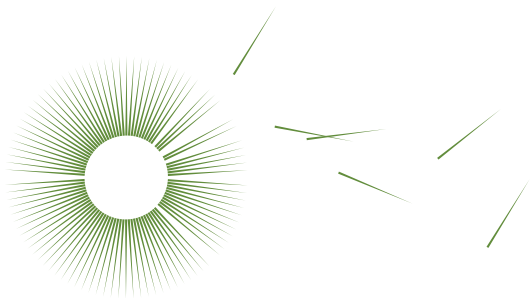


EnergyConnect (NSW – Western Section)

Technical paper 4

Visual and landscape character impact assessment



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EnergyConnect (NSW – Western Section)

Landscape and visual impact assessment



September 2020

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Glossary

| Term | Definition |
|------------------------------------|---|
| Amenity | ‘The pleasantness of a place as conveyed by desirable attributes including visual, noise, odour etc.’ (Australian Institute of Landscape Architects QLD 2018) |
| Cultural Landscape | A cultural landscape is a physical area with natural features modified by human activity resulting in patterns of evidence layered in the landscape. These layers give a place its distinctive spatial, historical, aesthetic, symbolic and memorable character. Within cultural landscapes there are areas where human impact is more obvious. These places ‘...may include components, contents, spaces and views’ (Murray–Darling Basin Authority, 2019). |
| Glare | ‘Condition of vision in which there is discomfort or a reduction in ability to see, or both, caused by an unsuitable distribution or range of luminance, or to extreme contrasts in the field of vision.’ (AS4282:2019) |
| Landscape | ‘All aspects of a tract of land, including landform, vegetation, buildings, villages, towns, cities and infrastructure.’ (Roads and Maritime Services 2018) |
| Landscape character | The ... ‘combined quality of built, natural and cultural aspects which make up an area and provide its unique sense of place’. (Roads and Maritime Services 2018) |
| Landscape character zone (or area) | ‘An area of landscape with similar properties or strongly defined spatial qualities, distinct from areas immediately nearby.’ (Roads and Maritime Services 2018) |
| Magnitude | Magnitude is the ... ‘measurement of the scale, form and character of a development proposal when compared to the existing condition. In the case of visual assessment this also relates to how far the proposal is from the viewer.’ (Roads and Maritime Services 2018) |
| (the) proponent | The proposal is proposed to be undertaken by NSW Electricity Networks Operations Pty Ltd as a trustee for NSW Electricity Operations Trust (referred to as TransGrid). TransGrid is the operator and manager of the main high voltage (HV) transmission network in NSW and the Australian Capital Territory (ACT), and is the Authorised Network Operator (ANO) for the purpose of an electricity transmission or distribution network under the provisions of the Electricity Network Assets (Authorised Transactions) Act 2015. |
| (the) proposal | <p>The proposal is known as ‘EnergyConnect (NSW – Western Section)’</p> <p>The proposal would involve the following key features:</p> <ul style="list-style-type: none"> - Construction of new high voltage transmission lines and associated infrastructure between the SA/NSW border near Chowilla and the existing Buronga substation - An upgrade to the existing transmission line between the Buronga substation and the NSW/Victoria border at Monak, near Red Cliffs - An expansion and upgrade of the existing Buronga substation from an operating capacity of 220 kV to 330 kV - Establishment and upgrade of access tracks and roads, as required - Other 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. |

| Term | Definition |
|---------------------------------|--|
| Proposal alignment | <p>For this assessment an indicative centreline of the proposal study area has been selected for the proposed route for the transmission line (the proposal alignment). It is noted that the alignment may be modified to a different location within the proposal study area during detailed design however the assessment presents a representative assessment of impacts. Due to limited receivers in the area the assessment should remain appropriate to these changes.</p> <p>The proposal alignment will comprise transmission line structures and wires within an easement.</p> |
| Proposal study area | The proposal, including transmission line corridor, Buronga substation upgrade and expansion, access tracks, and the main construction compounds and accommodation camps at Buronga and Anabran South would be contained within the proposal study area. The proposal study area 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, and is used in the environmental assessment to provide a broader understanding of the constraints and conditions of the locality. |
| Landscape and visual study area | This study, considers a wider 'landscape and visual study area' which includes a visual catchment which varies according to the land cover (vegetation and built form) and topography of the landscape (out to approximately 12 kilometres from proposal study area centreline). Generally, however, the landscape and visual study area extends to about two kilometres beyond the proposal study 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. |
| Sense of place | Is the intangible qualities and character of a place, interpreted and valued by people. |
| Sensitivity | <p>'Susceptibility of a landscape or receptor to accommodate change without losing valued attributes.' (Australian Institute of Landscape Architects QLD 2018)</p> <p>The sensitivity of a landscape character zone or view is 'its capacity to absorb change'. (Roads and Maritime Services 2013)</p> |
| Sky glow | 'The brightening of the night sky that results from radiation (visible and non-visible), scattered from the constituents of the atmosphere (gaseous, molecules, aerosols and particulate matter), in the direction of observation.' It comprises Natural sky glow and artificial sky glow. (AS4282:2019) |
| Spill light | 'Light emitted by a lighting installation that falls outside of the design area. Spill light may or may not be obtrusive depending on what it affects' (AS4282:2019) |
| Values | 'Any aspect of landscape or views people consider to be important. Landscape and visual values may be reflected in local, state or federal planning regulations, other published documents or be established through community consultation and engagement, or as professionally assessed.' (Australian Institute of Landscape Architects QLD 2018) |
| View | 'Any sight, prospect or field of vision as seen from a place, and may be wide or narrow, partial or full, pleasant or unattractive, distinctive or nondescript, and may include background, mid ground and/or foreground elements or features.' (Australian Institute of Landscape Architects QLD 2018) |
| Viewpoint | 'The specific location of a view, typically used for assessment purposes.' (Australian Institute of Landscape Architects QLD 2018) |
| Visual absorption capacity | 'The potential for a landscape or scene to absorb a particular change without a noticeable loss of valued attributes.' (Australian Institute of Landscape Architects QLD 2018) |

Executive summary

The proposal

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.

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

Approach to this landscape and visual impact assessment

The assessment considers a landscape and visual study area which extends beyond the proposal study area to include areas where there would be views to the proposal. This assessment considers the proposal, starting at the South Australian Border, and divides it into landscape character areas used for the consideration of both landscape and visual impacts. These are the Lake Victoria Cultural Landscape and semi-arid plains, Mallee shrubland and rural landscape, Murray River plains rural landscape. It also considers views from the air for the entire proposal study area.

This assessment identifies the potential landscape and visual impact of the proposal during the day and at night, for the period of construction and operation. GIS analysis, photomontages and cross sections have been developed to analyse and communicate the potential visibility of the proposal to assist in the interpretation of visual impact.

Views from surrounding residences

For a proposal of this scale and length there would be relatively few potential visual impacts on private residential properties.

In summary, there are a few private properties where there is a potential visual impact, including 'Regunyah', within the Lake Victoria Cultural Landscape and semi-arid plains character area; 'Wilton' and 'Dunvegan' in the Mallee shrubland and rural landscape, and a property about 500 metres east of the proposal alignment in the vicinity of the Sturt Highway within the Arable landscapes on the Murray River plain landscape character area.

In the vicinity of residences such as these, minimising the height and maximising the spacing of transmission line structures would reduce the extent of visual change and reduce the potential visual impact.

Scenic or significant vistas and road corridors in the public domain

There were no significant vistas identified in the landscape and visual study area and no mapped scenic views. However, the landscape and visual impacts within this study area have been identified with a focus on identifying views from scenic routes, views to landscapes with scenic value and views from road corridors. The relative scenic value of these views is considered in determining the sensitivity level of each view in accordance with the assessment methodology.

Landscape impact

While the landscape and visual study area includes landscapes of state and regional landscape sensitivity, there would be relatively low landscape impacts during construction and operation of the proposal. This is due to the relatively small area of direct impact, the relatively flat and open landscape requiring minimal landform changes, and the transmission line corridor avoiding important landscape features, such as Lake Victoria, dry relic lake beds, billabongs, and river crossings. Those visual impacts which have been identified range from **low** to **moderate landscape impact** during construction, and **low landscape impact** during operations.

Visual impact

Considering the length and scale of this proposal, the visual impacts are relatively low and have a relatively small influence. Those visual impacts which have been identified mostly having a **low** to **moderate** visual impact.

These impacts include moderate adverse visual impacts during construction and operation on views within the vicinity of Lake Victoria, with views from Renmark Road being of **low visual impact** but would be experienced for a long duration as the proposal alignment parallels the road for several kilometres. There would also be **low to moderate visual impact** in views from the land between Renmark Road and Lake Victoria. This is due to the increased visual sensitivity of these locations and the importance of views to the sense of place of this significant cultural landscape.

There would be **low visual impacts** in views from roads throughout the Mallee shrubland and rural landscapes during construction and operation of the proposal. This includes views from Anabranche Mail Road, the Silver City Highway, Pooncarie Road, and other similar roads which cross the proposal alignment in this area. This is due to the relatively low sensitivity of these routes and the absorption capacity of the landscape with taller vegetation, an undulating terrain and precedent of existing power infrastructure.

In views from Arumpo Road, in the vicinity of the Buronga substation, there would be a **moderate visual impact** during construction and operation of the proposal. This is due to the scale of the proposed substation and convergence of transmission lines in this location.

In views east of the Buronga substation, such as from the Sturt Highway, there would be a **low visual impact** during construction and operation. This is because the proposal would replace existing transmission lines, resulting in an incremental increase in the size of the transmission line structures.

Night lighting

At night there would be a **moderate adverse visual impact** during construction of the proposal within the high sensitivity, predominantly dark landscape of the Lake Victoria cultural landscape and semi-arid plains landscape character area. This would be due to works extending to 7pm on a daily basis and the short duration when there would be lighting required along the transmission line construction areas. During operations this would reduce to a **negligible visual impact** as there would be no permanent lighting proposed in this area.

There would be **moderate visual impacts** in some areas within the Mallee shrubland and rural landscape character area, where construction requires night work, night deliveries and security lighting. However, during operation there would be a **low visual impact** in areas where there would be permanent security lighting, such as at the Buronga substation upgrade and expansion.

In the Murray River plains and rural landscape there would be a **low visual impact** during construction due to works extending to 7pm on a daily basis and the short duration when there would be lighting required in areas used for construction. During operation of the proposal there would be a **negligible visual impact** as there is no lighting proposed in this section of the proposal alignment.

Air traffic

There are scenic flights over the landscape and visual study area which may have views to the proposal during construction and operation. While the transmission lines would create a strong linear corridor across the landscape, this would not change the prevailing character of views from the air. Particularly in areas to the east of the proposal alignment where the visual complexity of the existing landscape increases. The transmission line and substations are uses expected within views from the air to a working rural landscape. In the vicinity of Lake Victoria, the proposal alignment is located to the north of an existing road, and away from the main scenic aerial views to the lake.

Cumulative landscape and visual impact

If approved, there is the potential for a cumulative landscape and visual impact associated with this proposal and the Buronga solar farm during operation as these projects would both contribute to landscape character change and alter the amenity of local views. Any cumulative visual impact would be experienced from a small area and there would be an opportunity to reduce the visual impacts of the respective project through the implementation of screening vegetation.

1. Introduction

1.1. Overview of EnergyConnect

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, 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.

1.3. 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 OX1)
- 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 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).

1.4. 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.

1.5. 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 NSW Department of Planning, Industry and Environment (DPIE) has provided the Secretary's Environmental Assessment Requirements (SEARs) for the EIS.

The purpose of this technical paper is to identify and assess the potential impacts of the proposal in relation to landscape character and visual amenity. It responds directly to the SEARs (refer to Section 1.4.1).

Further detail on the methodology applied in this assessment is detailed in Section 3 of this technical paper.

1.6. Secretary's environmental assessment requirements

The SEARs 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 – AMENITY

| Reference | SEARs requirements | |
|---------------------|--|---|
| Key Issue – Amenity | An assessment of the likely visual impacts of the project on: <ul style="list-style-type: none">- surrounding residences- scenic or significant vistas- night lighting- air traffic- road corridors in the public domain | Section 5.5 Section 5.3 Section 5.4 Section 5.3 Section 5.3 |

1.7. 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 technical paper
- *Chapter 4 – Landscape impact assessment:* Describes the potential landscape impacts associated with the proposal during construction and operation
- *Chapter 5 – Visual impact assessment:* Describes the potential visual impacts associated with the proposal during construction and operation, day and night
- *Chapter 6 – Cumulative impacts:* Outlines the potential cumulative impacts with respect to other known developments within the vicinity of the proposal
- *Chapter 7 – Mitigation measures:* Outlines the proposed mitigation measures for the proposal
- *Chapter 8 – Conclusion:* Provides a conclusion of the potential impacts of the proposal on the surrounding landscape character and visual amenity
- *Chapter 9 – References:* Identifies the key reports and documents used to generate this report.

1.8. Report terminology

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

- **Proposal study area** – the proposal, including the transmission line corridor, Buronga substation upgrade and expansion, access tracks, and the main construction compounds and accommodation camps at Buronga and Anabran South would be contained within the proposal study area. The proposal study area 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, and is used in the environmental assessment to provide a broader understanding of the constraints and conditions of the locality.
- **Landscape and visual study area** – This study, considers a wider ‘landscape and visual study area’ which includes a visual catchment which varies according to the land cover (vegetation and built form) and topography of the landscape (out to approximately 12 kilometres from proposal study area centreline). Generally, however, the landscape and visual study area extends to about two kilometres beyond the proposal study area.
- **Transmission line corridor** – the corridor in which the final easement and transmission line is expected to be contained within. It would consist of a 200 metre corridor along the transmission line component of the proposal. Transmission line construction activities would be contained within this area, but some access tracks may extend beyond this corridor.

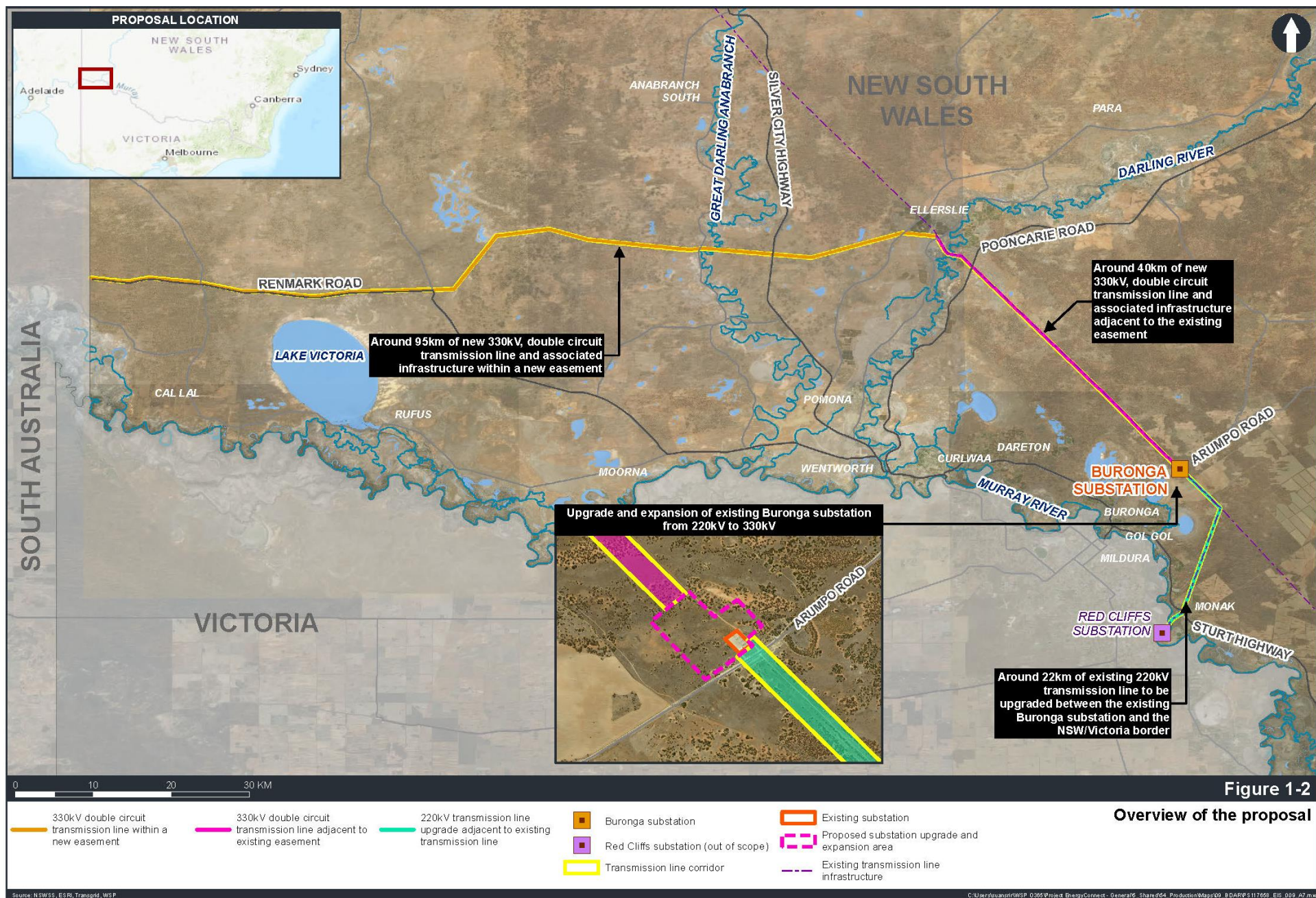


FIGURE 1-2 OVERVIEW OF THE PROPOSAL

2. Legislative and policy context

The following review identifies key documents which provide relevant guidance for the visual assessment of the proposal. This should be read in conjunction with the planning report and its response to the planning scheme benchmarks.

2.1. Far West Regional Plan 2036

The proposal is located in the 'southern area' of the Far West region, comprising Balranald and Wentworth local government areas. The southern area is well known for its 'diverse agriculture, and connections to the Murray River and Victoria'. The area has 'diverse landscapes and environmental features', from arid and semi-arid desert areas, productive areas of irrigated agriculture, the Murray and Darling rivers and associated floodplain areas and tributaries. Protecting and managing the region's 'environmental assets' is a key priority, including existing conservation areas, river systems, wetlands and lagoons, and native vegetation of high conservation value, including vegetation types that have been over-cleared or occur within over-cleared landscapes.

