

Hunter Transmission Project

Technical Report 3: Landscape character and visual impact assessment



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Hunter Transmission Project

Technical report 3: Landscape Character and Visual Impact Assessment

Client: EnergyCo

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Glossary and abbreviations

Term/abbreviation	Definition
Access roads	Permanent access roads that would be used to access project infrastructure
Bayswater Power Station	Existing power station at Bayswater owned by AGL.
Bayswater South switching station	The new switching station that would be constructed south of Bayswater Power Station.
Construction impact area	The area that would be directly impacted by the construction of the project, including (but not limited to) transmission towers and lines, stringing sites, access roads, access tracks, substations, switching stations, adjustments and upgrades to existing lines, communications infrastructure, workforce accommodation, construction compounds, laydown and utility adjustments
Construction support site	An area used as the base for construction activities, usually for the storage of plant/equipment and materials, processing facilities (concrete batching, aggregate crushing, grinding and screening), maintenance facilities/workshops, staff facilities, firefighting equipment, helicopter landing pad and support facilities, access and parking and wastewater treatment. Some construction support sites would also include temporary workers' accommodation
Critical State significant infrastructure (CSSI)	Infrastructure that is declared to be critical State significant infrastructure under Section 5.13 of the EP&A Act
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
Cumulative impact	The combined impacts of the project on a matter with other relevant future projects
DMP	Destination Management Plan
DPE	(NSW) Department of Planning and Environment (until January 2024)
DPHI	(NSW) Department of Planning, Housing and Infrastructure (previously DPI, DPIE and DPE)
Easement affected	Where a landholding would host the proposed transmission infrastructure and therefore be affected by an easement.
EIS	Environmental Impact Statement
EnergyCo	The Energy Corporation of New South Wales constituted by section 7 of the <i>NSW Energy and Utilities Administration Act 1987</i> as the NSW Government-controlled statutory authority appointed as the infrastructure planner under the <i>NSW Electricity Infrastructure Investment Act 2020</i> responsible for the delivery of NSW's REZs. The proponent for the HTP
Eraring Power Station	Existing power station at Eraring operated by Origin Energy.
Exclusion zone	A safe clearance area around the transmission line and structures to protect public safety, the network and to maintain access to the asset. It delineates the area where most land use activities are prohibited The zone is located within the easement and is defined according to the operational voltage and design of the infrastructure
Interconnector	An electricity interconnector is a connection that allows power to flow in both directions between regions in the national electricity market (NEM), providing access to a larger number of electricity generators and greater ability to meet varying demand where and when it is needed most

Term/abbreviation	Definition
Ha	hectares
Hunter Transmission Project (HTP) or project	The HTP as described in <i>Chapter 4 (Project description)</i> of the EIS and identified in the overview figures of the EIS.
HTP corridor	The HTP corridor includes: <ul style="list-style-type: none"> the transmission line corridor connecting Bayswater South switching station to Olney switching station the transmission line corridor connecting the Bayswater South switching station to the existing Bayswater substation the transmission line corridor connecting the Olney switching station to the existing 500 kV transmission line between Eraring and Kemps Creek
HVO	Hunter Valley Operations
km	kilometre
kV	Kilovolts (1000 volts)
Landowner(s)	People who own properties/land
Landscape	‘A holistic area comprising its various parts including landform, vegetation, buildings, villages, towns, cities and infrastructure’. (DPHI 2024)
Landscape character	‘The combined quality of built, natural and cultural aspects which make up an area and provide its unique sense of place’. (Transport for NSW 2023)
Landscape character zone	‘An area of landscape with similar properties or strongly defined spatial qualities, distinct from areas immediately nearby’. (Transport for NSW 2023)
Laydown areas	Established to allow for flexibility in construction and to minimise the need for vehicle movements to and from the construction support sites. These would act as temporary staging, storage, and complex plant/equipment setup areas. They would also act as traffic control nodes during construction of the HTP.
LCVIA	Landscape Character and Visual Impact Assessment (this report)
LEP	Local Environmental Plan
LGA	Local Government Area
LiDAR	Light Detection and Ranging
LSPS	Local Strategic Planning Statement
m	metre
Magnitude	‘The apparent size of a transmission infrastructure project in the landscape of when viewed from a given viewpoint’ (DPHI 2024)
mAHD	metres above Australian Height Datum
No clearing zone	Areas within the transmission line easement where vegetation removal is not required. These areas would occur where there is sufficient separation of 10 m or more between the maximum operating temperature conductor position and the existing vegetation This area is excluded from the disturbance area
Olney switching station	The new switching station that would be constructed in Olney State Forest.

