TransGrid

EnergyConnect (NSW – Western Section)

Technical paper 7

Air quality impact assessment

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Technical paper 7 – Air quality impact assessment

TransGrid

WSP
Level 15, 28 Freshwater Place
Southbank VIC 3006

Tel: +61 3 9861 1111
Fax: +61 3 9861 1144
wsp.com

REV	DATE	DETAILS
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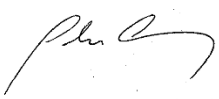
	NAME	DATE	SIGNATURE
Prepared by:	Mengjiao Wang	21/10/2020	
Reviewed by:	John Conway	21/10/2020	
Approved by:	Emma Taylor	21/10/2020	

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GLOSSARY

Air NEPM	National Environment Protection (Ambient Air Quality) Measure
Approved Methods	Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales 2016
AQIA	Air Quality Impact Assessment
AQMS	Air Quality Monitoring Stations
AWS	Automatic Weather Station
BoM	Bureau of Meteorology
CO	Carbon Monoxide
disturbance area	Refers to the area that would be directly impacted by both construction and operation (including the areas that would be impacted by maintenance activities) of the proposal including all proposal infrastructure elements (including the proposed transmission line alignment, substation site works and other ancillary works i.e. the operational footprint) as well as locations for currently proposed construction elements such as construction compounds, access tracks and site access points, laydown and staging areas, concrete batching plants, brake/winch sites, site offices and accommodation camps. This area would be mostly contained within the transmission line corridor and would be determined during detailed design in consideration of avoidance and impact minimisation.
DPIE	(NSW) Department of Planning Industry and Environment
EIS	Environmental Impact Statement
EnergyConnect	An electrical interconnector of approximately 900 kilometres between the electricity grids of South Australia and New South Wales, with an added connection to north west Victoria. In NSW, EnergyConnect comprises two sections – Western Section (the proposal the subject of this EIS) and the Eastern Section (which will be subject to separate environmental assessment).
HDV	Heavy duty vehicles defined as vehicles with a gross weight greater than 3.5 tonnes
IAQM	Institute of Air Quality Management
the IAQM guidance	Guidance on the Assessment of Dust from Demolition and Construction
LPG	Liquefied Natural Gas
NEM	National Electricity Market
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measures
NOx	Oxides of Nitrogen
NPI	National Pollutant Inventory
NSW	New South Wales

OPGW	Overhead Optical Ground Wires
PAHs	Polycyclic Aromatic Hydrocarbons
PM	Particulate Matters
$PM_{2.5}$	Particles with an aerodynamic of 2.5 micrometres or less
PM_{10}	Particles with an aerodynamic of 10 micrometres or less
(the) proposal	The proposal is known as 'EnergyConnect (NSW – Western Section)' as described in Chapter 1 of this document.
proposal study area	The study area for this EIS, which comprises a one km wide corridor between the SA/NSW border near Chowilla and Buronga and a 200 m wide corridor between Buronga and the NSW/Victoria border at Monak, near Red Cliffs. It encompasses the indicative disturbance area and transmission line corridor, which has been applied to identify the constraints nearby to the proposal which may or may not be indirectly impacted by the proposal. Some access tracks could be located within the proposal study area.
SA	South Australia
SEARs	Secretary's Environmental Assessment Requirements
SO_2	Sulphur Dioxide
transmission line corridor	A 200 metre corridor in which the final transmission line easement and transmission line infrastructure would be contained within. Construction activities associated with the transmission line would be expected to be contained within this area.
TSP	Total Suspended Particulates
VOCs	Volatile Organic Compounds
WSP	WSP Australia Pty Limited
Units	
ºC	Degree Celsius
km	kilometre
km/h	kilometre per hour
kV	kilovolts
m	Metre
mm	Millimetres
Mtpa	Million tonnes per annum
MW	Megawatt
t/a	tonne per annum
$\mu g/m^3$	Microgram per cubic meter

EXECUTIVE SUMMARY

ENERGYCONNECT (NSW – WESTERN SECTION)

TransGrid (electricity transmission operator in New South Wales (NSW)) and ElectraNet (electricity transmission operator in South Australia (SA)) are currently seeking regulatory and environmental planning approval for the construction and operation of a new High Voltage (HV) interconnector between NSW and SA, with an added connection to north-west Victoria (VIC). Collectively the proposed interconnector is known as EnergyConnect.

The proposal, focusing on the western section of EnergyConnect in NSW (the subject of this technical paper), would involve the construction and operation of new 330kV transmission lines between the SA/NSW border and Buronga, an expansion and upgrade of the existing Buronga substation from an operating capacity of 220kV to a combined operating voltage 220kV/330kV and an upgrade of the existing 220kV transmission line between Buronga substation and the border of NSW and Victoria.

OVERVIEW OF ENVIRONMENTAL ASSESSMENT

EXISTING ENVIRONMENT

Climate statistical data collected at the Lake Victoria Storage Automatic Weather Station (AWS) and Mildura Airport AWS was reviewed to evaluate local meteorological conditions.

The proposal study area and its surrounding areas are predominantly rural with some residences. The main existing emissions are wind-blown dust from exposed land and traffic using the local road network.

The National Pollutant Inventory (NPI) database review indicated that the proposal is not likely to be affected by emissions from operation of any NPI reporting facilities.

The latest five years (2015 to 2019 inclusive) monitoring data of PM_{10} (particulate matters equal to or less than 10 micrometres in diameter) at the Buronga air quality monitoring station was analysed and presented in this assessment. As PM_{10} was not monitored using reference or reference equivalence methods, the monitoring data was considered indicative of particulate matter concentrations in a rural area and was not compared against the air national environment protection measures standards.

Three sensitive receptors within 350 metres of the transmission line corridor were identified, and no sensitive receptors were identified within 500 metres of the Buronga substation, the main construction compound and accommodation camp sites and concrete batching plants along transmission lines.

In summary, the existing environment of the proposal characterised by relatively flat terrain with large areas of bare land subject to dust generation during hot and windy conditions and with few sensitive receptors along the transmission line corridor.

ASSESSMENT METHODOLOGY

A risk-based assessment was conducted for dust emissions associated with the construction of the proposal in accordance with the *Guidance on the assessment of dust from demolition and construction* published by the Institute of Air Quality Management (IAQM) in 2014.

The following emissions were assessed qualitatively:

- dust emissions from any construction works ‘screened out’ (i.e. not requiring detailed risk assessment according to the IAQM guidance)
- gaseous emission from the construction works
- potential emissions from the operation phase.

ASSESSMENT OUTCOMES

The potential impacts from the construction and operation phases are presented below.

CONSTRUCTION

The risk of dust impacts from earthworks, construction and vehicle track out[1] activities associated with the transmission lines are negligible prior to the implementation of proposed mitigation measures. With further site-specific mitigation measures in Section 8.1 in place, the residual dust impacts would not be of significance.

The dust impacts associated with upgrading the Buronga substation, main construction compound and accommodation camp sites and concrete batching plants along transmission lines are not significant prior to mitigation due to there being no sensitive receptors located within 500 metres. With further mitigation measures in place (Section 8.1), the residual dust impacts would be further reduced and not of significance.

Gaseous emissions generated from vehicles and fugitive sources would be minimised with the implementation of mitigation measures detailed in Section 8.1 and air quality impacts would not be significant.

OPERATION

During normal operation, potential wind-blown dust emissions from unsealed tracks and roads would be negligible. No other air emissions would be generated either from the operation of transmission lines or the Buronga substation.

During routine inspection, maintenance or emergency, potential gaseous and dust emissions are anticipated to be negligible, and the impacts on surrounding areas would not be of significance.

CUMULATIVE IMPACTS

Potential cumulative impacts from three identified proposed developments were considered in this assessment. With appropriate dust control measures in place for all developments during construction, cumulative impacts are not expected to be of significance. No operational cumulative impacts would be expected.

CONCLUSION

In summary, potential air quality (gaseous and dust emissions) impacts associated with the construction and operation of the proposal were determined to be not of significance on surrounding environment including the nearest sensitive receptors.

[1] Track out is dirt, mud or other materials tracked onto a paved public roadway by a vehicle leaving a construction site.

1 INTRODUCTION

1.1 PROPOSAL CONTEXT AND OVERVIEW

TransGrid (electricity transmission operator in New South Wales (NSW)) and ElectraNet (electricity transmission operator in South Australia (SA)) are seeking regulatory and environmental planning approval for the construction and operation of a new High Voltage (HV) interconnector between NSW and SA, with an added connection to north-west Victoria. Collectively, the proposed interconnector is known as EnergyConnect.

EnergyConnect comprises several components or 'sections' (shown on Figure 1.1). The Western Section (referred to as 'the proposal') is the subject of this technical paper.

EnergyConnect aims to secure increased electricity transmission between SA, NSW and Victoria in the near term, while facilitating the longer-term transition of the energy sector across the National Electricity Market (NEM) to low emission energy sources.

EnergyConnect has been identified as a priority transmission project in the NSW Transmission Infrastructure Strategy (Department of Planning and Environment, 2018), linking the SA and NSW energy markets and would assist in transporting energy from the South-West Renewable Energy Zone to major demand centres.