Distance is identified as a 'constant challenge' to the region, with 'better access to reliable telecommunications' and 'electricity supply network' a key priority to support the region's three key employment sectors: agriculture, mining and tourism (Goal 1, Direction 8 and 12). Development of renewable energies and associated industries, including solar and wind projects, are also recognised as an opportunity around Wentworth and Balranald (Goal 1, Direction 4).

2.1.1. Lake Victoria Cultural Landscape Management Plan of Management, 2019

Lake Victoria is described in the Cultural Landscape Management Plan as a 'highly significant place'. (p.3) With evidence of Aboriginal occupation from at least the past 18,000 years it has the remains of ... 'exceptionally high spiritual and cultural significance to Aboriginal people, particularly the Barkindji and Maraura people'. (p.11)

The Statement of Significance for Lake Victoria contained in this Management Plan summarises the heritage values in accordance with the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (Burra Charter) and NSW Heritage Act 1977. This includes identifying the aesthetic values of Lake Victoria, which are:

- 'Lake Victoria is a landmark feature because of the visual contrast it provides as a very large lake set into a semi-arid landscape. It is also the most substantial and likely the most ancient lake along the central River Murray.
- The combination of natural and cultural aspects, both social and historic, makes Lake Victoria an important cultural landscape which has both aesthetic and social value.
- Associated Aboriginal people feel that the landscape is an important part of the significance of the area. The burial sites and other heritage material can only retain their integrity if the environment remains intact. It is clear that the aesthetic quality of the landscape is part of the spiritual aspects of Lake Victoria, so social and aesthetic significance are closely related.
- Although highly modified, the areas of native vegetation are highly regarded by the Aboriginal and European communities, particularly the stands of river red gum (Murray–Darling Basin Authority, 2019, s.1.6.3).

The Plan divides the lake foreshore and the surrounding landscape into 23 management areas. The proposal is closest to the 'Noola Beach North' landscape management area, which contains

‘regenerating river red gum fringe at higher elevations’ (s.2.4). Management strategies for the ‘Noola Beach North’ landscape, include to protecting cultural heritage, including restricting access and conserving lakeshore native vegetation and stability. Views to and from the lake are not specifically identified as a management priority in the Plan.

2.2. Local planning schemes

The transmission line would traverse Wentworth Shire Council local government area (LGA). Details of relevant planning documents are described below where a specific reference to visual amenity has been made. The review found that there are no locally designated protection areas for visual amenity or views contained in or adjacent to the proposal study area.

2.2.1. Wentworth Local Environmental Plan 2011

The purpose of the Wentworth Local Environmental Plan 2011 (LEP) is to ‘encourage and manage ecologically sustainable development within Wentworth’ (Wentworth Shire Council, 2011a, cl.1.2.2a). In particular, it aims to ‘encourage the retention and enhancement of land that supports the primary economic activities within Wentworth for productive agriculture’ whilst conserving and protecting areas of cultural heritage and environmental significance, including conservation parks, reserves and the Murray and Darling River systems (cl.1.2.2b-d).

The majority of the transmission line corridor traverses the Primary Production zone, which aims to protect ‘both mixed dryland and irrigation agricultural land uses’ in the shire that together ‘form the distinctive rural character of Wentworth’ (cl.RU1 zone). The LEP also aims to ‘minimise the fragmentation and alienation of resource lands’ in this zone (cl.RU1 zone).

There are two areas within the proposal study area zoned Environmental Conservation east of the Darling River, west of Pooncarie Road (including one small area intersecting the transmission line corridor) and one area at Trentham Cliffs, east of the Sturt Highway, falling partly within the proposal study area. A key objective of this zone is to ‘protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values’ (cl.E2 zone).

An objective of the heritage conservation clause is to conserve the heritage significance of heritage items and heritage conservation areas, including ‘settings and views’ (cl.5.10). Heritage items within and in close proximity to the proposal include:

- Provincial Border Obelisk, Old Wentworth Road (west of Lake Victoria);
- Noola Homestead, Lake Victoria;
- Nulla Nulla Woolshed and Homestead (Renmark Road Lake Victoria);
- Hazeldell Homestead, Low Darling Road; and
- Sturts Billabong, Darling river, Low Darling Road.

The proposal would need to cross the Murray River near Monak to join the Victorian section of EnergyConnect (subject to separate planning approval). A key aim of the ‘development on river front areas’ clause aims to ‘protect the amenity, scenic landscape values and cultural heritage of the Murray River’. It requires ‘the appearance of the development, from both the Murray River and the river front area’ to be ‘compatible with the surrounding area’ and ‘minimal visual disturbance to the existing landscape’ (cl.7.6).

2.2.2. Wentworth Shire Development Control Plan 2011

The Wentworth Shire Development Control Plan (DCP) supports the Wentworth LEP by providing additional objectives and controls for administering development.

The DCP recognises the visual quality of the rural landscape, stating that development in rural areas should be 'consistent with the rural character' and avoid 'significant environmental features, such as natural forms, remnant native vegetation, wetlands or natural watercourses and drainage' (chapter 5, s.5.3).

It also states that adequate buffer areas and setbacks should be used to 'minimise negative impacts on rural dwellings from agriculture and rural industry' and landscaping and other screening options should be used to 'reduce the total buffer distance required between dwellings and adjoining land uses'. It also suggests that consideration is given to the 'design and materials of industrial buildings facing roads, particularly main roads' and the design of buildings 'where they are adjacent to residential areas or other land uses' (chapter 7, s.7.1.1). It also requires external storage areas at industrial sites 'shall not be visible from a public place' or 'suitably screened (with dense landscaping and/or fencing)' (chapter 5, s.5.3).

The proposal is outside of the Buronga and Gol Gol structure plan area and the associated master plan area. Although the plan recognises the importance of the shire's rural 'views and vistas' in relation to the design and placement of Highway Promotional Signs (chapter 3, s.10), the plan does not identify any specific views, lookouts or areas containing landscape character value for protection within the Shire.

3. Methodology

3.1. Guidance for landscape and visual impact assessment

A range of guidance is available for the assessment of landscape and visual impact. However, the industry typically refers to the following guidance:

- *The Guidance Note for Landscape and Visual Assessment (GNLVA)*, Australian Institute of Landscape Architects Queensland, 2018.
- *Guideline for Landscape Character and Visual Impact Assessment EIA-N04*, NSW Roads and Maritime Services, 2018.
- *The Guidelines for Landscape and Visual Impact Assessment (GLVIA)*, Third Edition, 2013, prepared by the Landscape Institute and Institute of Environmental Management & Assessment.

The following steps were undertaken in the assessment of the landscape and visual impacts of the proposal.

3.2. Assessment of landscape impact

Landscape is defined as ... 'All aspects of a tract of land, including landform, vegetation, buildings, villages, towns, cities and infrastructure.' (Roads and Maritime Services, 2018)

The landscape assessment begins with the identification of landscape character areas. An assessment of landscape impact was then carried out by identifying the sensitivity of each landscape character area, and the likely magnitude of change expected as a result of the proposal. These factors were combined to make an overall assessment of landscape impact.

3.2.1. Identification of landscape character areas

The landscape assessment begins with the identification of landscape character areas. Landscape character is the ... 'combined quality of built, natural and cultural aspects which make up an area and provide its unique sense of place'.

The landscape and visual study area has been divided into landscape character areas that reflect the qualities of the built, natural and cultural environment, including geology, topography, vegetation, waterways, built form, patterns and types of land use.

3.2.2. Landscape sensitivity

Landscape sensitivity refers to the value placed on a landscape and its susceptibility to change. The sensitivity of a landscape may reflect the frequency and volume of users but it may also reflect valued characteristics such as rarity, tranquillity, scenic amenity and its contribution to sense of place. The value of landscapes can be described in Federal, State and local government masterplans and planning documents and protected by legislation. These protections reflect the importance of landscape resources to the local, regional and state-wide community.

Landscape sensitivity in this assessment is therefore considered in the broadest possible context, from those landscapes of national importance through to those considered to be landscapes of importance locally.

Table 3-1 lists the landscape sensitivity levels that applies to this assessment.

TABLE 3-1: LANDSCAPE SENSITIVITY LEVELS

| Landscape sensitivity | Description |
|-----------------------|---|
| National | <ul style="list-style-type: none"> - Landscape feature or place protected under national legislation or international policy e.g. the Red Top Lookout at the World Heritage Listed Mungo National Park. - These landscapes are generally unique and uncommon nationally. |
| State | <ul style="list-style-type: none"> - Landscape feature or place that is heavily used and/or is iconic to the State, e.g. Lake Victoria. - These landscapes are generally unique to or uncommon within the state. |
| Regional | <ul style="list-style-type: none"> - Landscape feature or place that is heavily used and valued by residents of a major portion of a city or a non-metropolitan region and / or - Places with regionally important scenic value or to landscape features. - These places are generally unique or uncommon within the region. |
| Local | <ul style="list-style-type: none"> - Landscape feature valued and experienced by concentrations of residents and/or local recreational users and / or - Places of local scenic value or local landscape features. - These views are likely to be somewhat common within the landscape. |
| Neighbourhood | <ul style="list-style-type: none"> - Places where without any particular scenic values or local landscape features - These places are likely to be common within the landscape. |

3.2.3. Magnitude of change to the landscape

The changes to the landscape that would occur as a result of the proposal are assigned a magnitude of change level. This considers direct impacts on the landscape such as the removal of trees and tree canopy, open space and public realm areas, as well as indirect impacts, such as changes to the function of an area of open space or the public realm. The magnitude of change can result in adverse or beneficial effects.

Table 3-2 lists the magnitude of change levels that have been used in this assessment.

TABLE 3-2: LANDSCAPE MAGNITUDE OF CHANGE LEVELS

| Magnitude of change | Description |
|---------------------|--|
| Very high | <ul style="list-style-type: none"> - The landscape is altered such that the proposal dominates and / or transforms its character, amenity and / or function. |
| High | <ul style="list-style-type: none"> - The proposal substantially changes and / or is not compatible with the character, amenity, and function of the landscape. - This would result in an extensive and / or severe change in landscape values. |
| Moderate | <ul style="list-style-type: none"> - The proposal somewhat changes and / or is not compatible with the character, amenity, and function of the landscape. - This would result in a considerable and / or unsympathetic change in landscape values. |
| Low | <ul style="list-style-type: none"> - The proposal changes are minor and / or are compatible with the character, amenity, and function of the landscape. - It would result in a slight change in landscape values. |
| Negligible | <ul style="list-style-type: none"> - The proposal would not change the character, amenity and/ or function of the landscape. - If there is a change, it would not be perceived as altering the landscape values. |

3.2.4. Assigning landscape impact levels

An assessment of landscape impact has been made by combining the landscape sensitivity and magnitude of change levels for each landscape character area and assigning an impact level (refer to Table 3-3).

TABLE 3-3: LANDSCAPE IMPACT LEVELS

| | Sensitivity | | | | |
|---------------------|-------------|------------|------------|------------|---------------|
| Magnitude of change | National | State | Regional | Local | Neighbourhood |
| Very high | Very high | Very high | High | High | Moderate |
| High | Very high | High | High | Moderate | Low |
| Moderate | High | High | Moderate | Low | Low |
| Low | Moderate | Moderate | Low | Low | Negligible |
| Negligible | Negligible | Negligible | Negligible | Negligible | Negligible |

3.3. Assessment of visual impact

The assessment of visual impact uses a representative viewpoint assessment approach. Representative viewpoints have been selected from the potential visual catchment of the proposal. Each view has then been assessed by identifying the magnitude of change level created by the proposal, and the sensitivity of the viewer. Combined, these characteristics of the view are then used to assign a level of potential visual impact. This methodology is explained more fully in the following paragraphs.

3.3.1. Existing visual conditions

Visual catchment and potential visibility of the proposal

A map has been prepared to illustrate the potential visual catchment of the proposal and extent of visibility from areas within this catchment. This visibility analysis uses a digital terrain model and points on the top of each transmission line structure along the proposal alignment, to identify the areas from which views to the proposal may be seen. The analysis shows areas where a greater number of transmission line structures are visible, as a darker colour.

The terrain data included one metre LIDAR data provided by TransGrid and one second SRTM Derived Hydrological ((DEM-H) version 1.0 Geoscience Australia 2011). The model does not include land cover features (i.e. trees and buildings). This therefore represents a worst-case scenario and the first step in the analysis process.

3.3.2. Representative viewpoint assessment

Site inspections were carried out during June of 2020. These inspections verified the results of a preliminary viewshed analysis.

Views representative of the site have been selected, they include views from areas where the greatest number of viewers are likely to congregate, such as lookouts, major roads and scenic routes, as well as locations in sensitive recreational and natural areas.

Photomontages have been prepared for some viewpoints to support the assessment of impact. These views illustrate locations where the proposal would be seen from higher sensitivity locations and to show a typical view within each landscape character area.

Visual sensitivity

Visual sensitivity refers to the nature and duration of views. Locations from which a view would potentially be seen for a longer duration, where there are higher numbers of potential viewers and where visual amenity is important to viewers can be regarded as having a higher visual sensitivity. Distance also contributes to the sensitivity of a view. Generally, the greater the distance, the less sensitive the viewpoint.

To ensure the impacts are attributed fairly, the sensitivity of each viewpoint is considered in the broadest context of possible views, including those of national importance through to those considered to have a neighbourhood importance. The following terminology has been used to describe the level of visual sensitivity, see Table 3-4.

TABLE 3-4: VISUAL SENSITIVITY TABLE

| Visual sensitivity | Description |
|--------------------|--|
| National | <ul style="list-style-type: none">- Heavily experienced view to a national icon, e.g. view from the Red Top Lookout at the World Heritage Listed Mungo National Park, and / or- Views to areas with a scenic value of national importance or to landscape features of the state, and / or- Views from World Heritage Listed Places.- These views are generally unique and uncommon nationally. |
| State | <ul style="list-style-type: none">- Heavily experienced view to a feature or landscape that is iconic to the state, e.g. views to and from the Blue Mountains or the view from the Memorial lookout at Lake Victoria, and / or- Views to areas with a scenic value recognised by the state.- These views are generally unique or uncommon within the state. |
| Regional | <ul style="list-style-type: none">- Heavily experienced view to a feature or landscape that is iconic to a major portion of a city or a non-metropolitan region, or an important view from an area of regional open space. e.g. a view from the Darling and Murray River Junction viewing tower in Wentworth, and / or- Views to areas of regionally important scenic value or to landscape features of the region.- These views are generally unique or uncommon within the region. |
| Local | <ul style="list-style-type: none">- High quality view experienced by concentrations of residents and/or local recreational users, and/or large numbers of road or rail users, and / or- Views to areas of local scenic value or to local landscape features.- These views are somewhat common within the landscape. |
| Neighbourhood | <ul style="list-style-type: none">- Views where visual amenity is not particularly important to the wider community, such as lower quality views briefly glimpsed from roads.- These views are likely to be common within the landscape. |

Magnitude of change

The magnitude of change refers to the change to the landscape that would occur as a result of development from a given viewpoint. This includes what has changed, and how it has changed. Visual modification describes the extent of change and identifies elements which are removed or added, changed in colour and texture, and compatibility of new elements with the existing landscape. Visual modification can result in an improvement or reduction in visual amenity.

A high magnitude of change will result if the development contrasts strongly with the existing landscape. Whereas a low degree of visual modification occurs if there is minimal visual contrast and a high level of integration of form, line, shape, pattern, colour or texture values between the

development and the environment in which it sits. In this situation, the development may be noticeable but does not markedly contrast with the existing modified landscape.

Table 3-5 lists the terminology used to describe the level of visual modification.

TABLE 3-5: MAGNITUDE OF CHANGE

| Magnitude of change | Description |
|---------------------|---|
| Very high | <ul style="list-style-type: none"> - The view is altered such that the proposal visually dominates and transforms the character of the view. - It would result in a substantial change in the amenity of the view. |
| High | <ul style="list-style-type: none"> - The proposal is visually prominent, and / or contrasts with the character of the view. - It would result in a considerable change in the amenity of the view. |
| Moderate | <ul style="list-style-type: none"> - The proposal is somewhat prominent and / or is not compatible with the character of the view. - It would result in a noticeable change in the amenity of the view. |
| Low | <ul style="list-style-type: none"> - The proposal is not visually prominent and / or is visually compatible with the character of the view. - It would result in a slight change in the amenity of the view. |
| Negligible | <ul style="list-style-type: none"> - The proposal is not visible, is not visually prominent in the view and / or is compatible with the character of the view. - It would result in no perceived change in the amenity of the view. |

There are some general principles regarding the relationship between the proposal and the landscape which determine the magnitude of change level. These principles, or assumptions, relate to how well a transmission line can be absorbed into the landscape and what is considered to be more or less visually harmonious. These principles will be applied generally to the viewpoint assessment, and include:

- **Scale**, the larger the scale of the structures, the more visually prominent they are likely to be;
- **Form**, the style and form of the infrastructure can assist in the absorption of development into a view i.e. lattice transmission line structures can be seen through and more visually light weight in some settings;
- **Distance**, the greater the distance, the less prominent the transmission line structures are likely to be;
- **Landform**, the location of the transmission line structures in relation to the surrounding landform i.e. landform may intervene and screen views, or may allow greater visibility if the proposal elements are located on higher ground;
- **Vegetation**, taller trees, and more dense vegetation will screen and reduce visibility;
- **Development context and character**, the presence of other existing infrastructure of a similar character can increase the compatibility of development within a view; and
- **Alignment and line**, simple lines and an alignment reflecting the patterns of the existing landscape can reduce visual contrast, whereas intersecting lines and discordant alignments can increase the visual prominence of proposal elements.

These principles have been applied generally to the viewpoint assessment.

3.3.3. Assigning visual impact levels

An assessment of visual impact has been made by combining the visual sensitivity and magnitude of change levels for each representative viewpoint and assigning an impact level (refer to Table 3-6).

TABLE 3-6: VISUAL IMPACT LEVELS

| | Sensitivity | | | | |
|---------------------|-------------|------------|------------|------------|---------------|
| Magnitude of change | National | State | Regional | Local | Neighbourhood |
| Very high | Very high | Very high | High | High | Moderate |
| High | Very high | High | High | Moderate | Low |
| Moderate | High | High | Moderate | Low | Low |
| Low | Moderate | Moderate | Low | Low | Negligible |
| Negligible | Negligible | Negligible | Negligible | Negligible | Negligible |

Photomontages

Five photomontages have been prepared to illustrate the expected changes to views as a result of the proposal. Photomontages are created using a combination of 3D modelling and photo editing techniques.