Term/abbreviation	Definition
Operation impact area	The area that would be occupied by permanent components of the project and/or maintained, including transmission line easements, transmission lines and towers, substations, switching stations, communications infrastructure, maintenance facilities, permanent access roads to substations and switching stations and access tracks to easement
Pre construction minor works	Minor works undertaken prior to construction that may include building and road dilapidation surveys; pre clearance surveys; investigative drilling, contamination investigations, excavation or salvage; installation of environmental impact mitigation measures; property acquisition adjustment works including installation of property fencing; archaeological testing; and maintenance of existing buildings or structures
Private receiver	A private owned or used viewpoint type (DPHI 2024)
Project impact area	The area that has been assumed for the purpose of this EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation
(the) proponent	The Energy Corporation of NSW (EnergyCo)
Public viewpoint	A publicly owned or used viewpoint type (DPHI 2024)
Renewable energy	Energy from a source that is not depleted when used, such as solar or wind power
Renewable Energy Zone (REZ)	A geographic area identified and declared by the NSW Government as a REZ
Rural dwelling	A dwelling within a rural zoned area (RU1, RU2, RU3, RU4 and RU6), large lot residential zoned area (R5), or environmental or conservation area zone (C2, C3 and C4)
SEARs	Secretary's environmental assessment requirements issued by the Department of Planning, Housing and Industry
Sensitive receivers	'Viewpoints that are more sensitive to change than others, including dwellings, historic homesteads, tourist and visitor accommodation, places of worship, town centres and central business districts' (DPHI 2024)
Sensitivity	'A measure of the capacity of an element of the landscape to absorb the impacts from a proposed land use change and/or build form' (DPHI 2024)
Sky glow	The 'brightening of the night sky that results from the reflection of radiation (visible and non-visible), scattered from the constituents of the atmosphere (gas molecules, aerosols and particulate matter), in the direction of observation.' It comprises natural and artificial sources of radiation. (AS4282:2023)
Spill light	'Light emitted by a lighting installation that falls outside the boundaries of the property for which the lighting installation is designed ... Spill light may not necessarily be obtrusive' (AS4282:2023)
Stringing site	Used for the preparation, assembly and operation of stringing equipment to connect the transmission line to the towers. Stringing sites would be positioned along the HTP corridor. On other transmission projects, they may be referred to as 'brake and winch' sites.
Substation	A facility used to increase or decrease voltages between incoming and outgoing lines (e.g. 330 kV to 500 kV)
Switching station	A facility used to connect 2 or more distinct transmission lines of the same designated voltage

Term/abbreviation	Definition
<i>Technical Supplement</i>	The <i>Transmission Guideline, Technical Supplement for Landscape Character and Visual Impact Assessment</i> (DPHI 2024). This guideline was released in November 2024 and provides guidance for the assessment of landscape character and a detailed methodology for the assessment of visual impacts of transmission projects in NSW.
Temporary worker accommodation	Temporary accommodation that would be erected and used during construction to house the construction workforce. Worker accommodation would be located at some construction support sites.
Transgrid	Preferred network operator for the HTP.
Transmission line easement	An area surrounding and including the transmission lines which is a legal proprietary right and allows for ongoing access and maintenance of the transmission lines. Landowners can typically continue to use most of the land within transmission line easements, subject to some restrictions for safety and operational reasons.
Transmission tower	For 500kV transmission lines, this is typically a free-standing steel lattice structure (suspension or tension tower). Transmission towers for the HTP would generally be up to 85 m high.
Transposition	Transposition is the periodic swapping of positions of the conductors of a transmission line to maintain transmission reliability
Visual impact	The impact on views from private and public places, which is determined by considering the visual magnitude of the project, and sensitivity of the viewer or viewing location

Executive Summary

Introduction

This Landscape character and visual impact assessment (LCVIA) accompanies the Environmental Impact Statement for the Hunter Transmission Project (HTP). It addresses the Secretary's environmental assessment requirements (SEARs) issued on 13 August 2024, including advice from several government agencies. The LCVIA has been undertaken in accordance with the NSW government guideline *Transmission Guideline, Technical Supplement for Landscape Character and Visual Assessment Technical Supplement* (DPHI 2024) where relevant.

