Australia* (2011), which is specific to SA vegetation, to accurately estimate potential radiant heat impacts on the Project infrastructure.

Table 3-1: IBRA sub-regions traversed by the Project infrastructure and potential AS 3959 classification

Bioregion	Subregion	Characteristics	Location	NVIS vegetation adjacent to corridors	AS 3959 classification	Potential fuel load (overall)
Gawler	Myall Plains	Vast plains of chenopod shrubland with emergent trees tending to lower chenopod shrublands in coastal areas and a narrow coastal strip with Samphire low open shrubland encroaching on tidal areas and Mangrove forests in tidal areas. The Sub-region also supports mixed open woodlands of Western Myall, Blackoak and False Sandalwood and smaller patches of Mallee on plains and low sand dunes.	- Around the Mullaquana Station desalination plant and substation. - Extending around Whyalla and northwards to Lincoln Gap.	Acacia woodland	Class A Forest Class D Scrub	35 t/ha
				Chenopod shrubland	Class G Grassland	4.5 t/ha
				Alectryon woodland and shrubland	Class D Scrub	8 t/ha
				Shrubland <1m	Class C Shrubland	15 t/ha
				Samphire shrubland	Class C Shrubland	15 t/ha
				Melaleuca shrubland <1m	Class C Shrubland	15 t/ha
				Casuarina woodland	Class A Forest Class D Scrub	35 t/ha
				Unclassified vegetation	Class G Grassland/ low threat (Exclusions 2.2.3.2 [e]&[f])	4.5 t/ha
	Arcoona Plateau	Dominated by treeless low stony hills with the clay soils supporting Chenopod and Samphire low open shrubland and creeklines with open woodlands and taller shrublands Inland saline depressions occur in small patches.	- South of Port Augusta to north of Port Augusta - Around Pimba at the end of the offtake lateral line to Carrapateena.	Chenopod shrub, samphire shrub and forbland	Class G Grassland	4.5 t/ha
				Acacia shrubland	Class D Scrub	25 t/ha
				Hummock grassland	Class G Grassland	4.5 t/ha
				Shrubland <1m	Class C Shrubland	15 t/ha
				Unclassified vegetation	Class G Grassland/ low threat (Exclusions 2.2.3.2 [e]&[f])	4.5 t/ha N/A
	Gawler Lakes	Sandy plains and low dunes with Acacia low open woodland and Chenopod low open shrublands and ephemeral salt lakes fringed	North of Port Augusta to the start of the Carrapateena offtake.	Unclassified vegetation	Class G Grassland/ low threat (Exclusions 2.2.3.2 [e]&[f])	4.5 t/ha
				Chenopod shrub, samphire shrub and forbland	Class G Grassland	4.5 t/ha

Bioregion	Subregion	Characteristics	Location	NVIS vegetation adjacent to corridors	AS 3959 classification	Potential fuel load (overall)
		with Samphire low open shrublands.		Areas of hummock grassland and low woodland based on description and site photos	Class D Scrub Class G Grassland	25 t/ha 4.5 t/ha
	Roxby	Low sand dunes with low open woodland and mixed grasses, sandy interdune swales with Acacia low open woodland over Chenopod low open shrubland and interdune swales with clay soils supporting Cane-grass tall grassland.	At the end of the alignment into Olympic Dam.	Unclassified vegetation	Class G Grassland/ low threat (Exclusions 2.2.3.2 [e]&[f])	4.5 t/ha N/A
				Hummock grassland	Class G Grassland	4.5 t/ha
				Other shrublands	Class D Scrub	25 t/ha
				Eucalyptus woodland	Class B Woodland	25 t/ha

Examples of vegetation types along the infrastructure alignment



Myall Plains subregion – Chenopod shrub samphire shrub and forbland surround the proposed Mullaquana Station desalination plant (above left) and proposed intake/outake pipeline (above right). Vegetation is classified as Class G Grassland due to reduced flammability.



Myall Plains subregion – Vegetation between the desalination plant and Mullaquana substation, up to Lincoln Gap. Large portions are not classified under NVIS, but contain low shrubland (Class C Shrubland).

Site 12 - Lake Dempsey
Lake Dempsey looking towards Pt Aug



2023:07:27 15:24:57

32°26'326058"S137°41'587879"E

Site 12 - Lake Dempsey
Tracks to the north



2023:07:27 15:23:25

32°26'310580"S137°42'4341"E

Arcoona plateau subregion - Vegetation north of Port Augusta not classified under NVIS, but contains low shrubland (Class C Shrubland).

Site 14 - Black Oak Creek
Black Oak Creek Looking South



2023:07:28 11:15:52

31°43'433647"S137°12'100888"E

Site 14 - Black Oak Creek
Water near track



2023:07:28 11:16:11

31°43'433610"S137°12'101002"E

Gawler Lakes subregion - Vegetation near Black Oak Creek not classified under NVIS, but contains mallee woodland (Class E Mallee/Mulga) and shrubland (Class C Shrubland).



Gawler Lakes subregion - Chenopod shrub, samphire shrub and forbland (Class G Grassland) near Lake Windabout. Mallee woodland (Class E Mallee/Mulga) and shrubland (Class C Shrubland) is located to the south of the lake.



Roxby subregion - Vegetation near Lake Mary includes Hummock Grassland (Class G Grassland), Other Shrublands (Class D Scrub) and Eucalyptus Woodland (Class B Woodland).

Bushfire behaviour

Chenopod shrublands

Chenopod shrublands are the predominant vegetation type across the alignment and contain plants with reduced flammability, such as saltbush and samphire. As a result, there is reduced fire behaviour in this vegetation type, except where there is a high cover of ephemeral grasses. Chenopod shrublands are modelled under the AFDRS using the grassland fire behaviour model (BoM n.d.) to avoid overestimation in fire behaviour under the shrubland model.

Mallee

Mallee fuels have a patchy distribution along the Project, appearing in discrete bands and patches, often on dunes, rises and better drained soils, along with chenopods and arid scrub. The severity of fire behaviour in mallee is directly linked to vegetation type and the ability of weather conditions, in particular wind, to propagate fire. The arrangement and types of fuel present in mallee often results in considerable variation in the intensity, rate of spread and residence time of a fire.

Areas that support a canopy of mallee with a spinifex (*Triodia spp.*) understorey present the greatest fire risk in mallee systems due to the extreme flammability of spinifex. Conversely, plains, swales and claypans that

support sparser fuels such as mallee with a chenopod understorey pose a lower fire risk. This risk increases under ephemeral fuel conditions.

During high winds, even areas with low percentage spinifex have capacity to carry a fire. Fire can also move through higher fuel load mallee areas under windy conditions. Crowning in moderate to high fire danger conditions in older mallee is commonplace given the open nature and height of the canopy, the understorey fuel and the extensive surface litter forming a continuous link with suspended bark on branches. An extension of this unpredictability in mallee fire behaviour is spotting potential. Spotting distances of two kilometres have been observed in large fires under extreme conditions (DEH 2009).

3.3.2 Topography and slope under vegetation

Desalination plant

The proposed desalination plant lies within the Myall Plains IBRA subregion which is characterised by the undulating, sand-covered calcareous plains of northern Eyre Peninsula. The site is relatively flat and low-lying, sloping gently from the coast in the east to a low escarpment in the west. Effective slope under vegetation adjoining the desalination plant is typically flat to gently downslope (0-5°) ranging between 2 m and 50 m AHD (refer Figure 3-3).

Transfer system and electricity supply corridors

The Gawler bioregion, in which the Project is contained is characterised by semi-arid to arid flat topped to rounded hills, rocky quartzite hills, sandstone plateaus, depositional plains, gibber plains and salt-encrusted lake beds. Elevation adjacent to the Project infrastructure corridor ranges from 0 m – 50 m adjacent to the coastline, 50 m – 100 m further inland and up to 150 m – 200 m around Woomera (refer Figure 3-3 and Figure 3-4).

Effective slope adjacent to the infrastructure easements is typically flat (0°), to gently down sloping (>0-5°) along the course of the alignment.

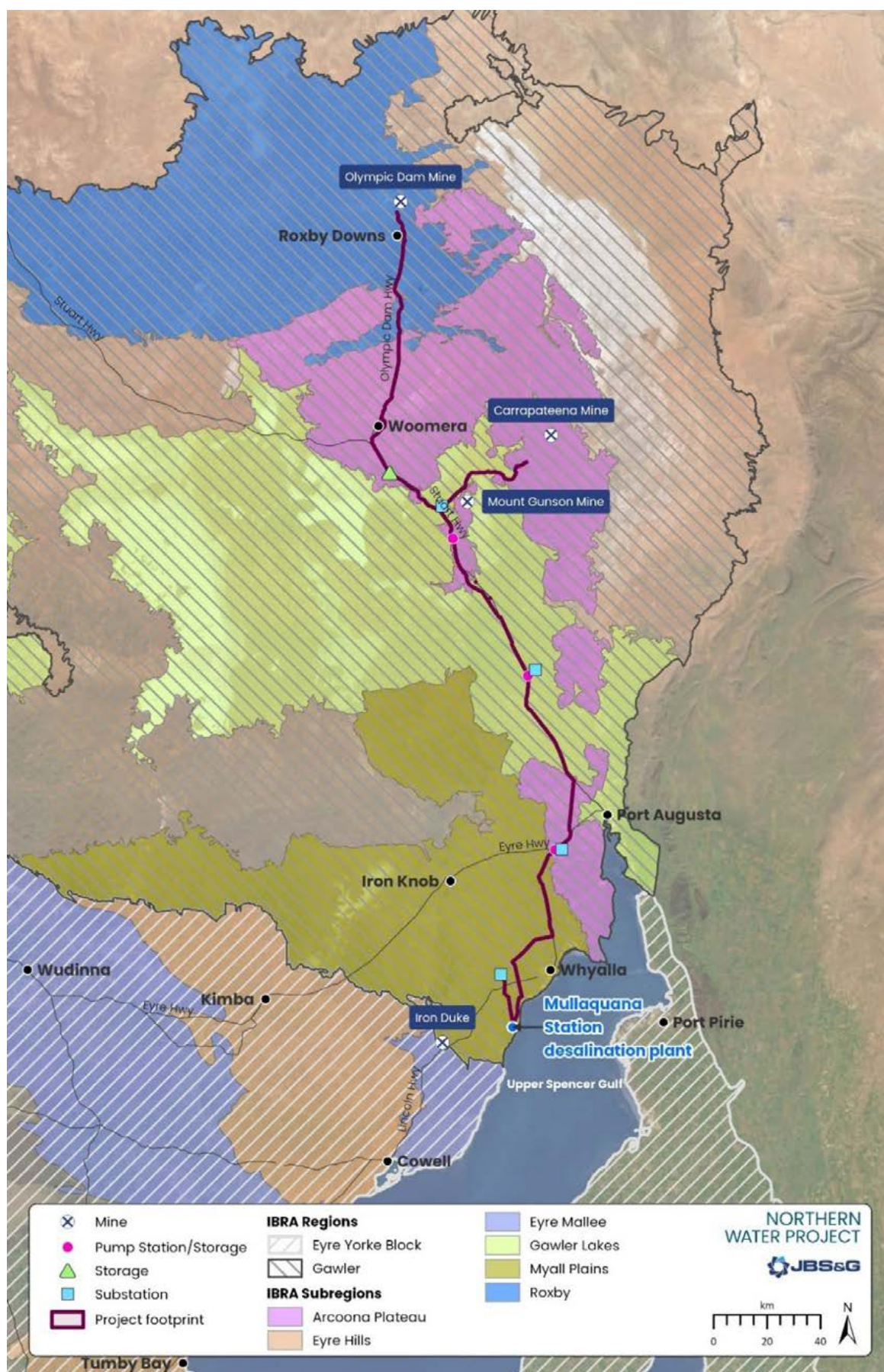


Figure 3-2: IBRA regions and subregions

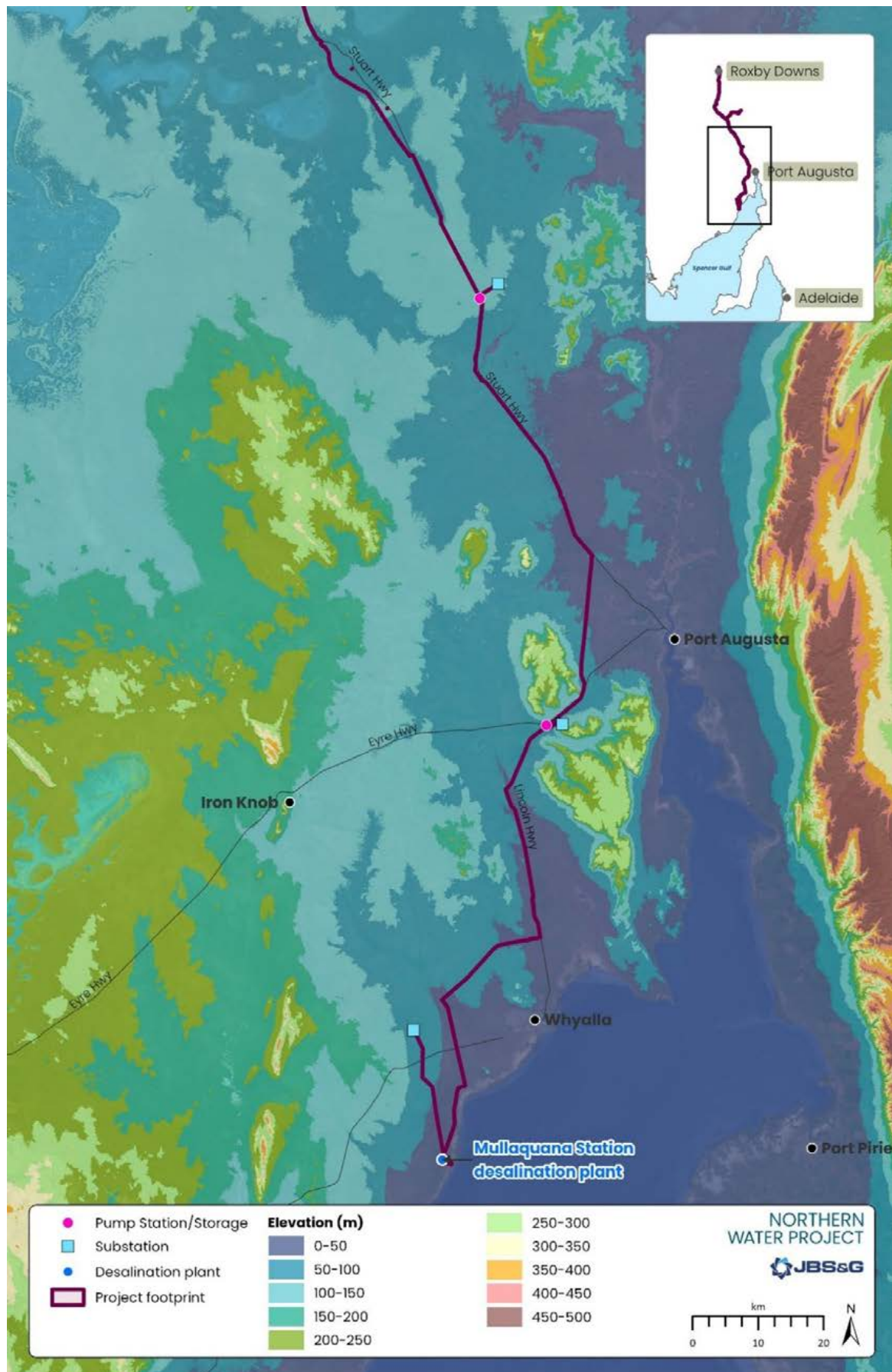


Figure 3-3: Terrain in the area of the Project (southern section)