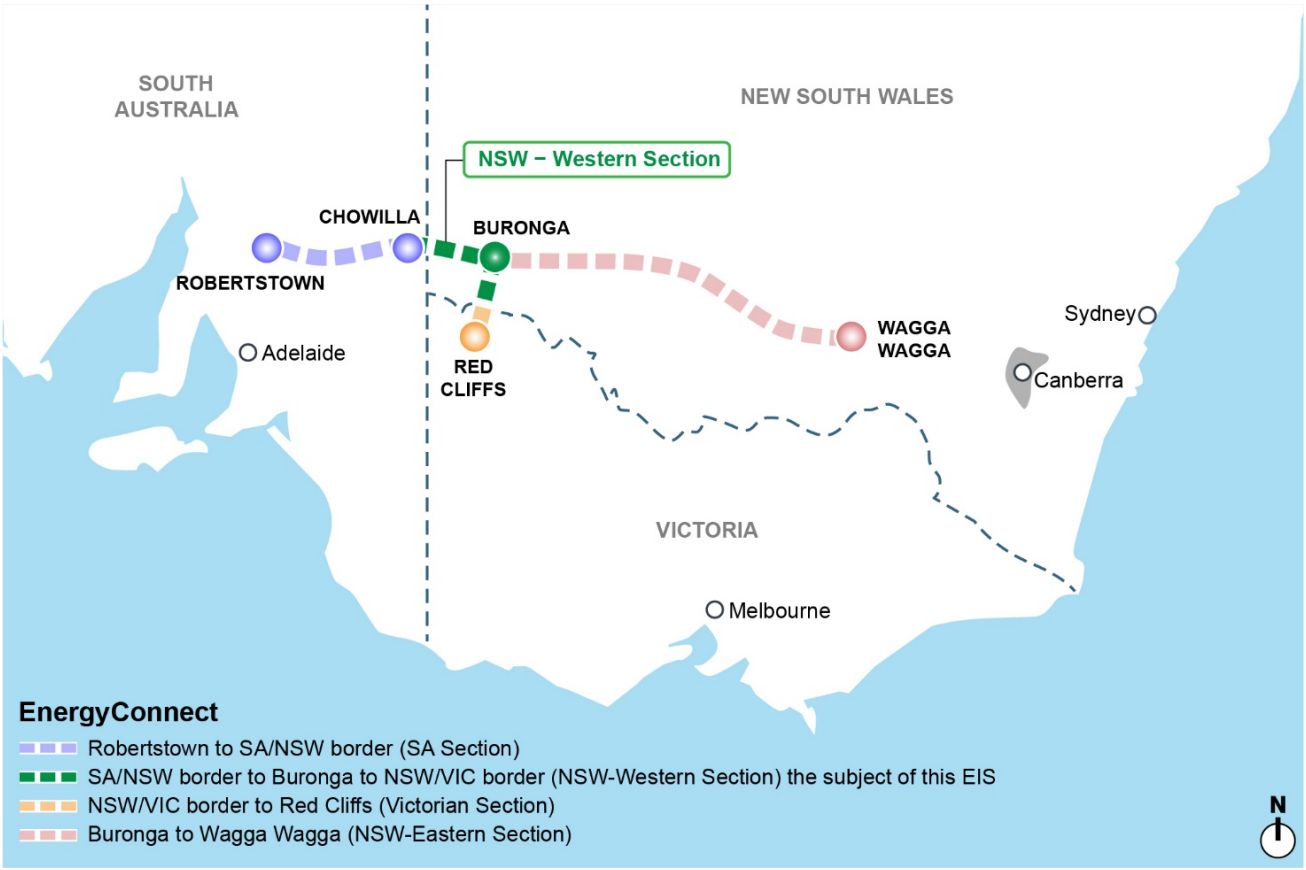

Figure 1.1 Overview of EnergyConnect

1.2 THE PROPOSAL

TransGrid is seeking approval under Division 5.2, Part 5 of the *Environmental Planning and Assessment Act 1979* (the EP&A Act) to construct and operate the proposal. The proposal has been declared as Critical State significant infrastructure under Section 5.13 of the EP&A Act.

The proposal was also declared a controlled action on 26 June 2020 and requires a separate approval under the (Commonwealth) *Environment Protection and Biodiversity Conservation Act 1999*. The proposal is subject to the bilateral assessment process that has been established between the Australian and NSW governments.

The proposal is located in western NSW within the Wentworth Local Government Area (LGA), approximately 800 kilometres west of Sydney at its nearest extent. The proposal spans between the SA/NSW border near Chowilla and Buronga and the NSW/Victoria border at Monak, near Red Cliffs. It traverses around 160 kilometres in total.

1.2.1 KEY PROPOSAL FEATURES

The key components of the proposal include:

- a new 330 kilovolt (kV) double circuit transmission line and associated infrastructure, extending around 135 kilometres between the SA/NSW border near Chowilla and the existing Buronga substation
- an upgrade of the existing 24 kilometre long 220kV single circuit transmission line between the Buronga substation and the NSW/Victoria border at Monak (near Red Cliffs, Victoria) to a 220kV double circuit transmission line, and the decommissioning of the 220kV single circuit transmission line (known as Line 0X1)
- a significant upgrade and expansion of the existing Buronga substation to a combined operating voltage 220kV/330kV
- new and/or upgrade of access tracks as required
- a minor realignment of the existing 0X2 220kV transmission line, in proximity to the Darling River
- ancillary works required to facilitate the construction of the proposal (e.g. laydown and staging areas, concrete batching plants, brake/winch sites, site offices and accommodation camps).

An overview of the proposal is provided in Figure 1.2. The final alignment and easement of the transmission line would be confirmed during detailed design and would be located within the transmission line corridor as shown in Figure 1.2.

Subject to approval, construction of the proposal would commence in mid-2021. The construction of the transmission lines would take approximately 18 months. The Buronga substation upgrade and expansion would be delivered in two components and would be initially operational by the end of 2022, with site decommissioning and rehabilitation to be completed by mid-2024.

The final construction program would be confirmed during detailed design.

The proposal is further described in Chapter 5 and Chapter 6 of the Environmental Impact Statement (EIS).

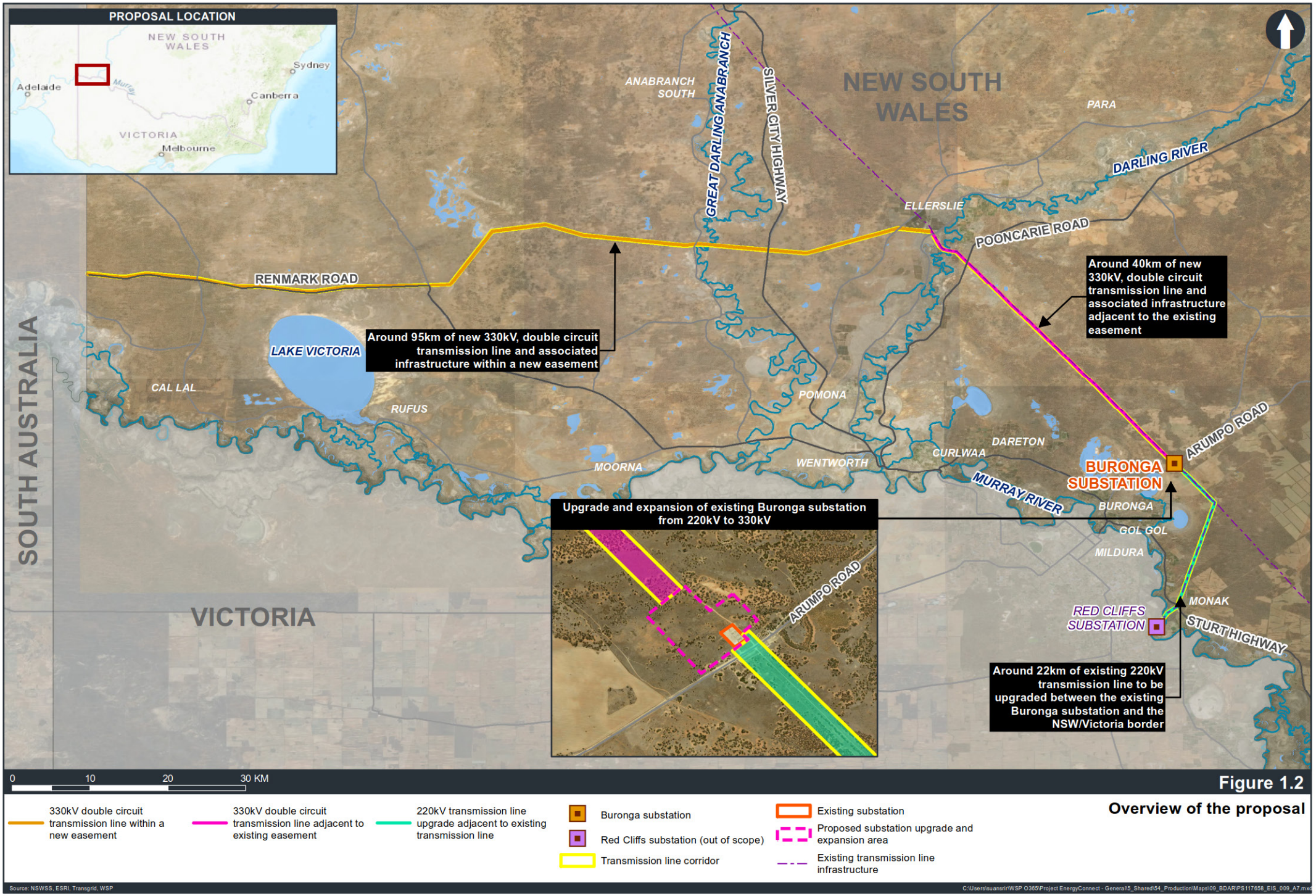

Figure 1.2

Overview of the proposal

1.2.2 PROPOSAL NEED

The proposal is required to complete the missing transmission link between the SA and NSW transmission networks. The upgrade to the existing transmission line between Buronga and Red Cliffs would also enhance the capacity of the network to provide electricity between NSW and Victoria.

This connection would relieve system constraints and allow for NSW, SA and Victorian consumers to benefit from significant amounts of low-cost, large-scale solar generation in south-west NSW. The proposal is an essential component of EnergyConnect.

1.2.3 KEY POLLUTANTS

The construction of the proposal would generate dust from dust generating activities including earth moving, construction and movement of vehicles on unpaved roads. The combustion of engine fuel from vehicle movements and the operation of on-site plant and machinery has the potential to generate gaseous air pollutants. Overall, the following key air pollutant emissions were identified:

- particulate matters (PM) associated pollutants:
  - total suspended particulates (TSP)
  - particulate matters equal to or less than 10 micrometres in diameter (PM_{10})
  - particulate matters equal to or less than 2.5 micrometres in diameter ($PM_{2.5}$)
  - deposited dust.
- gaseous air pollutants:
  - carbon monoxide (CO)
  - oxides of nitrogen (NO_x)
  - sulphur dioxide (SO_2)
  - volatile organic compounds (VOCs) (e.g. benzene)
  - polycyclic aromatic hydrocarbons (PAHs).

1.3 PURPOSE OF THIS TECHNICAL REPORT

This technical paper is one of a number of technical papers that form part of the EIS for the proposal.

The purpose of this technical paper is to identify and assess the potential impacts of the proposal in relation to air quality. It responds directly to the Secretary's environmental assessment requirements (SEARs) issued by NSW Department of Planning, Industry and Environment (DPIE) (refer to Section 1.3.1) and has been prepared with consideration of the *Guidance on the assessment of dust from demolition and construction* (IAQM, 2014).

Further detail on the methodology applied in this assessment is detailed in Chapter 3 of this air quality impact assessment (AQIA) report.

1.3.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The SEAR specific to this assessment and where these aspects are addressed in this technical report are outlined in Table 1.1.

Table 1.1 Secretary's environmental assessment requirements – Air

REFERENCE	SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS	WHERE ADDRESSED
Key issue – Air	An assessment of the air quality impacts of the project	Chapter 5 and 6

1.4 STRUCTURE OF THIS REPORT

The structure and content of this report is as follows:

- *Chapter 1 – Introduction:* Outlines the background and need for the proposal, and the purpose of this report.
- *Chapter 2 – Legislative and policy context:* Provides an outline of the key legislative requirements and policy guidelines relating to the proposal.
- *Chapter 3 – Methodology:* Provides an outline of the methodology used for the preparation of this AQIA.
- *Chapter 4 – Existing environment:* Describes the existing topography, climate, ambient air quality and sensitive receptors.
- *Chapter 5 – Assessment of construction impacts:* Describes the potential construction impacts associated with the proposal.
- *Chapter 6 – Assessment of operational impacts:* Describes the potential operational impacts associated with the proposal.
- *Chapter 7 – Cumulative impacts:* Outlines the potential cumulative impacts with respect to other known developments within the vicinity of the proposal.
- *Chapter 8 – Mitigation measures:* Outlines the proposed mitigation measures for the proposal.
- *Chapter 9 – Conclusion:* Provides a conclusion of the potential impacts of the proposal on air quality impacts.
- *Chapter 10 – References*: Identifies the key reports and documents used to generate this report.

Appendices to this report includes:

- **Appendix A** – Location of identified sensitive receptors.