The objective of the LCVIA is to identify and assess the potential impacts of the HTP to landscape character (the overall impact of the project on the area's character and sense of place), and to public and private views. The LCVIA covers:

- impacts to landscape character:
 - during the day throughout construction
 - during the day throughout operation
 - at night throughout construction
 - at night throughout operation
- impacts to views from the public domain and from private dwellings:
 - during the day throughout construction
 - during the day throughout operation
 - at night throughout construction
 - at night throughout operation
- cumulative impacts.

Methodology

The likely impact of the HTP to landscape character and to views has been determined by identifying and combining:

- the sensitivity of the landscape, or the view, to change, and
- the magnitude of change the HTP would have on the landscape or the view.

The resulting level impact is rated either very low, low, moderate or high. Moderate and high impacts are to be avoided where possible or mitigated to an acceptable level.

Impacts were assessed during the day throughout construction and operation, and at night during construction and operation. Cumulative visual impacts were also assessed.

Existing environment

The HTP runs through power station, mining and government land between Bayswater and Broke, then through forested land within the Pokolbin, Corrabare, Watagan and Olney State forests. Landform and vegetation along the HTP corridor reflect the predominant land uses and range from: totally cleared, extensively excavated, open-cut mines; to flat to gently undulating agricultural areas with rural homes, grazing pastures and crops; and densely forested, steeply elevating, escarpments and rugged ranges.

In addition to rural residences, nearby sensitive locations include:

- conservation areas: the Greater Blue Mountains World Heritage Area (which includes Wollemi and Yengo National Park) is around 4.75 kilometres to the west of the HTP at closest; Watagan National Park lies just east of the HTP; while the southern end of the HTP would connect to the existing transmission line within Jilliby State conservation area (extending within the National Park around 300 metres)

- viticulture areas: the Broke-Fordwich vineyard precinct is around 4 kilometres to the west, and Hermitage Road precinct over 7 kilometres to the east
- tourist and scenic routes: Wollombi Road (NSW Tourist Drive 33 from Calga to Branxton); Golden Highway west of Jerrys Plains (gateway to the equine and viticulture area to the west); the Great North Walk (walking trail from Sydney to Newcastle); and Cessnock Road (while not a designated scenic road, Cessnock Road connects 2 important vineyard areas (Hermitage Road and Broke-Fordwich) and is used by tourists visiting both wine precincts).

Landscape character assessment

Within the landscape character study area (5 kilometres from the HTP), 11 landscape character zones (LCZs) were identified based on similar topography, vegetation type and cover, and land use. These LCZs are:

- LCZ 1 Energy and mining
- LCZ 2 Jerrys Plains rural village
- LCZ 3 Hunter River (Lemington) rural valley
- LCZ 4 Hunter River (Maison Dieu) rural valley
- LCZ 5 Bushland and open forest
- LCZ 6 Broke rural village
- LCZ 7 Wollombi Brook rural valley
- LCZ 8 Forested hills
- LCZ 9 Millfield suburban area
- LCZ 10 Congewai Creek rural valley
- LCZ 11 Narrow rural valley
- LCZ 12 Managed forestry.

In addition, 2 locations beyond the study area were included for assessment (Hebden Road and Freemans Drive) as construction support sites with workers' accommodation would be located there.

The sensitivity of each LCZ (including Hebden Road and Freemans Drive) during the day, and night, was determined based on existing landscape characteristics, such as uniqueness, scenic quality, and level of brightness. The magnitude of change to each LCZ was informed by matters such as the size and scale of the HTP, and geographical area it would cover.

Impact during the day throughout construction and operation

The daytime assessment is summarised in Table 5-5.