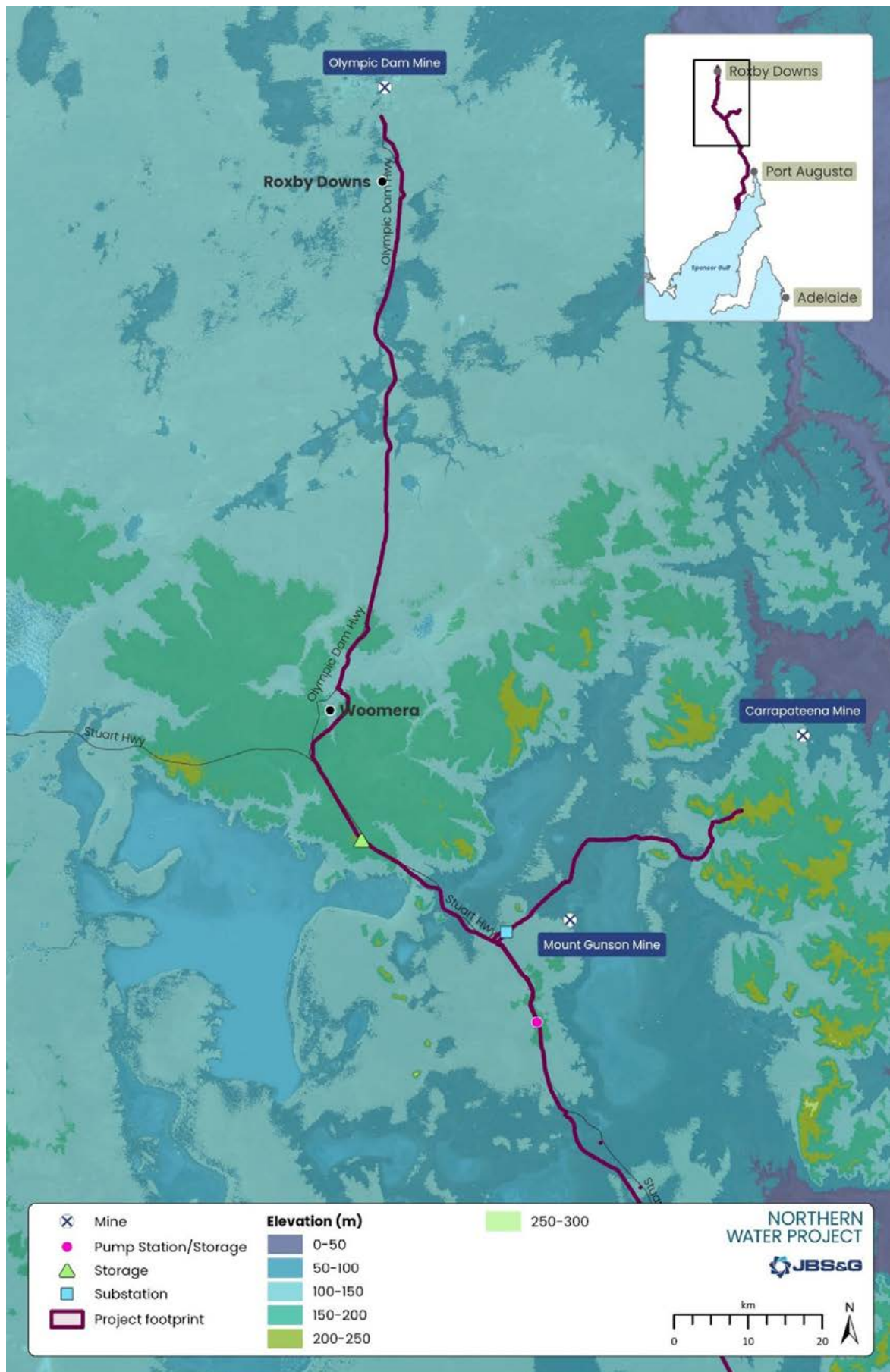


Figure 3-4: Terrain in the area of the Project (northern section)

3.4 Predominant and Worst-case Bushfire Weather Conditions

3.4.1 Climate statistics

Rainfall

The Project is subject to a semi-arid to arid climate and is commonly subject to temperatures exceeding 35°C during the summer months, with the coastal areas subject to sea breezes having lower summer afternoon temperatures.

Rainfall frequency and intensity varies from year to year, with long periods of drought-like conditions evident in historical records.

Rainfall across the Project falls relatively evenly all year, with mean annual rainfall being lower in the northern portion of the site. Mean annual rainfall is 150 mm at Olympic Dam, 224 mm at Port Augusta and 267 mm at Whyalla Aero (BoM site). Figure 3-5 depicts the mean monthly rainfall data for three local stations (BoM 2025).

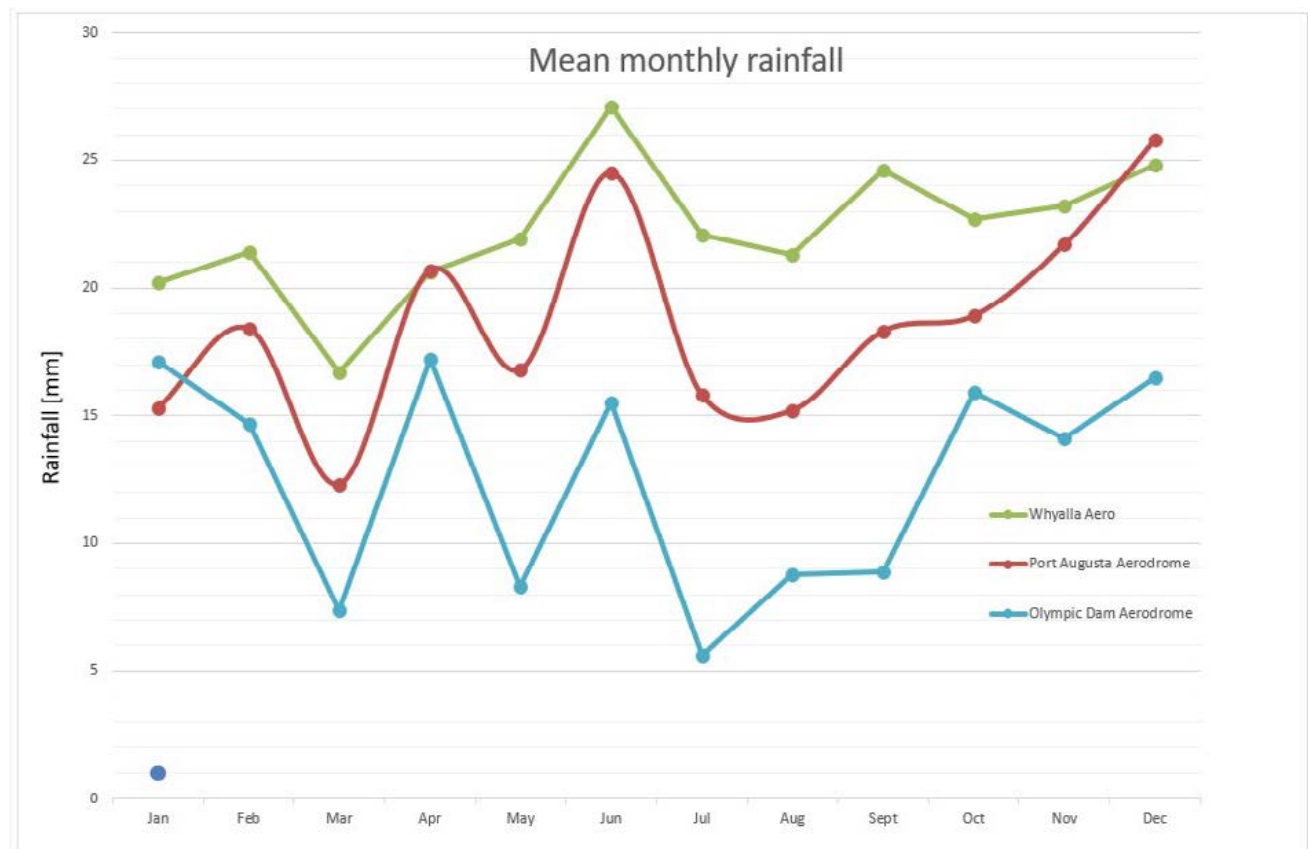


Figure 3-5: Mean monthly rainfall

Temperature

Mean monthly maximum temperature for three stations in proximity to the Project are depicted in Figure 3-6 (BoM 2025). Maximum temperatures are highest during the spring, summer and early autumn months of November to March. Mean maximum temperatures at Whyalla Aero, Port Augusta Aerodrome and Olympic Dam Aerodrome range from 27°C to 29°C in October and April, and 30°C to 36°C from November to February.

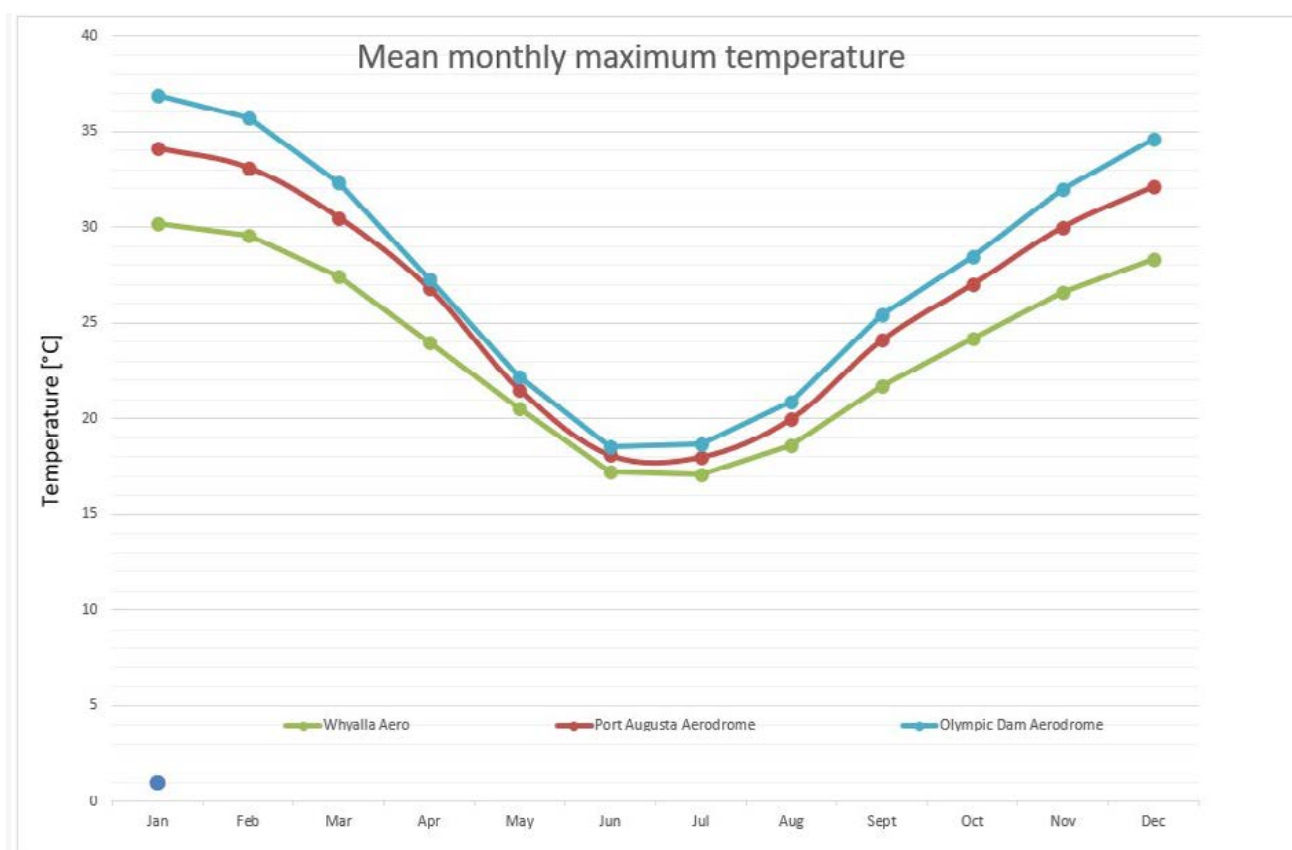


Figure 3-6: Mean maximum monthly temperature

3.4.2 Predominant bushfire weather conditions

Predominant bushfire weather conditions are those that occur 95% of the time during the designated bushfire season. For the subject locality, these generally correlate with average January climatic conditions.

Mean January 9:00 am and 3:00 pm wind profiles for Whyalla Aero (in the southern section) and Olympic Dam Aerodrome (in the northern section) BoM weather stations are contained in Figure 3-7.

At Whyalla, winds are generally from the south, southeast or southwest in the morning averaging around 13 km/hr and south to southeast in the afternoon, averaging around 17 km/hr.

At Olympic Dam Aerodrome, the predominant summer winds are south to southeast in the morning, averaging 20 km/hr and south in the afternoon averaging 18 km/hr (although afternoon winds can vary from a range of directions).

Mean January 9:00 am relative humidity for the stations is approximately 60% at Whyalla and 37% at Olympic Dam Aerodrome. This reduces in the afternoon to 45% at Whyalla and 18% at Olympic Dam Aerodrome. January mean maximum temperature peaks at around 29°C at Whyalla, and 37°C at Olympic Dam Aerodrome (BoM 2024).

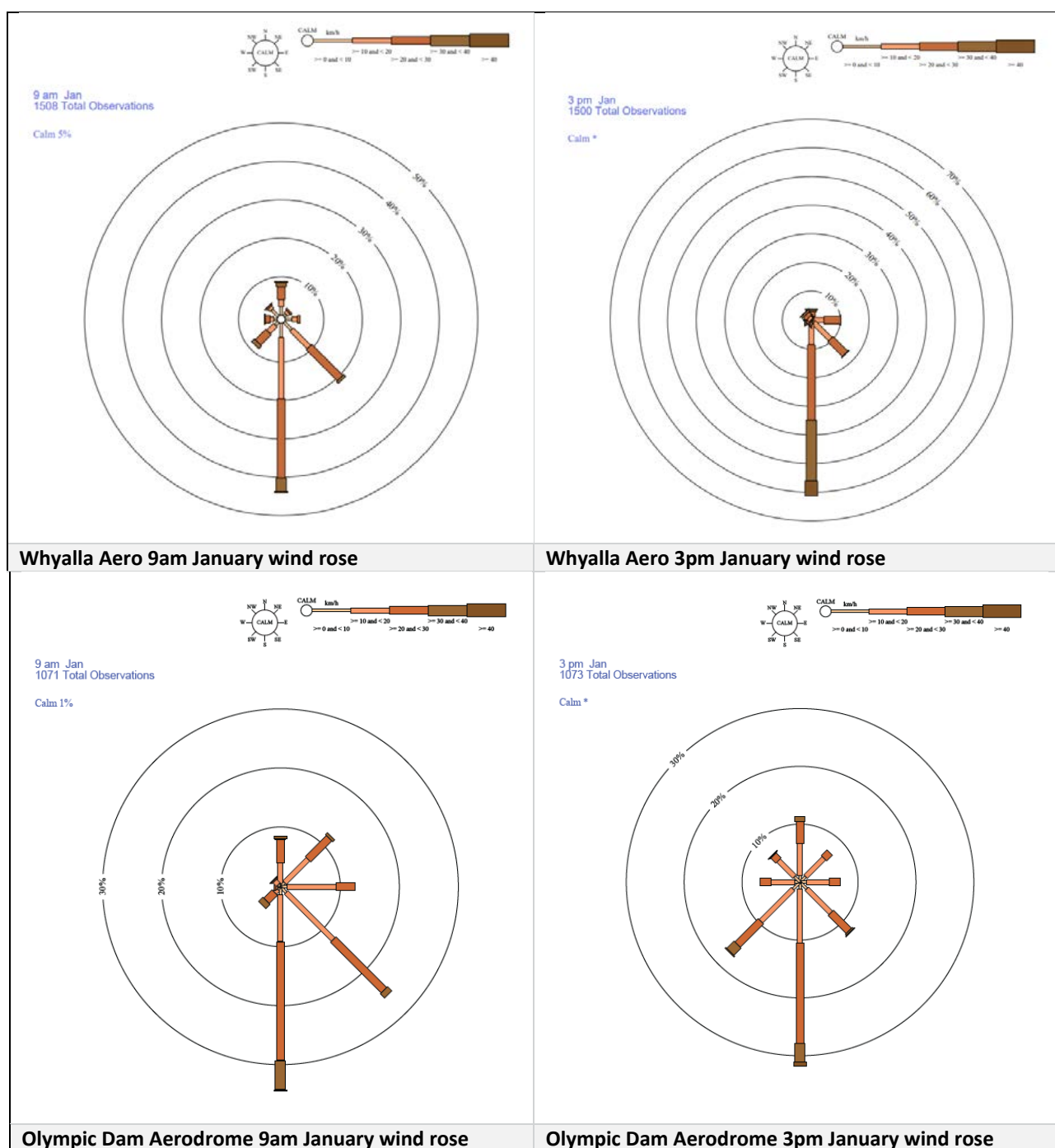


Figure 3-7: January wind roses Whyalla (Norrie) and Olympic Dam Aerodrome

3.4.3 Worst case bushfire weather conditions

Worst case (adverse) bushfire weather conditions can occur during the summer months, following previous seasons of plentiful rainfall along with high temperatures, low relative humidity, and strong winds. These conditions are sometimes associated with 'Extreme' or 'Catastrophic' fire danger ratings under the AFDRS.