1.5 REPORT TERMINOLOGY

The following terms are discussed throughout this report and are defined as:

- **Proposal study area** – the study area for the environmental assessments to provide a broader understanding of the constraints and conditions of the locality. It comprises of a one kilometre wide corridor between the SA/NSW border near Chowilla and Buronga and a 200 metre wide corridor between Buronga and the NSW/Victoria border at Monak, near Red Cliffs. The transmission line corridor, Buronga substation upgrade and expansion, access tracks, and the main construction compounds and accommodation camps at Buronga and Anabranch South would be contained in this area
- **Transmission line corridor** – A 200 metre corridor in which the final transmission line easement and transmission line infrastructure would be contained within. Construction activities associated with the transmission line would be expected to be contained within this area.

1.6 LIMITATIONS

The existing environment study was conducted using publicly available data (e.g. Bureau of Meteorology) and consulting the DPIE (i.e. ambient air quality monitoring data). Due to the remoteness of the proposal and the limited availability of information for the proposal study area, the most representative data was analysed to demonstrate the likely condition of the existing environment.

2 LEGISLATIVE AND POLICY CONTEXT

This chapter describes Commonwealth and NSW state legislative and policy context of the proposal in relation to air quality.

2.1 COMMONWEALTH

2.1.1 NATIONAL ENVIRONMENT PROTECTION (AMBIENT AIR QUALITY) MEASURE

The National Environment Protection Council (NEPC) established ambient air quality standards and goals in the *National Environment Protection (Ambient Air Quality) Measure 2016* (Air NEPM).

The Air NEPM sets health-based air quality standards for seven criteria air pollutants. These standards are not relevant to air emissions from individual sources, specific industries or roadside locations. Air NEPM standards are intended to be applied at performance monitoring locations that represent air quality for a region or sub-region of 25,000 people or more.

Overall, ambient air quality standards relevant to this proposal are presented in Table 2.1.

Table 2.1 Ambient air quality standards from Air NEPM

POLLUTANT	AVERAGING PERIOD	STANDARDS[1]	MAXIMUM ALLOWABLE EXCEEDANCES	SOURCE
PM_{10}	1 day	50 µg/m^3	None	Air NEPM
	1 year	20 µg/m^3	None	Air NEPM
$PM_{2.5}$[2]	1 day	25 µg/m^3	None	Air NEPM
	1 year	8 µg/m^3	None	Air NEPM

(1) 100th percentile

(2) Commonwealth, State and Territory Environment Ministers have flagged an objective to move to $PM_{2.5}$ standards of 20 µg/m^3 (1-day average) and 7 µg/m^3 (1-year average) by 2025.

2.2 STATE

2.2.1 PROTECTION OF THE ENVIRONMENT OPERATION ACT 1997

The *Protection of the Environment Operations Act 1997* provides the legislative framework for the protection and enhancement of air quality in NSW. Its primary objectives are to reduce risks to harmless levels through pollution prevention, cleaner production, application of waste management hierarchy, continual environmental improvement and environmental monitoring.

2.2.2 APPROVED METHODS FOR MODELLING AND ASSESSMENT OF AIR QUALITY IN NSW (2016)

The NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales 2016* (Approved Methods) prescribes the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in the state.

The Approved Methods lists impact assessment criteria for a number of pollutants and the relevant criteria of this proposal are presented in Table 2.2.

Table 2.2 Air quality impact assessment criteria in the Approved Methods

POLLUTANT	AVERAGING PERIOD	STANDARDS[1]
TSP	Annual	90 µg/m^3
PM_{10}	24 hours	50 µg/m^3
	Annual	20 µg/m^3
$PM_{2.5}$	24 hours	25 µg/m^3
	Annual	8 µg/m^3
Deposited dust	Annual	2 g/m^2/month (increase) 4 g/m^2/month (cumulative)

(1) 100th percentile

3 METHODOLOGY

This chapter describes the methods used to assess the potential impacts of the proposal. As the nature of activities during the construction phase and operation phase vary, the assessment methodology used for two phases were discussed separately.

3.1 CONSTRUCTION

The dust emissions associated with the construction of proposal was assessed in accordance with the *Guidance on the assessment of dust from demolition and construction* published by the Institute of Air Quality Management (IAQM) in 2014 (hereafter referred to as the IAQM guidance). Gaseous emissions from the construction works and any construction works screened out by the IAQM guidance was assessed qualitatively.

As stated in the IAQM guidance, the risk of dust emissions from a construction site causing health impacts is related to:

- the activities being undertaken (earthmoving, number of vehicles and plant etc.)
- the duration of these activities
- the size of the site
- the meteorological conditions (wind speed, direction and rainfall)
- the proximity of receptors to the activities
- the adequacy of the mitigation measures applied to reduce or eliminate dust
- the sensitivity of the receptors to dust.

The quantity of dust emitted from construction operations is related to the area of land being worked, and the level of construction activity (nature, magnitude and duration).

The wind direction, wind speed and rainfall, at the time when a construction activity is taking place, will also influence whether there is likely to be dust impacts. Adverse impacts can occur in any direction from a site. They are, however, more likely to occur downwind of the prevailing wind direction and/or close to the site. In addition, local conditions including topography and natural barriers (e.g. woodland) will reduce airborne concentrations due to impaction. Furthermore, the existing background concentrations can be used to determine whether ambient air quality standards are likely to be exceeded as a result of construction activities.

The AQIA undertaken for the construction phase adopted the following approach:

- overview the proposal scope, proposal study area and activities during construction and operation
- review the existing environment conditions including local topography, climate and existing ambient air quality
- identify sensitive receptors within 350 meters of the transmission line corridor of the transmission lines, 500 metres of the Buronga substation, the construction compound and camp sites and concrete batching plants along transmission lines, if there are any
- conduct a qualitative assessment of potential dust impacts associated with the proposal:
  - risk-based assessment in accordance with the IAQM guidance:
    - Step 1: Screen the requirement for a more detailed assessment
    - Step 2: Assess the risk of dust impacts. This is done separately for each of three activities including earthwork, construction and track out
      - Step 2A: Determine the potential dust emission magnitude
      - Step 2B: Determine the sensitivity of the area
      - Step 2C: Assess the risk by combining the factors in Step 2A and Step 2B.
    - Step 3: Determine the site-specific mitigation
    - Step 4: Examine the residual effects and determine whether or not these are significant

- for construction works screened out for a detailed risk assessment (in Step 1), the IAQM guidance indicates that it can be concluded that the level of risk is “negligible” and any effects would not be of significance. To minimise the impacts on the environment from the proposal construction activities and implement best practices, the potential emissions from these construction site activities were qualitatively assessed
- qualitatively address gaseous emissions generated from vehicles and fugitive sources
- develop site-specific mitigation measures for the construction of the proposal
- assess the residual impacts after the implementation of mitigation measures.

3.2 OPERATION

During the operational phase, no air emissions are anticipated to be generated either from the operation of transmission lines or the Buronga substation.

Gaseous emissions due to vehicle fuel combustion and wheel-generated dust on unpaved roads have the potential to be generated during routine inspection, maintenance or emergency. The frequency of these events and numbers of vehicles required at that time were addressed to qualitatively assess the potential impacts.

4 EXISTING ENVIRONMENT

4.1 TOPOGRAPHY

The western section, located over 300 kilometres from the closest coastline in SA, stretches from the SA/NSW border to Buronga substation and then south to the NSW/VIC border, near Monak. The overall terrain is relatively flat across the proposal with an elevation ranging from 35 metres to 80 metres as shown in Figure 4.1.

4.2 CLIMATE

Meteorological conditions are important for determining the direction and rate at which emissions from a source disperses. The key meteorological parameters for air dispersion are wind speed, wind direction, temperature, rainfall and relative humidity. Historical meteorological data in the vicinity of the proposal study area was reviewed in this section to demonstrate the existing local meteorological conditions.

The Bureau of Meteorology (BoM) collects meteorological data at Automatic Weather Station (AWS) across Australia and can be used for determining climate statistics over a long period.

There are three AWSs near the proposal alignment:

- Mildura Airport AWS is located 21 kilometres to the southwest of Buronga substation and 16 kilometres to the west of the closest transmission line
- Lake Victoria Storage AWS is approximately 15 kilometres to the south of the closest transmission line
- Wentworth Post Office AWS is located 24 kilometres to the south west of the closest transmission line. However, as most of the climatic data has not been collected at the Wentworth Post Office AWS since 1967 except for rainfall, the climate statistics data from this station were not analysed in this assessment.

Table 4.1 provides a basic summary of the stations and Figure 4.1 presents the location of the stations.

As the land is relatively flat surrounding the proposal study area, it is considered the climate data at Lake Victoria Storage AWS and Mildura Airport AWS are both representative of the proposal study area.

Table 4.1 Summary of AWS near the proposal

STATIONS	SITE NUMBER	COORDINATES	DISTANCE (KILOMETRES)	AVAILABLE DATA TYPE	NOTES
Mildura Airport	076031	142.09°E, 34.24°S	16 km west	Climate statistics 1-minute weather data	
Wentworth Post Office	047053	141.92°E, 34.11°S	24 km south west	Climate statistics	Monitoring stopped in 1967 except for rainfall
Lake Victoria Storage	047016	141.27°E, 34.04°S	15 km south	Climate statistics	3 pm conditions were not collected