The process used to prepare these images was as follows:

- GPS coordinates and details of the camera was recorded;
- A terrain model was prepared using contours with 5-metre intervals;
- The camera was positioned in the model using the photograph GPS data for each image;
- A minimum of three points were identified in each view, from the terrain model, and used to align the view; and
- The transmission line structures, wires and associated infrastructure were modelled in 3D and materials assigned to the model.

These modelled views were then edited in photoshop to insert the model into the photograph.

For this assessment, an indicative centreline of the transmission line corridor has been selected for the proposed route for the transmission line (the proposal alignment). It is noted that the proposal alignment may be modified to a different location within the transmission line corridor during detailed design however the assessment presents a representative assessment of impacts. Due to limited receivers in the area the assessment should remain appropriate to these changes.

The photomontages used in this assessment represent the operational view to the proposal. Photomontages of construction activity or construction camps have not been prepared as these are temporary activities which would change throughout the construction process.

Transmission line structures have been modelled at the maximum assumed height (80 metres for the 330 kV transmission line and 50 metres for the 220 kV transmission line) and spaced at about 460 metres and 390 metres apart for the 330kV and 220kV transmission line respectively.

The upgraded and expanded Buronga substation facility has not been modelled and presented in a photomontage as part of the assessment as the detailed design of this facility is not yet determined. The extent of the expanded area is known and the expected infrastructure heights

and general form are in concept and these have been used to inform the assessment of this component of the proposal.

The viewpoints used to create these photomontages were chosen to represent a range of viewing locations along the proposal corridor, from a distance and orientation where the proposal would be most visible. The photomontage locations were also chosen to illustrate views from areas with the greatest visual sensitivity and where the greatest number of viewers would be located.

Distant views were not selected as the detail of the model would not be evident and the extent of change in the photograph would be less.

3.3.4. Assessment of night-time visual impact

An assessment of the potential visual impacts of the project at night has been undertaken for each landscape character area.

The assessment of night-time impact has been carried out with a similar methodology to the daytime assessment. However, the assessment also draws upon the guidance contained within AS4282 *Control of the obtrusive effects of outdoor lighting* (2019).

AS4282 identifies four main potential effects of lighting, which are, the effects on residents, transport system users, transport signalling systems and astronomical observations. Of relevance to this assessment is the effects of lighting on the visual amenity of residents and transport system users.

AS4282 identifies environmental zones which are useful for categorising night-time landscape settings. The following assessment will use these environmental zones to describe the existing night-time visual condition and assign a sensitivity to these settings.

3.4. Night-time visual sensitivity

The environmental zone (defined in AS4282) which best describes the existing night-time visual condition of the site has been selected. These zones are typical night-time settings and reflect the predominant light level of each landscape character area. Each environmental zone is assigned a level of sensitivity as described in Table 3-7.

TABLE 3-7: ENVIRONMENTAL ZONE SENSITIVITY – NIGHT-TIME

| Environmental Zones (AS4282:2019) | | |
|-----------------------------------|------------------------------------|--|
| Sensitivity level | Description | Examples |
| Very high | A0: Intrinsically dark | UNESCO Starlight Reserve IDA Dark Sky Parks Major optical observatories No road lighting – unless specifically required by the road controlling authority |
| High | A1: Dark | Relatively uninhabited rural areas No road lighting – unless specifically required by the road controlling authority |
| Moderate | A2: Low district brightness | Sparsely inhabited rural and semi-rural areas |
| Low | A3: Medium district brightness | Suburban areas in towns and cities |
| Negligible | A4: High district brightness areas | Town and city centres and other commercial areas Residential areas abutting commercial areas |

3.4.1. Night-time magnitude of change

Following the sensitivity assessment, the magnitude of change that would be expected within each landscape character area at night is then identified. These changes are described, as relevant, in terms of:

- Sky glow – which is the brightening of the night sky
- Glare – condition of vision in which there is discomfort or a reduction in ability to see
- Light spill – light emitted by a lighting installation that falls outside of the design area.

TABLE 3-8: VISUAL MAGNITUDE OF CHANGE LEVELS – NIGHT-TIME

| Magnitude of change | Description |
|---------------------|---|
| Very high | <ul style="list-style-type: none">- Substantial change to the level of skyglow, glare or light spill expected, and / or- The lighting of the proposal would transform the character of the surrounding setting at night, and / or- The effect of lighting would be experienced over an extensive area and / or |
| High | <ul style="list-style-type: none">- Considerable change to the level of skyglow, glare or light spill and / or- The lighting of the proposal would noticeably contrast with the surrounding landscape at night and / or- The effect of lighting would be experienced across a large portion of the landscape. |
| Moderate | <ul style="list-style-type: none">- Alteration to the level of skyglow, glare or light spill would be expected, and / or- The lighting of the proposal would contrast somewhat with the surrounding landscape at night, and / or- The effect of lighting would be experienced across a moderate portion of the landscape. |
| Low | <ul style="list-style-type: none">- Alteration to the level of skyglow, glare or light spill would be expected, and / or- The lighting of the proposal would not contrast substantially with the surrounding landscape at night, and or- The effect of lighting would be experienced across a small portion of the landscape. |
| Negligible | <ul style="list-style-type: none">- Either the level of skyglow, glare and light spill is unchanged or- if it is altered, the change is generally unlikely to be perceived by viewers or- compatible with the existing or intended future use of the area. |

3.4.2. Night time visual impact levels

An assessment of night-time visual impact has been made by combining the visual sensitivity of the environmental zone with the night-time visual magnitude of change for each area generally and assigning an impact level (refer to Table 3-9).

TABLE 3-9: VISUAL IMPACT LEVELS – NIGHT TIME

| | Sensitivity (AS4282:2019 Environmental Zone) | | | | |
|---------------------|--|------------|---------------|------------|-----------------|
| Magnitude of change | Very high (A0) | High (A1) | Moderate (A2) | Low (A3) | Negligible (A4) |
| Very high | Very high | Very high | High | High | Moderate |
| High | Very high | High | High | Moderate | Low |
| Moderate | High | High | Moderate | Low | Negligible |
| Low | Moderate | Moderate | Low | Low | Negligible |
| Negligible | Negligible | Negligible | Negligible | Negligible | Negligible |

3.5. Impacts on views from private properties

The assessment of visual impact on views from private residential properties is guided by the planning principles for ‘view sharing’ provided in the judgement of the NSW Planning Environment court in the *Tenacity Consulting V Warringah Council* [2004], NSWLEC 140.

View sharing is when a property ... ‘enjoys existing views and a proposed development would share that view by taking some of it away.’ (NSWLEC 140, 2004)

While the approach set out in this judgement is more suitable for urban settings, the principles can be applied to regional landscape settings in a more general way and with considerations of scenic preference appropriate for the range of landscapes available within the setting of the proposal.

3.5.1. Identifying receptors

The judgement indicates that the most affected properties should be considered only. However, for the purposes of this assessment, all receptors identified within the landscape and visual study area have been assessed. Where there is a group of properties in this area, a house which represents the worst-case scenario has been selected and assessed as representative of views from this group.

3.5.2. Assessment steps

To determine whether view sharing is reasonable the judgement identifies a four-step assessment process. These steps are:

Step 1: Assess views to be affected, noting:

- water views are valued more highly than land views
- iconic views are valued more highly than views without icons
- whole views are valued more highly than partial views.

Step 2: Consider from what part of the property the views are obtained

- the protection of views across side boundaries is more difficult than the protection of views from front and rear boundaries
- whether the view is enjoyed from a standing or sitting position may also be relevant. Sitting views are more difficult to protect than standing views.

Step 3: Assess the extent of the impact

- this should be undertaken from the whole of the property (residence), not just for the view that is affected

- the impact on views from living areas is more significant than from bedrooms or services areas
- views from kitchens are highly valued because people spend so much time in them.

Step 4: Assess the reasonableness of the proposal that is causing the impact, noting that:

- a development that complies with all planning controls would be considered more reasonable than one that breaches them
- with a complying proposal, the question should be asked whether a more skilful design could provide the applicant with the same development potential and amenity and reduce the impact on the views of neighbours. If the answer to that question is no, then the view impact of a complying development would probably be considered acceptable and the view sharing reasonable.

The following modifications to this approach have been made to reflect the landscape setting, proposal type and the proposal stage:

- a desktop analysis of topography and vegetation cover were used to assess and describe the views to be affected (step 1).
- when considering what part of the property the views are obtained from (step 2), the residence has been considered as one vantage point. If there is a potential adverse visual impact identified, then during detailed design a visit to the property may be required to confirm the extent of the visibility, significance of any visual impact and need for mitigation measures investigated in consultation with the landholder
- to illustrate the potential extent of visual impact (step 3) cross sections have been prepared. The cross sections are based on a 3D digital terrain model and indicatively show the screening effect of vegetation and other buildings
- the reasonableness of the proposal (step 4) is usually considered in relation to development controls set by local government in their Local Environmental Plan and Development Control Plan. However, these controls are not applicable to a proposal of this type and scale, being a Critical State significant infrastructure project. Considering the opportunity to skilfully consider the design of the proposal may, however, be appropriate during detailed design. Opportunities for design refinements, such as refinements to transmission line structure positioning within the transmission line corridor for example, are identified in the mitigation measures section of this technical paper.

3.6. Mitigation and residual effects

For those areas identified as likely to result in a visual impact, as a result of the proposal, methods for reducing these impacts have been considered and specific mitigation approaches recommended. These mitigation techniques may include the use of vegetation for screening, reducing the size of the transmission line structures or adjustments in the location and spacing of transmission line structures for example. Incorporating these proposed mitigation approaches into the assessment, impacts of specific viewpoints are then re-assessed and the residual effects of the proposal can then be identified.

3.7. Cumulative and interactive effects

Incorporating cumulative effects into the impact assessment widens the assessment to include not only direct effects, but also collective effects.

Cumulative effects of projects can indicate that the combination of effects created by multiple projects may be greater than the sum of the individual effects. Cumulative impacts between

projects will be addressed based on assumptions about the likely implementation of proposed projects within neighbouring areas.

4. Landscape assessment

4.1. Landscape character areas

The site is located between the NSW/South Australian border near Chowilla in the west, Buronga substation in the east, and extending south to the NSW/Victoria border at Monak beside the Murray River.

The topography of the landscape and visual study area is flat between the SA/NSW border and Renmark Road, particularly to the north of Renmark Road and west of Lake Victoria. The landform lowers to the form broad lakes including Lake Victoria, within the study area. The landform becomes undulating to the east of the lake and continuing east for much of the landscape and visual study area as the landscape is dissected by a series of river plains, including the Great Darling Anabranch and Darling rivers. In the eastern part of the landscape and visual study area the landform lowers and broadens out in the vicinity of Buronga and Red Cliffs as the proposal alignment approaches the Murray River. (Refer Figure 4-1)

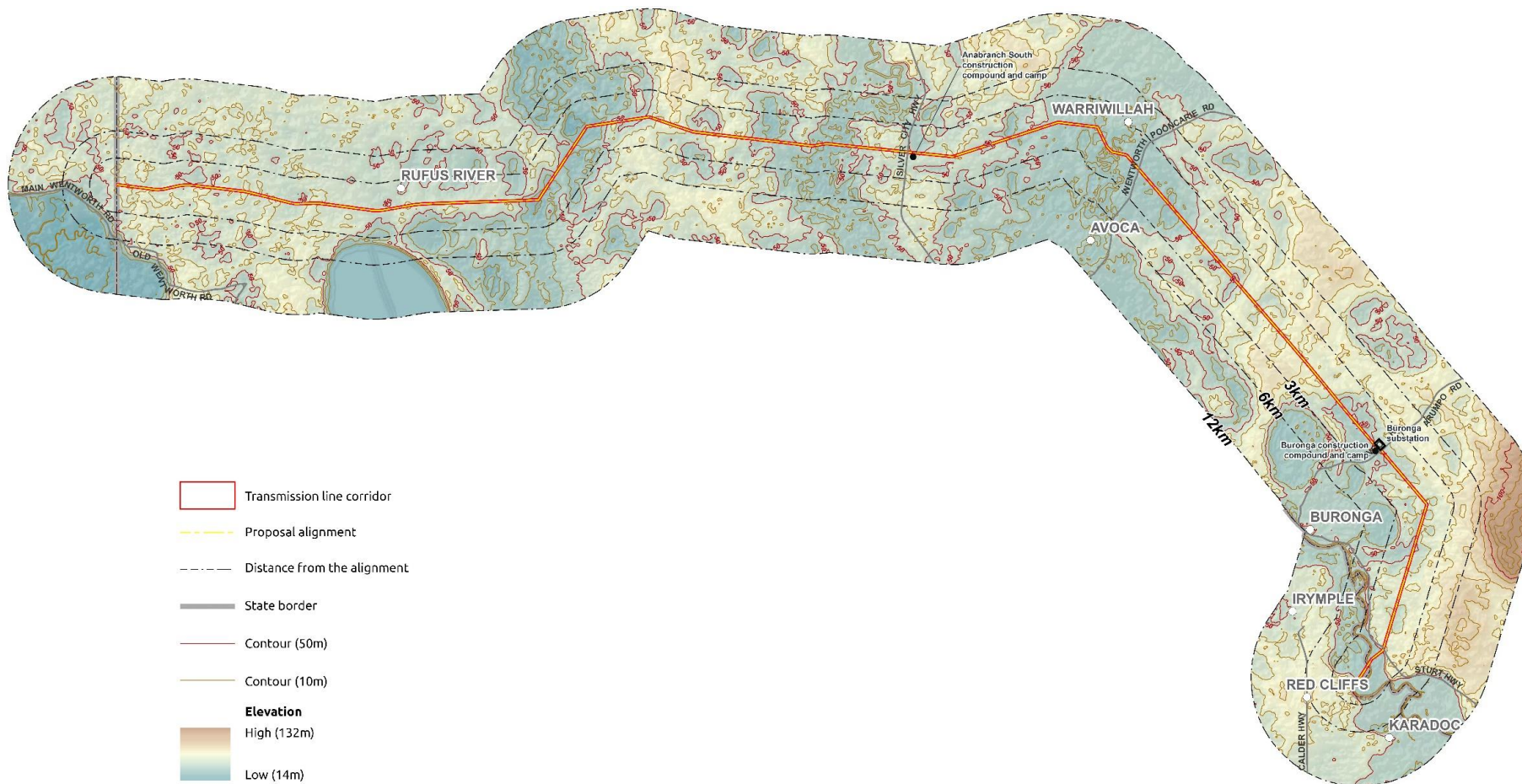
While there is a diverse mosaic of landscapes within the landscape and visual study area, three key landscape character areas have been identified. These are based on similar topography, vegetation type and cover, and land use.

These landscape character areas are (west to east):

- Lake Victoria Cultural Landscape and semi-arid plains;
- Mallee shrubland and rural landscape; and
- Murray River plain rural landscape character area.

The following section includes a description of the existing conditions in each of these landscape character areas, describes the sensitivity of each landscape character area, the magnitude of change expected as a result of the project and assigns an impact level.

The location of these landscape characters is shown in Figure 4-2.



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Landscape and visual impact assessment

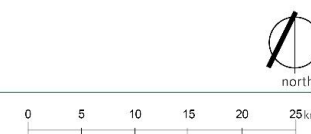
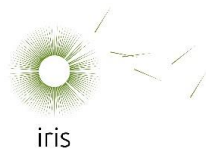
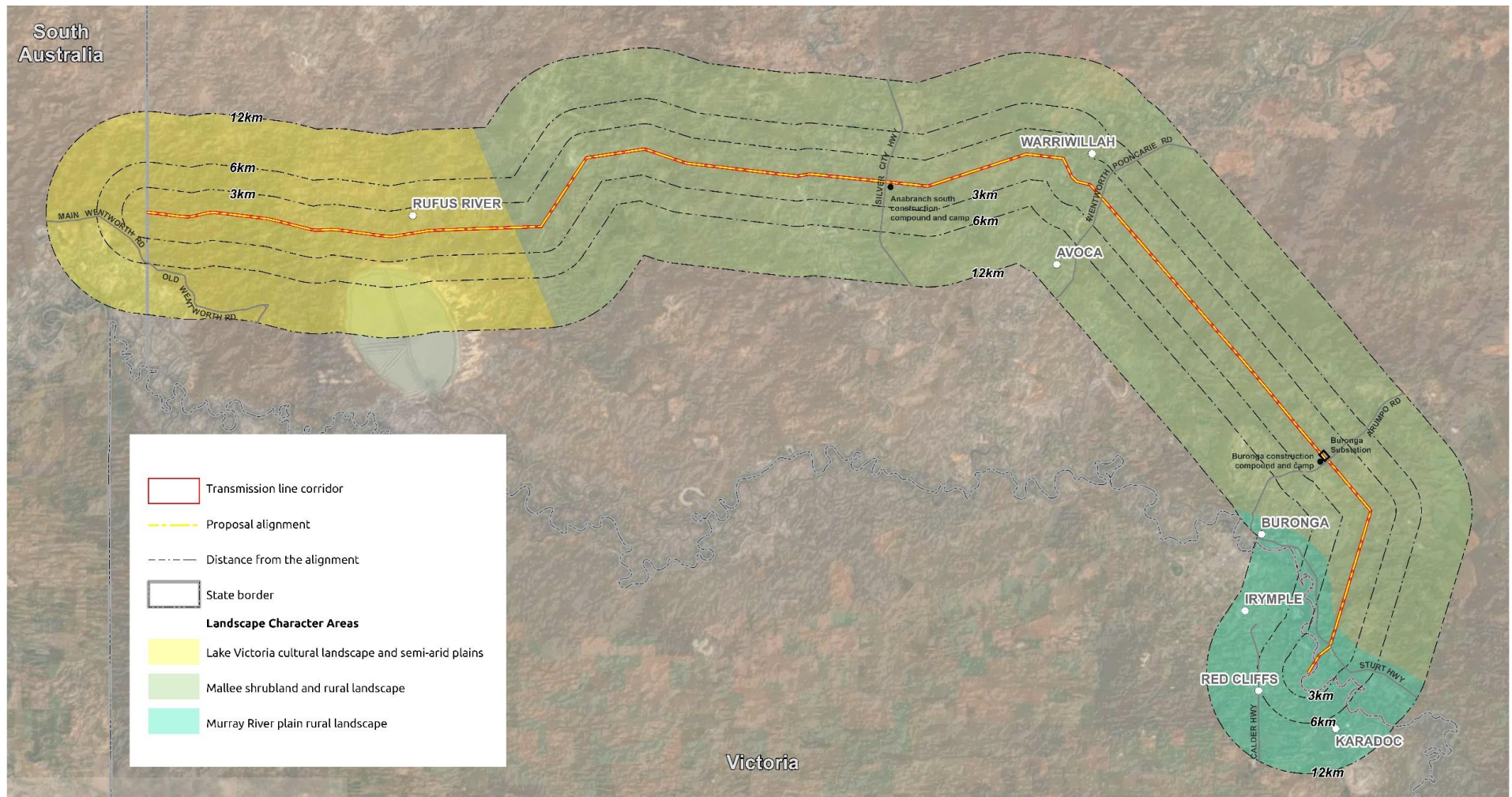


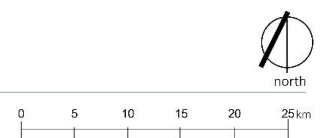
FIGURE 4-1 TOPOGRAPHY



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Landscape and visual impact assessment

FIGURE 4-2 LANDSCAPE CHARACTER AREAS



4.1.1. Lake Victoria cultural landscape and semi-arid plains

Existing conditions:

This character area extends generally between the SA/NSW border and Nulla Road, north of Lake Victoria. This landscape consists of vast semi-arid plains of low elevation, with sandhills and gentle undulating sandy rises, interspersed by dense swathes of low mallee shrubland. The landscape has a remote and arid character, and includes salt pans and expanses of flat, low open shrubland. (Refer to Figure 4-3)

Near Nulla Road, the landscape is open, with vegetation cleared for grazing, allowing expansive slightly elevated views, with some long-distance views to Lake Victoria. Further to the west, the landscape transitions into dense, low mallee shrubland, which encloses views.