Rainfall directly affects the occurrence and severity of bushfires in Central Australia with higher rainfall in previous years increasing vegetation growth and therefore the amount of fuel available to burn in successive years.

Bureau of Meteorology (2021; Figure 3-8) identifies that summer and autumn are the predominant fire seasons for the Project area. Rainfall is lowest and temperatures highest during the late spring to early autumn months of November to April.

Wind speed and direction varies seasonally within the region. While predominant winds are from the southeast to southwest and can reach 30 km – 40 km/hr due to a strong afternoon sea breeze. There are a significant number of days during spring and summer where adverse northeast to northwest winds, greater than 40 km/hr, can be experienced in tandem with low relative humidity. Bushfires in the region often start during dry thunderstorms in association with the presence of a high-pressure system and strong, gusty, hot northerly winds ahead of a cool southerly change late in the afternoon (GoSA, 2019a).

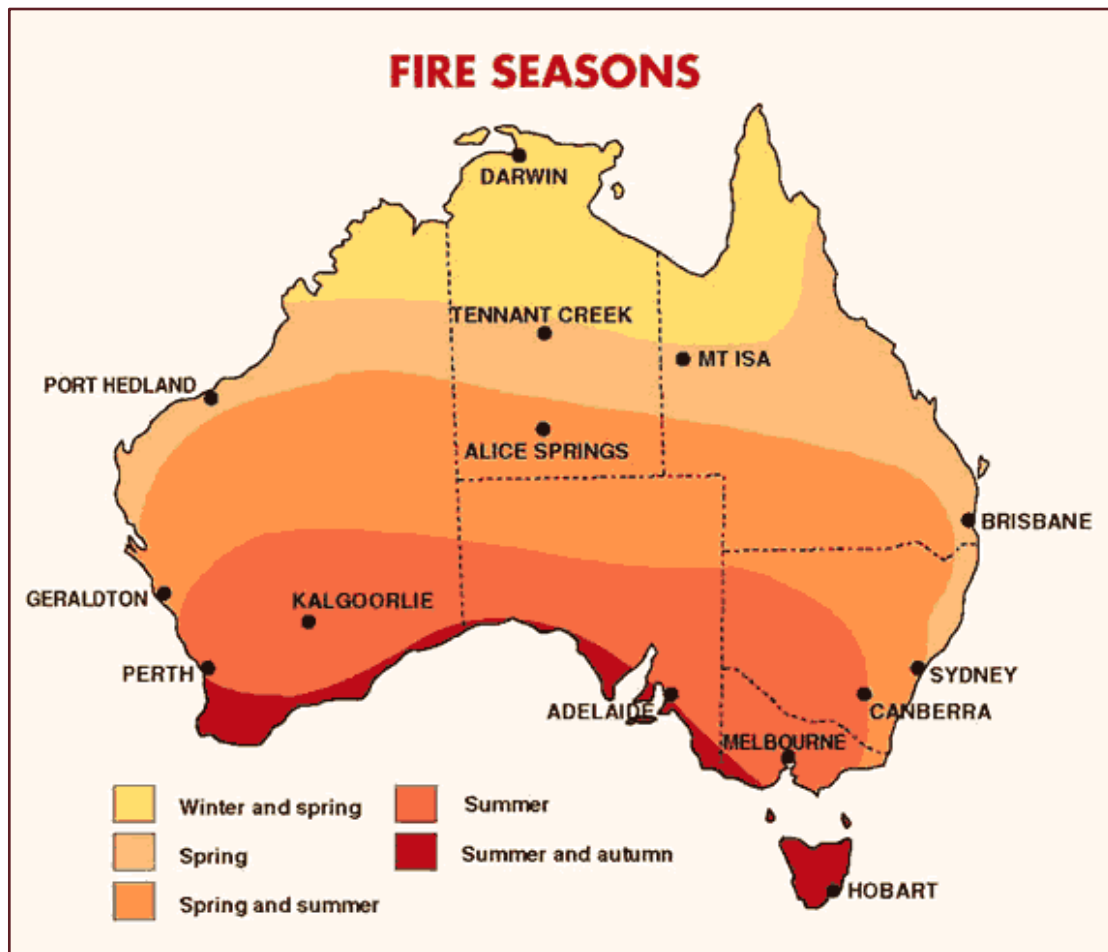


Figure 3-8: Fire seasons (BOM 2021)

4. Potential Bushfire Risk Scenarios

The following potential bushfire risk scenarios have been identified for the Project:

1. Bushfire risk to Project life and property assets as a result of a bushfire occurring within the surrounding landscape (external ignition sources).
2. Bushfire risk to Project life and property assets as a result of construction or operational activities.
3. Bushfire risk to surrounding life, property and environmental assets as a result of construction or operation activities.

These potential bushfire risk scenarios have been used to inform a bushfire risk assessment to assist in the development of appropriate bushfire risk mitigation and management measures (refer to Section 6).

4.1 Scenario 1: Bushfire risk to the Project as a result of a bushfire occurring within the surrounding landscape

4.1.1 Mullaquana Station desalination plant to north of Whyalla (Upper Eyre Peninsula BMA)

A landscape scale bushfire approaching the desalination plant, Mullaquana transmission line, main transfer pipeline and associated water delivery infrastructure and substations is most likely to approach from the south/southwest/southeast, given:

- proximity of the alignment to the coastline in the southern section (limiting landscape scale behaviour from the east);
- vast expanses of intact mallee scrub inland of the coast to the southwest; and
- prevailing afternoon winds summer from the southeast to the southwest, which often reach 30 km/hr – 40 km/hr due to afternoon sea breezes.

The Mullaquana transmission line extends northwest away from the coast and has potential to be impacted by landscape scale fire behaviour through shrub and mallee fuels from the south and southeast, under prevailing afternoon wind conditions.

A bushfire occurring through the predominant fuels is likely to be wind driven due to the low structure of grass and mallee and would have potential to travel over long distances, causing significant damage and loss of life, as evidenced by historical bushfires on the Eyre Peninsula, most notably the 2005 Wangary Bushfire.

Remnant areas of mallee woodland and shrub throughout the landscape would act to exacerbate behaviour of grassfires through extended residence time within the woody fuels.

For the portion of the alignment just north of Whyalla, the landscape changes to open mallee and shrublands (pastoral lease areas) with areas of chenopod shrubland and hummock grassland. Bushfires through the mallee and shrubland vegetation are likely to have higher fuels than fires on cropping land, leading to increased fire behaviour. Where chenopod shrublands exist across this of section alignment, less intense bushfires are expected.

Lincoln Highway runs adjacent to the main transfer pipeline for part of the alignment and will assist a fire protection response for attending fire services.

Project assets at risk of bushfire impacts in the southern section of the alignment include:

- Mullaquana Station desalination plant, substation and pump station.
- Mullaquana transmission line and Mullaquana substation.
- Main transfer pipeline above ground infrastructure.

- Any temporary workforce accommodation and laydown areas (locations to be confirmed).

4.1.2 North of Whyalla to Olympic Dam (Flinders and Outback BMA)

Bushfires within the Flinders and Outback BMA have potential to run unchecked through the expansive landscape, as fire suppression operations are rarely undertaken in the remote countryside. In this regard, the Project alignment north of Whyalla has potential to be impacted by large-scale bushfires. Bushfire fuels adjacent to the northern portion of the alignment are typically mallee woodland and shrublands, hummock grassland and chenopod shrubland. Bushfires are generally wind driven due to the open nature of the landscape. Prevailing summer winds at Olympic Dam, at the northerly point of the Project alignment, are from the south in both the morning and afternoon, tending southeasterly in the morning and south-westerly in the afternoon, although a range of wind patterns exist to enable fire spread to the alignment from multiple directions.

Project assets at risk of bushfire impacts in the northern portion of the alignment include:

- Pandurra transmission line
- Lincoln Gap pump station, water storage and Corraberra Hill substation
- Bookaloo transmission line
- Kalaya pump station, water storage and Kootaberra substation
- Mangata pump station and water storage
- Oakden Hills transmission line
- Mount Gunston substation
- Bimba water storage
- Main transfer pipeline and Carrapateena lateral branch pipeline above ground infrastructure (noting that the Carrapateena pipeline may be either above or below ground)
- Any temporary workforce accommodation and laydown areas (locations to be confirmed).

4.2 Scenario 2: Bushfire risk to the Project as a result of construction or operation activities

A bushfire resulting from potential construction/operational ignition sources, as detailed in Section 3.2, has potential to damage property/infrastructure assets and place the Project workforce at risk. This is a particular risk given the proximity and extent of vegetation hazards along the Project alignment and remoteness of the Project, meaning that a firefighting response may not be practical, feasible, or timely. Remote workers would be especially at risk during a bushfire event.

Given an ignition point in proximity to the Project alignment, and limited potential to reach steady-state fire behaviour, bushfire impact under this scenario is expected to be relatively localised. There is expected to be a higher likelihood of ignition during the construction phase due to potential fire generating activities, however, there is a greater likelihood of fire spread during the operation phase, due to absence of on-site personnel to quickly respond to a localised fire.

Asset Protection Zones (APZs) adjacent to key assets in accordance with requirements of the relevant BMAP will assist in reducing radiant heat impacts and improve the resilience of above ground infrastructure in the bushfire.

The desalination plant is located within relatively low flammability chenopod shrubland. This will reduce the potential bushfire impacts to the facility and occupants. Workers accommodation camps may need to be provided with APZs to protect the buildings, depending on the location. The remaining facilities/structures

and laydown areas are not expected to be manned for extended periods and will need to be provided with APZs, as mentioned above.

4.3 Scenario 3: Bushfire risk to surrounding life, property and environmental assets as a result of construction or operation activities

4.3.1 Life and property assets

Built-up environments comprising agricultural land, small rural towns, Defence estates, and mines are positioned along the transfer system and transmission line alignments. These areas are all within 10 km of the proposed infrastructure and have the potential to be adversely impacted by a bushfire ignited because of construction or operation activities and subsequent bushfire spread emanating from the alignment towards external assets. While the agricultural and urban areas are less vegetated than surrounding intact mallee vegetation, a bushfire has potential to spread through the grassland and patchy vegetation landscapes to result in significant bushfire behaviour and damage to people, livestock, and property.

Settlements and property positioned north of the alignment would be vulnerable to bushfire occurring as a result of construction or operations under predominant fire weather conditions, with winds coming from the southwest to southeast. Settlements and property to the south of the alignment would be particularly at risk of increased bushfire behaviour under adverse bushfire weather conditions, with strong, hot winds occurring from the north driving a bushfire southward.

Bushfire fuels immediately adjacent to the urban areas of Whyalla and Port Augusta consist largely of agricultural land, chenopod shrubland, or as patchy mallee vegetation which would act to moderate bushfire behaviour in proximity to the town sites.

There are five Country and Metropolitan Fire Service (CFS and MFS) stations located along the length and within 20 km of the Project alignment (including Whyalla, Port Augusta, Iron Knob, Woomera and Roxby Downs). It is possible that response times to a fire occurring along the alignment would be under one hour, which may reduce the likelihood of a fire reaching its full rate of spread potential. This would, however, depend on the accessibility of the fire front and weather conditions.

4.3.2 Environmental assets

The Project alignment has been chosen to avoid environmentally sensitive and heavily vegetated areas, where possible. Despite this, the southern portion of the alignment traverse some areas having environmental value, including coastal 'Important Wetlands', and areas supporting Ecological Communities of National Environmental Significance. In the north of the alignment, the Project passes through large, uninterrupted areas of pastoral land comprising grassland, shrubland, mallee and woodland native vegetation types.

A bushfire occurring as a result of Project construction and operational activities has potential to damage large tracts of sensitive vegetation and if uncontained would likely be difficult to control due to the large expanses of intact vegetation within the landscape and limited access for firefighting operations to be carried out as the fire moves away from the Project alignment.

5. Bushfire Risk Assessment

5.1 Assessment of Potential Bushfire Risk Scenarios

The potential bushfire scenarios identified in Section 4 have been subject to bushfire risk assessment through determination of likelihood and consequence in accordance with the methodology detailed in Section 5.2 below. This process determines the inherent bushfire risk associated with each scenario and informs the level of mitigation or management response required to reduce the risk to an acceptable level.

5.2 Bushfire Risk Assessment Methodology

5.2.1 Risk management guidelines

Australian Standard *AS ISO 31000:2018 Risk Management—Principles and Guidelines* (SA 2018b) provides an internationally recognised approach to risk management. The risk assessment methodology adopted in this FHMP is based on ISO 31000 and has been tailored towards assessing and mitigating bushfire risk with respect to Project construction and operation.

5.2.2 Risk management process

Figure 5-1 provides a summary of the risk management process in accordance with ISO 31000. Each of the steps in the process are further described in the following subsections.

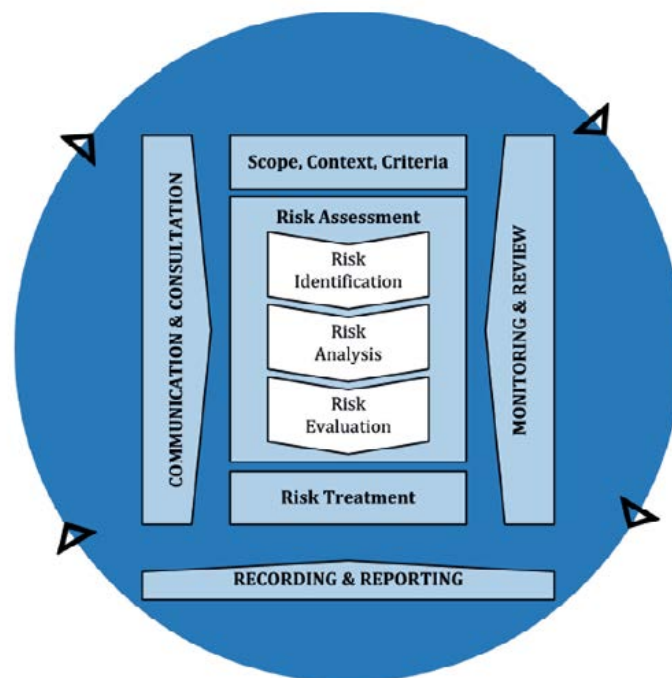


Figure 5-1: Risk management process (SA 2018b)

Communication and consultation

Relevant stakeholders are communicated with at the appropriate stage and a general understanding of the process and role of stakeholders is promoted.

Scope, context criteria

The context in which risk management process will occur is defined and criteria are set to evaluate risk.

Risk assessment

Risk identification

Events or circumstances that could impact the achievement of the outcomes are identified as well as assets that could be impacted by bushfire.

Risk analysis

The likelihood of an event occurring and expected consequences are combined to give a level of risk to the Project area or external receptors. The level of risk is evaluated against pre-established criteria and the urgency and nature of treatments are prioritised.

From a bushfire management perspective, this methodology can be useful in determining:

1. The *inherent* bushfire risk (i.e. the initial level of risk prior to risk treatment and mitigation).
2. The *residual* bushfire risk (i.e. the level of risk remaining following risk treatment and mitigation).

Assessing likelihood

Likelihood is defined as the chance of a bushfire igniting, spreading and reaching an asset. The likelihood rating system is included in Table 5-1.

Table 5-1: Likelihood rating system

Likelihood Rating	Description
Almost certain	Consequence expected to occur in most circumstances, may occur once every year or more.
Likely	Consequence will probably occur in most circumstances, may occur once every five years.
Possible	Consequence might occur at some time, may occur every ten to twenty years.
Unlikely	Consequence is not expected to occur, may occur once every one-hundred years.
Rare	Consequences may occur only in exceptional circumstances; may occur once every five-hundred or more years.

Assessing consequence

Consequence is defined as the outcome or impact of a bushfire event on people, property and the environment, taking into consideration the degree and severity of potential bushfire scenarios, location of bushfire hazard areas, assets present in the area and the level of management and suppression response available. The consequence rating system is included in Table 5-2.

Table 5-2: Consequence rating system

Consequence Rating	Description
Catastrophic	A large number of severe injuries, widespread damage and displacement of the community, significant impact on the environment
Major	Extensive number of injuries requiring hospitalisation, significant damage and impact on the community, longer term impacts on the environment
Moderate	Some injuries requiring medical treatment but no fatalities, localised damage and short-term impact on the environment
Minor	Small number of injuries but no fatalities, some damage and disruption but no lasting effects
Negligible	No injuries or fatalities, little damage or disruption

Determining the risk rating and treatment priorities

Inherent (existing) and residual (post-treatment) risk ratings for each scenario are the product of likelihood and consequence. The risk assessment matrix used to determine the risk rating is included in Table 5-3.