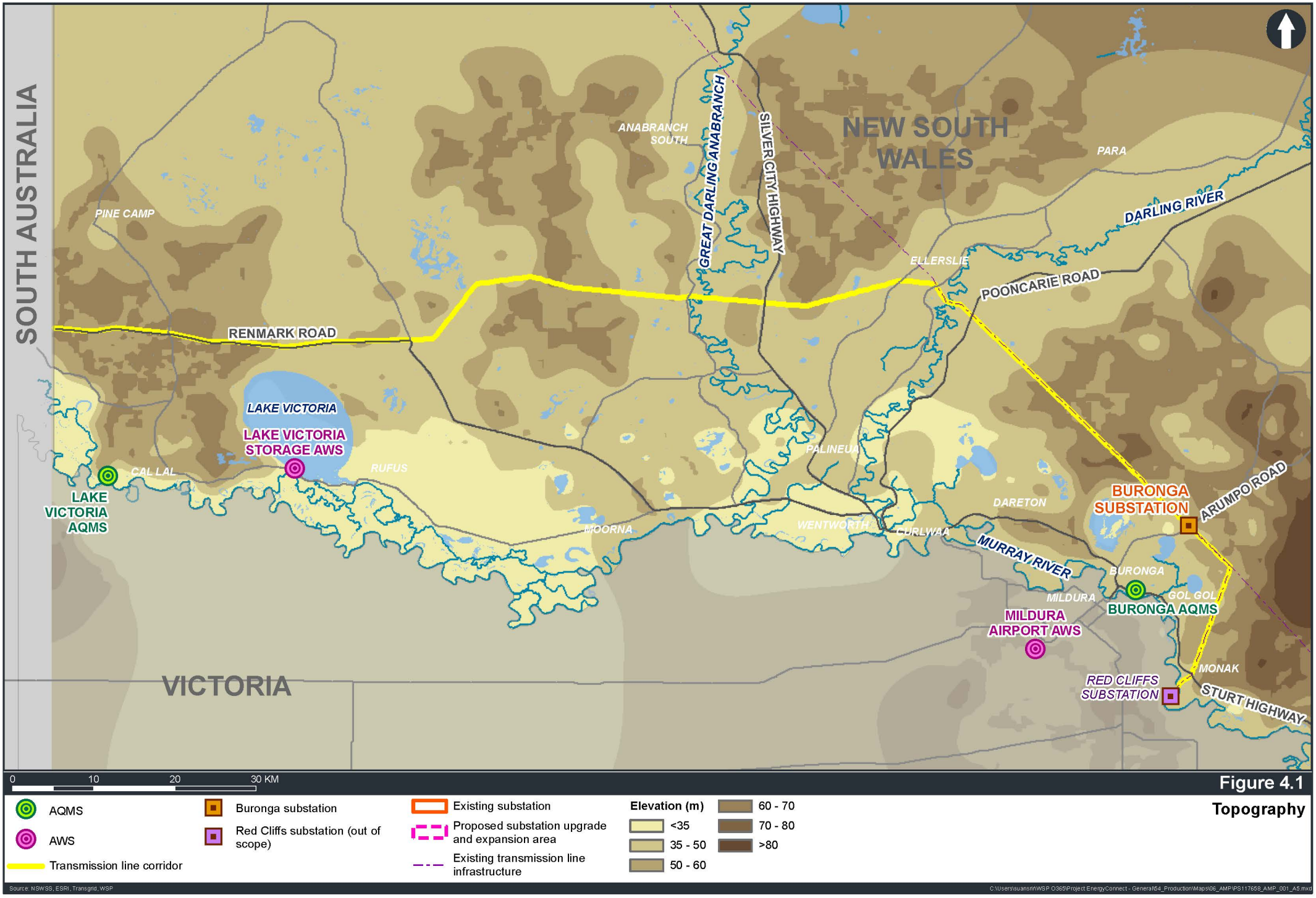

Figure 4.1

Topography

4.2.1 CLIMATE STATISTICS

The climate statistics data recorded by BoM at the Mildura Airport AWS and Lake Victoria Storage AWS are presented in Table 4.2 and Table 4.3 respectively.

The local climate around Mildura Airport AWS is characterised by:

- average maximum temperature of 32.5ºC in January
- average minimum temperature of 4.4ºC in July
- annual average rainfall of 285.8 millimetres and average rainy days (rain ≥ 1 millimetres) of 43.8
- average maximum 9 am relative humidity of 88 per cent in June
- average minimum 3 pm relative humidity of 27 per cent in January and December.

The local climate around Lake Victoria Storage AWS is characterised by:

- average maximum temperature of 32.3ºC in January
- average minimum temperature of 5.3ºC in July
- annual average rainfall of 259.1 millimetres and average rainy days (rain ≥ 1 millimetre) of 43.1
- average maximum 9 am relative humidity of 86 per cent in June.

Table 4.2 Summary of climate statistics at Mildura Airport AWS

PARAMETER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANU
Daily temperature (1946 to 2020)													
Max (ºC)	32.5	31.8	28.5	23.7	19.1	16	15.5	17.3	20.6	24.2	27.7	30.4	23.9
Min (ºC)	16.8	16.5	13.9	10.2	7.4	5.2	4.4	5.2	7.3	9.8	12.6	15	10.4
Rainfall (1946 to 2020)													
Mean rainfall (mm)	21.9	21.5	19.4	19.5	25.3	22	24.7	25.2	26.6	28.2	25.9	25.2	285.8
Mean days of rain	2.5	2.1	2.4	2.8	4.1	4.6	5.1	5.1	4.3	4.4	3.6	2.8	43.8
Mean 9 am conditions (1946 to 2010)													
Temperature (ºC)	21.7	20.9	18.5	14.9	10.8	7.8	7.1	9.1	12.7	16.1	18.4	20.5	14.9
Relative humidity (%)	52	56	61	68	81	88	86	78	67	57	53	50	67
Wind speed (km/h)	15.7	14.5	13.4	11.6	9.5	9.4	10.4	12.8	15.7	17.4	16.6	16	13.6
Mean 3 pm conditions (1946 to 2010)													
Temperature (ºC)	30.5	29.9	27.1	22.7	18.3	15.3	14.6	16.4	19.4	22.6	25.9	28.4	22.6
Relative humidity (%)	27	30	33	40	50	56	54	47	40	34	30	27	39
Wind speed (km/h)	16.9	16	15.6	15.4	15.1	15.6	17.3	19.3	19.7	19.7	18.4	18.1	17.3

Note: ANU: Annual

Table 4.3 Summary climate statistics at Lake Victoria Storage AWS

OBS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANU
Daily temperature (1922 to 2020)													
Max (ºC)	32.3	31.7	28.6	23.6	19.1	15.7	15.4	17.2	20.5	23.9	27.4	30.5	23.8
Min (ºC)	16.6	16.5	14.1	10.5	7.8	5.7	5.3	6.1	8.1	10.6	13.2	15.3	10.8
Rainfall (1922 to 2020)													
Mean rainfall (mm)	19.6	18.7	14.6	18.8	23.5	22.6	23.8	23.5	24.2	26.1	23.4	20.5	259.1
Mean days of rain	2.3	2.1	2	2.9	4.3	4.6	5.4	5.2	4.2	4	3.4	2.7	43.1
Mean 9 am conditions (1922 to 2010)													
Temperature (ºC)	21.6	21.1	18.7	15.2	11.6	8.8	8.4	9.9	13	16	18.5	20.7	15.3
Relative humidity (%)	58	61	65	71	80	86	84	78	71	65	61	58	70
Wind speed (km/h)	10.5	9.3	8.8	7.8	6.6	7.1	8.5	9.7	10.8	11.4	10.4	10.7	9.3
Mean 3 pm conditions (None)													

Note: ANU: Annual

4.2.2 TYPICAL WIND CONDITIONS

As detailed wind conditions data were only recorded at Mildura Airport AWS, Figure 4.2 presents seasonal and annual wind roses showing the frequency of strength and direction of winds for the past five years (2015 to 2019 inclusive) at this station.

The wind roses indicate that the typical winds at Mildura Airport AWS are:

- most frequently from the southerly direction and rarely from the north during summer with a calm wind frequency of 1.12 per cent
- most frequently from the southerly direction and moderately from the west and north-northeast during autumn with a calm wind frequency of 3.53 per cent
- most frequently from the westerly, northerly and north north-easterly directions and rarely from the east during winter with a calm wind frequency of 4.25 per cent
- most frequently from southerly to westerly directions during spring with a calm wind frequency of 1.9 per cent
- most frequently from a southerly direction and moderately from the west and north north-east across five years with a calm wind frequency of 2.71 per cent.

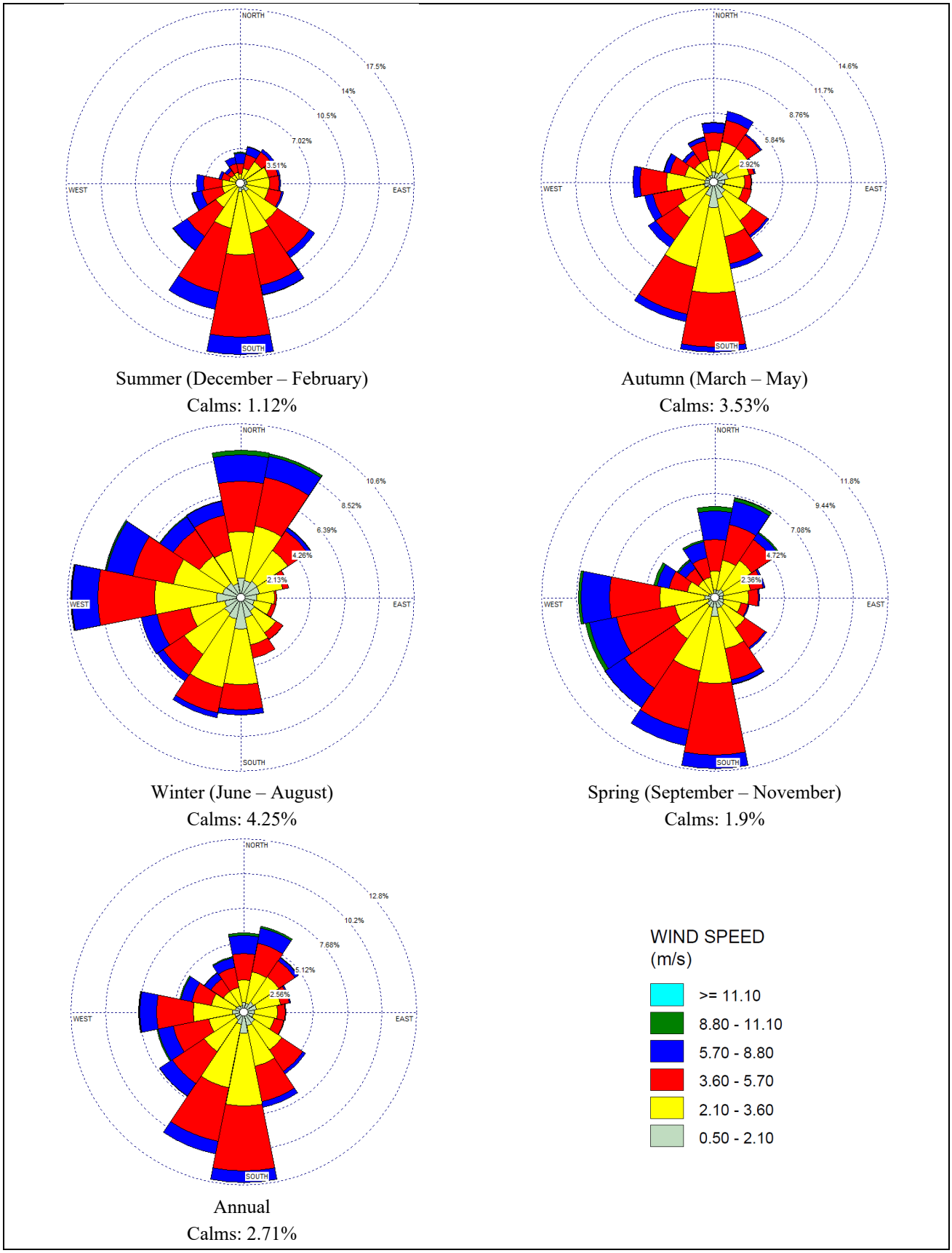

Figure 4.2 Mildura Airport AWS seasonal and annual wind roses (2015–2019)

4.3 AMBIENT AIR QUALITY

4.3.1 EXISTING EMISSION SOURCES

The proposal study area and surrounding areas are predominantly rural with some residences. The main existing emissions are wind-blown dust from bare land and traffic using the local road network.

A National Pollutant Inventory (NPI) database review was conducted to identify existing emission sources in the vicinity of the proposal study area. Two facilities located in Buronga reported their emissions to the NPI for the 2018/2019 reporting period (refer to Table 4.4). However, these two facilities are approximately nine kilometres southwest to the proposal study area. Therefore, the proposal study area is not likely to be affected by the emissions from the operation of these facilities.