This area experiences a hot and persistently semi-arid climate, with low rainfall, and regular high temperatures. The land use in the region generally reflects the climatic conditions and are predominately agriculturally, comprising low-intensity beef cattle and sheep grazing at low stocking rates as well as goat production on saltbush plains. The native saltbush and bluebush shrubland and grassland are a valuable grazing resource, providing green fodder for livestock during times of drought; although much of the land in this area has been destocked and rested in recent years. The area is very lightly populated, including a few remote pastoral properties (including the heritage listed 'Nulla Nulla' and 'Noola' stations) with homesteads and staff cottages. There is also a small group of residential properties at Lake Victoria, associated with the management of the lake. Other nearby land uses include open cut mineral sand mining.

Tourism is also a key land use in the area, with inland lakes, waterways and national parks catering for nature-based recreation, including walking, bird watching, fishing, camping, as well as for educational field trips by school and university groups.

Lake Victoria is a unique landscape feature to the south of the transmission line corridor, which has significant cultural heritage values and is a popular recreation and tourist site, particularly during periods of inundation. It is a 'landmark feature because of the visual contrast it provides as a very large lake set into a semi-arid landscape' (Murray–Darling Basin Authority, 2019, s.1.6.3). While the lake is highly modified, including constructed embankments and regulators, the areas of native vegetation are highly valued by the local community, particularly the 'stands of river red gum' (Murray–Darling Basin Authority, 2019, s.1.6.3). The lake reserve includes a boat ramp, picnic facilities and lookout located at the southern end of the lake.

Renmark Road is a two-lane road running generally east to west, between Nulla Road and the SA border, largely running parallel to the south of the transmission line corridor.

Landscape sensitivity:

Lake Victoria is identified as a 'significant cultural landscape' in the Cultural Landscape Management Plan (Murray–Darling Basin Authority, 2019) and a ... 'landmark feature because of the visual contrast it provides as a very large Lake set into a semi-arid landscape' (Murray–Darling Basin Authority, 2019). The lake is also identified as Environmental Conservation in the Wentworth Local Environmental Plan 2011. There are several local heritage listed places including the Provincial Border Obelisk, Old Wentworth Road, Noola Homestead, Lake Victoria, Nulla Nulla Woolshed and Homestead (Wentworth Local Environmental Plan 2011).

The transmission line corridor is located about five kilometres north of the lake foreshore and north of Renmark Road. Renmark Road creates a northern boundary to the setting of the lake, so that the areas to the north of this road contribute less to the sense of place of the lake. Therefore, the Lake Victoria Cultural Landscape and semi-arid plains landscape character area is of **state sensitivity** south of Renmark Road and **regional sensitivity** to the north of Renmark Road.

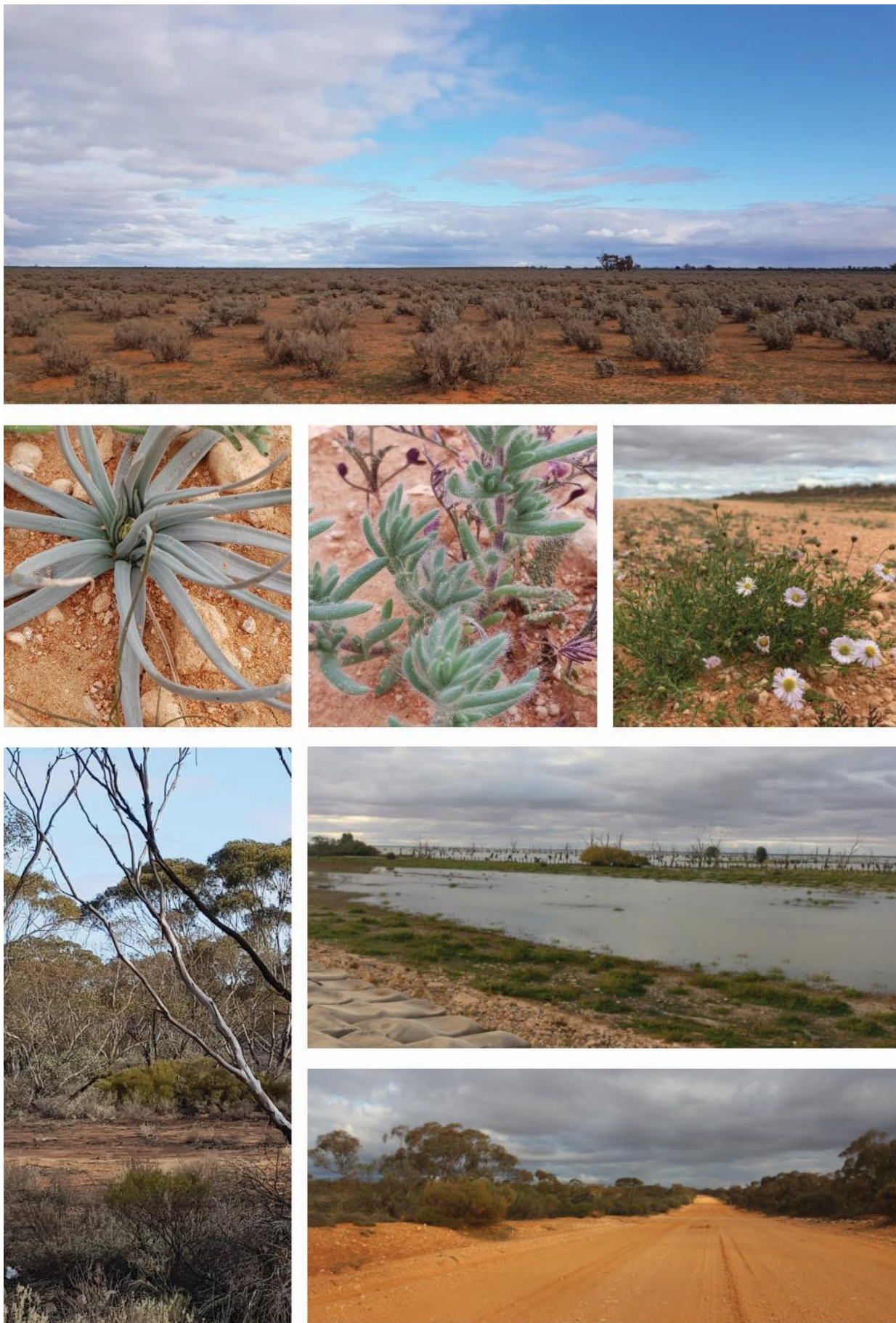


FIGURE 4-3 LAKE VICTORIA CULTURAL LANDSCAPE CHARACTER AREA, CHARACTER IMAGES

Landscape impact during construction:

Vegetation within the area used for construction would be impacted with some completely removed and some trimmed to lower heights (in the easements). Full removal is expected at each transmission line structure site, and for construction access tracks, laydown and compound site areas. In some areas this would involve the removal of trees but mostly, due to the semi-arid landscape, this would mainly involve the removal of shrubs and groundcovers. There would only be small and localised landform modification, with this character area being a predominantly flat landform.

Overall, there would be a moderate magnitude of change to a landscape of regional landscape sensitivity, and a **moderate landscape impact** during construction.

As there would be no direct impact, in areas to the south of Renmark Road there would be a negligible magnitude of change to the landscape, which is of state sensitivity, and a **negligible landscape impact** during construction.

Landscape impact during operation:

The dispersed rural activities would continue under the transmission lines and around the structures. While there would potentially be some access tracks maintained along the transmission line corridor, all other areas impacted by construction, outside the operational footprint, would be reinstated and revegetated as appropriate. However, there would be transmission line structures, regularly spaced for about 38 kilometres across this landscape character area.

Overall, there would be a low magnitude of change to a landscape of regional landscape sensitivity, and a **low landscape impact** during operation.

During operation in areas to the south of Renmark Road there would be a negligible magnitude of change to the landscape, which is of state sensitivity, and a **negligible landscape impact**.

4.1.2. Mallee shrubland and rural landscape

Existing conditions:

This landscape character area extends generally between Nulla Road and to the locality of Mallee. In this area, the proposed corridor extends northeast along the eastern property boundary of 'Nulla Nulla' Station, then east to Low Darling Road, crossing the Great Darling Anabranch and Darling rivers, then southwest towards Mallee. The landscape in this area generally consists of open, undulating rural plains with areas of native eucalyptus forest (including mallee shrubland). (Refer to Figure 4-4)

In most areas, thick mallee scrub has been cleared for agricultural uses, with thinned out and patches of this vegetation remaining. These agricultural uses include sheep and cattle grazing on native low shrubs (typically saltbush and bluebush shrublands) and pastures. There are also areas of broadacre cereal cropping, as well as viticulture and horticulture (mainly fruit and nut trees) industries in areas close to the Darling River.

There are several seasonally dry relic lake beds, such as Lake Gol Gol and Gol Gol swamp, to the south of the transmission line corridor. While not visually prominent, these form local visual features and distinctive formations in the landscape. There are also densely vegetated areas of mallee eucalypts, patches of black oak and belah forest.

There are areas characterised by existing power infrastructure, including the Buronga to Broken Hill 220kV transmission lines, electrical infrastructure at Pooncarie Road, and Buronga substation at Arumpo Road. There are also various agricultural structures including livestock saleyards, fruit and tree nut packing and grading sheds, wine processing facilities, rural merchandise and

machinery businesses, and grain receival points including silos. There are several arterial roads which support local and regional transport, including the Sturt and Silver City Highways, which both cross the transmission line corridor.

Although there are a number of areas zoned for environmental conservation and management (Wentworth LEP 2011) overlapping or in close proximity to the transmission line corridor, such as Lake Gol Gol, they are not intended for recreational use and do not contain trails or lookouts.

Landscape sensitivity:

This area is a predominantly rural landscape, valued and experienced by sparsely populated and relatively low use roads. There are visitors to the area travelling along the 'Wentworth to Mungo Loop' tourist drive, via Arumpo Road and Pooncarie Road. An area to the east of the Darling River and west of Pooncarie Road are zoned Environmental Conservation, and as such the aesthetic values of these areas should be protected (Wentworth Local Environmental Plan 2011, cl.E2 zone). There are also several river crossings, which have elevated local landscape value, and the Sturts Billabong on the Darling River which is heritage listed (Wentworth Local Environmental Plan 2011) While this is a relatively common landscape in this region, the Wentworth LEP 2011 recognises the mix of dryland and irrigation agricultural land uses as a part of the '*distinctive rural character of Wentworth*' (cl.RU1 zone). Overall, the Mallee shrubland and rural landscape character area is of **local sensitivity**.

Landscape impact during construction:

Construction access tracks and sites prepared for minor staging, storage and laydown ancillary areas would be established within the transmission line corridor. There would also be construction compounds and camp sites at Anabranch South and in the vicinity of the Buronga substation.

Vegetation within the area used for construction would be impacted with some completely removed and some trimmed to lower heights (in the easements). Full removal is expected at each transmission line structure worksite, up to a maximum of every 300 metres along the transmission line corridor, and for construction access tracks, laydown and compound site areas. This would involve the removal of trees within native bushland and agricultural areas. Riparian vegetation at creek and river crossings would likely need trimming to lower heights to accord with easement management requirements. There would also be a large area of agricultural land and trees removed to construct the substation expansion at Buronga.

There would only be small and localised landform modification, with this character area being a predominantly flat to undulating landform. The area used for construction would not directly impact the dry relic lake beds or other important landscape features.

Overall, there would be a moderate magnitude of change to a landscape of local landscape sensitivity, and a **low landscape impact** during construction.

Landscape impact during operation:

The predominantly agricultural land uses would continue under the transmission lines and around the transmission line corridor. While there would be some access tracks maintained, all other areas impacted by construction, outside the operational footprint, would be reinstated and revegetated as appropriate. However, there would be transmission line structures, regularly spaced for about 100 kilometres across this landscape character area. There would also be a large area transformed from rural use to an expanded substation at Buronga.

Overall, there would be a moderate magnitude of change to this landscape, which is of local landscape sensitivity, and a **low landscape impact** during operation.



FIGURE 4-4 MALLEE SHRUBLAND AND RURAL LANDSCAPE CHARACTER AREA, CHARACTER IMAGES

4.1.3. Murray River plain rural landscape

Existing conditions:

This landscape character area is located on the Murray River floodplain generally between Trentham Cliffs and extending along the Sturt Highway and to the Murray River. This landscape is relatively flat along the Murray River, rising to a higher-level terrace back from the riparian zone and then gently undulating to the north towards Mallee. This area has been extensively cleared and modified for irrigated and dryland arable farming purposes. This rural landscape includes a mix of cereal crops, viticulture, and horticulture such as wine and table grapes, citrus, almonds and vegetable production (Refer to Figure 4-5).

Nearing the Murray River, properties and lot sizes become smaller in size, with some small acreage properties and rural lifestyle blocks overlooking the river. These properties have southerly views to the Kings Billabong Park and River Murray Reserve.

The area is settled, contains a busy highway (Sturt Highway) and large-scale power infrastructure, including 220kV transmission lines, extending between Buronga and Red Cliffs, crossing the Murray River at Monak. Other infrastructure in the area include mineral extraction beside the Sturt Highway north of Monak and a higher concentration of rural structures including sheds, workshops, packing and processing facilities, supporting the surrounding agricultural uses.

Landscape sensitivity:

This landscape includes the riverfront areas of the Murray River and areas of Environmental Conservation (Trentham Cliffs east of Sturt Highway), which are identified as having amenity and scenic landscape values in the *Wentworth Local Environmental Plan 2011* (cl.E2 zone). This area also borrows views from the River Murray Reserve and Kings Billabong Park across the river in Victoria, which reinforce the leafy character of these riparian areas.

This landscape would be appreciated by larger numbers of people travelling along the Sturt Highway including tourists and visitors to the region. Overall, the Murray River plain rural landscape character area is of **local sensitivity**.

Landscape impact during construction:

Construction access tracks would be established and sites prepared for minor staging, storage and laydown ancillary areas in locations along the transmission line corridor. Vegetation within the area used for construction would be impacted with some completely removed and some trimmed to lower heights (in the easements). Full removal is expected at the site of each transmission line structure, up to a maximum of every 300 metres along the alignment, and for construction access tracks, laydown and compound site areas.

There would be some localised landform modification required at each site particularly in areas where the landform is more undulating near the Murray River. The proposal would not directly impact on any important landscape features.

Overall, there would be a low magnitude of change to this landscape, which is of local landscape sensitivity, and a **low landscape impact** during construction.

Landscape impact during operation:

The predominantly agricultural land uses would continue under the transmission lines and around the transmission line corridor. Areas impacted by construction, outside the operational footprint, would be reinstated and revegetated as appropriate. There would be transmission line structures, regularly spaced across this landscape. The proposal would utilise existing maintenance access tracks, reducing the extent of change to the existing landform and land cover.

Overall, there would be a low magnitude of change to a landscape of local landscape sensitivity, and a **low landscape impact** during operation.



FIGURE 4-5 MURRAY RIVER PLAINS RURAL LANDSCAPE CHARACTER AREA, CHARACTER IMAGES

4.2. Summary of landscape impacts

In summary, while the landscape and visual study area includes landscapes of state and regional landscape sensitivity, there would be relatively low landscape impacts during construction and operation of the proposal. This is due to the relatively small area of direct impact, the relatively flat and open landscape requiring minimal landform changes, and transmission line corridor avoiding important landscape features such as Lake Victoria, dry relic lake beds, billabongs and river crossings. Those visual impacts which have been identified range from **low** to **moderate landscape impact** during construction, and **low landscape impact** during operations. These impacts are listed in Table 4-1.

TABLE 4-1: SUMMARY OF LANDSCAPE IMPACTS

| Landscape character area | Landscape sensitivity | Construction | | Operation | |
|--------------------------------------|----------------------------------|---------------------|------------------|---------------------|------------------|
| | | Magnitude of change | Landscape impact | Magnitude of change | Landscape impact |
| Lake Victoria Cultural | State (south of Renmark Road) | Negligible | Negligible | Negligible | Negligible |
| Landscape and semi-arid plains | Regional (north of Renmark Road) | Moderate | Moderate | Low | Low |
| Mallee shrubland and rural landscape | Local | Moderate | Low | Moderate | Low |
| Murray River plain rural landscape | Local | Low | Low | Low | Low |

5. Visual impact assessment

5.1. Visual catchment of the proposal

The visual catchment of the proposal is varied across the landscape and visual study area and determined primarily by landform and vegetation cover. As a substantial portion of the proposal is linear, there are areas where numerous transmission line structures and greater lengths of the proposal alignment are seen. The diagram at Figure 5-1 shows the potential visual catchment of the proposal alignment. This map highlights areas where a greater length of the proposal would be seen with an increasingly darker colour. This visual catchment diagram shows that the proposal would be visible from a broad visual catchment due to the broad open semi-arid and rural landscapes.