The risk ratings also provide a treatment priority which determines the order, importance or urgency for allocation of resources to apply the treatment strategies. Treatment of assets with an extreme risk rating should be addressed before assets with lower risk ratings.

Table 5-3: Risk assessment matrix

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	High	High	Extreme	Extreme	Extreme
Likely	Medium	High	High	Extreme	Extreme
Possible	Low	Medium	High	Extreme	Extreme
Unlikely	Low	Low	Medium	High	Extreme
Rare	Low	Low	Medium	High	High
Risk level	Risk response				
Low	Acceptable risk. Application of standard management measures will ensure risk level remains low and risk should be eliminated or reduced as time permits.				
Medium	Potentially unacceptable risk. Development of site-specific management measures may be required to lower the risk level and risk should be reduced as soon as reasonably practicable.				
High	Potentially unacceptable risk. Development of additional site-specific management measures will be required to lower the risk level and requires urgent action as soon as possible.				
Extreme	Unacceptable risk. Additional site-specific mitigation will be required to lower the risk level and an immediate mitigation response is required.				

Risk Evaluation

The purpose of evaluating risk is to confirm that the risk ratings for each asset are appropriate, identify treatment priorities (as discussed previously) and identify which scenarios require treatment. At a more detailed level, evaluating risk can help identify specific assets that require treatment and this will be carried out during the development of future site-specific BMPs.

The acceptability of a risk level can be evaluated using the criteria listed in Table 5-4. Some risk ratings may be acceptable without any treatment (e.g. Low risk ratings) while the risk to others may be suitable with standard management controls (e.g. Moderate and High-risk ratings). Determining the acceptability of risk allows decisions to be made on whether treatment is required or whether routine controls are sufficient.

Table 5-4: Risk acceptability

Risk rating	Risk acceptability
Extreme	Unacceptable risk – only acceptable with excellent controls. An urgent mitigation response is required to lower the risk level.
Very high	Unacceptable risk – only acceptable with excellent controls. A mitigation response is required to lower the risk level.
High	Potentially unacceptable risk - only acceptable with adequate controls. Development of a mitigation response may be required to lower the risk level.

Risk rating	Risk acceptability
Medium	Potentially unacceptable risk - only acceptable with adequate controls. A mitigation response may not be required to lower the risk level but the risk must be monitored regularly.
Low	Acceptable risk with routine controls. Application of standard management measures will ensure risk level remains low. Treatment action is not required, but the risk must be monitored.

Risk treatment

The purpose of risk treatment is to reduce the likelihood of a bushfire occurring and/or the potential impact of a bushfire on an asset or facility. This is achieved by implementing treatment strategies that modify the characteristics of the risk, the asset/facility, or the environment.

Treatment strategies will depend on the level of risk associated with the scenario and the type of assets being treated. Asset specific bushfire mitigation strategies are generally based on fuel management, ignition management, preparedness, planning and engagement of personnel and a direct fire suppression response.

Monitoring and review

The effectiveness of each stage and effectiveness of risks and treatment strategies are monitored and any new risks are detected.

Recording and reporting

The risk management process needs to be recorded and reviewed to communicate to all stakeholders at key stages, deliver information on the effectiveness on the risk treatment plan, provide valuable information to decisions making across the organisation.

5.3 Bushfire Risk Assessment Results

5.3.1 Risk context

Risk is being assessed to inform bushfire mitigation strategies for the protection of life, property and environmental assets within and adjacent to the Project. The risk assessment adopts a broad area and supports a tenure blind approach to ensure wider risk impacts and adjoining lands are captured to suitably address potential risk.

5.3.2 Risk identification

Bushfire risk is identified in the potential bushfire scenarios outlined in Section 4 which discusses the potential bushfire scenarios that could impact life, property and environmental assets within the Project area and adjacent land.

5.3.3 Risk analysis and evaluation

Risk analysis and evaluation for each of the potential bushfire scenarios is provided in Table 5-5, which specifies the likelihood and consequence of each scenario with and without mitigation to determine inherent and residual risks.

5.3.4 Bushfire risk assessment results

Results of the bushfire risk assessment are presented in Table 5-5. Results indicate that the bushfire scenarios assessed pose a significant level of inherent risk to life, property and environmental assets with Extreme and High levels of inherent risk being identified.

Following implementation of the mitigation measures recommended in Section 6, the residual risk are expected to be reduced to lower levels of Low and Medium.

Inherent and residual risk is identified as being higher during the construction stage, where construction activities have a greater potential to ignite a fire (i.e. increased likelihood) compared to the operational stage of the Project and the workforce numbers are at their peak.

Table 5-5: Bushfire risk assessment

Bushfire scenario	Comments	Inherent (pre-treatment) risk		Mitigation and management measures	Residual (post-treatment) risk			
		Likelihood	Consequence		Inherent risk	Likelihood	Consequence	Residual risk
Scenario 1: Project life and property assets are impacted by a bushfire occurring within the surrounding landscape (external ignition sources).	Construction: This scenario is concerned with bushfire impacts on life and property assets as a result of a bushfire occurring external to the Project area during construction of the Project. The inherent risk during construction is considered to be Extreme due to large areas of native vegetation and potential for landscape scale bushfire to impact the isolated construction workforce (either in the field or at construction camps), and assets, including construction vehicles and equipment and pipeline prior to being buried, having potential for ‘Major’ consequences. Adoption of the bushfire management measures would result in Medium residual risk due to the consequence being reduce to ‘Minor’. Likelihood of bushfire ignition under this scenario does not change pre-and post-treatment since the Project is unable to control external bushfires. The inherent and residual risk is higher during construction than operation due to the higher numbers of people present along the project corridor during this Phase of the project and increased asset exposure.	Possible	Major	Extreme	Implementation of management measures identified in Section 6	Possible	Minor	Medium
	Operation: This scenario is concerned with bushfire impacts on life and property assets as a result of a bushfire occurring external to the Project area, during operation of the Project. The inherent risk during operation is considered to be High due to the lower consequence rating of ‘Moderate’ (when compared to construction) which results from reduced workforce numbers and vehicles working along the alignment and at the desalination plant compared to construction phase, and the completion of infrastructure as well as burying of pipeline infrastructure. Adoption of the bushfire management measures would result in Medium residual risk due to the consequence being reduce to ‘Minor’. Likelihood of bushfire ignition under this scenario does not change pre-and post-	Possible	Moderate	High	Implementation of management measures identified in Section 6	Possible	Minor	Medium
	<i>*The level of risk to people and infrastructure will depend on factors such as fuel loads, weather, scale of the bushfire and accessibility.</i>							
Scenario 2: Project life and property assets are impacted by a bushfire resulting from construction and operation activities.	Construction: This scenario is concerned with bushfire impacts on life and property assets as a result of a bushfire occurring as a result of Project activities during <u>construction</u> of the Project. The <u>inherent</u> risk during construction is considered to be Extreme due to large areas of native vegetation and potential for landscape scale bushfire to impact the isolated construction workforce (either in the field or at construction camps) and assets, including construction vehicles and equipment and pipeline prior to being buried, with ‘Major’ consequences. Because construction activities have potential to ignite a bushfire, likelihood of bushfire ignition is considered to be ‘Likely’. Adoption of the bushfire management measures would result in Medium residual risk due to the likelihood of a fire being reduce to ‘Possible’ (given the construction activities) and the consequence being reduce to ‘Minor’. The inherent and residual risk is higher during construction than operation due to the higher numbers of people present along the project corridor during this Phase of the project and increased asset exposure.	Likely	Major	Extreme	Implementation of management measures identified in Section 6	Possible	Minor	Medium

Bushfire scenario	Comments	Inherent (pre-treatment) risk		Mitigation and management measures	Residual (post-treatment) risk			
		Likelihood	Consequence		Inherent risk	Likelihood	Consequence	Residual risk
	Operation: This scenario is concerned with bushfire impacts on life and property assets as a result of a bushfire occurring as a result of Project activities during operation of the Project. Ignition of a bushfire from operation and maintenance of the desalination plant; transfer system infrastructure; high voltage transmission towers and lines; communications towers; pumping stations; substations; and water storage tanks is considered to be rare. Ignitions from laydown areas and accommodation camps would be more likely due to the presence of people and potentially combustible materials. The inherent consequences are considered to be lower than construction due to the reduced workforce and potential fire generating activities but there still remains a ‘Possible’ likelihood of ignition. The inherent risk is considered to be High due to the potential impacts on Project assets. Adoption of the bushfire management measures would result in Low residual risk.	Possible	Moderate	High	Implementation of management measures identified in Section 6	Unlikely	Minor	Low
<i>*The level of risk to people and infrastructure will depend on factors such as fuel loads, weather, scale of the bushfire and accessibility.</i>								
Scenario 3: Surrounding life, property and environmental assets are impacted by a bushfire resulting from construction and operation activities	Construction: The <u>inherent</u> risk to surrounding assets during construction is considered to be Extreme due to the relative proximity of the Project to settlements and areas with high environmental value, potential for landscape scale bushfire behaviour, and potentially fire generating activities associated with construction of the Project. Implementation of the bushfire management measures would manage and minimise these risks to a Medium level of <u>residual</u> risk.	Likely	Major	Extreme	Implementation of management measures identified in Section 6	Possible	Minor	Medium
	Operation: Ignition of a bushfire from operation and maintenance of the desalination plant; transfer system infrastructure; high voltage transmission towers and lines; communications towers; pumping stations; substations; and water storage tanks is considered to be rare. Ignitions from laydown areas and accommodation camps would be more likely due to the presence of people and potentially combustible materials. The <u>inherent</u> risk is considered to be High due to the potential impacts on surrounding assets and potential for landscape scale bushfire behaviour. Adoption of the bushfire management measures would result in the likelihood and consequence being minimised and managed to a level of Low <u>residual</u> risk.	Possible	Major	Extreme	Implementation of management measures identified in Section 6	Unlikely	Minor	Low
<i>*The level of risk will to life, property and the environmental assets will depend on factors such as fuel loads, weather, scale of the bushfire, importance/sensitivity of vegetation and biota, proximity to settlements and accessibility.</i>								

6. Recommended Bushfire Risk Mitigation and Management Measures

This section provides an overview of the bushfire mitigation measures to be considered for both the construction and operation phases of the Project. Where relevant, these measures will be further developed and refined within the future Bushfire Management Plans prepared to support the construction and operation stages of the proposed Project and any other required or non-statutory bushfire risk/emergency management plans prepared at later stages.

The recommended bushfire risk mitigation measures have been categorised below according to the Prevention, Preparedness, Response and Recovery (PPRR) emergency management framework which is a widely used emergency management philosophy adopted by most emergency management agencies in Australia. This framework provides a holistic approach to hazard mitigation and management for the Project.

6.1 Prevention

Bushfire prevention strategies are mitigation measures that are designed to reduce and avoid both the risk of bushfire ignition and the effects of a bushfire on life, property and environmental assets. Prevention measures are primarily associated with vegetation and asset management, bushfire constructions standards and limiting activities with the potential to ignite a bushfire.

6.1.1 Vegetation management

Transmission line poles and towers and communications towers

Vegetation management in proximity to transmission line poles, tower and communications towers should be considered in order to:

- Protect the base of the poles and towers from direct flame contact and minimise damage to the assets.
- Reduce radiant heat impacts to any vulnerable or combustible elements of the infrastructure.
- Reduce the likelihood of radiant heat and embers emanating for an asset fire (e.g. a pole top fire), from igniting a bushfire in adjoining vegetation.

The extent of vegetation management to create Asset Protection Zones (APZs) should be determined in accordance with the relevant Australian Standards (including AS 3959), BMAPs, legislation and regulation, ElectraNet and South Australian Power Networks (SAPN) policy, and the SACFS Guide *Renewable Energy Facilities*. The appropriate level of clearing and vegetation management will be determined during detailed design.

As an indication of potential APZ widths in accordance with AS 3959, the following separation distances from the most common vegetation types along the alignment (on undulating slopes of between zero and five degrees downslope) would achieve BAL-12.5. BAL-12.5 equates to low levels of radiant heat impact and ember attack. A minimum APZ of 20 m is recommended.

- Class B Woodland – 35 m
- Class C Shrubland – 22 m
- Class D Scrub – 31 m
- Class E Mallee/Mulga – 20 m
- Class G Grassland – 20 m.

The environmental value of surrounding vegetation will need to be considered when deciding on the appropriate width of APZs as the alignment line extends through several environmental protection areas. In addition, given the nature of the towers and poles which are likely to be of steel or concrete construction, and location of transmission lines well above the canopy line, reduced APZ widths may be warranted in some areas.

Main transfer and lateral branch pipelines

The main transfer and lateral branch pipelines will be predominantly located underground, and it is only the aboveground infrastructure (e.g. aboveground pipe, valves) that would be at risk of bushfire impact. As per above, appropriate levels of vegetation clearing and modification to create an APZ adjacent to aboveground infrastructure will be determined at detailed design stage. The underground pipeline construction has inherent fire resistance properties which will act to reduce the risk of damage to the assets in a bushfire, however there may be some elements, such as above ground pipe, scour valves and isolation valves that are more vulnerable to bushfire and may require different treatments.

Laydown areas and accommodation camp sites

APZs should be installed around the perimeter of workforce accommodation camps to achieve BAL-12.5 in accordance with the relevant BMAP. Laydown areas have potential to contain flammable or combustible materials and consideration should be given to providing separation between the laydown materials and vegetation hazards surrounding the laydown area to also achieve BAL-12.5. This will be determined at detailed design stage.

Substations, pumping stations and water storage tanks

The three BMAPs (UEP, Flinders Mid-North Yorke and Outback) identify many of the existing water storage and substations as assets at risk of bushfire. Depending on the risk rating of the assets, the BMAP require risk treatment strategies such as APZs, general fuel reduction and preparedness actions. Site-specific risk mitigation treatments will be further investigated at detailed design stage.

The extent of vegetation management to create APZs should be determined in accordance with the relevant Australian Standards (including AS 3959), BMAPs, legislation and regulation, ElectraNet and SAPN policy, and the SACFS Guide *Renewable Energy Facilities*. The appropriate level of clearing and vegetation management will be determined during detailed design.

Desalination plant

The desalination plant is surrounded by chenopod shrubland which has relatively low flammability; however the bushfire risk increases after high rainfall periods when annual grasses proliferate. Weed control should be considered in proximity to the plant, to reduce the fuel loads over the summer.

Asset Protection Zones sufficient to achieve BAL-12.5 around buildings and critical infrastructure are recommended as a minimum in accordance with SACFS Guide *Renewable Energy Facilities*. Non-vegetated surfaces around buildings should be incorporated into the facility design to achieve this where possible.

Asset Protection Zone management

Where APZs are implemented adjacent to above-ground infrastructure, they should be managed on a regular and ongoing basis in accordance with the specifications set out in *Bushfire Management Zone Standard and Guidance for Use* (SBCC 2020) and the SACFS Guide *Renewable Energy Facilities*.

Management measures for consideration may include the following:

- Reducing fine fuels (<6 mm diameter) to significantly reduce fire intensity and flame contact with assets
- Maintaining tree canopies at least 2 m apart and branches 2 m above ground.
- Avoid even cover of understorey fuels and clump shrubs instead.
- Removing dead vegetation and understorey.

- No heath or shrub understorey within 2 m of the asset (10 m for substations).
- No branches overhanging buildings.
- Grasses reduced to 100 mm nominal height.

Vegetation management may be carried out utilising the following methods:

- Mechanical removal and/or thinning of vegetation tree/shrub vegetation.
- Slashing or spraying of grasses and weeds.
- Prescribed burning undertaken in consultation with CFS and DEW (suitability to be determined in consultation with CFS and DEW).

6.1.2 Bushfire construction standards

The proposed workers accommodation camps will contain Class 3 residential buildings as classified under the Building Code of Australia (BCA). Class 3 buildings are residential buildings that are a common place of long term or transient living for a number of unrelated persons and are required to comply with the bushfire construction requirements of AS 3959 when located within a Bushfire Protection Area.

The applicable BMAPs require BMAP assets to have an APZ sufficient to achieve BAL-12.5, therefore the residential buildings are to be constructed to BAL-12.5 in accordance with provisions of the BCA. This construction standard is known to be readily achievable for temporary transportable buildings and involves measures such as sealing and screening of gaps, apertures and sub-floor spaces to prevent ember ingress into the building.