Table 4.4 Closest facilities reporting to the NPI database for the 2018/2019 period

FACILITY	ADDRESS	MAIN ACTIVITY	RELEVANT REPORTED SUBSTANCE (TONNE/ANNUM)
Buronga Hill Winery	557a Silver City Highway, Buronga, NSW 2739	Winemaking	PM_{10}: 0.2t/a $PM_{2.5}$: 0.084 t/a CO: 1.1 t/a NO_x: 3.3 t/a SO_2: 0.001 t/a TVOCs: 42 t/a
Stanley Wines Buronga	514 Silver City Highway, Buronga, NSW 2739	Winemaking activities and spirit processing, production and packaging	TVOCs: 14 t/a

4.3.2 BACKGROUND AIR QUALITY

The NSW Government monitors air quality at 47 air quality monitoring stations (AQMS) in metropolitan and regional centres and 36 rural AQMS. There are two rural stations close to the proposal study area:

- Buronga AQMS: approximately 8.3 kilometres to the west of the transmission line
- Lake Victoria AQMS: approximately 17.5 kilometre to the south of the transmission line near the NSW/SA border.

Only dust (i.e. PM_{10} and $PM_{2.5}$) is being monitored at the rural stations using 8520 DustTraks or DRX DustTraks. These instruments are not reference or reference equivalence methods. As such, the monitoring data at these stations were considered indicative of particulate matter concentrations in a rural area and compliance assessment against the Air NEPM standards was not conducted. All the data presented in this section were to provide a context of indicative background air quality level.

The latest five years (2015 to 2019 inclusive) monitoring data of PM_{10} and $PM_{2.5}$ at the Buronga AQMS was analysed. However, the majority of $PM_{2.5}$ monitored concentrations were higher than that of PM_{10} and TSP, which is not considered reasonable, and were not presented in this section.

The indicative annual and 24-hour PM_{10} concentrations, number of days with elevated PM_{10} concentrations (i.e. above Air NEPM standard of 20 $\mu g/m^3$) are presented in Table 4.5. There were 149 days, equivalent to 8.2% days, with elevated PM_{10} concentrations over five years due to a range of events including dust storms, bushfire smoke, fog or other dust event in the region.

The Lake Victoria AQMS began PM_{10} and $PM_{2.5}$ monitoring in August 2019 and was not included in this assessment due to less than 75 per cent of data available for the year.

Table 4.5 Indicative PM_{10} concentrations at the Buronga AQMS (2015–2019 inclusive)

YEARS	ANNUAL	24-HOUR AVERAGE (µg/m³)				
		Maximum	99th percentile	70th percentile	50th percentile	Number of days with elevated concentrations
2015	7.1	80.0	29.0	7.5	5.5	13
2016	6.5	34.9	19.9	7.4	5.5	3
2017	1.9	71.8	46.6	7.3	5.1	28
2018	10.5	162.8	64.7	9.6	6.6	28
2019	31.9	1292.5	403.2	16.1	11.5	77

4.4 SENSITIVE RECEPTORS

The Approved Methods (EPA, 2016) describes a sensitive receptor as:

> A location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area. An air quality impact assessment should also consider the location of any known or likely future sensitive receptor.

As there is potential for the final location of the transmission lines to adjust within the transmission line corridor, sensitive receptors within 350 metres of the boundary of the corridor (in relation to the transmission lines sections) have been identified for assessment. Sensitive receptors within 500 metres of the Buronga substation, the construction compound and camp facilities sites and concrete batching plants along transmission lines were identified for assessment. Both of these approaches to sensitive receptor identification are expected to provide a conservative assessment for air quality impacts.

Sensitive receptors are shown in Appendix A. There are no sensitive receptors within 500 metres of the Buronga substation, the construction compound and camp facilities sites, and concrete batching plants along the transmission line would be located at least 500 metres away from sensitive receptors.

Receptors identified within the assessment buffer are presented in Table 4.6 and shown in Appendix A.

Table 4.6 Identified sensitive receptors

RECEPTOR ID	TYPE	SUBURB[1]	DISTANCE FROM THE TRANSMISSION LINE CORRIDOR (METRES)
R1489	Residential	Wentworth-1	198
R2023	Residential	Wentworth-1	258
R2022	Residential	Wentworth-2	104

(1) Suburb-number means the sensitive receptors located in the same suburb but may be affected by different structure construction sites.

5 ASSESSMENT OF CONSTRUCTION IMPACTS

5.1 CONSTRUCTION SCHEDULING

5.1.1 TRANSMISSION LINE

Two parts of transmission line construction are included in this proposal as follows:

- SA/NSW border to Buronga substation: approximately 135 kilometres of new 330kV double circuit transmission line and associated infrastructure
- Buronga substation to the NSW/VIC border: approximately 22 kilometres of an upgrade to the existing 220kV transmission line.

As part of these activities, redundant 220kV transmission line structures would be decommissioned, and concrete batching plants would be operating within the transmission line corridor to support the construction of new transmission line structures.

Subject to approval, construction of the proposed transmission lines is planned to start in mid-2021. The indicative duration of each stage is presented in Table 5.1. For emissions associated with construction activities, the duration of construction works indicates the period during which the emissions would be potentially generated. The construction methodology will be further developed and confirmed during detailed design.

Table 5.1 Transmission line construction period and working hours

STAGES	COMMENCEMENT AND COMPLETION DATE	STANDARD WORKING HOURS
Enabling works (excluding site establishment)	July 2021 – Sept 2021	7:00 am – 7:00 pm
Enabling works (site establishment) and access tracks	Sept 2021 – April 2022	
Earthworks and civil construction works	Oct 2021 – Oct 2022	
Tower assembly, erection and stringing	Nov 2021 – Dec 2022	
Commissioning	Sept 2022 – Dec 2022	
Demobilisation/rehabilitation	Jan 2023 – June 2023	

5.1.2 SUBSTATION

The existing Buronga substation would be upgraded and expanded from an operating capacity of 220kV to a combined operating voltage 220kV/330kV. The new 330kV substation yard would be constructed adjacent to the existing 220kV substation. Subject to approvals, construction of the Buronga substation is planned to start in mid-2021.

The indicative duration of each stage is presented in Table 5.2.

Table 5.2 Buronga substation construction period and working hours

ACTIVITIES	COMMENCEMENT AND COMPLETION DATE		STANDARD WORKING HOURS
	Component 1	Component 2	
Enabling works (including site establishment)	July 2021 – Dec 2021		7:00 am – 7:00 pm
Earthworks and civil construction works	Aug 2021 – Dec 2022		
Electrical construction works	April 2022 – Nov 2022	Jun 2022 – May 2023	
Pre-commissioning and commissioning	Oct 2022 – Dec 2022	Nov 2022 – Aug 2023	
Demobilisation/rehabilitation	Aug 2023 – June 2024		

5.1.3 ANCILLARY SITES

The Anabranch South and Buronga main construction compounds and accommodation camps would operate within the timeframes presented in Table 5.1 and Table 5.2, with Anabranch South operating for the same duration as the transmission line works, and Buronga similar timeframes to the Buronga substation upgrade and expansion.

5.2 DUST IMPACTS

Dust impacts depend on the quantity and drift potential of the particles in the atmosphere. Larger particles (the larger particle fractions of TSP) settle out closer to the source due to their larger mass. The deposition of the particles can cause nuisance and aesthetic impacts on the receiving environment. Finer particles (PM_{10} and $PM_{2.5}$) remain entrained longer and therefore dispersed at greater distances from the source. The fine nature of these particles also has the potential for human health impacts if not adequately controlled.

This section assesses the potential dust impacts associated with the proposal. The dust impact assessment approach outlined in the IAQM guidance was adopted in this assessment. For construction works included in the detailed risk assessment (‘screened in’) are analysed in Section 5.2.1 and for those activities not included (‘screened out’) are qualitatively assessed in Section 5.2.2.

The following work has been included in this section:

- risk assessment:
  - Step 1: Screen the requirement for a more detailed assessment.
  - Step 2: Assess the risk of dust impacts. This is done separately for each of three activities including earthwork, construction and vehicle track out.
    - Step 2A: Determine the potential dust emission magnitude.
    - Step 2B: Determine the sensitivity of the area.
    - Step 2C: Assess the risk by combining the factors in Step 2A and Step 2B.
  - Step 3: Determine the site-specific mitigation.
  - Step 4: Examine the residual effects and determine whether or not these are significant.

- qualitative assessment:
  - Buronga substation
  - ancillary sites.

5.2.1 RISK ASSESSMENT

5.2.1.1 STEP 1 – SCREEN THE NEED FOR A DETAILED ASSESSMENT

The IAQM guidance recommends that a risk assessment of potential dust impacts from construction activities is undertaken when sensitive receptors are located within:

- 350 metres of the boundary of the site
- 50 metres of the routes used by construction vehicles on the public highway, up to 500 metres from the site entrances.

In cases where no sensitive receptors identified within these locations, the need for a more detailed assessment is 'screened out'. It can be concluded that the level of risk is negligible, and any impacts will not be of significance. Given that with the progress of detailed design, there is potential that the exact location for each construction site and the transmission line might change within the transmission line corridor, therefore, the corridor boundary was conservatively used as the site boundary for transmission lines construction. For Buronga substation, construction compound and camp facilities sites and concrete batching plants along transmission lines, the screening threshold was conservatively extended to 500 metres.

Due to the nature of the proposal, the Buronga substation, the main construction compound and accommodation camp sites and each transmission line structure site are considered as separate construction sites. The exact locations of concrete batching plants along transmission lines would be determined during detailed design. However, for the purposes of this assessment, it is assumed that the plants would be located greater than 500 meters away from any sensitive receptors.

The identified sensitive receptors for each site are:

- three along the transmission lines in Wentworth
- none within 500 metres of the Buronga substation
- none within 500 metres of the main construction compound and accommodation camp facilities sites
- none within 500 metres of the concrete batching plants along transmission lines.

A detailed risk assessment was triggered for construction of the transmission lines and are discussed in Section 5.2.1.2 to Section 5.2.1.6.

The Buronga substation upgrade and expansion, the main construction compound and accommodation camp sites, and the operation of concrete batching plants along transmission lines were 'screened out' for a detailed risk assessment. However, to minimise the impacts on the environment from the proposal construction activities and implement best practices, potential emissions sources from these sites were qualitatively analysed in Section 5.2.2.

5.2.1.2 STEP 2A – DETERMINE THE POTENTIAL DUST EMISSION MAGNITUDE

The potential dust emission magnitudes for earthworks, construction and vehicle track out activities were evaluated in this section. Examples provided in the IAQM guidance have been used to classify potential large, medium or small dust emission magnitude as shown in Table 5.3.