Generally, there is the potential for a medium to low level of visibility of the proposal from Renmark Road, west of Lake Victoria where the landform is undulating and there is some vegetation which would intervene. However, to the north of Lake Victoria and to an area in the vicinity of the intersection with Rufus and Nulla roads, there would be medium to high visibility of the proposed transmission line (numerous towers visible) from Renmark Road. This visibility would diminish with distance and as vegetation intervene.

The proposed transmission line would be visible from short sections of roads and rural properties surrounding the transmission line corridor, and more visible from elevated areas of the landscape, in areas such as around the Silver City Highway, where the landform is more pronounced, and then particularly where there are views across flattens out.



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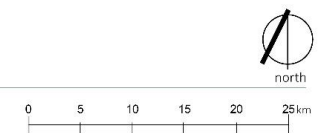


FIGURE 5-1 VISIBILITY ANALYSIS

5.2. Visual sensitivity of the study area

The visual sensitivity of the landscape and visual study area is influenced by a range of tourist routes, facilities and land uses located throughout the study area. The following list summarises these generally and have been used to identify representative viewpoints and define the visual sensitivity of each view.

In particular, the landscape and visual study area includes a number of important historic, cultural and environmental tourist places and routes. The location of a view on a tourist route or within a designated open space area or reserve typically increases its sensitivity due to the greater number of likely viewers and the greater emphasis that travellers, tourists and recreational users have on landscape appreciation. Key receptors identified as likely to have an elevated visual sensitivity are:

- **Lake Victoria** is a highly significant cultural landscape with exceptionally high spiritual and cultural significance to Aboriginal people, particularly the Barkindji and Maraura people. Lake Victoria also plays an important role in tourism, and is used for recreation for picnickers, campers and fishers, as well as for educational field trips by school and university groups. To the south of the lake there is a memorial lookout and campground.
- **The Classic Australian Drive** which is a scenic route following the Sturt Highway through the Riverina Murray region between Wentworth and Wagga Wagga. This is a heavily trafficked route.
- The **Silver City Highway** is a 683-kilometre-long highway that links Buronga to Queensland via Wentworth, Broken Hill, and Tibooburra, in the arid Far West region of New South Wales.
- The **Mallee Cliffs National Park** includes extensive areas of flat to undulating sandy red plains and linear sand dunes and functions primarily as a nature conservation area. Public access is restricted.
- **Wentworth to Mungo Loop tourist route** via **Arumpo Road** and **Pooncarie Road**. A route used to access the World Heritage Listed Mungo National Park.

No scenic or significant views or vistas have been identified within the proposal study area.

5.3. Assessment of daytime visual impacts

5.3.1. Selection of representative viewpoints

A series of visits to the landscape and visual study area were undertaken during June of 2020. The following viewpoints were selected as representative of the range of views to the proposal. This has included views from locations which have been identified as having increased visual sensitivity and where people are likely to congregate.

The following views represent the range of views to the proposal and will be assessed in this technical paper, they have been grouped by landscape character area:

Lake Victoria Cultural Landscape and semi-arid plains

1. View east along Renmark Road;
2. View north from track to Lake Victoria;
3. View north from track near Lake Victoria;
4. View north from Lake Victoria visitor lookout; and
5. View north from Renmark Road, near intersection with Nulla Road junction.

Mallee shrubland and rural landscape

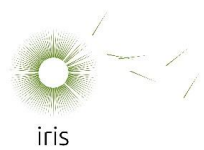
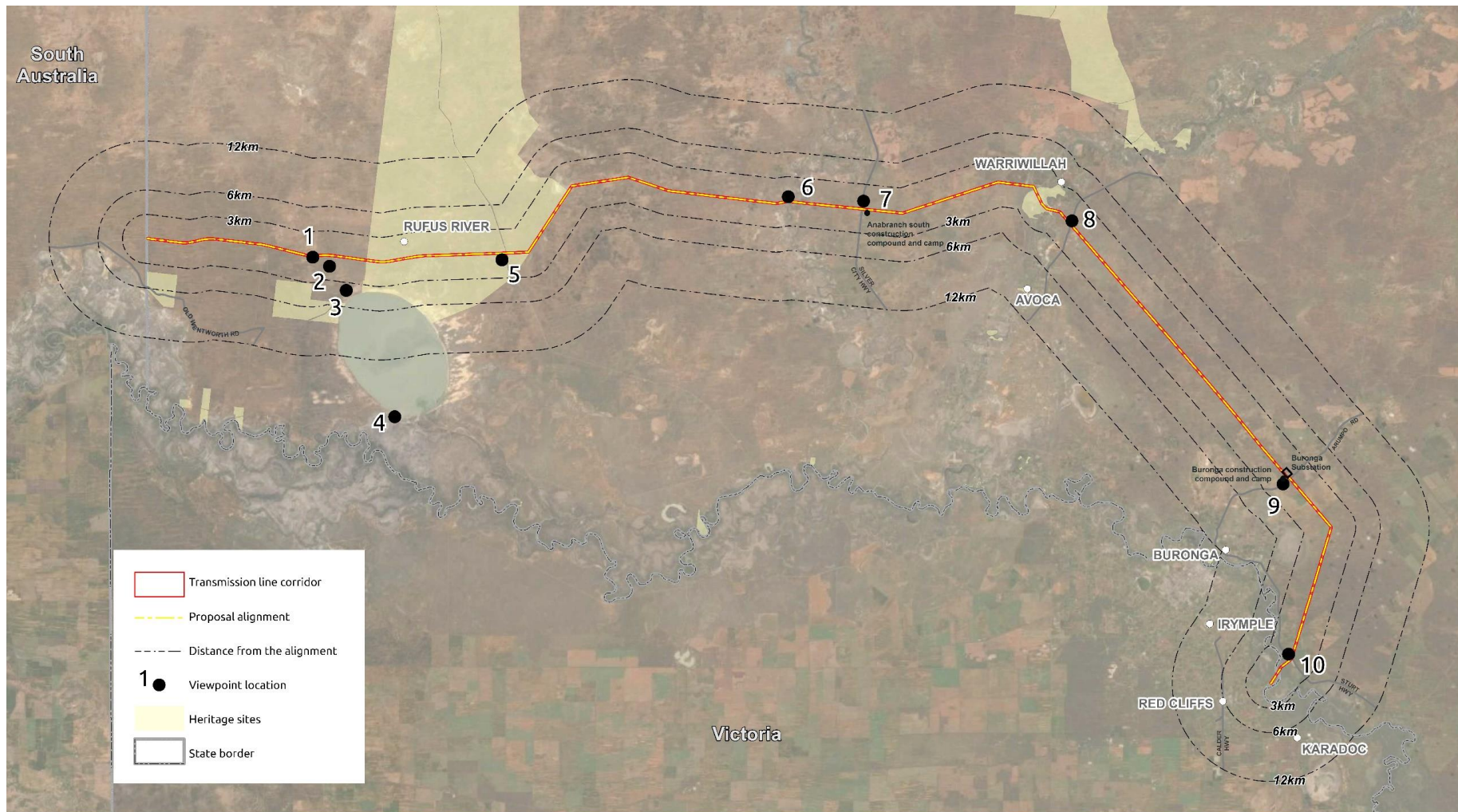
6. View south from Anabranche Mail Road;
7. View south from Silver City Highway;
8. View south from Pooncarie Road; and
9. View northeast from Arumpo Road to proposed Buronga substation upgrade and expansion site.

Murray River plains rural landscape

10. View southeast from Sturt Highway.

The location of these viewpoints is shown in Figure 5-2.

In addition, view from the air is addressed for the whole proposal study area.



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FIGURE 5-2 VIEWPOINT LOCATION PLAN

5.3.2. Assessment of representative viewpoints

The following section includes an assessment of each representative view and identifies the daytime visual impacts. These are arranged by landscape character area.

Lake Victoria Cultural Landscape and semi-arid plains

Viewpoint 1: View east along Renmark Road



FIGURE 5-3 VIEW EAST ALONG RENMARK ROAD

Location: 33°54'1.78"S, 141°11'6.7"E

Existing conditions: This view shows the dense, low mallee eucalypt vegetation either side of Renmark road, between Nulla Road and Rufus River Road. These multi-stemmed small trees provide a dense screening along the road. The landform is relatively flat rising to a small ridge in the background. The road, with some roadside guideposts and a road sign, are the only built elements in this view.

Sensitivity: Renmark Road is an unsurfaced road linking Wentworth and Renmark, providing access to the northern camps of Lake Victoria, and scattered rural properties and homesteads. While there are no mapped areas of scenic value seen in this view, this landscape has a high value to the local aboriginal people and is associated with the visual setting of Lake Victoria. Overall, this is a locally common view which would be experienced for several kilometres from vehicles moving at speed along Renmark Road. This view is of **local visual sensitivity**.

Visual impact during construction: The proposal would cross Renmark Road diagonally from the northeast to the southwest about 100 metres to the east of this viewpoint. While there would be excavation, levelling works and foundations at each transmission line structure site, requiring the removal of shrubs and undergrowth, these would be set back from the road and screened by the dense intervening vegetation. There would be construction access tracks and sites for minor staging, storage and laydown ancillary areas visible in the vicinity of the Renmark Road.

Works to erect the galvanised steel structures and string the wires and conductors across the road would be seen in this view, extending across view and above the surrounding vegetation. This work would include the use of large machinery cranes, ground pulled draw wire or stringing drones as required. Where the works are visible, they would contrast with the surrounding landscape. This would result in a moderate magnitude of change and a **low visual impact**.

Visual impact during operation: The proposed transmission line would be located in the middle ground of this view. Transmission line structures would be visible on both sides of Renmark Road, with wires seen overhead crossing the road at an angle. As the transmission line structures would be set back about 100 metres from the road, the base and lower section of the structure would be out of view, however, the upper section of several transmission line structures would be seen rising above the vegetation. This would include several transmission line structures for the crossing and then becoming less visible as the proposed transmission line continues away from this location. There may be construction access tracks visible along the transmission line corridor and works to rehabilitate sites disturbed for minor staging, storage and laydown during construction alongside the road.

Overall, while these transmission line structures would rise prominently above the tree line, they would not dominate or change the prevailing character of this view. There would be a moderate magnitude of change as a result of the proposal, and a **low visual impact**.

Viewpoint 2: View north from track to Lake Victoria



FIGURE 5-4 VIEW NORTH FROM TRACK TO LAKE VICTORIA

Location: 33°54'32.35"S 141°12'12.71"E

Existing conditions: This view shows the relatively open semi-arid landscape on the elevated land to the north of Lake Victoria. Several vehicle tracks can be seen intersecting in this location. There is a mix of open landscape with low vegetation and scattered groups of mallee eucalypt trees which partly enclose this view. While the landform is relatively flat, this vegetation limits the distance seen in this view. It does not have the same vastness seen to the north of Renmark Road.

Sensitivity: This view is available from a track within an area with restricted public access. It is used by the local Aboriginal community to access the northern camps of Lake Victoria. This view is from a location on the route to the camp, in the vicinity of Renmark Road, where the Lake itself cannot be seen. While there are no mapped areas of scenic value seen in this view, this landscape has a high value to the local aboriginal people and is associated with the visual setting of Lake Victoria. Overall, while this is a locally common view, which would be experienced for several kilometres from moving vehicles or people walking on the track, this location is important to the sense of place and a part of the journey to Lake Victoria. For these reasons this view is of **regional visual sensitivity**.



FIGURE 5-5 POTENTIAL VIEW NORTH FROM TRACK TO LAKE VICTORIA, PHOTOMONTAGE

Visual impact during construction: The proposed transmission line would be located about one kilometre to the north of this location, about 100 metres north of Renmark Road, which is out of view. At this distance, and due to the intervening vegetation, the installation of the upper portion of the transmission line structures and works to string the lines would be seen. Several structures would be seen across the in the background of the view and visible against the sky. Overall, there would be a moderate magnitude of change and a **moderate visual impact** in views from this location.

Visual impact during operation: The proposed transmission line would be located in the background of this view. The upper portion of the transmission line structures and overhead wires would be visible rising above the low vegetation seen in this view. This would include several transmission line structures, regularly spaced across the view.

While these transmission line structures would rise above the tree line, due to the distance and intervening vegetation, they would not dominate or change the prevailing character of this view. Overall, there would be a moderate magnitude of change, and a **moderate visual impact** from this location.

Viewpoint 3: View north from track near Lake Victoria



FIGURE 5-6 VIEW NORTH FROM TRACK NEAR LAKE VICTORIA

Location: 33°55'51.60"S, 141°13'19.20"E

Existing conditions: This view shows the relatively flat, semi-arid landscape near the northern foreshore area of Lake Victoria. The vegetation cover is dense but very low, allowing panoramic far reaching views across this vast landscape. A vehicle track can be seen in the view foreground, providing controlled access to the waters and foreshore of Lake Victoria for the local Aboriginal community.

Sensitivity: This view is available from a track within an area of restricted public access. It is used by the local Aboriginal community to access the northern camps of Lake Victoria. This view is from a location on one of the routes to the campground, at a locally elevated location near the northern foreshore of Lake Victoria. While there are no mapped areas of scenic value seen in this view, this landscape has a high value to the local aboriginal people and is associated with the visual setting of Lake Victoria. Overall, while this is a locally common view, which would be

experienced for several kilometres from moving vehicles and people walking on the track, this location is important to the sense of place and a part of the journey to Lake Victoria. For these reasons, this view is of **regional visual sensitivity**.



FIGURE 5-7 POTENTIAL VIEW NORTH FROM TRACK NEAR LAKE VICTORIA

Visual impact during construction: The proposed transmission line would be located over three kilometres to the north of this location. At this distance, there would be glimpses to the upper portion of the works to install several transmission line structures. These structures would be seen in the background of the view and viewed against the sky. Overall, there would be a low magnitude of change and a **low visual impact** in views from this location.

Visual impact during operation: The upper portion of the transmission line structures would be visible from this location, rising above the low vegetation, in the background of this view. Several transmission line structures would be visible, regularly spaced across the view, spanning east-west. While these transmission line structures would rise above the vegetation and seen against the skyline, they would not dominate or change the prevailing character of this view, due to the distance and intervening vegetation. Overall, as the distance increases, the visibility and prominence of the power line structures would decrease. While being small individually, the number and linear arrangement of the towers would increase the contrast between these elements and the otherwise natural character of the view. It is therefore considered that there would be a low magnitude of change, and a **low visual impact** from this location.

While it is unlikely that the proposal would be seen from the lake shore and camp at Lake Victoria, due to the landform, which drops away from this bluff, towards the lake edge.

Viewpoint 4: View north from Lake Victoria visitor lookout



FIGURE 5-8 VIEW NORTH FROM LAKE VICTORIA VISITOR LOOKOUT

Location: 34° 2'49.75"S, 141°16'31.60"E

Existing conditions: This view from the southern end of Lake Victoria shows the lake in the foreground and extending about ten kilometres north into the far background of the view. While it is a natural waterbody, the southern lakeshore (foreground of view) has been modified to increase the water storage capacity, creating several islands (including former woodland, reeds and sedge tussocks). A few stands of river red gum around the lake provide visual interest, however, much of the lake shore is either unvegetated or dominated by introduced weeds (Murray–Darling Basin Authority, 2019, p.18). Beyond the lake, and difficult to distinguish in the distant background, are the flat rural plains at Nulla Nulla Station.

Sensitivity: This viewpoint is available from the Memorial Lookout at Lake Victoria. There is an elevated viewing deck, shelter and visitor information boards. The lake is identified as a 'significant cultural landscape' in the Cultural Landscape Management Plan (Murray–Darling Basin Authority, 2019) and a ... 'landmark feature because of the visual contrast it provides as a very large Lake set into a semi-arid landscape' (Murray–Darling Basin Authority, 2019) The lake is also identified as Environmental Conservation in the *Wentworth Local Environmental Plan 2011*. Overall, this view is of **regional visual sensitivity**.

Visual impact during construction: The area impacted by construction would be located about 16 kilometres to the north. At this distance, the proposal would not be perceptible. There would be a negligible magnitude of change and a **negligible visual impact** in views from this location.

Visual impact during operation: The transmission line structures would extend east-west across the distant background of this view, to the north of Lake Victoria, about 16 kilometres to the north of this location. At this distance, as well as the potential for screening due to intervening vegetation and the rising landform north of the lake, any view of the upper portions of the line

structures would be not be imperceptible. As a result, there would be a negligible magnitude of change and a **negligible visual impact**.

Viewpoint 5: View north from Renmark Road, near intersection with Nulla Road



FIGURE 5-9 VIEW NORTH FROM RENMARK ROAD, NEAR INTERSECTION WITH NULLA ROAD

Location: 33°54'11.09"S, 141°23'36.84"E

Existing conditions: This view shows a predominantly open landscape with panoramic, distant views across the flat terrain. This section of Renmark Road is unsurfaced and there are roadside guideposts, a telecommunication tower, and some power poles and wires visible rising above the low vegetation.

Sensitivity: Renmark Road is an unsurfaced road linking Wentworth and Renmark, providing access to the northern camps of Lake Victoria, and scattered rural properties and homesteads. Although this viewpoint is located in the 'Nulla Nulla' heritage area (identified in the Wentworth Local Environmental Plan 2011), the homestead and woolshed located over seven kilometres to the north, and not visible. While there are no mapped areas of scenic value seen in this view, this landscape is a part of the setting of Lake Victoria. Overall, this is a locally common view which would be experienced for several kilometres from vehicles moving at speed along Renmark road. This view is of **local visual sensitivity**.

Visual impact during construction: The area impacted by construction would be located about 600 metres north of Renmark Road.

The proposed transmission line would cross this view and run generally parallel with the road as it extends west. Excavation and levelling works would be seen at each transmission line structure site, including removal of shrubs and undergrowth within the easement corridor, works to install the transmission line structure foundations, erect the transmission line structures and string the wires. This work would include the use of large machinery such as excavators and graders, cranes, ground pulled draw wire or stringing drones as required.

There would be construction equipment and vehicles seen using the existing road, in the foreground of this view, to access the site. There would also be construction access tracks and sites for minor staging, storage and laydown ancillary areas visible in the vicinity of the Renmark Road.