The assessment results show that during the daytime, the HTP would have a:

- **moderate** impact on 3 LCZs:
 - LCZ 7: Wollombi Brook rural valley (during construction and operation) due to the existing higher scenic quality of the LCZ
 - LCZ 8: Forested hills, during construction and operation, due to the existing wooded characteristic of the landscape and proposed tree clearance for the HTP, and
 - LCZ 11: Narrow Rural Valleys (during construction and operation) due to the HTP's higher magnitude of change within the more confined LCZ.

- **low** impact on:
 - 3 landscape character zones (LCZ 3: Hunter River (Lemington) Rural Valley, LCZ 4: Hunter River (Maison Dieu) Rural Valley, and LCZ 12: Managed forestry) during construction and operation
 - 1 landscape character zone (LCZ 9: Millfield suburban area) during construction, and
 - Freemans Drive during construction.

On all other landscape character zones or locations, the HTP would have **very low** or **negligible** impact during the daytime.

Impacts at night throughout construction and operation

The nighttime assessment is summarised in Table 5-6. The assessment results show that during the nighttime, the HTP would have a:

- **moderate** impact on one LCZ and one location beyond the LCVIA study area:
 - LCZ 8: Forested hills at the location of the proposed Olney switching station (during construction and operation), due to the introduction of (occasional use) localised artificial light into an otherwise dark environment
 - Freemans Drive (during construction) due to increased localised lighting of the rural area associated with the proposed workers' accommodation
- **low** impact on one LCZ and one location beyond the LCVIA study area due to increased localised lighting associated with proposed workers' accommodation:
 - LCZ 4: Hunter River (Maison Dieu) Rural Valley) (during construction)
 - Hebden Road, during construction.

On all other landscape character zones or locations, the HTP would have a **negligible** impact at night.

Visual impact assessment

A visibility analysis was prepared, showing the extent of potential visibility of the HTP. Within the area of visibility, public and private viewpoints were identified. This visibility was based on landform only (not including the screening effect of vegetation) and shows the theoretical area over which there may be a view to the HTP.

Public viewpoints

Ten public viewpoints were selected to represent views to the project. The viewpoints include a state highway and other public roads, a village and lookout:

- 01: New England Highway
- 02: Jerrys Plains
- 03: Golden Highway
- 04: Shearers Lane
- 05: Hunter Valley Gliding Club
- 06: Putty Road
- 07: Cessnock Road
- 08: Wollombi Road (looking east)
- 09: Wollombi Road (looking west)
- 10: Flat Rock Lookout
- 11: Pines Campground and picnic area
- 12: Watagan Forest Road.

The location of these viewpoints is shown in **Appendix F**.

Impacts during the day throughout operation

A proportionate visual impact assessment was undertaken to assess potential daytime impacts during operation for these views. This included:

- a desktop 'simple assessment' to determine which views would have low and very low impacts, to eliminate them from further assessment
- an 'intermediate assessment' of viewpoints with a moderate or higher impact in the simple assessment, using a 3D model to more accurately determine the magnitude rating
- a 'detailed assessment' of viewpoints with a moderate or higher impact in the intermediate assessment, using a photomontage to calculate magnitude taking existing vegetation into account.

The outcomes of the simple visual impact assessment are contained in Table 6-1. The simple assessment identified a **high** visual impact from 1 public viewpoint (05: Cessnock Road), a **moderate** visual impact from five public viewpoints (06 Putty Road; 08 Wollombi Road (looking east); 10 Flat Rock Lookout; 11 Olney Headquarters campsite and picnic ground; and 12 Watagan Forest Road). All remaining viewpoints had a low or very low potential visual impact.

In lieu of a modelled 'intermediate assessment' of the view from the public viewpoints with a potential high and moderate visual impact, these viewpoints proceeded to a 'detailed assessment' and a photomontage (or bare earth render, where substantial vegetation intervenes) was prepared to illustrate the view. The photomontage includes the modelled project, from which the magnitude of change can be more accurately measured. The detailed assessment found that the impact to 05: Cessnock Road reduced to **moderate** (from the rating of high in the simple assessment). All of the views identified in the simple assessment as having a potential moderate visual impact, would be reduced to low or no visual impact.