Table 5.3 Example definitions for large, medium and small dust emission magnitude

ACTIVITIES	LARGE	MEDIUM	SMALL
Earthworks	— Total site area >10,000 square metres — Potential dust soil type (e.g. clay) — >10 heavy earth moving vehicles active at any one time — Formation of bounds >8 metres in height — Total material moved >100,000 tonnes.	— Total site area 2,500–10,000 square metres — Moderately dusty soil type (e.g. silt) — 5–10 heavy earth moving vehicles active at any one time — Formation of bounds 4–8 metres in height — Total material moved 20,000 tonnes – 100,000 tonnes.	— Total site area <2,500 square metres — Soil type with large grain size (e.g. sand) — <5 heavy earth moving vehicles active at any one time — Formation of bounds <4 metres in height — Total material moved <20,000 tonnes — Earthworks during wetter months.
Construction	— Total building volume >100,000 cubic metres — On-site concrete batching — Sandblasting.	— Total building volume 25,000–100,000 cubic metres — On-site concrete batching — Potentially dusty construction material (e.g. concrete).	— Total building volume <25,000 cubic metres — Construction material with low potential for dust release (e.g. metal cladding or timber).
Track out[1]	— >50 heavy duty vehicles (HDV,>3.5 tonne) outward movements in any one day — Potential dusty surface material (e.g. high clay content) — Unpaved road length >100 metres.	— 10–50 HDV (>3.5 tonne) outward movements in any one day — Moderately dusty surface material (e.g. high clay content) — Unpaved road length 50–100 metres.	— <10 HDV (>3.5 tonne) outward movements in any one day — Surface material with low potential for dust release — Unpaved road length <50 metres.

(1) Track out is dirt, mud or other materials tracked onto a paved public roadway by a vehicle leaving a construction site.

EARTHWORKS

The transmission lines would be supported on a series of transmission line structures spaced between 300 and 600 metres apart on the 330kV line and between 300 and 450 metres apart on the 220kV line. The main earthworks associated with the construction of the transmission lines would be structural excavations. A self-supporting structure with four foundations per structure was conservatively assumed to estimate the volume of excavated material. Reinforced concrete would be used to fill the excavations. Excavated material would be stockpiled and used for backfill around the foundations.

Except for the typical earthworks, access tracks may be required where existing access tracks are not available. Track construction would be carried out so as to cause minimum disturbance to soil and vegetation on and adjacent to the track. Access tracks would potentially be from structure to structure. Dust may be generated from vehicles moving on unpaved tracks and wind erosion from exposed areas, which has the similar dust emission nature from earthworks sites. Therefore, the access track areas were included within the total earthworks site area calculation.

Given the distance between structures, each structure location is considered to be a separate site. 300 metres long access tracks on both sides of each structure were conservatively assumed to be part of each site.

Details of the indicative earthworks at each transmission line structure site are:

- total site area would approximately be 8,910 square metres:
  - the disturbance area at each structure would be up to 65 by 90 metres, equivalent to 5,850 square metres (structural excavation area for four foundations would be approximately 13 square metres)
  - access tracks area would be 3,060 square metres (six metres in width, 510 metres in length excluding 90 metres in the disturbance area)
- the total material moved at each structure site from the proposal would approximately be 200 cubic metres, equivalent to 1,102 tonnes (assuming earth density of 5,510 kilograms per cubic metre)
- the soil type is sandy
- less than five heavy earth moving vehicles active at any one time.

As listed above, the dust emission magnitude is within the small category for all criteria except for the total site area which is in the medium category. The total site area was calculated in a very conservative way while the typical earthworks area only accounts for a small proportion of the total area expected to be exposed. Therefore, the overall dust emission magnitude for the earthworks at each site of the transmission lines is considered to be in the small category.

CONSTRUCTION

Main construction activities include:

- concrete filling in foundation
- assemble tower structures
- erect transmission line structures.

All the above activities are not likely to cause significant dust emission. No heavy dusty construction activities would be involved.

No concrete batching plants would be built at any individual structure site, but there would be some temporary concrete batching plants built along the transmission line to support construction of multiple structures. As the plants would be located greater than 500 meters away from any sensitive receptors, the impacts associated with concrete batching plants were qualitatively assessed in Section 5.2.2.2.

Overall, the dust emission magnitude for the construction of each structure site is in the small category.

TRACK OUT

Track out is dirt, mud or other materials tracked onto a paved public roadway by a vehicle leaving a construction site. Heavy vehicles (gross weight greater than 3.5 tonnes) involved in the transmission lines construction include excavator, crane, rigid tippers, semi-trailer, roller, dozer, grader, concrete agitator.

Outwards movements of 15 heavy vehicles are expected during a typical day and a maximum of 80 movements during peak construction period. However, the sandy soil has low potential for dust release and all access tracks would be developed with minimum disturbance to soil and vegetation. Therefore, the dust emission magnitude for track out is considered to be in the small category.

5.2.1.3 STEP 2B – DETERMINE THE SENSITIVITY OF THE AREA

The sensitivity of the surrounding land uses takes a number of factors into account:

- the specific sensitivities of receptors
- the number of receptors and their proximity to the site
- local background PM_{10} concentrations
- site-specific factors that may reduce the risk of wind-blown dust (e.g. trees).

The sensitive receptors identified along the transmission line are homesteads or potential dwellings. These receptors are considered to be 'high' sensitivity receptors to dust soiling and health effects. The matrices for determining surrounding area sensitivity to dust soiling and human health are presented in Table 5.4 and Table 5.5.

Table 5.4 Sensitivity of the area to dust soiling

RECEPTOR SENSITIVITY	NUMBER OF RECEPTORS	DISTANCE FROM THE SOURCE (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10–100	High	Medium	Low	Low
	1–10	Medium	Low	Low	Low

Table 5.5 Sensitivity of the area to human health impacts

RECEPTOR SENSITIVITY	ANNUAL MEAN PM_{10} CONCENTRATION[1]	NUMBER OF RECEPTORS	DISTANCE FROM THE SOURCE (m)				
			<20	<50	<100	<200	<350
High	>20 µg/m^3	>100	High	High	High	Medium	Low
		10–100	High	High	Medium	Low	Low
		1–10	High	Medium	Low	Low	Low
	18–20 µg/m^3	>100	High	High	Medium	Low	Low
		10–100	High	Medium	Low	Low	Low
		1–10	High	Medium	Low	Low	Low
	16–18 µg/m^3	>100	High	Medium	Low	Low	Low
		10–100	High	Medium	Low	Low	Low
		1–10	Medium	Low	Low	Low	Low
	<16 µg/m^3	>100	Medium	Low	Low	Low	Low
		10–100	Low	Low	Low	Low	Low
		1–10	Low	Low	Low	Low	Low

(1) The annual mean PM_{10} concentration ranges was adjusted in accordance with the annual mean Air NEPM objective of 20 µg/m^3.

The identified sensitive receptors potentially affected by structure sites (refer to Table 4.6):

- Wentworth-1 site: two receptors at 198 meters and 258 metres from the transmission line corridor
- Wentworth-2 site: one receptor at 104 metres from the transmission line corridor.

In accordance with the IAQM guidance and Table 5.4, the areas surrounding the Wentworth-1 and Wentworth-2 sites have a low sensitivity to dust soiling impacts.

PM_{10} monitoring data was not monitored using approved method. As such, the annual PM_{10} concentration is conservatively assumed to be above the objective of 20 µg/m^3. In accordance with the IAQM guidance and Table 5.5, the areas surrounding the Wentworth-1 and Wentworth-2 sites have a low sensitivity to human health impacts.

The outcome of defining the sensitivity of the surrounding areas to dust soiling and human health is summarised in Table 5.6.

Table 5.6 Summary of sensitivity of the surrounding areas

POTENTIAL IMPACT	SITE LOCATION	DETERMINING FACTORS	SENSITIVITY OF THE SURROUNDING AREAS
Dust soiling	Wentworth-1	Receptor sensitivity: High Two receptors within 350 metres	Low
	Wentworth-2	Receptor sensitivity: High One receptor within 350 metres	Low
Human health	Wentworth-1	Receptor sensitivity: High One receptor within 200 metres or two receptors within 350 metres Annual PM_{10} >20 µg/m^3	Low
	Wentworth-2	Receptor sensitivity: High One receptor within 200 metres Annual PM_{10} >20 µg/m^3	Low

5.2.1.4 STEP 2C – DEFINE THE RISK OF IMPACTS

The dust emission magnitudes for earthworks, construction and track out were combined with the sensitivity of the area to determine the risk of impacts. The matrices for risk of dust impacts are presented in Table 5.7 and Table 5.8.

Table 5.7 Risk of dust impacts for earthworks and construction

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 5.8 Risk of dust impacts for track out

SENSITIVITY OF AREA	DUST EMISSION MAGNITUDE		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Based on the dust emission magnitudes determined in Section 5.2.1.2, the sensitivity of the surrounding areas in Table 5.6 and determining matrices in Table 5.7 and Table 5.8, earthworks, construction and track out activities associated with the proposal are considered to have negligible risk of dust soiling impacts and human health impacts. A summary of dust risks at the sensitive receptor locations is presented in Table 5.9.

Table 5.9 Summary of dust risks

POTENTIAL IMPACT	SITE LOCATION	RISK		
		Earthworks	Construction	Trackout
Dust soiling	Wentworth-1	Negligible	Negligible	Negligible
	Wentworth-2	Negligible	Negligible	Negligible
Human health	Wentworth-1	Negligible	Negligible	Negligible
	Wentworth-2	Negligible	Negligible	Negligible

5.2.1.5 STEP 3 – SITE-SPECIFIC MITIGATION

As stated in Section 5.2.1.4, risks are described in terms of there being a negligible, low, medium or high risk. Where there are low, medium or high risks of an impact, then site-specific mitigation will be required. For cases where the risk category is negligible, no mitigation measures beyond those required by legislation is required. For general mitigation measures, the highest risk category was applied. To minimise the dust impacts associated with the proposal, site-specific mitigation measures are presented in Section 8.1.

5.2.1.6 STEP 4 – DETERMINE SIGNIFICANCE OF RESIDUAL IMPACTS

For almost all construction activities, the aim is to prevent significant effects on receptors through the use of effective mitigation. According to the IAQM guidance, this is normally possible. Therefore, with the implementation of site-specific mitigation measures detailed in Section 8.1, the residual dust impacts would not be of significance.

5.2.2 QUALITATIVE ASSESSMENT

Since no sensitive receptors are located within 500 metres of Buronga substation, main construction compounds and accommodation camps and concrete batching plants, a detailed risk assessment of dust impacts was 'screened out'. As such, the level of risk to dust impacts are considered to be negligible and any effects would not be of significance.

Nevertheless, potential dust emissions from these locations were addressed in this section to assist with developing site-specific mitigation measures.

5.2.2.1 BURONGA SUBSTATION

The potential dust emissions were assessed for earthworks, construction and track out activities that would take place on site as per methodology presented in Section 5.2.1.2.

EARTHWORKS

Excavated soil, unsuitable for compaction as a foundation would be removed using road transport trucks, trailers, grader and excavator. The removed soil would be transferred to another location within the TransGrid owned substation land parcel. Quarry products would be imported to construct compacted substation pad.

Details of the earthworks at the Buronga substation construction site are indicatively as follows:

- the total volume of soil to be removed would be up to 350,000 cubic metres, equivalent to 1,928,500 tonnes (assuming earth density of 5,510 kilograms per cubic metre)
- total site area would be approximately 335,000 square metres.

The dust emission magnitude for the earthworks at the Buronga substation construction site would be large (refer to Table 5.3).

CONSTRUCTION

Construction works at the Buronga substation include civil and electrical works.