While there would be some large-scale equipment and construction activity occurring, the works would be located on small sites spaced about 300 to 600 metres apart, so that several sites would be seen sequentially in this view.

There is limited intervening vegetation to screen the works, however, the works would be in the middle to background of this view and therefore not visually prominent. Overall, there would be a moderate magnitude of change and a **low visual impact**.



FIGURE 5-10 POTENTIAL VIEW NORTH FROM RENMARK ROAD, NEAR INTERSECTION WITH NULLA ROAD, PHOTOMONTAGE

Visual impact during operation: The proposal alignment would be located in the middle ground of this view, located to the north of Renmark Road and aligned across this view. There would be several transmission line structures visible, evenly spaced, across this view, with minimal screening from intervening vegetation. There may be construction access tracks visible extending into the site and works to rehabilitate sites disturbed for minor staging, storage and laydown during construction alongside the road.

The use and character of land seen in this view would be retained and the presence of existing telecommunication structures and vastness of this landscape increases the capacity for this view to absorb change. While these transmission line structures would rise prominently above the surrounding landscape, they would not dominate or change the prevailing character of this view. Overall, there would be a moderate magnitude of change, and a **low visual impact**.

Mallee shrubland and rural landscape

Viewpoint 6: View south from Anabranh Mail Road



FIGURE 5-11 VIEW SOUTH FROM ANABRANH MAIL ROAD

Location: 33°50'42.00"S, 141°42'30.46"E

Existing conditions: This view is located in a remote, semi-arid landscape, with some intermittent evidence of low-intensity agricultural use, including sheep grazing. The vegetation in this location includes native saltbush and low eucalyptus shrubland, filtering views across the flat terrain. Apart from the unsurfaced road are very few built elements seen along this section of the Anabranh Mail Road.

Sensitivity: Anabranh Mail Road is an unsurfaced road providing access to several homesteads along the western side of the Great Darling Anabranh River, north of Wentworth. This is a locally common view which would be experienced for several kilometres from vehicles moving at speed by a low number of receivers. Overall, this view is of **neighbourhood visual sensitivity**.

Visual impact during construction: The proposed transmission line would cross Anabranh Mail Road diagonally about 500 metres south of this viewpoint. While there would be excavation, levelling works and foundations at each transmission line structure site, requiring the removal of shrubs and undergrowth, these would be set back from the road and screened by the dense intervening vegetation. Works to erect the galvanised steel structures and string the wires and conductors across the road would be seen in this view, extending across view and above the surrounding vegetation. This work would include the use of large machinery cranes, ground pulled draw wire or stringing drones as required.

There would be construction equipment and vehicles seen using the Anabranh Mail Road, in the middle ground of this view, with new tracks formed to provide access to the site. There may also be sites for minor staging, storage and laydown ancillary areas visible.

The works would be located in the middle to background of this view and would be visible above the tree line, contrasting with the surrounding remote rural landscape. Overall, there would be a moderate magnitude of change and a **low visual impact**.

Visual impact during operation: The proposed transmission line would be seen in the middle ground of this view, crossing Anabranck Mail Road diagonally. Large transmission line structures would be visible either side of the road, with transmission wires visible overhead crossing the road. As the structures would be set back from the road, the base and lower section of the transmission line structure would be screened by intervening vegetation. Beyond the road crossing, the upper section of several structures may be visible, extending to the northeast and southwest of Anabranck Mail Road. There may be construction access tracks visible along the transmission line corridor and works to rehabilitate areas disturbed for minor staging, storage and laydown during construction alongside the road.

Overall, as the transmission line structures would be large in scale and rise prominently above the tree line, there would be a moderate magnitude of change and a **low visual impact** to this remote rural landscape.

Viewpoint 7: View south from Silver City Highway



FIGURE 5-12 VIEW SOUTH FROM SILVER CITY HIGHWAY

Location: 33°50'56.89"S, 141°47'28.64"E

Existing conditions: This view shows the flat, open rural plain which extends from the Great Darling Anabranck and Darling rivers, north of Wentworth. The landscape has been mostly cleared for agricultural use and includes sheep and cattle grazing on native low shrubs (including saltbush and bluebush shrublands) and pastures. There are areas of native eucalyptus forest (including mallee shrubland) and regrowth visible in the background of this view.

Sensitivity: The two-lane wide Silver City Highway provides access between Wentworth and Broken Hill. This highway does not form part of a tourist route however, it does continue through

the far western arid areas of NSW and onto Queensland and would attract greater use than other local roads. This is a locally common view which would be experienced for several kilometres from vehicles moving at speed along the highway. Overall, this view is of **local visual sensitivity**.

Visual impact during construction: The proposed transmission line would cross the Silver City Highway about 700 metres south of this viewpoint. A compound and camp site would also be established in this view, east of the Highway (left), including site offices and other ancillary works required to support construction. Excavation and levelling works would be seen at each transmission line structure site beside the road, including removal of shrubs and undergrowth, foundation construction, installation of the galvanised steel structures and stringing of the wires and conductors across the road. Beyond these roadside transmission line structures, works to install the other structures to the east and west would also be visible, due to the flat terrain and limited intervening vegetation. This work would include the use of large machinery such as excavators and graders, cranes, ground pulled draw wire or stringing drones as required. There would be construction equipment and vehicles seen in the middle ground of this view, using the highway to access the site.

The works would extend across a large part of the middle ground of this view, contrasting with the surrounding rural landscape. Overall, there would be a moderate magnitude of change and a **low visual impact**.



FIGURE 5-13 POTENTIAL VIEW SOUTH FROM SILVER CITY HIGHWAY, PHOTOMONTAGE

Visual impact during operation: The proposed transmission line would be in the middle ground of this view, aligned and crossing perpendicular to the highway. A large transmission line structure would be seen on either side of the road, with transmission wires seen overhead crossing the highway. Beyond the road crossing, several other structures would be visible, evenly spaced and extending to the east and west of the highway. There may be construction access tracks visible extending into the site and works to rehabilitate sites disturbed for minor staging, storage and laydown during construction alongside the road. Much of the vegetation seen in this view would

be retained and the use and character of land would be unchanged.

The transmission line structures would be large in scale and rise prominently above the rural plain. Overall, there would be a moderate magnitude of change as a result of the proposal, in view of local sensitivity, resulting in a **low visual impact**.

Viewpoint 8: View south from Pooncarie Road



FIGURE 5-14 VIEW SOUTH FROM POONCARIE ROAD

Location: 33°52'1.81"S, 142° 1'14.23"E

Existing conditions: This view shows a junction of several transmission lines at the Ellerslie substation on Pooncarie Road. The substation is fully fenced, set back from the road and partially screened by low native vegetation. The existing steel lattice structures and wires of the 220kV Buronga to Broken Hill transmission lines can be seen crossing the road in the middle ground of view, beyond the substation. Several other smaller monopoles are located along both side of the road, extending into the distance. The roadside vegetation includes scattered trees which somewhat enclose the view and partly screens the substation.

Sensitivity: Pooncarie Road is part of the 'Wentworth to Mungo Loop' tourist drive and also part of 'The Classic Australian Drive', which follows the Sturt Highway through the Riverina Murray region between Wentworth, Mungo National Park, Balranald and Wagga Wagga. This is a locally common landscape which would be seen for several kilometres from vehicles moving at speed. Overall, this view is of **local visual sensitivity**.

Visual impact during construction: The proposed transmission line would cross the road about 300 metres south of this viewpoint, beyond the substation and existing 220kV Buronga to Broken Hill transmission corridor. Due to intervening vegetation and infrastructure at the substation, the construction work at each transmission line structure site, including excavation and levelling works, vegetation removal and foundation construction, is unlikely to be seen from this location. However, the installation of the transmission line structures and stringing of the wires and

conductors, particularly as they cross the road, would be seen, rising above the tree line. There would also be construction access tracks and sites for minor staging, storage and laydown ancillary areas visible in the vicinity of the road.

This work would include the use of large machinery such as cranes and ground pulled draw wire or stringing drones as required. There would also be construction equipment and vehicles seen in the middle ground of this view, using Pooncarie Road to access the site.

While the works would be seen in the middle ground of this view, the intervening vegetation and context of existing power infrastructure, would reduce the visibility of the proposal. Overall, there would be a low magnitude of change and a **low visual impact**.

Visual impact during operation: The proposed transmission line would cross the road diagonally, beyond the substation in the middle ground of this view. It would be aligned parallel with the existing 220kV Buronga to Broken Hill transmission corridor. The transmission line structures would likely be evenly spaced, extending across the view, and visible rising above the intervening vegetation. While these structures would be larger and taller than the existing structures, adding further infrastructure to this view, this context would increase the capacity of this view to absorb this change.

While the works would extend across the middle ground of this view, the proposal would not dominate or change the prevailing character of this view. Overall, there would be a low magnitude of change, and a **low visual impact**.

Viewpoint 9: View northeast from Arumpo Road to proposed Buronga substation upgrade and expansion site



FIGURE 5-15 VIEW NORTHEAST FROM ARUMPO ROAD TO PROPOSED BURONGA SUBSTATION UPGRADE AND EXPANSION SITE

Location: 34° 6'31.74"S, 142°15'9.98"E

Existing conditions: This view shows a predominantly open rural landscape, with expansive views across the flat terrain. Most of the land alongside this section of Arumpo Road has been cleared for grazing pasture and dryland arable farmland. There are patches of low native woodland trees visible in the middle and background of view. The existing Buronga 220kV substation can be seen in the centre of view, north of the road (left of view). The existing steel lattice structures and wires of the 220kV Broken Hill to Buronga, and Buronga to Balranald transmission lines can be seen crossing the road in the middle ground of view, beyond the substation. There are likely to be further development within this landscape for energy related projects which would alter the character of this view, and similar views in the vicinity. This includes a proposed 1,200-hectare solar farm, on a site about 1.5 kilometres north of the existing substation site, on land currently also used for cropping and grazing (Renew Estate, 2018).

Sensitivity: Arumpo Road is a two-lane sealed road providing access to local homesteads and properties north of Gol Gol and Buronga, used mainly by residents, visitors and staff at the properties and substation. This road is also part of the 'Wentworth to Mungo Loop' tourist drive. This view is of **local visual sensitivity**.

Visual impact during construction: The existing substation would be expanded into the surrounding area, west of the road and is likely to extend across a large part of the foreground of view (left of view). The proposed transmission line would be located parallel to the existing 220kV transmission corridor and in the background of this view. The proposed transmission line would cross Arumpo Road about 900 metres northeast of this viewpoint, crossing the road at an angle, aligned in a northeast to the southwest direction. Vegetation clearing and earthworks would be seen at the substation construction site followed by works to construct the substation infrastructure.

The main construction compound and accommodation camp site at Buronga would be to the south west of the substation construction site. The transmission line structures would be constructed, including foundations, erection of the structures and works to string the wires and conductors. This would involve the use of large machinery such as excavators and graders, cranes, ground pulled draw wire or stringing drones as required. The construction of the substation, including earthwork activities, the presence and operation of large plant and equipment and the infrastructure being installed, would be seen, unobstructed in this view and the transmission line structures would be visible rising above the road and surrounding existing vegetation.

There would be also be construction equipment and vehicles seen in the foreground of this view, using Arumpo Road to access the substation and transmission line structure construction sites. Overall, due to the large scale and extent of the construction works, there would be a high magnitude of change and a **moderate visual impact**.

Visual impact during operation: The proposed upgrade and expansion to the Buronga substation would considerably increase the size of this facility. The vegetation which screens the existing substation would have been removed and much of the north of this view (right of view) would be developed and include infrastructure that would rise above the surrounding vegetation and be seen against the skyline. Beyond this, the proposed transmission lines would be seen crossing Arumpo Road diagonally, with transmission wires seen overhead crossing the road. This transmission line would be aligned generally parallel to the location of the former 220kV transmission corridor and would be about 30 per cent larger than the existing structures.

While the proposed transmission line would be somewhat absorbed into this view due to the existing transmission line structures and substation, the additional substation infrastructure would dominate this view. Overall, there would be a high magnitude of change, and a **moderate visual impact**.

Murray River plain rural landscape

Viewpoint 10: View southeast from Sturt Highway



FIGURE 5-16 VIEW SOUTHEAST FROM STURT HIGHWAY

Location: 34°15'52.23"S, 142°15'31.64"E

Existing conditions: This view along the Sturt Highway, includes an undulating landscape. To the north of the highway (left of view) is a rural landscape with fields for grazing. To the south (right of view) is vegetation associated with the Murray River, with glimpses to arable fields to the southeast in the background. The existing steel lattice structures and wires of the 220kV Buronga to Red Cliffs transmission lines can be seen crossing the road in the middle ground of view, rising above the surrounding landscape and seen against the sky. There are also smaller transmission line poles along the Highway seen passing under the 220kV transmission lines.

Sensitivity: At this location, the Sturt Highway is a two-lane road providing access to/from Buronga and Mildura, used by high volumes of residents, visitors and freight transporters. This section of the road forms part of the 'Wentworth to Mungo Loop' tourist drive. Although this view is experienced by high number of receivers, including tourists, the presence of existing large scale power infrastructure reduces the sensitivity, and is considered to be of **local visual sensitivity**.

Visual impact during construction: The proposed transmission line would cross the Sturt Highway in a north-south direction about 450 metres east of this viewpoint, and crossing perpendicular to the road, alongside the alignment of the existing Buronga to Red Cliffs transmission line structures. Excavation and levelling works would be seen at each structures construction site, north and south of the road, including removal of shrubs and undergrowth, foundation construction, installation of the galvanised steel structures and stringing of the wires and conductors across the road. There may be construction access tracks and general construction work activities visible in the vicinity of the highway.

Due to the undulating, open terrain to the north of the road (left), construction of the structures would be most prominent in this area. This work would include the use of large machinery such as excavators and graders, cranes, ground pulled draw wire or stringing drones as required. Following the energization of the new transmission line the works would continue as the existing towers and line are dismantled and removed.

The works would be seen across the middle ground of this view, on both sides of the highway, introducing large scale construction activity into this view. The duration of the works would be longer as consecutive stages of construction would be required. The scale of the works would contrast with the surrounding rural landscape resulting in a moderate magnitude of change and a **low visual impact**.

Visual impact during operation: The existing transmission lines would have been removed and there would be several new transmission line structures visible in the middle ground of this view, on both sides of the Highway, and with the wires crossing the highway overhead. These structures and lines would be located closer to the viewer than the existing Buronga to Red Cliffs transmission line and the supporting structures would be about 30 per cent larger in scale than the existing structures. Much of the vegetation seen in this view would be retained and the existing rural uses would continue on the adjacent fields. Due to the larger scale of the transmission line structures, which would rise prominently above the rural plain, there would be a moderate magnitude of change and a **low visual impact** overall.



FIGURE 5-17 POTENTIAL VIEW SOUTHEAST FROM STURT HIGHWAY, PHOTOMONTAGE

Views from the air

Existing conditions: Views from the air would include the urban outskirts of Mildura transitioning to rural uses including grazing properties and irrigated and dryland arable farmland, including a mix of cereal crops, viticulture, and horticulture.

Sensitivity: There are scenic flights offered from Mildura Airport, with routes extending to Lake Victoria and Mungo National Park. As these scenic flights are for tourist and recreational purposes, the views from these flights would be of regional visual sensitivity.

Visual impact during construction:

The area impacted by construction would be located to the north of Lake Victoria. Works to construct the proposal would be seen within the vast open, predominantly flat landscape of the semi-arid plains, which has only a few scattered buildings and sparse, scattered vegetation. The line created by the proposed transmission line would be generally parallel with Renmark Road, and visually separate from the setting of Lake Victoria itself.

In areas to the east of the Silver City Highway, the undulating landform and extra vegetation within the Mallee shrubland and rural landscape, and Murray River plain rural landscape would provide some visual enclosure to the proposal. In many locations within the eastern areas of the transmission line corridor, the proposal would be seen in the context of existing transmission lines and substations. The proposed expansion of the Buronga substation would also be seen in the context of existing power infrastructure.

While the work to construct the project would be visible unobstructed from the air, it would be seen with a complex landscape resulting in a low to negligible magnitude of change and a **low to negligible visual impact**.

Visual impact during operation:

The transmission lines would create a strong linear corridor across the landscape in views from the air. Within the semi-arid plains, north of Lake Victoria, the transmission line structures would be visible rising prominently above the surrounding landscape. In areas to the east of the Silver City Highway, the undulating landform and extra vegetation within the Mallee shrublands would assist in the visual absorption of the proposed transmission lines and substations into views from the air.

Overall, while the proposal would be seen unobstructed from the air and extend across a large area of the landscape, the proposal would not change the prevailing character of views from the air. It would result in a low to negligible magnitude of change and a **low to negligible visual impact**.

5.3.3. Summary of daytime visual impacts

In summary, considering the length and scale of this project, there are relatively few visual impacts. Those visual impacts which have been identified mostly having a **low to moderate** visual impact. These impacts are listed in Table 5-1.

TABLE 5-1: SUMMARY OF VISUAL IMPACTS

| | | | Construction | | Operation | |
|---|---|--------------------|---------------------|------------------|---------------------|------------------|
| No. | Location | Visual sensitivity | Magnitude of change | Visual impact | Magnitude of change | Visual impact |
| Lake Victoria cultural landscape and semi-arid plains | | | | | | |
| 1 | View east from Renmark Road | Local | Moderate | Low | Moderate | Low |
| 2 | View north from track to Lake Victoria | Regional | Moderate | Moderate | Moderate | Moderate |
| 3 | View from track near Lake Victoria | Regional | Low | Low | Low | Low |
| 4 | View north from Lake Victoria visitor lookout | Regional | Negligible | Negligible | Negligible | Negligible |
| 5 | View north from Renmark Road, near intersection with Nulla Rd | Local | Moderate | Low | Moderate | Low |
| Nulla Road to Mallee | | | | | | |
| 6 | View south from Anabranche Mail Road | Neighbourhood | Moderate | Low | Moderate | Low |
| 7 | View south from Silver City Highway | Local | Moderate | Low | Moderate | Low |
| 8 | View south from Pooncarie Road | Local | Low | Low | Low | Low |
| 9 | View northeast from Arumpo Road to proposed Buronga substation upgrade and expansion site | Local | High | Moderate | High | Moderate |
| Murray River plains rural landscape | | | | | | |
| 10 | View southeast from Sturt Highway | Local | Moderate | Low | Moderate | Low |
| Views from the air | | | | | | |
| | Scenic flights | Regional | Low - Negligible | Low - Negligible | Low - Negligible | Low - Negligible |

5.4. Assessment of night-time impacts

The three landscape character areas have been used to assess the night-time impacts of the proposal.