Non-residential buildings in the workers camps and laydown areas, such as mess halls, assembly buildings and offices would not be formally required to comply with AS 3959; however, it is recommended that these buildings also adopt the construction standards of BAL-12.5 where practicable in order to increase the level of bushfire resilience for both property protection and life preservation.

Regular inspections and maintenance should also be carried out on buildings to be sure they meet the required standards.

6.1.3 Asset inspections and maintenance

Project assets should be regularly inspected to identify any potential fire ignition risks, such as infrastructure defects or poor vegetation management. A monitoring program should be established for the Project to ensure these inspections are carried out as required.

6.1.4 Investigations into network events

Network events on the transmission alignments, such as power outages, should be inspected to ensure that the event was not caused by something that has potential to ignite a fire.

6.1.5 Bushfire season controls

Total Fire Ban controls

CFS declare Total Fire Bans on days when a fire is likely to spread rapidly because of extreme fire weather or if there are already widespread fires and there are limited resources to fight additional fires. Total Fire Bans may be scheduled on days with a forecast Extreme or Catastrophic rating under the Australian Fire Danger Rating System (refer to Section 6.2.3) and are published between 4:30 pm to 5:30 pm the day prior.

Total Fire Ban controls include:

- No lighting of open-air fires or any other activity in the open air that is likely to cause a fire.

- No movements of vehicles in bushland or paddocks will be permitted. All vehicle movements are to be contained to tracks or mineral earth breaks to avoid of combustible vegetation or designated roads/tracks.
- No hot works (e.g. grinding, welding, thermal or oxygen cutting or heating etc. in the open air) to be undertaken,
- No clearing of vegetation is permitted.
- No use or operation of any engine, vehicle, plant, equipment or machinery in the area likely to cause a bushfire or contribute to the spread of a bushfire is not permitted.

A permit may be obtained under the FES Act where it is deemed appropriate for exemptions to be made to Total Fire Ban Controls.

Temporary de-energisation of power network

South Australian legislation allows network providers to de-energise the energy network as a fire mitigation measure. The network providers may consider deenergising transmission lines if damaged, due to adverse environmental conditions (i.e. elevated AFDRS), if there is a risk of fire ignition, or at the request of emergency services.

6.1.6 Security

Construction sites and Project assets should be appropriately secured to minimise the risk of arson both along the Project alignment and adjacent to/within the substations, pumping stations, workers camps and laydown areas.

6.2 Preparedness

Preparedness strategies aim to build the capacity of the Project and surrounding life, property and environmental assets to cope with the consequences of a bushfire emergency, including routine maintenance, creating and testing plans and procedures, carrying out training, conducting audits and monitoring and sharing information to prepare for a bushfire should it occur.

6.2.1 Access provisions

Access tracks/roads

Where practicable, and where the Project extends through high bushfire risk areas, the access tracks/roads should be capable of providing two-wheel drive access to ensure ease of evacuation as well as ease of access for firefighting appliances (including standard 34 units).

Acknowledging the SA standards for fire access tracks detailed in Section 1.5.8, consideration should be given to providing this standard of access where there is scope to do so.

In addition, the SACFS *Guide – Renewable Energy Facilities* recommends 6 m wide all-weather access roads, together with passing bays or turning areas where narrower roads are required to support firefighting operations.

Noting that the majority of the informal access track along the transfer system will have a width of less than 7 m (e.g. for environmental reasons), consideration should be given during detailed design to providing additional passing bays or turning areas for firefighting appliances, where appropriate. These informal tracks may also provide the necessary firebreaks and emergency access along the Project alignment.

Multiple access/egress

Permanent facilities such as the desalination plant, pump stations and construction compounds should, where practicable, provide multiple access/egress opportunities to improve emergency response and reduce the potential for entrapment during a bushfire.

Loop roads

Where practicable, permanent facilities should incorporate internal road layouts that enable firefighting appliances to enter and exit in a forward direction.

Gate access

Any access gates should be designed to facilitate emergency service access, including provision for emergency locking systems where required by the relevant fire authority.

Firebreaks

Any required statutory or strategic firebreaks should be established in accordance with the applicable requirements.

Hardstand and turn around areas

Hardstand and turnaround areas should be provided adjacent to permanent firefighting water supplies and other critical infrastructure, where appropriate, to facilitate safe operation of firefighting appliances.

Watercourse crossings

Watercourse crossings intended for emergency access should be designed to support firefighting appliances where practicable.

Vegetation clearance

Vegetation adjacent to emergency access roads should be managed to maintain a minimum horizontal clearance of 4 m and vertical clearance of 4 m, where practicable, to facilitate safe access for firefighting appliances.

6.2.2 Development of bushfire emergency evacuation procedures

Site specific Bushfire Emergency Plans (BEPs) should be developed for the desalination plant, substations, pumping stations, proposed workers' camps, laydowns and the Project alignment to address evacuation of workers during a bushfire emergency, for the relevant stage of development.

Bushfire emergency arrangements also need to be specifically documented within the Project's Emergency Management Plan for all stages and sites. It is recommended that bushfire evacuation plans are developed in consultation with the CFS and a suitably qualified bushfire practitioner for each stage of development.

The future BEPs should:

- Develop clear evacuation plans to relocate personnel from the Project area (depending on the direction of the fire threat), including evacuation routes and mode of transport.
- Develop a complete off-site evacuation plan including:
 - Identification of a primary egress route with several contingency egress routes (in different directions and with well separated travel paths to avoid a single bushfire event preventing use of multiple egress routes).
 - Egress routes are to be suitable for proposed vehicular transport (e.g. suitable for 2WD or 4WD as required). Ongoing maintenance of the evacuation routes will be required especially prior to commencement of bushfire season.

- Organise sufficient vehicular transport for all anticipated personnel required to evacuate, with some spare capacity to accommodate any vehicle breakdowns.
- Consider progressive or staged off-site evacuation including removal of non-essential people or remote workers relatively early if possible and safe to do so. This early evacuation would permit the removal of people considered at risk including those with respiratory or other medical problems.
- Having a clear plan of how to evacuate personnel offsite in case of medical emergency which will likely be via vehicular travel.

6.2.3 Development of other procedures

Bushfire monitoring procedures

Develop procedures for monitoring local bushfire events, summarising information and issuing to all relevant stakeholders including the following examples (for confirmation through the development of post-approval management plans):

- Regular monitoring of websites for forecast weather, active bushfires, Australian Warning System alerts, and AFDR.
- Creation and distribution of a summary report to all relevant stakeholders that includes the above information as well as status of assets, fire appliances, fire systems, water supplies, access routes, etc.

Communication procedures

Develop a clear communication plan (including contact information) for bushfire emergencies including when and how best to contact the following (for confirmation through the development of post-approval management plans):

- Relevant internal personnel such as the Emergency Management Team (EMT) and CFS, including when to ring '000' to log an emergency call.
- Remote workers including subcontractors.
- Adjacent landowners and pastoralists.

Procedures for handling communication black spots along the Project corridor should also be considered to ensure information can be disseminated the full length of the alignment (e.g. a monitoring station with stable phone and internet reception and two-way radio communications protocols).

Road closures

Develop procedures for the closure of Project access and maintenance tracks. The procedures should define:

- The trigger for road closure, e.g. CFS bushfire warning in local area, direct advice from CFS or South Australia Police (SAPOL).
- How this information will be distributed to staff, subcontractors, transport companies, etc., e.g. radio communication, email in advance.

Identification of critical assets

- Review and define the relative importance of all assets within the Project area during construction and operation to provide greater clarity about which assets are deemed critical versus sacrificial.
- Ensure site inductions include a summary of the procedures and expectations of staff in the prevention, preparedness and response to bushfires.

- Appropriate evacuation procedures/locations are to be determined in conjunction with CFS or other emergency services and coordinated by the appointed fire warden.
- On-site and off-site emergency assembly (muster) points will be designated prior to construction and all contractors, staff and visitors will be made aware of their location prior to entry into the development envelope.

Remote shut down

Procedures should identify how critical plant and infrastructure can be safely isolated or shut down, where practicable, in advance of, or during, a bushfire emergency.

Development of a site bushfire emergency map

Develop a GIS map specifically for use during bushfire emergencies depicting the following:

- Critical assets and infrastructure.
- Nominated bushfire refuge buildings/safer place.
- Managed APZs.
- Fixed firefighting systems (hydrant, fire hose reel, monitors, bushfire water spray systems) protecting those identified assets/infrastructure.
- Vehicular access routes.
- Proposed off-site evacuation routes to ensure proximity of bushfire to these routes is clear.
- Bushfire water sources such as water tanks, quick refill points, fire hydrants, dams.
- Geofence cultural sites to limit impact on these sites (note, confidentiality in regard to cultural heritage sites will need to be maintained in compliance with legislation).

Emergency information

Permanent facilities should maintain readily accessible emergency information, including site plans, emergency contacts, firefighting water supplies, hazardous materials (where applicable) and emergency access arrangements for use by emergency responders.

Procedures responding to Australian Fire Danger Ratings

The Australian Fire Danger Rating System (AFDRS) provides advice about the level of bushfire threat on a particular day based on forecast weather conditions. AFDRs are issued daily on the CFS website and can act as triggers for specific bushfire prevention, preparedness and response actions. Total Fire Bans may be imposed at Extreme or Catastrophic AFDRs (see Section 6.1.5). Table 6-1 provides an example of Project response actions that could be applied at each AFDR.

Table 6-1: Example AFDR actions

AFDR	Description	Example Project response
Catastrophic (Total Fire Ban)	If a fire starts and takes hold, lives are likely to be lost.	No works of any description to be undertaken by any personnel within the Project area, except in the instance of emergency works and in consultation with the CFS.

AFDR	Description	Example Project response
	- These are the worst conditions for a bush or grass fire. - Homes are not designed or constructed to withstand fires in these conditions. - The safest place to be is away from high risk bushfire areas.	Visitors, contractors and staff to be evacuated from the Project area if safe to do so.
Extreme (Total Fire Ban)	Fires will spread quickly and be extremely dangerous. - These are dangerous fire conditions. - Must be physically and mentally prepared to defend in these conditions.	Reconsider the need for personnel to be on site. For any necessary works: - Adhere to Total Fire Ban controls for any necessary or emergency works, in consultation with CFS. - Adhere to controls for High and Moderate AFDR (as listed below).
High	Fires can be dangerous. - There's a heightened risk. - If a fire starts, your life and property may be at risk.	No hot works (e.g. grinding, welding, thermal or oxygen cutting or heating etc. in the open air) to be undertaken within 15 m of vegetated areas. A portable water supply for firefighting purposes (i.e. on the back of a light vehicle, trailer light firefighting or water tanker) with a minimum water carrying capacity of 450L and appropriate pump/hoses is to be present when working adjacent to bushland areas or potential ignition sources from construction activities. Basic firefighting equipment (e.g. rake, knapsack, shovel) to be on board all light vehicles and users trained in operation. Ensure CFS website is checked every half-hour to determine if a fire may impact the development envelope and keep up to date with any CFS bushfire alerts and instructions (i.e. Advice, Watch and Act, Emergency Warning and All Clear). If a fire is within 20 km of personnel within the development envelope and heading in that general direction, phone CFS and/or other emergency services for evacuation advice and consider self-evacuation.
Moderate	Most fires can be controlled. Controlled burning may occur in these conditions if it is safe – check to see if permits apply.	Basic firefighting equipment (e.g. rake, knapsack, shovel) to be on board all light vehicles and users trained in operation. Fire extinguishers to be easily accessible within areas of hot works. Ensure CFS website is checked regularly to determine if a fire may impact the development envelope and keep up to date with any CFS bushfire alerts and instructions (i.e. Advice, Watch and Act, Emergency Warning and All Clear). If a fire is within 20 km of personnel within the development envelope and heading in that general direction, phone CFS and/or other emergency services for evacuation advice and consider self-evacuation.

Procedures responding to the Australian Warning System

CFS issues bushfire warnings through the Australian Warning System (AWS) to communicate the level of risk posed by an active bushfire and the actions required to protect life and property. Warnings may be disseminated through a range of communication channels, including the CFS website and mobile application, Emergency Alert (where utilised), broadcast media and social media platforms. The four warning levels are **Advice**, **Watch and Act**, **Emergency Warning** and **All Clear** (Table 6-2).

The AWS should be monitored during bushfire events and incorporated into the Project's emergency management procedures. Site-specific trigger actions should be developed as part of future Bushfire Emergency Plans and Emergency Management Plans to assist with decisions regarding the restriction of works, staged evacuation of personnel and emergency response.

Table 6-2: Australian Warning System (AWS) levels and example Project response

CFS bushfire warnings	Description	Example Project response
Advice	A fire has started but there is currently no immediate threat. Stay informed and monitor conditions, as the situation may change.	Increase monitoring of bushfire conditions, review weather forecasts and Fire Danger Ratings, and prepare personnel for possible changes to site operations.
Watch and Act	Conditions are changing and there is a heightened level of risk. Take action now to protect yourself and others.	Consider suspending non-essential activities, prepare for or commence staged evacuation of non-essential personnel, and implement site-specific emergency procedures.
Emergency Warning	You are in immediate danger and need to take action immediately.	Cease works, implement emergency procedures and evacuate personnel from the affected area where it is safe to do so, in accordance with the Bushfire Emergency Plan and advice from emergency services.
All Clear	The immediate danger has passed; however, caution should continue to be exercised.	Re-enter affected areas only after confirming they are safe and following advice from emergency services. Inspect infrastructure before recommencing operations.

6.2.4 Personnel training

All staff working within the Project area should be trained in responding to and managing all emergency incidents in accordance with the Project emergency management plan. A record of training must be kept up to date and debrief sessions held after all training exercises.

It is recommended that specific staff are trained or recruited in the detection and suppression of bushfires. This training should be undertaken in consultation with CFS and local brigades to develop relationships and ensure adequate training and knowledge is provided. The site Emergency Management Team (EMT) should be trained in incident management systems (e.g. Australasian Inter-Service Incident Management System [AIIMS] or similar).

Personnel that are at risk from smoke related respiratory problems or significant medical problems, should be identified before the bushfire season and trained on how to respond. These people should be seen as key personnel to remove from site early in a bushfire event to reduce the likelihood of respiratory problems and to limit burden on medical staff.

Staff information sessions should be conducted prior to the bushfire season to ensure familiarity with relevant emergency management procedures and evacuation strategies.

6.2.5 Routine maintenance and testing

Routine testing, maintenance and ongoing inspections should be carried out throughout the year on items such as bushfire suppression equipment designed to suppress fire, firefighting water tanks, buildings, access roads and evacuation tracks.

Scheduled maintenance programs for infrastructure, vehicles and power tools should be developed and adhered to on an ongoing basis.

6.2.6 Pre bushfire season audits

Pre bushfire season audits of site readiness for bushfire emergencies should be carried out, including:

- Alignment of APZs.
- Access tracks and roads, especially to critical assets and evacuation routes.
- On-site refuge buildings (i.e. water and food storage, building maintenance).
- Firefighting systems and fire water supplies.
- Fire appliances, civil equipment, medical vehicles and supplies.
- Firefighting PPE and equipment for personnel to protect from heat, embers, smoke, etc.
- Communications equipment and infrastructure (towers, phone lines, etc).
- Review of site personnel to confirm suitable number of bushfire trained staff and appropriate spread between all rosters.
- Ensure proposed evacuation vehicles are maintained and ready for use prior to bushfire season.
- Ensure a bushfire emergency response plan has been created and reviewed.

6.3 Response

The Response phase focuses on the assistance and intervention during or immediately after a bushfire emergency. The focus is on saving lives and protecting property and environmental assets.

6.3.1 Fire brigade support

The CFS and MFS have several brigades located in settlements along the Project alignment, which are situated within 20 km of the Project area. Additional firefighting support is expected to be provided by DEW Fire Service crews. Aerial support from air tankers/fire bombers may be required for larger and more remote fires.

Due to the remote location of much alignment and nature of volunteer fire and rescuer crews, response times have potential to exceed 30 minutes, depending on the point of ignition.

6.3.2 On-site firefighting resources

Due to the potential for a public suppression response to be delayed, consideration should be given to the provision of on-site fire suppression capabilities.

The risk assessment indicates that the risk of ignition is higher during the construction stage compared to the operational stage; therefore, provision of firefighting infrastructure may need to be prioritised for the construction stage of the development.

Firefighting resources could include:

- Mobile firefighting units.
- Project owned and operated dedicated water tanker/firefighting truck on permanent standby.