Main civil construction works include:

- construction of substation bench
- construction of stormwater drainage system
- earth-grid installation
- construction of footings including main transformer compound
- construction of spill oil drainage system including oil containment tank
- construction of substation fencing
- construction of conduits and pits.

Main electrical construction works include:

- structure and high voltage (HV) equipment erection
- transformer delivery and installation
- cabling and termination
- HV conductor installation.

The civil construction work may cause low level dust emission due to wheel-generated dust on unsealed surface and wind erosion from exposed areas. However, it is not expected to be significant. The electrical construction works are not likely to cause significant dust emission. In addition, no on-site concrete batching plants would be built. Therefore, the dust emission magnitude for the construction works of the Buronga substation is in the small category (dust emission magnitude).

TRACK OUT

Heavy vehicles in the Buronga substation construction include crane, rigid tippers, semi-trailers, rollers, and concrete agitators.

Outwards movements of 15 heavy vehicles are expected during a typical day and maximum of 30 movements during peak construction period. Two new unsealed entry and exit roads from Arumpo Road to the extended 330kV substation would be constructed. The total length is expected to be greater than 100 metres. However, the sandy soil has low potential for dust release. Therefore, the overall dust emission magnitude for track out is considered to be in the medium category.

5.2.2.2 ANCILLARY SITES

Two to three construction compound and camp sites would be required during the construction works. The sites would consist of a construction camp, laydown area and a concrete batching plant. Each site would be located near a sealed main road to facilitate journeys to and from the site. In addition, some temporary concrete batching plants would be built along the transmission lines to support construction of the transmission line.

The sites would be located at Anabranch South, Buronga and/or Wentworth. The locations of the proposed sites at Anabranch South and Buronga are known however the Wentworth site is still subject to further investigation. On this basis, the air quality assessment has assessed potential impacts of the Anabranch South and Buronga sites only. Additional air quality impact assessment on specific receivers would be required in support of the planning approval application once the Wentworth site location is further refined.

Potential dust emission sources at the main construction compound and accommodation camp sites and the concrete batching plants include:

- the operation of concrete batching plant
- vehicle movements on unsealed roads/surfaces
- wind erosion of unsealed surfaces
- materials drop off and loading at the laydown area.

Among the above potential sources, the main source of dust emissions is considered to be from operation of the concrete batching plant. Emissions from other sources are not likely to be significant.

Typically, a concrete batching plant consists of cement storage silos, aggregate feeder bins, a conveyor system with a fabric filter connected to hopper, concrete truck parking area and raw feed stockpiles. The potential dust emission sources include:

- sand and aggregate unloading and transferring to elevated bins
- fugitive emission from conveyers
- weigh hopper loading and mixer loading
- sand and aggregate spillage on the road and within the yard
- wind erosion from stockpiles, bunkers and other exposed surface.

Most of these dust-generating activities would be minimised through enclosure or sealing of equipment and the emissions from the concrete bathing plant would be transient in nature. With proposed mitigation measures presented in Section 8.1 in place, the potential impacts would be not of significance.

5.3 GASEOUS EMISSIONS

Gaseous emissions such as CO, NO_x, SO_2, VOCs and PAHs would be generated from vehicles and fugitive sources during the construction phase.

5.3.1 VEHICLE EMISSIONS

Diesel fuel combustion from vehicle movements and on-site plant and machinery operation would generate CO, NOx, SO_2 and trace amounts of non-combustible hydrocarbons (i.e. VOCs and PAHs). The emission rates and potential impact on surrounding areas would depend on the number and power output of the combustion engines, the quality of fuel used, the condition of the engines and the intensity of use.

During the construction phase, equipment and material would be transported to each tower site along the alignment, the Buronga substation, the main construction compound and accommodation camp sites or concrete batching plants along transmission lines. Details of daily heavy vehicle movements are presented in Section 5.2.1.2. The plant and machinery involved in the proposal construction include excavators, cranes, rigid tippers, semi-trailers, rollers, dozers, concrete agitators, watercarts, graders, stringing winches, backhoes, dumper trucks, trenchers, transport trucks, generators and air compressors.

Light vehicles would be used to transport workers. Maximum daily movements of light vehicles for the Buronga substation construction would be 100 and 150 for transmission lines construction.

Fuel combustion emissions from plant and equipment along the transmission lines corridor would be intermittent and transient. Given the anticipated duration of works at any given location, the likely numbers of emission sources, and scheduling of activities (i.e. not all machinery would be operating in the same location simultaneously), gaseous emissions are not anticipated to significantly influence local air quality Emissions would be adequately manageable through the implementation of mitigation measures (refer to Section 8.1).

5.3.2 FUGITIVE EMISSIONS

Petroleum, diesel, liquefied natural gas (LPG) and mineral oils stored in the storage and laydown areas at the construction compound and camp sites have the potential to generate fugitive emissions. These hazardous and dangerous goods would be secured in purpose built bunded and secure areas. These emissions are expected to be minor and readily dispersed within the sites. With appropriate handling and storage, air quality impacts from these fugitive sources are considered to be negligible.

6 ASSESSMENT OF OPERATIONAL IMPACTS

6.1 INFRASTRUCTURE OPERATIONS

During normal operation, wind-blown dust would be generated from unsealed access tracks along the transmission lines and unsealed roads at the Buronga substation. But the emissions would be negligible. No other air emissions are anticipated to be generated either from the operation of transmission lines or the Buronga substation.

6.2 INSPECTION, MAINTENANCE OR EMERGENCY WORKS

During routine inspection, maintenance or emergency works, light vehicles or light aircraft would be used to transport personnel to the sites, this would generate emissions due to fuel combustion and dust emissions from light vehicles travelling on unsealed roads.

The maintenance access requirements are expected to be as follows:

6.2.1 TRANSMISSION LINES

- Annual fly over inspection, as part on seasonal bushfire prevention survey.
- Routine asset inspection and routine maintenance on a six-yearly cycle for self-supporting towers and three-yearly cycle for guyed structures by light vehicles.
- Light aircrafts or light vehicles would be used to access the sites as fault and emergency occurs which would be rare.

6.2.2 BURONGA SUBSTATION

- Switching operators would undertake planned and unplanned switching of equipment using light vehicles two to three times a week by one to two personnel.
- Routine substation asset inspection would be conducted on a yearly cycle using light vehicles by two to three personnel.
- Routine/planned substation maintenance would typically be on a monthly basis and undertaken by three to five personnel in light trucks.
- Fault and emergency access using light vehicles should an unplanned outage occur or repair of damaged assets is required (which is rare).

The frequency to access the proposal during operation phase are anticipated to be low and the number of vehicles required during these events would be small. Therefore, the gaseous and dust emissions during operation phase is anticipated to be negligible, and the impacts on surrounding areas would be not of significance.

7 CUMULATIVE IMPACT

7.1 OVERVIEW

Cumulative impact assessment means the consideration of other nearby development projects along with the proposal. Projects with the potential for cumulative impacts with the proposal were identified through a review of publicly available information and environmental impact assessments from the following databases:

- NSW Major Projects website (NSW Government, searched June 2020)
- Wentworth Shire Council website (Wentworth Shire Council, searched June 2020)
- Australian Government – Department of Environment and Energy, EPBC Public notices list (Australian Government, searched June 2020).

Three proposed developments have been identified and these are:

- Copi Mineral Sands Mine
- Buronga Solar Farm
- Buronga – Gol Gol residential expansion.

7.2 COPI MINERAL SANDS MINE

The Copi Mineral Sands development, located around 25 kilometres north of the proposed alignment, involves an open cut mineral sands mine and associated infrastructure to extract and process up to 1.5 million tonnes per annum (Mtpa) for up to six years, transporting the heavy mineral concentrate via road for off-site processing; and progressively rehabilitating the site.

This development is in the early stages of planning but the impacts of the project will largely be isolated from the proposal. The proposal air quality impacts during construction and operational phases are expected to be relatively localised to the proposal disturbance areas and low impact and therefore cumulative impacts are not expected.

7.3 BURONGA SOLAR FARM

The Buronga Solar Farm development included a 400 MW solar farm with energy storage and associated infrastructure located adjacent to the proposal Buronga Substation.

With appropriate dust control measures in place for both developments during construction, no substantial cumulative impacts would be expected. No operational cumulative impacts would be expected.

7.4 BURONGA – GOL GOL RESIDENTIAL EXPANSION

Wentworth Shire Council are planning new subdivisions to provide approximately 500 new large residential housing allotments in the Buronga – Gol Gol growth area, approximately 10 kilometres to the west of the transmission line corridor.

The proposed residential expansion would create additional exposed ground areas with potential for dust impacts on surrounding areas during the construction phase. With appropriate dust control measures in place for both developments during construction no substantial cumulative impacts would be expected.

No operational cumulative impacts would be expected.

7.5 SUMMARY

Potential cumulative impacts from three identified proposed developments were considered in this assessment. With appropriate dust control measures in place for all developments during construction, no substantial cumulative impacts would be expected. No operational cumulative impacts would be expected.

8 MITIGATION MEASURES

8.1 SITE-SPECIFIC MITIGATION MEASURES

Site-specific mitigation measures have been proposed to minimise air quality impacts associated with the proposal. Mitigation measures for the proposal are presented in Table 8.1.

Table 8.1 Mitigation measures

REFERENCE	MITIGATION MEASURE	TIMING	APPLICABLE LOCATION(S)
AQ1	Construction air quality management measures will be detailed in the Air Quality Management Plan and implemented during construction to minimise particulate and gaseous emissions as far as possible. Measures will include (but not limited to): — use of water sprays or dust suppression surfactants as required for dust suppression — adjusting the intensity of activities based on observed dust levels and weather forecasts — minimising the amount of materials stockpiled and position stockpiles away from surrounding receivers — vehicle movements to be strictly limited to designated entry/exit routes and parking areas, and measures to minimise the tracking of material onto paved roads — covering of loads — stabilising disturbed areas as soon as practicable, including new access routes — minimising the extent of disturbance as far as practicable — regularly conducting visual inspections of dust emissions and applying additional controls as required.	Construction	All locations
AQ2	Ensure that all vehicles and machinery are fitted with appropriate emission control equipment and maintained in a proper and efficient manner.	Construction	All locations

REFERENCE	MITIGATION MEASURE	TIMING	APPLICABLE LOCATION(S)
AQ3	Measures will be implemented at concrete batching plants to minimise emissions to air as far as possible, and will be regularly inspected with additional controls implemented as required. Measures to minimise emissions to air may include: — all aggregate and sand will be stored appropriately in storage bins or bays to minimise dust generation, and material will not exceed the height of the bay — cement silos and hoppers will be fitted with dust filters — all inspection points and hatches will be fully sealed — all dry raw materials to be transferred into the bowl of an agitator via front end loaders by maintaining adequate moisture levels and/or an enclosed conveyor — the cement silo will be fitted with emergency pressure alert and automatic cut off overfill protection — transfer of cement from storage to batching will occur via sealed steel augers — regularly inspect dust emissions and apply additional controls as required.	Construction	Concrete batching plant(s)

8.2 RESIDUAL IMPACTS

8.2.1 CONSTRUCTION

As discussed in Chapter 5, the risks of dust impacts from earthworks, construction and track out activities associated with the transmission lines are negligible prior to mitigation (based on the risk rating levels identified in Table 5.7). With further site-specific mitigation measures in place, the residual dust impacts would be further reduced and not be of significance.