5.4.1. Lake Victoria cultural landscape and semi-arid plains

Sensitivity: This landscape is predominantly dark, with very few sources of light apart from lighting at sparsely located rural homesteads, intermittent vehicles travelling along Renmark, Nulla and Rufus River roads, and some occasional security lighting associated with the buildings and water infrastructure at Lake Victoria. At night, the setting is Dark (A1) which has a high visual sensitivity at night.

Visual impact during construction: There are no primary compound or camp sites planned for the proposal in the Lake Victoria Cultural landscape and semi-arid plains character area. There would, however, be works occurring between 7am and 7pm, 7 days a week within areas used for construction. Some lighting may be required during winter and potentially other periods. This could include lighting at the minor staging, storage and laydown ancillary areas as well as headlights from staff and construction vehicles accessing and moving along the transmission line corridor. While this lighting is likely to contrast with the surrounding, predominantly dark landscape, this effect would occur for a short duration each day and for a short time within the proposal construction program.

Overall, there would be a low magnitude of change to this landscape which is of high sensitivity, and a **moderate visual impact** at night. This night time visual impact would be localised and temporary.

Visual impact during operation: There is no lighting proposed along the main transmission lines, however, there would be some minor security lighting provided at the Buronga substation. This would, however, result in a low magnitude of change to a landscape of high visual sensitivity, and a **low visual impact** at night.

5.4.2. Mallee shrubland and rural landscape

Sensitivity: This rural landscape is predominantly dark with limited light sources at night, such as lighting associated with homesteads and agricultural buildings on rural properties, and vehicles on remote roads. Overall, this landscape includes areas of Dark (A1) which has a high visual sensitivity.

Visual impact during construction: Construction along the transmission line corridor would occur between 7am and 7pm, seven days a week. There would be some lighting required in these areas during winter (and potentially other periods) for a short duration in the early evening. This may include task lighting associated with the construction works as well as headlights from staff and construction vehicles accessing the site and moving along the transmission line corridor.

The facilities at the main construction compound and accommodation camp sites at Anabranth South and Buronga (including laydown/delivery areas, concrete batching and workforce accommodation) may also require lighting. The construction compounds would operate between 7am and 7pm, seven days a week and the camp would operate 24 hours a day, seven days a week. Lighting would be required at these facilities when they are operating outside of daylight hours.

Overall, the lighting at these sites would contrast with the surrounding predominantly dark landscape and there would be a moderate magnitude of change to this landscape. This landscape is of moderate visual sensitivity and there would be a **moderate visual impact** at night.

Visual impact during operation: During operation, there would not be any lighting proposed along the main transmission lines. There would, however, be some minor security lighting provided at the Buronga substation. This lighting would be in addition to the existing lighting at the substation.

As a result, there would be a low magnitude of change to a landscape of high visual sensitivity, and a **low visual impact** at night.

5.4.3. Murray River plain rural landscape

Sensitivity: At night, this landscape would have low light levels with scattered rural residences across the landscape. There would be some denser clusters of residences in the vicinity of the Murray River and vehicles travelling along local roads and the Sturt Highway, contributing to the light levels. The sky glow from nearby settlements such as Buronga, Gol Gol, Red Cliffs and Mildura may also influence this character area. Overall, this landscape is an area of Low district brightness (A2) and has a moderate visual sensitivity at night.

Visual impact during construction: While there are no construction and accommodation camp sites planned in the Murray River plain rural character area, there would be works along the transmission line corridor that would occur between 7am-7pm, 7 days a week. Consequently, there would be lighting required during winter (and potentially for other periods) for a short duration in the early evening. This would include lighting at the minor staging, storage and laydown ancillary areas as well as headlights from staff and construction vehicles accessing and moving along the transmission line corridor. This lighting is likely to contrast somewhat with the surrounding area of low district brightness. This effect would only occur for a short duration each day and for a short time within the proposal construction program.

Overall, there would be a low magnitude of change to this landscape which is of moderate sensitivity, and a **low visual impact** at night.

Visual impact during operation: During operation, there would not be any lighting proposed along the main transmission line. Therefore, there would be a negligible magnitude of change to this landscape which is of moderate sensitivity, and a **negligible visual impact** at night during operation.

5.5. Impact on views from private property

The following section will consider the potential views to the proposal from private properties. This assessment considers properties located within six-kilometres from the transmission line corridor and from greater distances if there is the potential for a view impact.

5.5.1. Lake Victoria cultural landscape and semi-arid plains

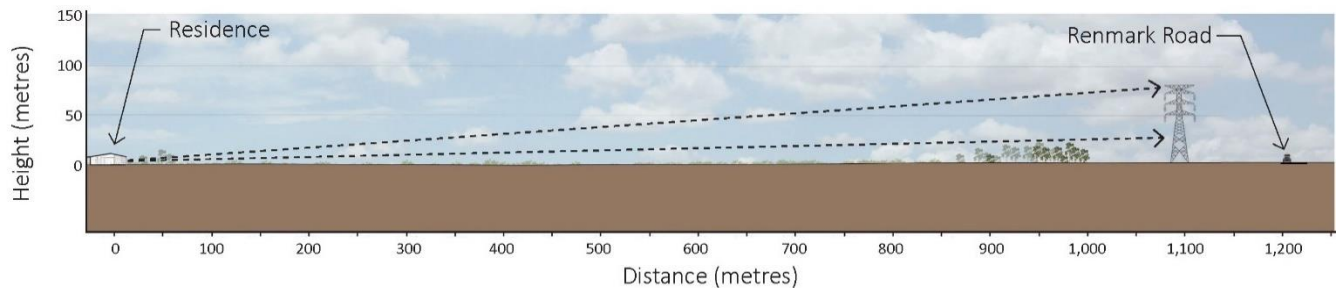
In this landscape character area there are a small number of rural homesteads which would potentially have a visual impact, these are:

- 'Noola' homestead south of Renmark Road and about five kilometres south of the transmission line corridor;
- 'Regunyah' homestead north of Renmark Road and about 1.1 kilometre north of the transmission line corridor; and
- 'Talgarry' homestead east of Rufus Road, about four kilometres south of the transmission line corridor.

Refer to Figure 5-19 for the location of these properties.

The 'Regunyah' homestead is closest to the transmission line corridor in this character area (refer to Figure 5-18). Views from this property would include the broad open semi-arid landscape with some scattered intervening trees. At about one kilometre, there is likely to be some visibility of the upper portion of several transmission line structures in the middle to background of views.

FIGURE 5-18 CROSS SECTION BETWEEN 'REGUNYAH' AND THE PROPOSAL (NORTH - SOUTH)



The 'Noola' and 'Talgarry' homesteads are each over four kilometres away from the transmission line corridor. Views from these properties would include the broad open semi-arid landscape with some scattered intervening trees. Where not screened by intervening elements, there would be views to the transmission line structures rising above the intervening vegetation. There may be several structures crossing the background of these views. Due to the distance, intervening landform and vegetation, the proposal is likely to be absorbed into the background of views from these properties.

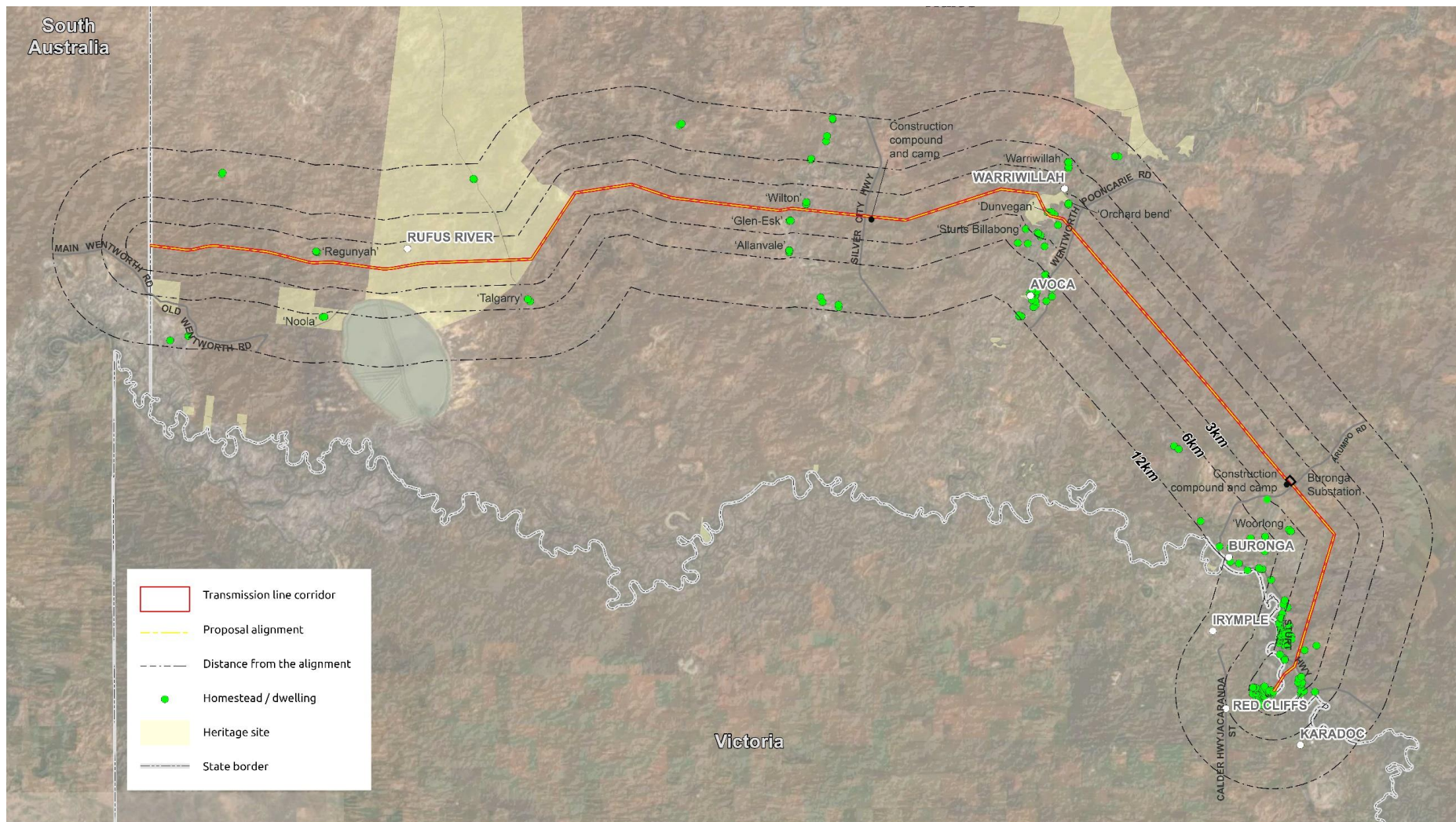
Overall, based on this assessment there is a potential visual impact from the residence on the 'Regunyah' property within the Lake Victoria Cultural Landscape and semi-arid plains character area. Views from the residence should be considered during detailed design and mitigation measures considered if required.

5.5.2. Mallee shrubland and rural landscape

In this landscape, there are several rural homesteads and residential properties/ receivers which have the potential to have a view of the proposal, these include (distances from the transmission line corridor are identified):

- 'Glen-Esk' homestead on Anabranh Mail Road, about 1.2 kilometres south;
- 'Wilton' homestead on Anabranh Mail Road, about 780 metres north;
- 'Allanvale' homestead on Anabranh Mail Road, about 4.2 kilometres south;
- 'Sturts Billabong' homestead on Low Darling Road, about two kilometres south;
- 'Orchard Bend' homestead on Low Darling Road, about 2.1 kilometres north;
- 'Dunvegan' homestead, managers residence and shed with accommodation on Low Darling Road, about 350 metres north;
- 'Warriwillah' homestead on Ellerslie Road, about three kilometres north;
- Residence on Arumpo Road, about three kilometres south west of the Buronga substation; and
- Residences on Drovers Drive, including the 'Woorlong' homestead on the north eastern outskirts of Gol Gol, about 3.5 kilometres south west.

Refer to Figure 5-19 for the location of these properties.



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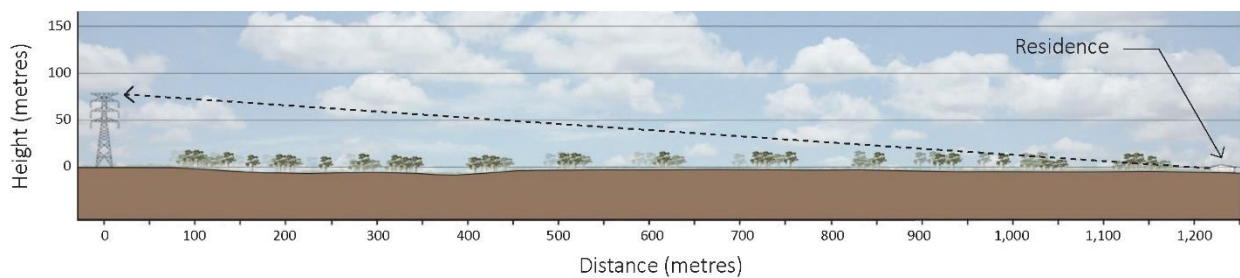
FIGURE 5-19 LOCATION OF HOMESTEADS AND DWELLINGS

IRIS Visual Planning + Design

There are numerous properties on Anabranh Mail Road, generally located along the Great Darling Anabranh River. 'Glen-Esk' and 'Wilton' are the closest to the transmission line corridor in this area.

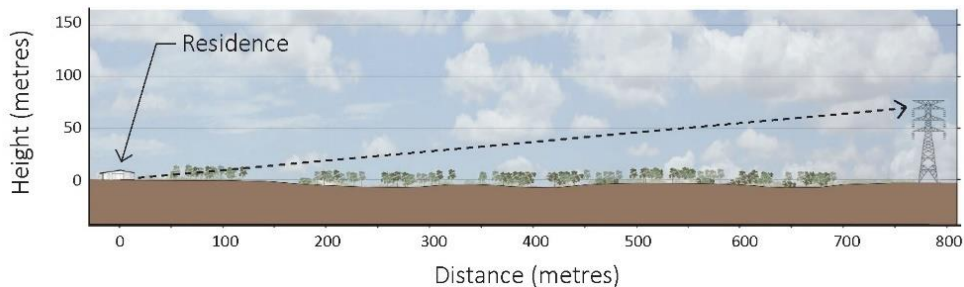
The 'Glen-Esk' homestead is likely to have views across the undulating landform to the surrounding rural landscape. There is more vegetation associated with the river which would increase the potential for screening of views to the proposed transmission line. However, where not screened by intervening elements, there would be views to the transmission line structures rising above the intervening vegetation. There may be several structures crossing the background of these views. Due to the distance, intervening landform and vegetation, the proposed transmission line is likely to be absorbed into the background of views from this property (Refer Figure 5-20).

FIGURE 5-20 CROSS SECTION BETWEEN 'GLEN-ESK' AND THE PROPOSAL (NORTH - SOUTH)



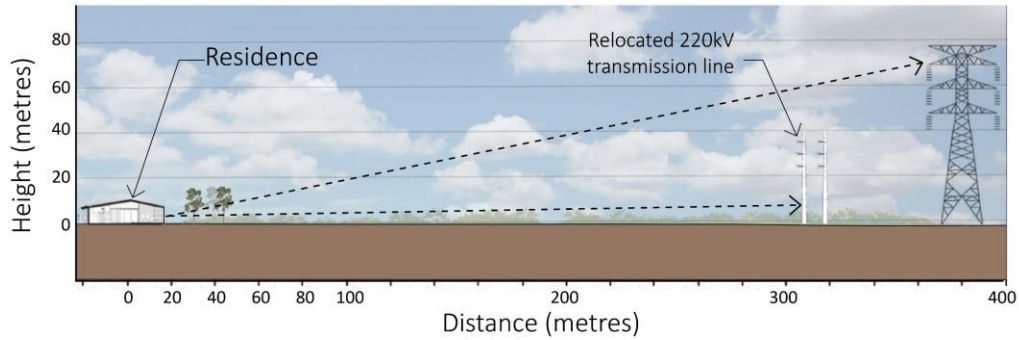
The 'Wilton' homestead is about 780 metres from the transmission line corridor (refer to Figure 5-21). Views from this property would include the surrounding rural landscape on an undulating landform with scattered clumps of trees. There may be some visibility of the upper portion of several transmission line structures in the middle to background of views.

FIGURE 5-21 CROSS SECTION BETWEEN 'WILTON' AND THE PROPOSAL (NORTH - SOUTH)



There are also several properties along the Darling River, located on Low Darling Road (west of the river) and Ellerslie Road (east of the river). The closest of these is the 'Dunvegan' homestead, and adjacent managers residence, which are about 350 metres from the transmission line corridor (refer to Figure 5-22). Views from this property would also include the existing 220kV Buronga to Broken Hill transmission lines which would be realigned, bringing the alignment of the 220kV transmission line about 80 metres closer to the residences. The surrounding rural landscape is on relatively flat landform with clumps of trees and vegetation around the dwellings, associated with the Darling River. There is the potential for some visibility of the upper portion of several transmission line structures and the several realigned existing 220kV transmission line structures in the middle to background of views from this property.

FIGURE 5-22 CROSS SECTION BETWEEN 'DUNVEGAN' AND THE PROPOSAL



The properties on Arumpo Road, south of the Buronga substation, would be separated from the proposal by about three kilometres and due to the existing vegetation and undulating landform of this rural landscape are not likely to have visibility of the proposal. Any views towards the proposal are likely to include the existing Buronga substation and 220kV transmission lines. If the proposal is seen, the substation and transmission line towers would be somewhat absorbed into the background of views from this property.

There are several properties at Drovers Drive, on the north eastern outskirts of Gol Gol. These properties are about three kilometres from transmission line corridor. Views from these properties would be across an undulating landform with rural activities including scattered trees and blocks of vegetation. If the proposed transmission line is visible, these views would include the existing Buronga to Red Cliff 220kV transmission line. Due to the distance, any views to the proposal would be seen within view of the existing substation and transmission lines and absorbed into the background of the view.