Impacts during the day throughout construction

The most significant impact during the temporary construction period would occur to the following public viewpoints:

- 06 and 07 (Wollombi Road) which would be adjacent to a large construction support site that would operate 24/7, and contrast the existing attractive rural valley scenery
- 10 (Watagan Forest Road) which would be adjacent to Olney switching station. Visual changes would involve tree removal and construction of the switching station close to road users.

05: Cessnock Road and Freeman's Drive would also experience visual changes to the view that would contrast the existing setting. Impacts would occur for a short period, while in transit, travelling past the construction sites.

Impacts at night throughout construction

Viewpoints 06, 07 and 10 would also experience the most significant nighttime impacts, as lighting at the adjacent construction support sites would contrast existing night lighting, and work at the sites would be undertaken 24/7. Impacts would occur for a short period, while in transit, travelling past the construction sites.

Impacts at night throughout operation

There is no operational lighting proposed along the transmission line. Operational lighting associated with Olney switching station would be seen briefly by road users travelling along Watagan Forest Road (P10) past the switching station.

Private viewpoints

Rural setback

In accordance with the Technical Supplement, any dwelling within the rural setback of a transmission tower will trigger a **high** visual impact and must be assessed against high-impact performance criteria. The setback for an 85 metre high transmission tower in rural areas is 400 metres. There are five dwellings identified within the 400 metre rural setback. However, it has been determined that an exemption from the setback is appropriate for these dwellings due to the screening effect of intervening vegetation. These dwellings, however, were further assessed according to the proportionate visual assessment process together with the other private viewpoints.

Impacts during the day throughout operation

A proportionate visual impact assessment was undertaken for those private viewpoints within the visual assessment study area (that is, within 1.625 kilometres of the Project) to assess potential daytime impacts during operation. This included:

- a desktop ‘simple assessment’ to determine which views would have low and very low impacts, to eliminate them from further assessment
- an ‘intermediate assessment’ of viewpoints with a moderate or higher impact in the simple assessment, using a 3D model to more accurately determine the magnitude rating
- a ‘detailed assessment’ of viewpoints with a moderate or higher impact in the intermediate assessment, using a photomontage to calculate magnitude taking existing vegetation into account.

The ‘simple assessment’ was undertaken for 68 dwellings (excluding easement affected dwellings; dwellings being acquired by the HTP, derelict or non-habitable dwellings; moveable dwellings; and accommodation within Singleton Military Area; ancillary farm, industrial or commercial buildings; heritage ruins and non-habitable heritage items.)

For the simple assessment, conservative assumptions regarding viewpoint sensitivity and scenic quality were made for all views from rural dwellings. Historic rural homesteads were classified the highest viewpoint sensitivity (in accordance with the Technical Supplement).

The ‘simple assessment’ identified:

- 12 private viewpoints with a potential **high** visual impact
- 22 private viewpoints with a potential **moderate** visual impact
- 34 private viewpoints with a potential **low** visual impact.

A site visit to each dwelling is not a component of the simple assessment and has not been undertaken. For this simple assessment, all views from dwellings are assumed to be primary views (that is, the highest sensitivity apart from listed heritage homes), and scenic quality is based on conservative assumptions of existing landscape character within each landscape character zone.

In accordance with the Technical Supplement, those viewpoints with a low visual impact were eliminated from further assessment. An ‘intermediate assessment’ was then conducted for the 32 private viewpoints which had a potential moderate and high visual impact. A number of additional private viewpoints, that had a low potential visual impact, were also considered in the intermediate assessment as a conservative approach, while the Technical Supplement requirements were being refined (note, the simple assessment methodology was updated in the Technical Supplement in April 2025).

The ‘intermediate assessment’ used a 3D generated ‘bare earth render’ of the HTP to more accurately determine the magnitude rating. The bare earth render is based on landform and excludes existing trees or other existing structures that could limit the view of the project.

The ‘intermediate assessment’ identified:

- 8 private viewpoints with a potential **high** visual impact
- 13 private viewpoints a **moderate** visual impact from
- **low** or no visual impact from all remaining private viewpoints.