Firefighting water

Firefighting water supply for the Project alignment may be provided by the following means (subject to detailed design):

- Mobile firefighting unit/s (i.e. on the back of a light vehicle, trailer light firefighting or water tanker) with a minimum water carrying capacity of 450 L and appropriate pump/hoses positioned along the alignment during construction operations.
- Static water supply tanks strategically located along the Project alignment (currently planned for pumping station and water storage sites) to provide water for the mobile firefighting unit/s and CFS/local fire brigade services. Tanks may be temporary along the pipeline corridor construction and may be retained as permanent tanks along the transmission corridor (where there is a great risk of fire).
- Existing groundwater bores along the alignment subject to landholder approval, with appropriate permits in place.
- Provision for firefighting water at accommodation camps, laydown areas, desalination plant, pumping stations and substations in order to facilitate a direct fire suppression response at the property interfaces. The water supply will be confirmed during the detailed design stage in accordance with the site layout and occupancy levels and is expected to include on-site static water supply (water tanks with appropriate firefighting couplings) and firefighting hose reels. The fire water supply may be provided by the proposed water storage tanks which will be situated along the Project alignment. This will require installation of appropriate couplings.

Firefighting equipment

Mobile crews should be provided with basic firefighting equipment such as fire extinguishers, rakes, knapsacks and shovels and trained in their operation. This would help to restrict growth and spread of a small-scale fire during construction and operational activities at remote sites. Firefighting equipment should also be available at the substations, pumping stations, workers camps and laydown areas to enable an immediate fire suppression response by site personnel if required.

6.4 Recovery

The Recovery phase involves strategies to reconstruct physical infrastructure and assets and restoring physical, emotional, environmental, and economic wellbeing post bushfire events. Recommended recovery actions include the following:

- Reenergisation of power supply once inspections have been carried out or weather conditions have become favourable.
- Staff to be made aware of the Employee Assistance Program.
- A review of loss of availability of critical infrastructure is to be carried out.
- A review of Insurance Policies is to be undertaken.
- A review of any reputational harm is to be undertaken (from fires started or exacerbated by the construction or ongoing maintenance of the Project).
- A review of the cause of the bushfire, bushfire impact, firefighting response, and asset resilience to bushfire and emergency management processes are carried out following the bushfire event.

7. Implementation of BRMP

7.1 Works Program

This BRMP provides overarching bushfire mitigation measures to be considered and adopted at future stages of Project construction and operation. There are no specific works to be carried out at this time.

Future Bushfire Management Plans (BMPs) prepared at subsequent stages should include a works program to ensure the inherent and residual bushfire risks are appropriately managed.

7.2 BRMP Monitoring and Review

This overarching BRMP has been prepared to inform future stages of construction and operation. As the plan does not specifically address future assets associated with the Project, the effectiveness of the bushfire risk assessment process and recommended treatment strategies cannot be monitored until site-specific BMPs have been prepared and the Project has commenced.

Future site-specific BMPs should be monitored as required, or on an annual basis to ensure:

- Implementation of the BRMP is assessed and corrective actions are applied in cases of non-compliance.
- The effectiveness and impact of bushfire prevention work is assessed and any significant changes in management, infrastructure design or the surrounding environment are captured and re-evaluated in a revised BRMP.

8. Limitations

Scope of services

This report (“the report”) has been prepared by JBS&G in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and JBS&G. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, JBS&G has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report (“the data”). Except as otherwise expressly stated in the report, JBS&G has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (“conclusions”) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. JBS&G has also not attempted to determine whether any material matter has been omitted from the data. JBS&G will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to JBS&G. The making of any assumption does not imply that JBS&G has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. JBS&G disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made, including to any third parties, and no liability will be accepted for use or interpretation of this report by any third party.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

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Appendix A Planning and Design Code Policy – Hazards (Bushfire) Overlays

Hazards (Bushfire – General Risk) Overlay

- DO 1 Development, including land division responds to the general level of bushfire risk by siting and designing buildings in a manner that mitigates the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change.
- DO 2 To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger.

Siting

- PO 1.1 Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.

Built form

- PO 2.1 Buildings and structures are designed and configured to reduce the impact of bushfire through using designs that reduce the potential for trapping burning debris against or underneath the building or structure, or between the ground and building floor level in the case of transportable buildings and buildings on stilts.

Habitable buildings

- PO 3.1 To minimise the threat, impact and exposure to bushfires on life and property, residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited on the flatter portion of allotments away from steep slopes.
- PO 3.2 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited away from vegetated areas that pose an unacceptable bushfire risk.
- PO 3.3 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) has a dedicated area available that is capable of accommodating a bushfire protection system comprising firefighting equipment and water supply in accordance with *Ministerial Building Standard MBS 008 - Designated bushfire prone areas - additional requirements*.

Vehicle access – roads, driveways and fire tracks

- PO 5.1 Roads are designed and constructed to facilitate the safe and effective:
- use, operation and evacuation of fire-fighting and emergency personnel
 - evacuation of residents, occupants and visitors.

Hazards (Bushfire – Outback) Overlay

- DO 1 Development is located to minimise the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change.
- DO 2 To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger.

Habitable buildings

- PO 1.1 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.

Vehicle access - roads and driveways

PO 2.1 Roads are designed and constructed to facilitate the safe and effective:

- c. use, operation and evacuation of fire-fighting and emergency personnel
- d. evacuation of residents, occupants and visitors (a) use, operation and evacuation of fire-fighting and emergency personnel

Hazards (Bushfire – Regional) Overlay

- DO 1 Development is located to minimise the threat and impact of bushfires on life and property taking into account the increased frequency and intensity of bushfires as a result of climate change.
- DO 2 To facilitate access for emergency service vehicles to aid the protection of lives and assets from bushfire danger.

Siting

- PO 1.1 Buildings and structures are located away from areas that pose an unacceptable bushfire risk as a result of vegetation cover and type, and terrain.

Built form

- PO 2.1 Buildings and structures are designed and configured to reduce the impact of bushfire through using designs that reduce the potential for trapping burning debris against or underneath the building or structure, or between the ground and building floor level in the case of transportable buildings and buildings on stilts.

Habitable buildings

- PO 3.1 To minimise the threat, impact and exposure to bushfires on life and property, residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited on the flatter portion of allotments away from steep slopes.
- PO 3.2 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) is sited away from vegetated areas that pose an unacceptable bushfire risk.
- PO 3.3 Residential and tourist accommodation and habitable buildings for vulnerable communities (including boarding houses, hostels, dormitory style accommodation, student accommodation and workers' accommodation) has a dedicated and accessible water supply available at all times for fire-fighting purposes.

Vehicle access – roads and driveways

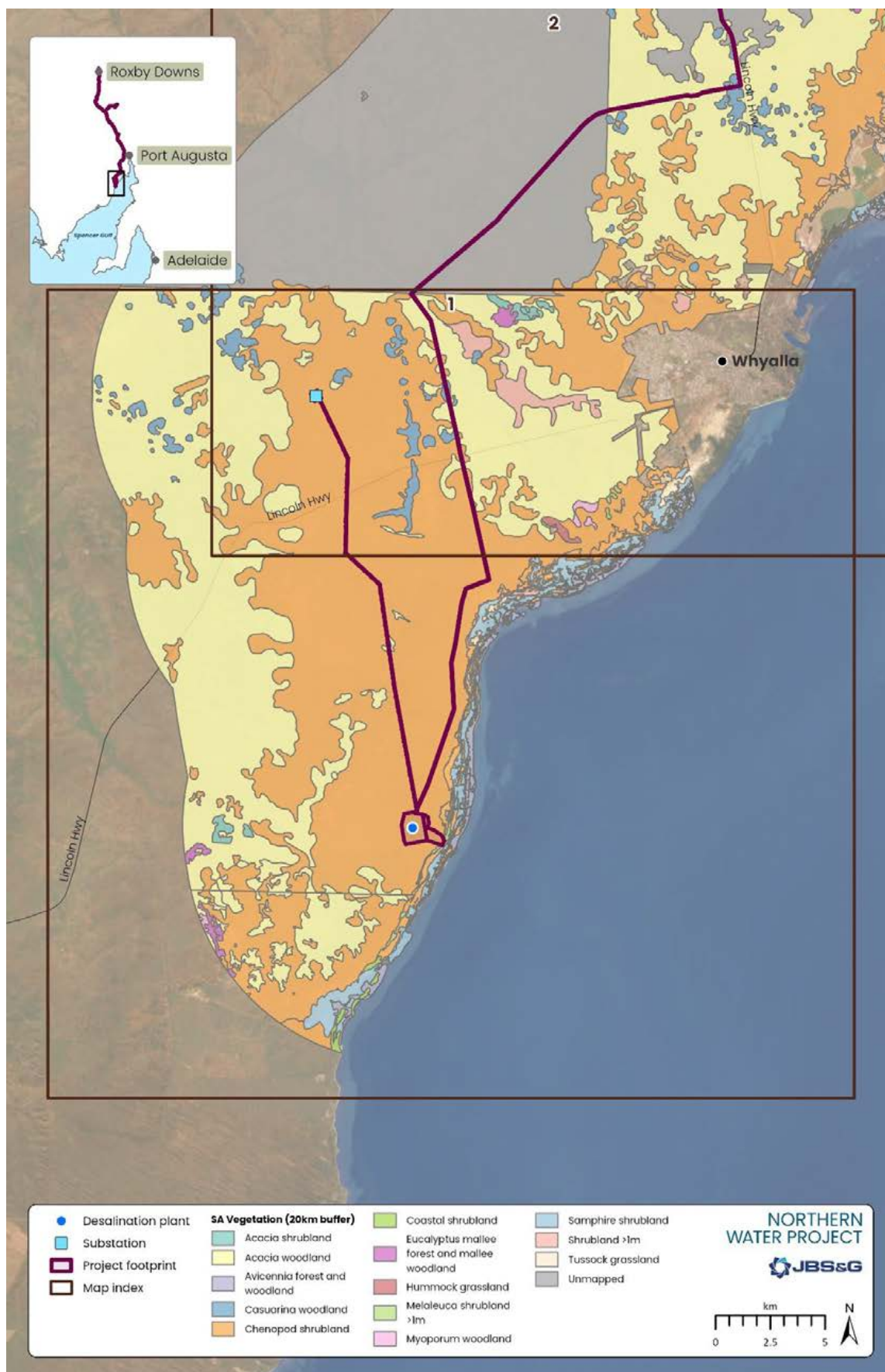
PO 5.1 Roads are designed and constructed to facilitate the safe and effective:

- a. evacuation of residents, occupants and visitors.

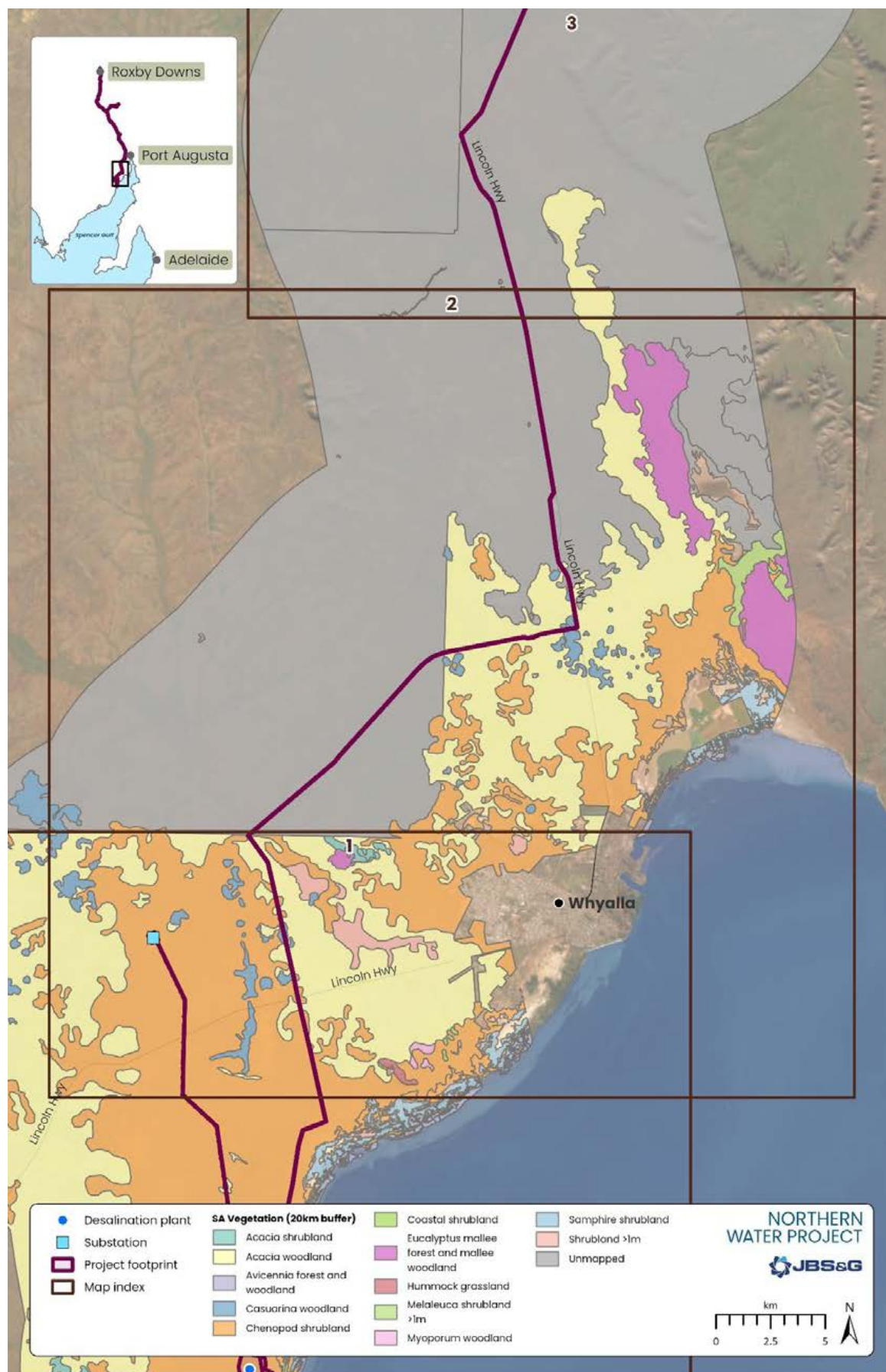
PO 5.2 Access to habitable buildings is designed and constructed to facilitate the safe and effective:

- a. use, operation and evacuation of fire-fighting and emergency personnel
- b. evacuation of residents, occupants and visitors.