The dust impacts associated with the Buronga substation, the main construction compound and accommodation camp sites and concrete batching plants along transmission lines are not significant prior to mitigation due to no sensitive receptors located within 500 metres of their boundaries. With further mitigation measures in place, the residual dust impacts would be further reduced and not be of significance.

Gaseous emissions generated from vehicles and fugitive sources during construction phase would be minimised with mitigation measures in place and air quality impacts would not be of significance.

8.2.2 OPERATION

During normal operation, potential wind-blown dust emissions from unsealed tracks and roads would be negligible. No other air emissions would be generated either from the operation of transmission lines or the Buronga substation.

During routine inspection, maintenance or emergency, the potential gaseous emissions and dust emissions are anticipated to be negligible, and the impacts on surrounding areas would not be significant. Notwithstanding, proposed management measures would be implemented to ensure potential air quality impacts are minimised.

9 CONCLUSION

The NSW Department of Planning, Industry and Environment (DPIE) has provided the Secretary environmental assessment requirements (SEARs) for the EIS which specifically outlines the specialist study requirements of the EIS. This report addresses the SEARs associated with air quality.

Dust impacts associated with construction of the proposal was conducted in accordance with the risk based approach detailed in the *Guidance on the assessment of dust from demolition and construction* published by the Institute of Air Quality Management (IAQM, 2014).

Gaseous emissions from construction works and any dust related construction works 'screened out' by the IAQM guidance criteria was assessed qualitatively. Air quality impacts of potential emissions from operation phase were also assessed qualitatively.

The potential impacts from the construction and operation phases are as follows:

9.1 CONSTRUCTION

The risks of dust impacts from earthworks, construction and track out activities associated with the transmission lines were determined to be negligible prior to mitigation. With further site-specific mitigation measures in place, the residual dust impacts would be further reduced and not be significant.

The dust impacts associated with the Buronga substation, the construction compound and camp sites and concrete batching plants along transmission lines are not significant prior to mitigation due to no sensitive receptors located within 500 metres. With further mitigation measures in place, the residual dust impacts would be further reduced and not be of significance.

Gaseous emissions generated from vehicles and fugitive sources during construction phase would be minimised with mitigation measures in place and air quality impacts would not be significant.

9.2 OPERATION

During normal operation, potential wind-blown dust emissions from unsealed tracks and roads would be negligible. No other air emissions would be generated either from the operation of transmission lines or the Buronga substation.

During routine inspection, maintenance or emergency, potential gaseous and dust emissions are anticipated to be negligible, and the impacts on surrounding areas would not be of significance.

Potential cumulative impacts from three identified proposed developments were also considered in this AQIA. With appropriate dust control measures in place for all developments during construction, no substantial cumulative impacts would be expected. No operational cumulative impacts would be expected.

In summary, potential air quality (gaseous and dust emissions) impacts associated with the construction and operation of the proposal (transmission lines and substations) were determined to be not of significance on surrounding environment including the nearest sensitive receptors.

10 LIMITATIONS

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APPENDIX A

LOCATION OF IDENTIFIED SENSITIVE RECEPTORS

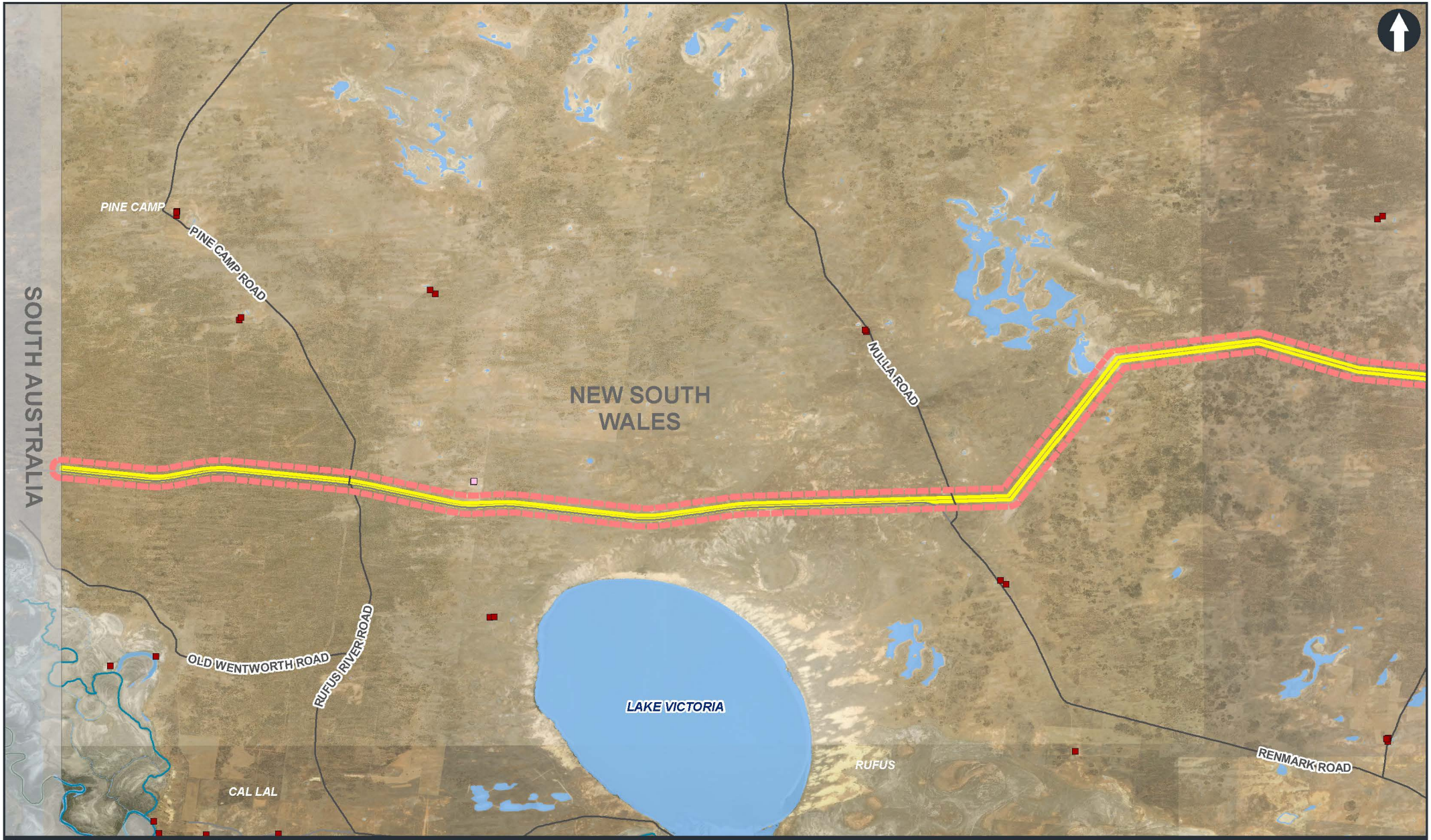

FIGURE A.1

Sensitive receptors

- Sensitive receptor outside assessment buffer – confirmed location
- Sensitive receptor outside assessment buffer – potential location
- Buronga substation
- Red Cliffs substation (out of scope)
- Transmission line corridor
- 350m assessment buffer

Source: NSWSS, ESRI, Transgrid, WSP

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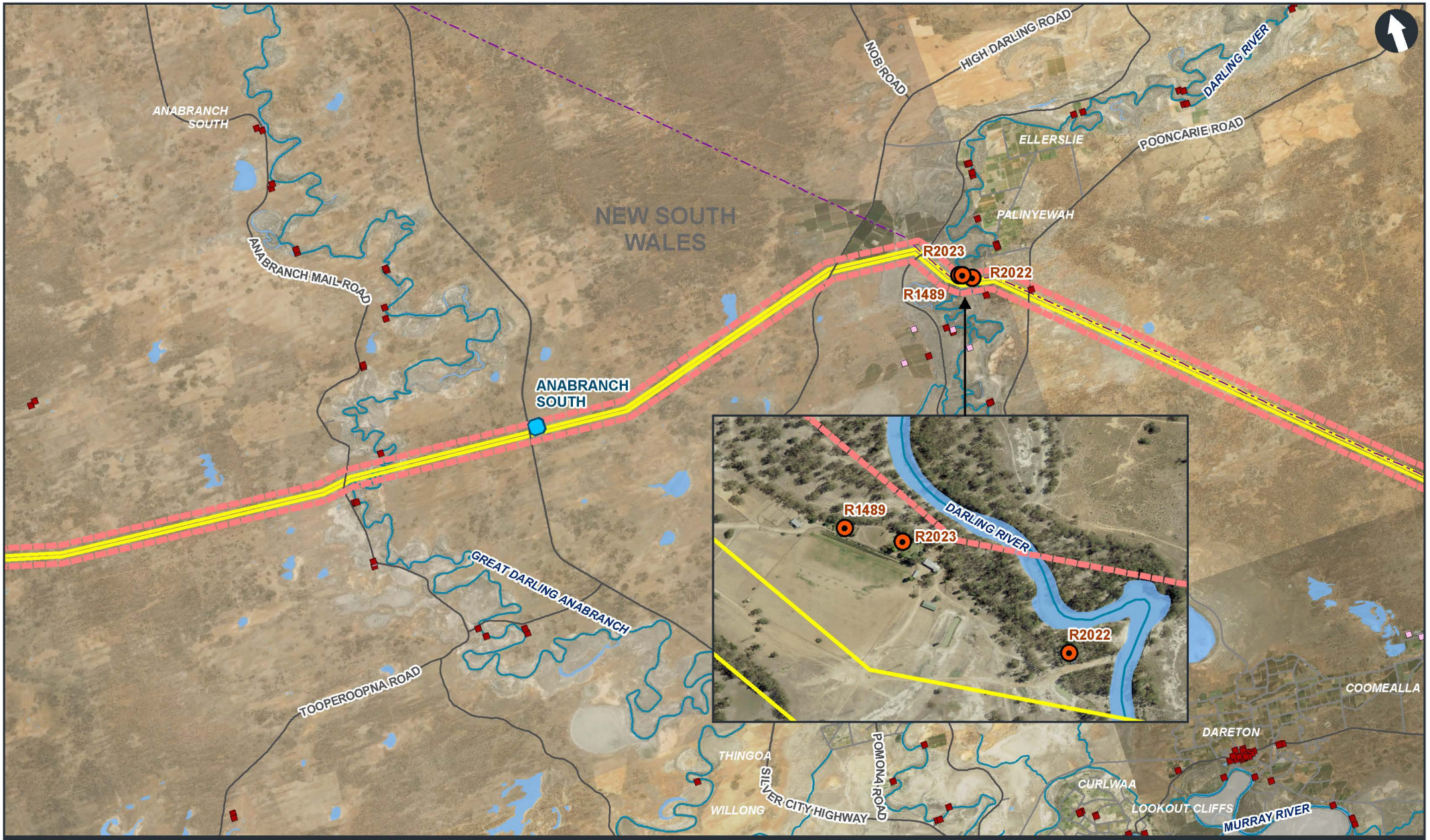

FIGURE A.2

Sensitive receptors

FIGURE A.3

Sensitive receptors

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