Overall, based on this assessment there is a potential visual impact from the residences on the 'Wilton' and 'Dunvegan' properties within the Mallee shrubland and rural landscape. Views from the residence at the 'Dunvegan' on Low Darling Road, in particular, should be considered during detailed design and mitigation measures considered if required.

5.5.3. Arable landscapes on the Murray River plain

In this landscape character area there are numerous residential properties which would potentially have a view of the proposal, these include:

- Numerous residences to the east of the Sturt Highway, on the outskirts of Trentham Cliffs, between one and 1.7 kilometres to the west the transmission line corridor;
- Two residences north of the Sturt Highway, about 500 metres and 1.5 kilometres east of the transmission line corridor; and
- A group of residences south of the Sturt Highway at Monak, between 1.2 kilometres and 1.9 kilometres, east of the transmission line corridor.

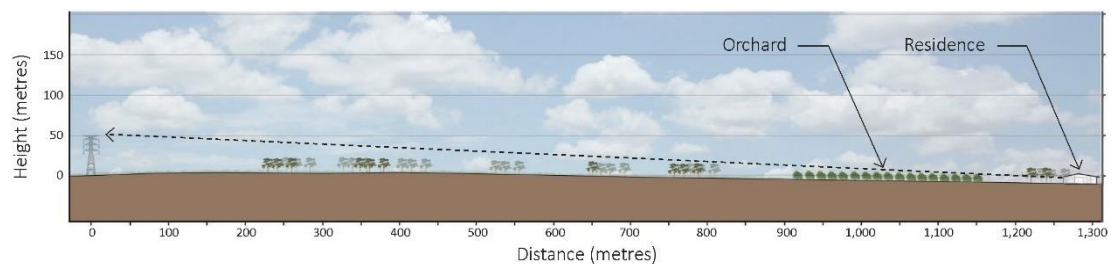
Refer to Figure 5-19 for the location of these properties.

There are several properties on the north eastern outskirts of Trentham Cliffs, between one kilometre and 1.7 kilometres to the west the transmission line corridor. There are also two residences to the east of the transmission line corridor, north of the Sturt Highway, about 500 metres and 1.5 kilometres east. Views from these properties would be across an undulating landform with rural activities including scattered trees and blocks of vegetation. If the proposed transmission line is visible, these views would include the existing Buronga to Red Cliff 220kV transmission line. From most of these properties, the distance and incremental change proposed

would be largely absorbed into the background of views from this property. At closer range, such as the property about 500 metres from the transmission line corridor, there would potentially be a greater view of the existing and proposed transmission line, and therefore only an incremental visual change.

There are several residential properties associated with the agricultural properties on Bonnie Doon Road, on the western outskirts of Monak (refer to Figure 5-23). These properties would have views across the agricultural landscape and to vegetation along the Murray River. These properties are over one kilometre from the transmission line corridor and would currently include views to the existing Buronga to Red Cliff 220kV transmission line. Due to the distance, and backdrop of vegetation, the transmission lines would be seen in the middle to background of these views and well absorbed. The proposal would increase the size of these structures, which would not substantially alter the prevailing character and amenity of these views.

FIGURE 5-23 CROSS SECTION BETWEEN PROPERTIES ON BONNIE DOON ROAD AND THE PROPOSAL



Overall, based on this assessment there would not be any visual impact on views from the private properties identified in the Arable landscapes on the Murray River plain landscape character area.

6. Cumulative impact

6.1. 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 include:

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

6.2. Copi mineral sands mine

This project involves the development of an open cut mineral sands mine and associated infrastructure to extract and process up to 1.5 million tons per annum for up to six years, transporting the heavy mineral concentrate via road for off-site processing; and progressively rehabilitating the site. It is located around 25 kilometres north of the proposal alignment and an EIS is currently being prepared for this project.

The project scoping report (Relentless Resources Ltd, 2018) describes the existing landscape and visual setting as primarily of a remote and arid nature, with salt pans and expanses of flat, low open shrubland. The issues screening considers visual amenity, saying that ... 'It is unlikely that the Project would potentially impact on the visual character of the landscape and the visual amenity of surrounding residents.' (page 23, Relentless Resources, 2018)

Potential cumulative landscape impact:

This project is located a considerable distance north of the proposal, and while it would have a similar remote and arid landscape character, it is not associated with the sensitive cultural landscape of Lake Victoria. The changes expected of this mining project would be different in nature to those expected from the proposal in that there would be a larger landform change and area of vegetation removed within a small area, whereas the proposal would have smaller areas of localised impact along a corridor. Overall, there would not be any cumulative landscape impact expected because of the proposal if this project was to be approved.

Potential cumulative visual impact:

The Copi mineral sands mine would not be seen in any views to the proposal, or in a sequence of views along any highway or scenic route. For this reason, there would not be a potential visual impact in associate with this project.

6.3. Buronga solar farm

The Buronga solar farm project is a 1,200-hectare 400 megawatts solar farm with energy storage and associated infrastructure has been proposed for a site about 1.5 kilometres north of the existing Buronga substation site and includes a connection to the Buronga substation. It would be located on land currently also used for cropping and grazing (Renew Estate, 2018). It includes connection to the substation and an EIS is currently being prepared for this project.

The scoping report for this project describes the surrounding landscape as having a generally flat terrain, and few residential dwellings. It expects that the visual impacts would be low, however, there would be a visual impact assessment undertaken as a part of the EIS.

Potential cumulative landscape impact:

While there would be minimal landform change, the removal of vegetation and introduction of energy generation infrastructure and additional transmission lines into the landscape would change the landscape character from rural to a character where energy infrastructure prevails. However, the landscape has a relatively high capacity to absorb the transmission lines as this is not an intact rural landscape, with a large existing substation, and scattered intensive rural uses with sheds and other structures. If approved, there would be a cumulative landscape impact associated with this project in combination with the proposal.

Potential cumulative visual impact:

This project would be seen in views to the proposal. When viewed together they would further alter the character of views, from the north, with additional transmission towers and lines and the introduction of solar infrastructure. There is, however, a visual compatibility between the existing substation and existing transmission lines with further similar character infrastructure. Furthermore, while the landscape is relatively flat, it has some visual absorption capacity to accommodate further infrastructure with existing scattered areas of vegetation which separate the proposal areas from surrounding rural properties.

If approved, there would be a cumulative visual impact associated with this project and the proposal.

While together these projects would alter the character of views in the vicinity of the proposal, these views are seen primarily from a small section of Arumpo Road. Furthermore, the landscape seen in these views have a high visual absorption capacity for energy infrastructure due to the surrounding vegetation and undulating landform.

6.4. Buronga – Gol Gol residential expansion

This residential expansion area, located about six kilometres west of the proposal alignment, on the outskirts of Gol Gol will accommodate about 500 new large residential housing allotments. There is no timeframe for when this development is expected to occur.

The area surrounding Gol Gol is rural with a generally flat terrain. There would be landscape character change with the transformation of agricultural fields to residential development, expanding the size and character of the town of Gol Gol.

Potential cumulative landscape impact:

This project is located on the outskirts of the existing town and has a more intensive agricultural character than the proposal alignment. The landscape impact of this residential expansion would not be associated with the proposal. The changes expected of this residential expansion project would be different in nature to those expected from the proposal in that there would be a larger landform change and area of agricultural land removed, whereas the proposal would have smaller

areas of localised impact along a corridor within a broader scale rural landscape. Overall, there would not be any cumulative landscape impact expected because of the proposal when this expansion occurs.

Potential cumulative visual impact:

The Gol Gol residential expansion area would not be seen in any views which also includes the proposal, or in a sequence of views along the highway that would be noticeably changed by the project and proposal. For these reasons there would not be a potential visual impact between the proposal and the Gol Gol residential expansion.

6.5. Summary

Due to the landscape and visual separation between the Copi mineral sands mine project and the Gol Gol residential expansion there would not be a cumulative landscape or visual impact.

However, if approved, there would be a cumulative landscape impact associated with this proposal and the Buronga solar farm during operation. These projects would require the removal of vegetation and landform change, altering the character of the surrounding landscape.

There is also the potential for a cumulative visual impact associated with this proposal and the Buronga solar farm during operation due to their proximity and the scale of visual change that would be experienced from Arumpo Road. However, these views are seen from a small area so that the cumulative effect would not be widely experienced.

7. Mitigation measures

7.1. Mitigation already incorporated into the proposal alignment

The location of the transmission line corridor has already anticipated visual amenity in refining the alignment. This includes:

- minimising the number of intersections with other infrastructure, which would require the use of taller structures;
- avoiding towns along the transmission line corridor by following a route which is located a distance to the north of Mildura and Wentworth;
- locating the transmission line corridor to the north of Renmark Road to minimise the visibility of the proposal from Lake Victoria;
- minimising intersections with existing farm infrastructure, areas of vegetation within conservation areas and cultural heritage places; and
- using the existing Buronga substation site for the additional substation infrastructure so as to co-locate this and to utilise a location which is away from residential receivers and other prominent community viewpoints.

There are only a few mitigation techniques that can reduce the visual impacts of the proposal due to the size of the transmission line structures, length of the transmission line corridor and character of the infrastructure.

Subject to other technical design considerations, there is scope to consider the placement of structures at critical locations, as well as some vegetative screening to substations and maintenance areas. These opportunities are described in the following sections.

7.2. Further opportunities for mitigation

7.2.1. Location of transmission line structures

Transmission line structures can be located so that they are at the maximum distance from sensitive viewpoints, so that they are viewed against a more visually absorptive background or so that intervening landform will block views, for example.

Where possible, transmission line structures should be located at a maximum spacing at road crossings. This would be a suitable mitigation technique for roads such as at the Silver City Highway (refer viewpoint 6), and the Sturt Highway (refer viewpoint 9). In these locations there is no landform to provide screening, and screening vegetation would not be effective.

Where the proposed transmission line is visible for a long duration, such as along Renmark Road (refer viewpoint 1 and 2), the symmetry of the structures in relation to the roadway and regular spacing of the transmission line structures, would reduce the potential visual impact within the otherwise broad open landscape.

In sections of the corridor where there is some undulating landform and where taller vegetation exists, such as at Anabranche Mail Road (refer viewpoint 5) the careful positioning of transmission line structures could reduce the visibility of the proposal from the road.

Transmission line structures should be sensitively located near creek lines and avoid the need to remove vegetation where possible.

When seen adjacent to other existing transmission lines, such as in views from Pooncarie Road near the Ellerslie substation, having a similar structure spacing and aligning the corridor parallel to the existing lines would assist in the absorption of the proposal into views without creating a visually jarring or overdeveloped visual effect.

In views to the Buronga substation, and associated maintenance areas, from adjacent roads and residential properties, the retention of existing vegetation and additional vegetative screening should be considered to filter and screen views.

Where there is a potential view to the proposal from the primary view of a residential dwelling, vegetative screening on these residential properties (off-site location) can be considered to reduce the visual impact on residents.

7.2.2. Screening vegetation

Screening vegetation would have a limited effect in mitigating the visual impacts of the proposal due to the height of the structures and scale of the substations. However, it may be possible to mitigate the impact of the proposal on views from private properties by installing vegetation for the purposes of screening in the vicinity of these residences. The provision of vegetation on private property would be determined in consultation with and be maintained by the land owner.

7.3. Mitigation measures

The following mitigation measures should be considered to further reduce the potential visual impacts identified in this assessment.

TABLE 7-1: MITIGATION MEASURES

| Reference | Mitigation measure | Timing | Applicable location(s) |
|-----------|---|------------------|---|
| LV1 | Opportunities for the retention and protection of existing trees within the disturbance area will be identified during detailed construction planning. | Detailed design | Whole of proposal |
| LV2 | Temporary and permanent access will be designed to minimise vegetation removal, changes to landform, and visual impacts. | Detailed design | Whole of proposal |
| LV3 | Proposed permanent engineering batters and water management measures will be designed to integrate with the existing landforms and natural features. | Detailed design | Whole of proposal |
| LV4 | Lighting at construction compound and accommodation camps will be designed and operated in accordance with AS4282-2019 Control of the obtrusive effects of outdoor lighting | Detailed design | Construction compound and accommodation camps |
| LV5 | Transmission line structures, where possible, are designed: <ul style="list-style-type: none"> • to maximise distance from private residences • to use local vegetation and landform to provide screening from residences or from the road • to be regularly spaced to reduce the potential visual impact where the proposal alignment is visible for a long duration, and in open landscapes • to be positioned alongside existing transmission line structures where they are adjacent to existing transmission lines where feasible • to avoid the location of transmission line structures on locally prominent landforms • to minimise clearing along creek lines. | Detailed design | Whole of proposal |
| LV6 | Where the transmission line crosses a roadway, transmission line structures will be located to maximise the distance from the roadway where feasible and where it will achieve an improved visual amenity outcome. | Detailed design | Transmission line |
| LV7 | The Tree Protection Zone (as defined in AS4970-2009 Protection of Trees on Development Sites) of retained trees within or immediately adjacent to the disturbance area will be protected through the restriction of construction activities (refer section 4.2 of AS4970-2009), to minimise the impact of the works on the long term health of these trees. | Pre-construction | Whole of proposal |
| LV8 | Opportunities for screening vegetation to be provided on private property will be investigated where it would reduce an identified visual impact from a residence, in negotiation with the affected resident. This will be informed by further assessment to determine the extent of the impact and appropriateness of any screening vegetation, which would be maintained by the landholder. | Construction | Transmission line |
| LV9 | Lighting at the substation will be designed and operated in accordance with AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting. | Operation | Buronga substation |

8. Conclusion

8.1. Views from surrounding residences

For a project of this scale and length there would be relatively few potential visual impacts on private residential properties.

In summary, there are a few private properties where the potential visual impact may require mitigation, these include 'Regunyah', within the Lake Victoria Cultural Landscape and semi-arid plains character area; 'Wilton' and 'Dunvegan' in the Mallee shrubland and rural landscape, and a property about 500 metres west of the proposal alignment north in the vicinity of the Sturt Highway within the Arable landscapes on the Murray River plain landscape character area.

In the vicinity of residences such as these, minimising the height and maximising the spacing of transmission line structures would reduce the extent of visual change and reduce the potential visual impact. There may also be the opportunity to screen views to the Buronga substation upgrade and expansion if seen from nearby residences by installing vegetation for the purposes of screening in the vicinity of these residences

The temporary visual impact on residential properties during construction in the vicinity of the construction compound and camp sites at Anabran South and Buronga could also be reduced through the implementation of measures relating to site layout and management of lighting for example.

8.2. Scenic or significant vistas and road corridors in the public domain

There were no significant vistas identified in the landscape and visual study area and no mapped scenic views. However, the landscape and visual impacts of the proposal have been identified with a focus on identifying views from scenic routes, views to landscapes with scenic value and views from road corridors. The relative scenic value of these views is considered in determining the sensitivity level of each view in accordance with the assessment methodology.

8.3. Landscape impact

While the landscape and visual study area includes landscapes of state and regional landscape sensitivity, there would be relatively low landscape impacts during construction and operation of the proposal. This is due to the relatively small area of direct impact, the relatively flat and open landscape requiring minimal landform changes, and the proposal alignment avoiding important landscape features, such as Lake Victoria, dry relic lake beds, billabongs, and river crossings. Those visual impacts which have been identified range from **low** to **moderate landscape impact** during construction, and **low landscape impact** during operations.

8.4. Visual impact

Considering the length and scale of this proposal, the visual impacts are relatively low and have a relatively small influence. Those visual impacts which have been identified mostly having a **low** to **moderate** visual impact.

These impacts include moderate adverse visual impacts during construction and operation on views within the vicinity of Lake Victoria, with views from Renmark Road being of **low visual impact** but would be experienced for a long duration as the proposal alignment parallels the road for several kilometres. There would also be **low** to **moderate visual impact** in views from the land

between Renmark Road and Lake Victoria. This is due to the increased visual sensitivity of these locations and the importance of views to the sense of place of this significant cultural landscape.

There would be **low visual impacts** in views from roads throughout the Mallee shrubland and rural landscapes during construction and operation of the proposal. This includes views from Anabranche Mail Road, the Silver City Highway, Pooncarie Road, and other similar roads which cross the proposal alignment in this area. This is due to the relatively low sensitivity of these routes and the absorption capacity of the landscape with taller vegetation, an undulating terrain and precedent of existing power infrastructure.

In views from Arumpo Road, in the vicinity of the Buronga substation, there would be a **moderate visual impact** during construction and operation of the proposal. This is due to the scale of the proposed substation and convergence of transmission lines in this location.

In views east of the Buronga substation, such as from the Sturt Highway, there would be a **low visual impact** during construction and operation. This is because to the proposal would replace existing transmission lines, resulting in an incremental increase in the size of the transmission line structures.

8.5. Night lighting

At night there would be **moderate adverse visual impact** during construction and a **negligible visual impact** during construction of the project within the predominantly dark landscape of the Lake Victoria cultural landscape and semi-arid plains landscape character area. As this is a sensitive landscape at night, there would be limited night works and no permanent lighting proposed in this area

There would be **moderate visual impacts** in some areas within the Mallee shrubland and rural landscape character area, where construction requires night work, night deliveries and security lighting, particularly at the construction compound and camps at Anabranche South and the Buronga substation upgrade and expansion site. However, during operation there would be a **low visual impact** in areas where there would be permanent security lighting, such as at the Buronga substation upgrade and expansion.

In the Murray River plains and rural landscape there would be a **low adverse visual impact** during construction and a **negligible visual impact** during operation as there would be limited night works and no permanent lighting needed in this section of the proposal alignment.

8.6. Air traffic

There are scenic flights over the landscape and visual study area which may have views to the proposal during construction and operation. While the transmission lines would create a strong linear corridor across the landscape, this would not change the prevailing character of views from the air. Particularly in areas to the east of the proposal alignment where the visual complexity of the existing landscape increases. The transmission line and substations are uses expected within views from the air to a working rural landscape. In the vicinity of Lake Victoria, the proposal alignment is located to the north of an existing road, and away from the main scenic aerial views to the lake.

8.7. Cumulative landscape and visual impact

There is the potential for a cumulative landscape and visual impact associated with this project and the Buronga solar farm during operation. These projects would both contribute to landscape character change and alter the amenity of views in the vicinity of the project. Generally, it is expected that the cumulative visual impact would be experienced from a small area, and there would be an opportunity to reduce the visual impacts of the respective project through the implementation of screening vegetation.

9. References

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