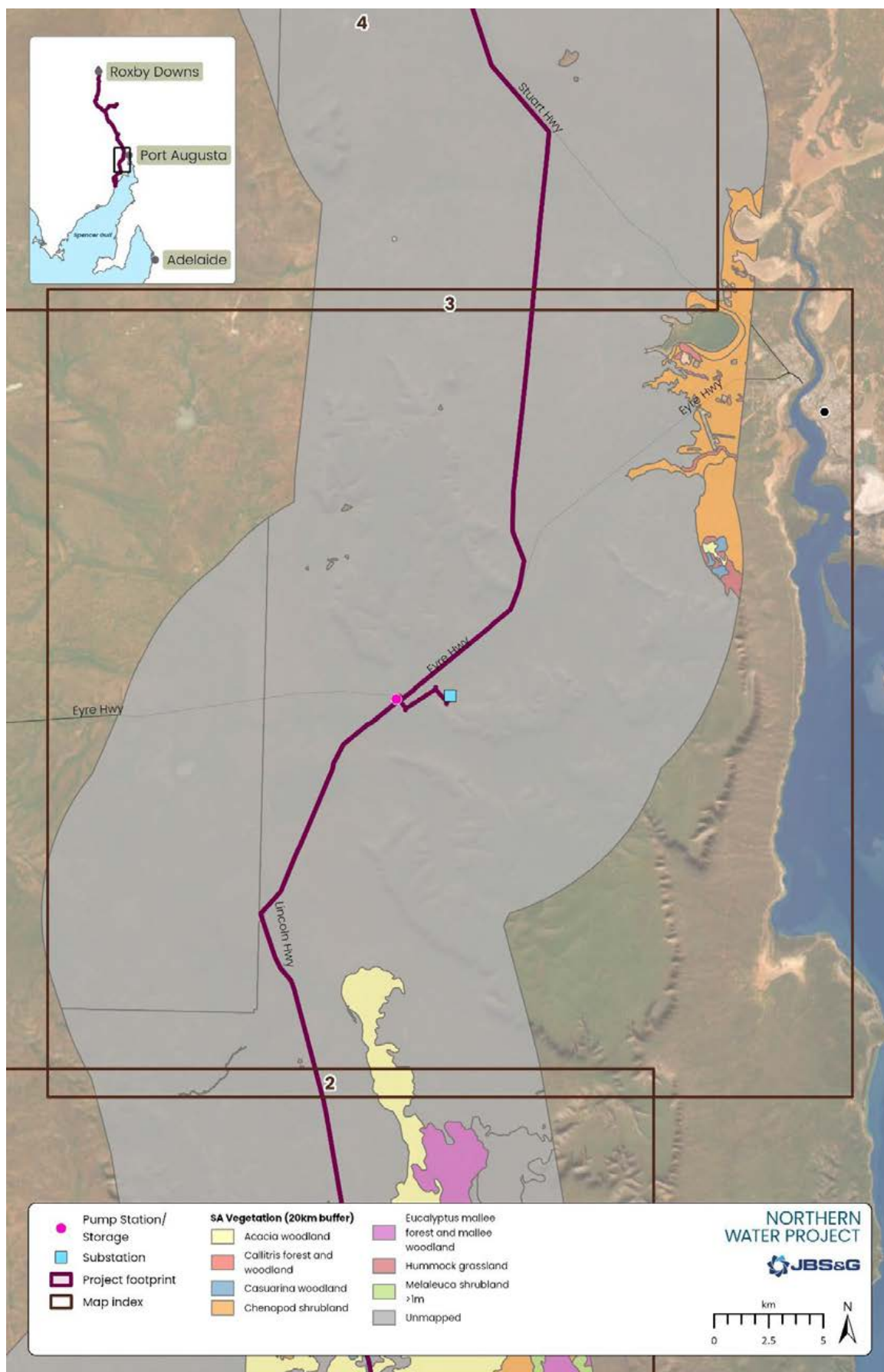
Appendix B Native Vegetation in the Project Area (map series)



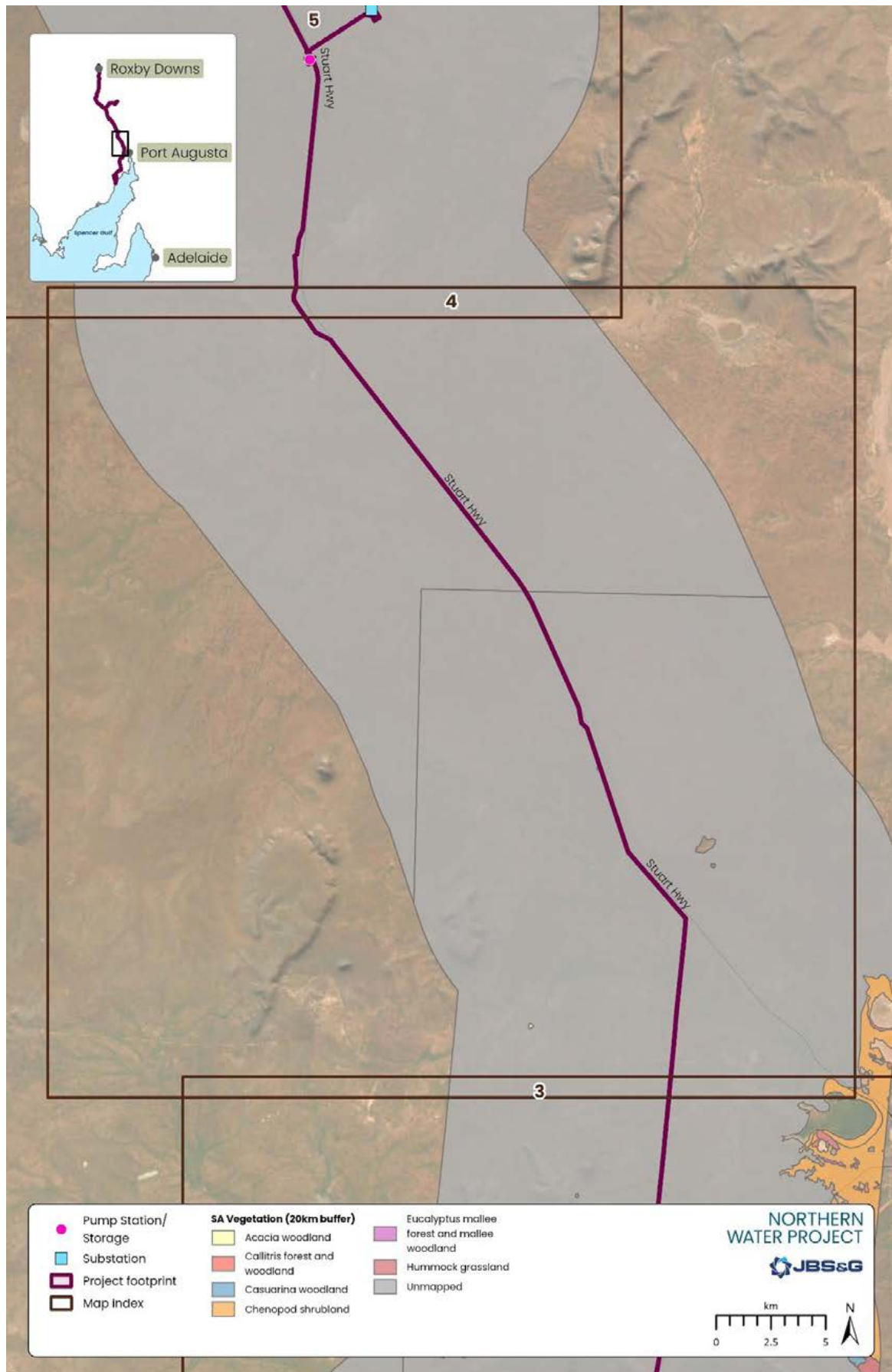
Native vegetation in the Project area (map series) – Page 1



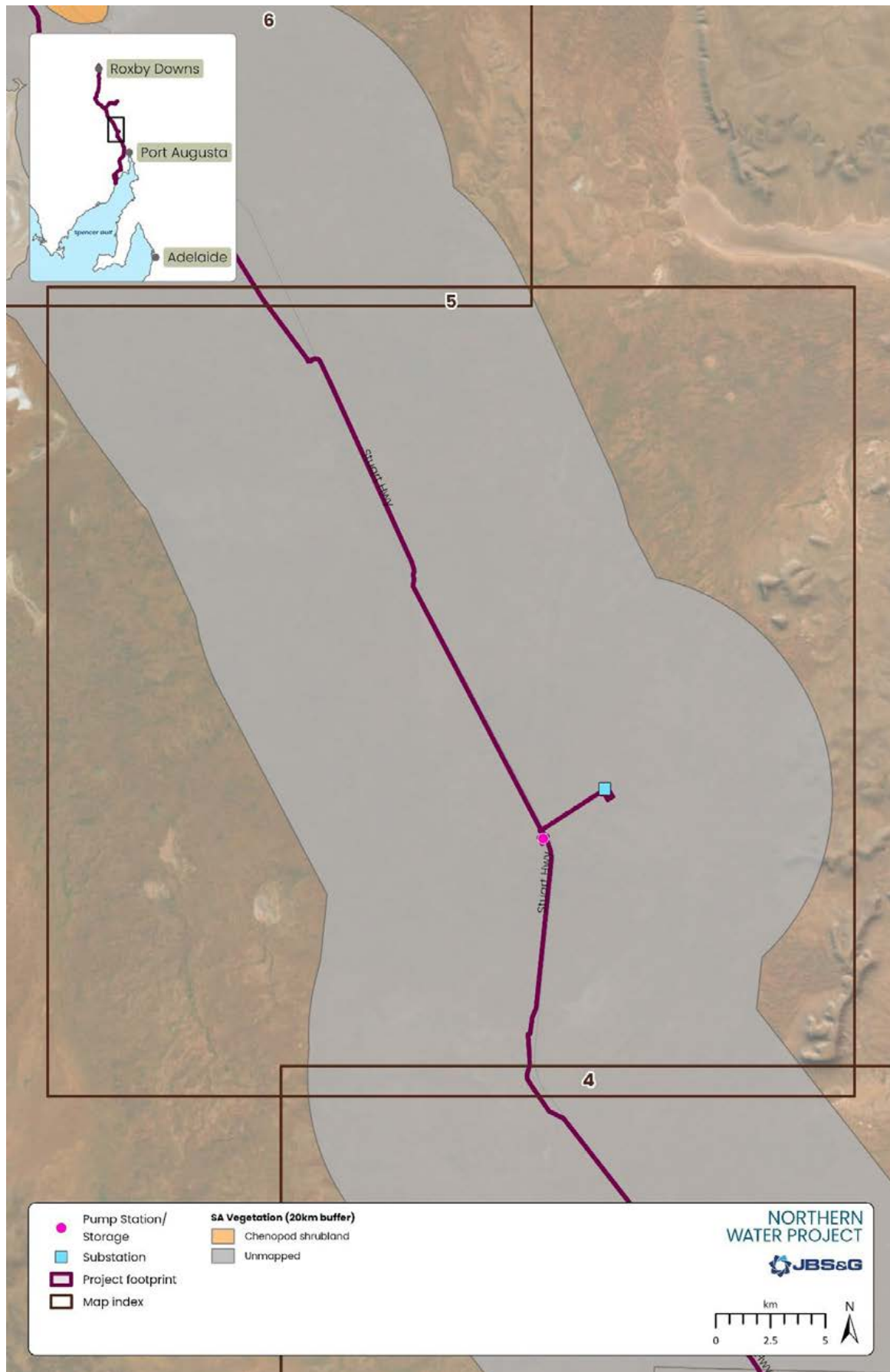
Native vegetation in the Project area (map series) – Page 2



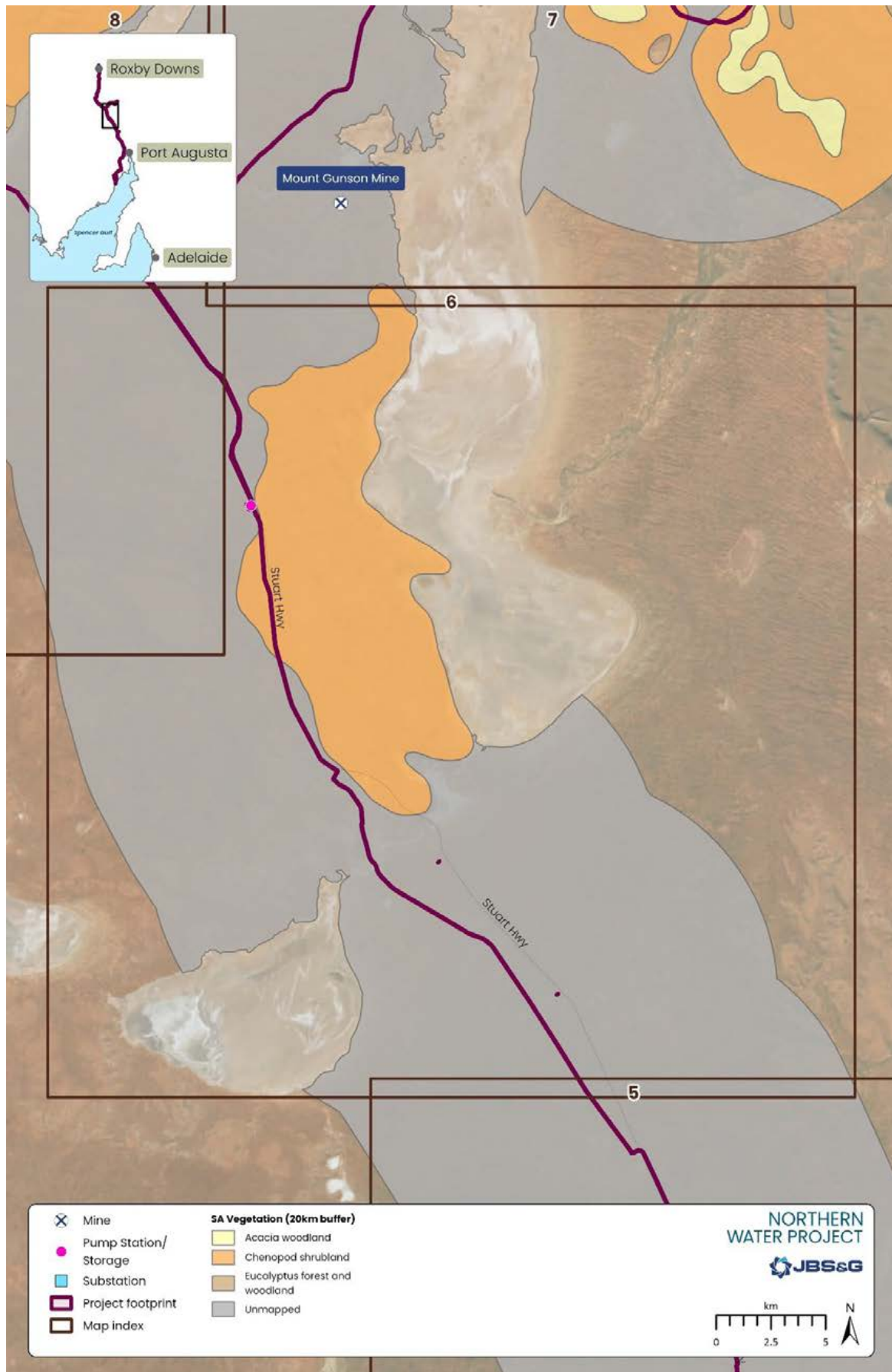
Native vegetation in the Project area (map series) – Page 3



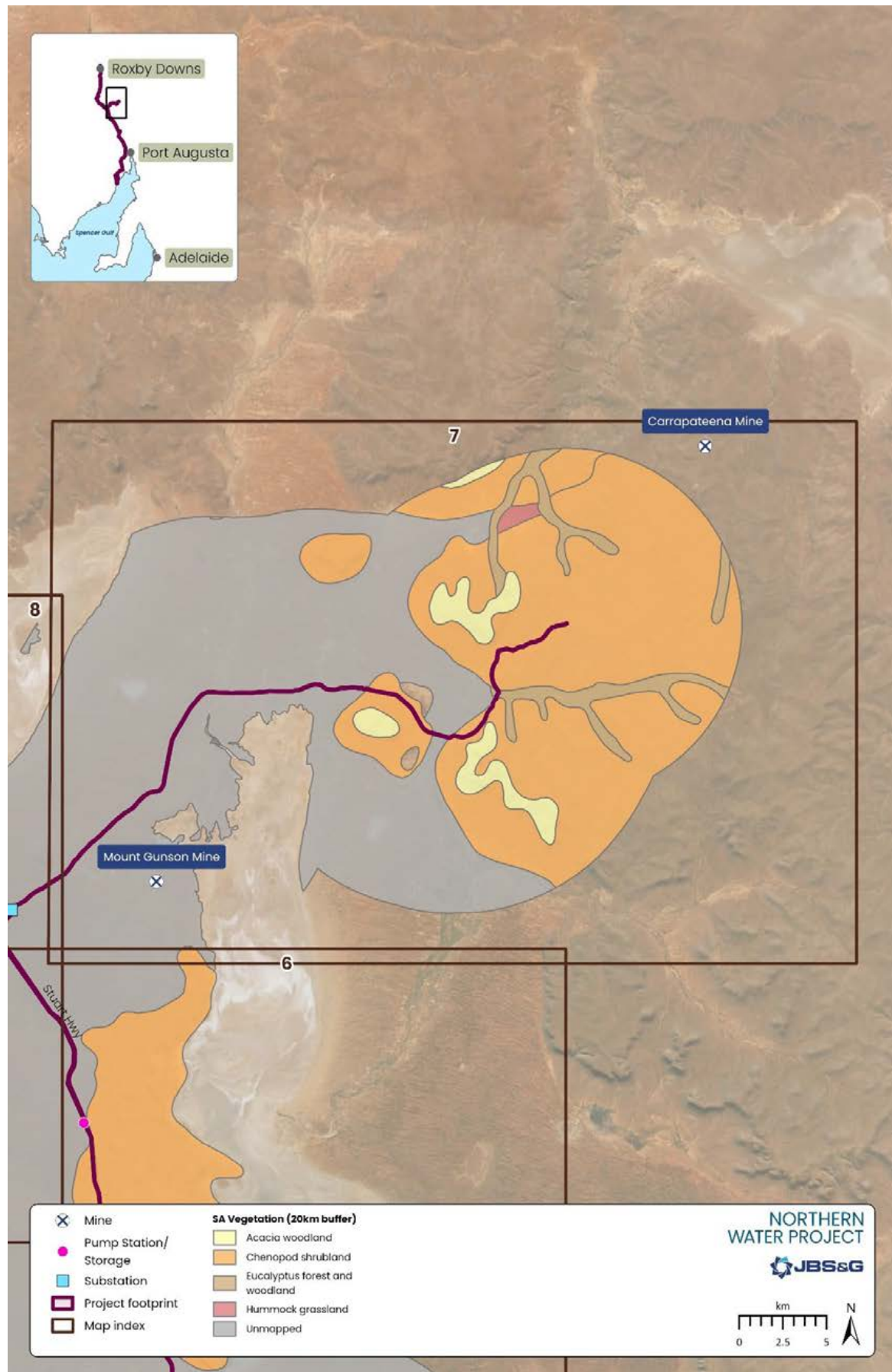
Native vegetation in the Project area (map series) – Page 4



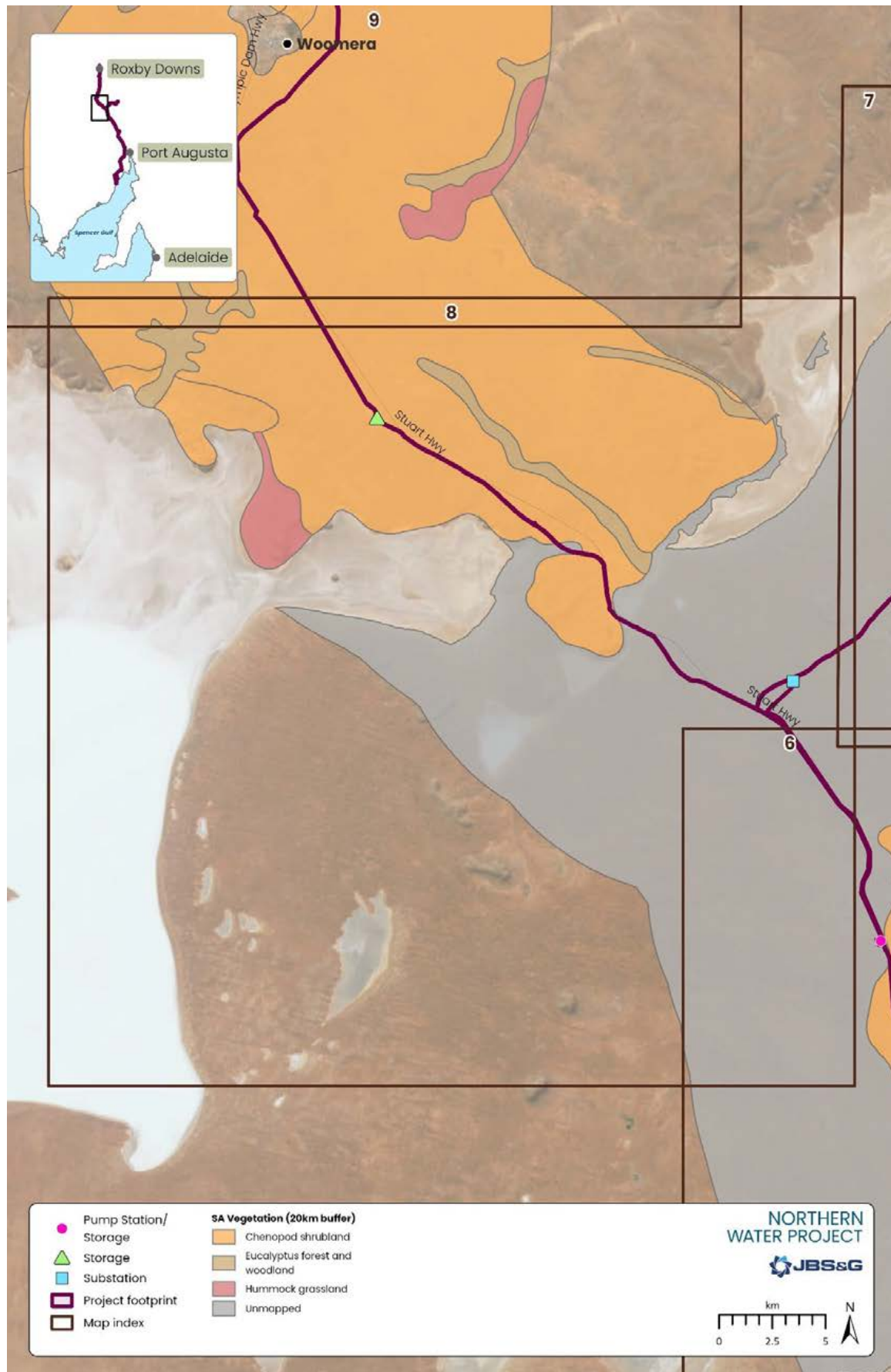
Native Vegetation in the Project area (map series) – Page 5



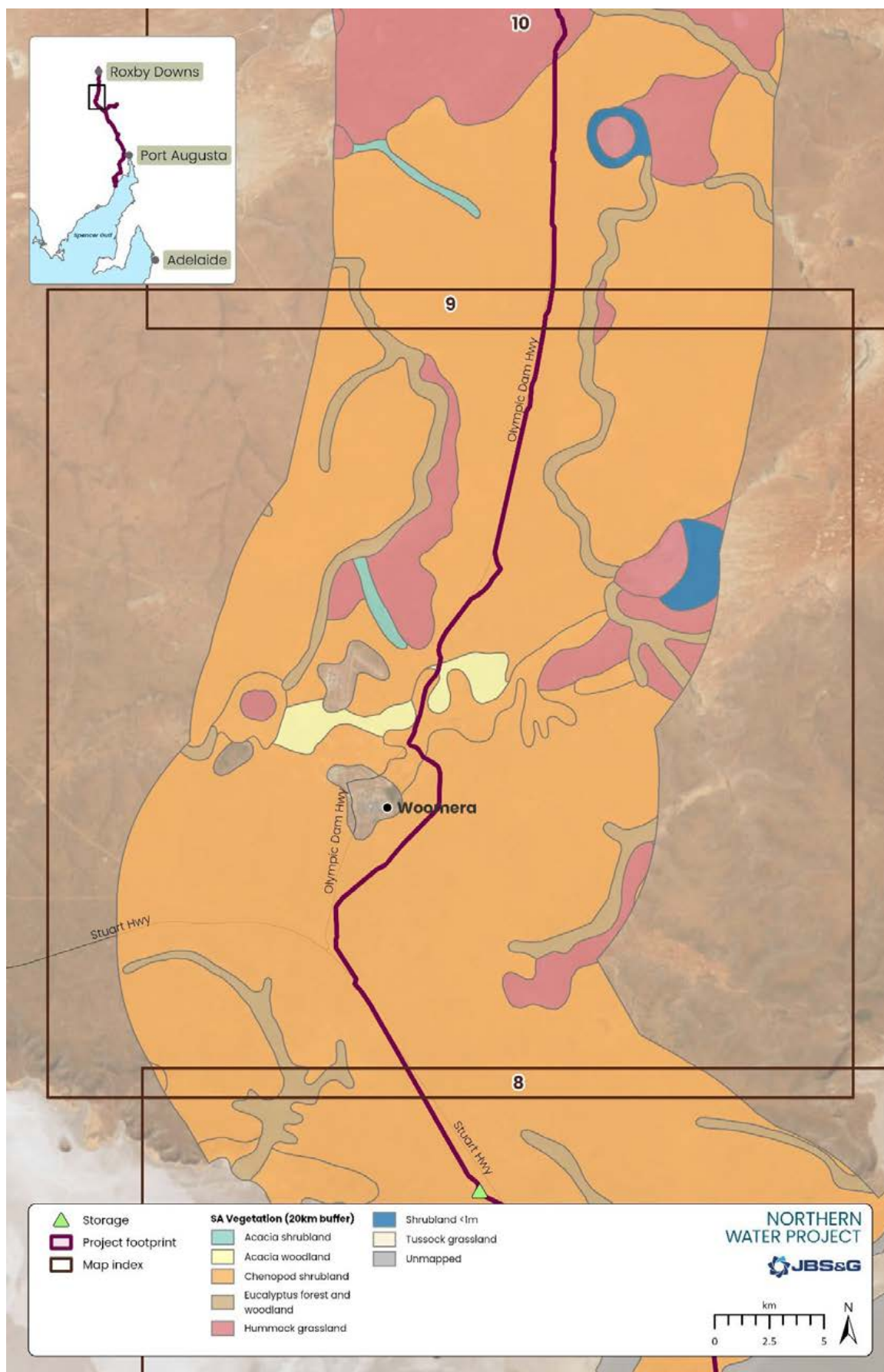
Native vegetation in the Project area (map series) – Page 6



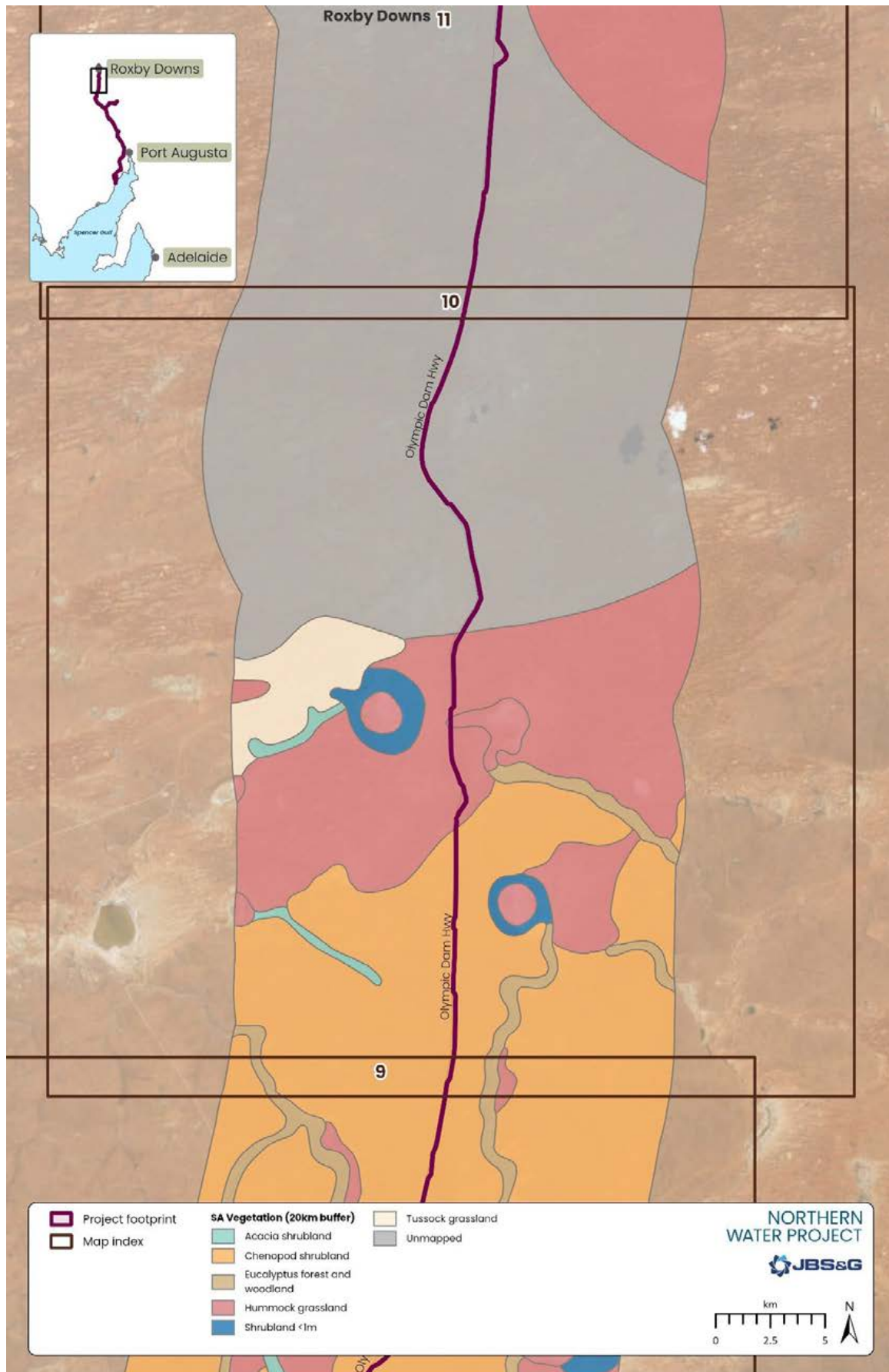
Native vegetation in the Project area (map series) – Page 7



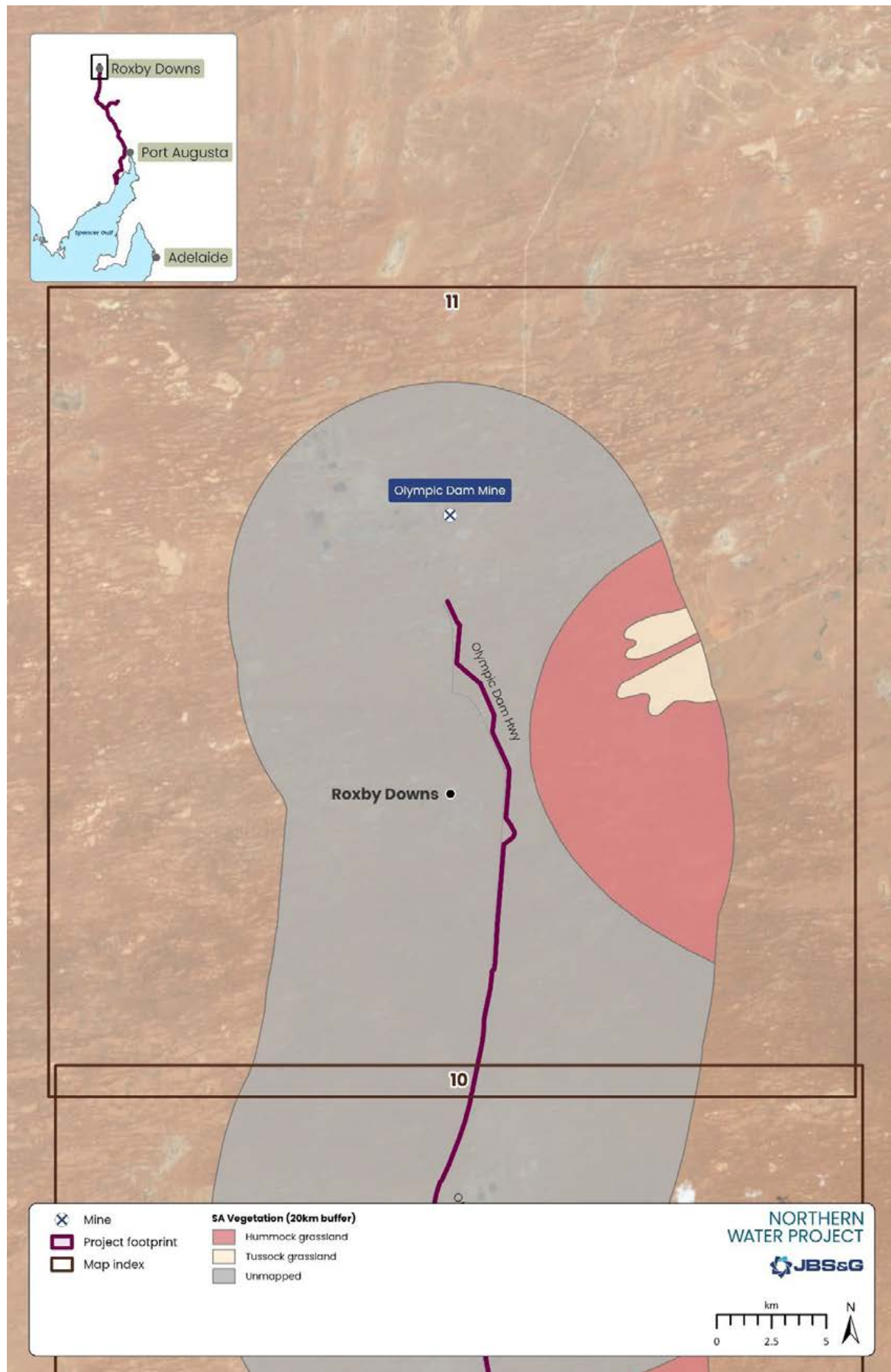
Native vegetation in the Project area (map series) – Page 8



Native vegetation in the Project area (map series) – Page 9



Native vegetation in the Project area (map series) – Page 10



Native vegetation in the project area (map series) – Page 11

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