A ‘detailed assessment’ was then conducted for receivers with a moderate or higher rating. Where possible, a site visit was conducted to photograph the view from the dwelling and to evaluate the ratings of visual sensitivity and scenic quality. The ‘detailed assessment’ was based on the assessment of photomontages (and detailed point-cloud (LiDAR) survey data generated images where access was not possible). The use of photomontages enabled a more accurate calculation of the magnitude of the HTP within each view.

The ‘detailed assessment’ identified:

- no private viewpoints with a **high** visual impact
- 6 private viewpoints with a **moderate** visual impact (ID238, ID465, ID466, ID46, ID2920 and ID2928).

Those private viewpoints with a moderate visual impact have been further considered in relation to the Performance Objectives for private viewpoints within the Technical Supplement.

A residual assessment of impact has identified the potential for:

- 4 private viewpoints with a **low** visual impact: ID2928, ID238, ID467 and ID2920
- 2 private viewpoints with a **moderate** visual impact: ID465 and ID466.

These opportunities for mitigation would be developed with landowners and implemented as a part of the project if appropriate.

Impacts during the day throughout construction

There would be temporary visual impacts from some dwellings with a view to HTP construction areas, construction support sites, or in view of the flight path of helicopters. Some construction activities may draw attention, such as helicopter movements. Other activities, such as surveying, would be more commonplace and less noticeable. Some construction support sites would result in less contrast and change in the view, such as laydown areas, while others such as large compounds operating 24/7, would result in greater contrast and change in the view.

The 3 proposed workers' accommodation sites are located away from dwellings, and direct visibility would be limited.

Overall, the level of impact during the temporary construction period would vary according to the visibility (distance and intervening landform and vegetation) and sensitivity of the viewing location.

Impacts at night throughout construction

At night there may be temporary visual impacts from dwellings with a view to construction compounds or combined compound and temporary worker accommodation facilities.

The level of impact will vary according to the visibility (distance and intervening landform and vegetation) and sensitivity of the viewing location.

Impacts at night throughout operation

There is no operational lighting proposed along the transmission line. Therefore, no private views would be affected by regular operations of the transmission line. Maintenance of the transmission line, including tree trimming, would be undertaken during the day. Maintenance activity at night would only occur in emergency situations.

Lighting would be installed at the Bayswater and Olney switching stations. There are no dwellings identified with potential views of the switching stations.

Cumulative landscape character and visual impacts

EnergyCo has identified the relevant projects that may be developed concurrently with the Hunter Transmission Project (HTP) and may result in cumulative impacts on people and the environment. The only project identified that would result in potential cumulative visual impacts to private viewpoints is the Maison Dieu Solar Farm project. Other projects in the region are located in the vicinity of an existing industrial area, are too far away from the HTP corridor or would be out of sync with its construction to cause significant visual cumulative impacts.

The results of the cumulative impact assessment for landscape character and visual impact are presented in **Table 7-1**.

During construction:

- there would not be a cumulative impact to landscape character during construction due to physical separation of the Maison Dieu Solar Farm and the HTP by intervening landform and distance
- cumulative impact to public views is unlikely as there would be limited opportunity to view Maison Dieu Solar Farm and the HTP in sequence
- there are no rural dwellings (private viewpoints) identified within the HTP visual study area that would have a visual impact caused by the proposed Maison Dieu Solar Farm and therefore, there would be no cumulative visual impacts.

During operation:

- there would be no cumulative landscape character during operation due to the physical and visual separation between these projects
- there would not be views to both projects from a public location
- there are no rural dwellings (private viewpoints) identified within the HTP visual study area that would have a visual impact caused by the Maison Dieu Solar Farm and therefore, there would be no cumulative visual impacts.

Mitigation measures

Mitigation measures have been incorporated into the HTP to reduce potential visual impacts. This includes:

- maximising the distance from existing dwellings and towns
- maximising the distance of transmission towers from individual rural dwellings
- occupying disturbed mining and energy operational land (which has low visual impacts)
- occupying operational forestry land (which has low visibility)
- minimising vegetation clearance requirements where practicable, including development of refined vegetation clearance areas rather than full easement clearance
- avoiding national parks, conservation areas and cultural heritage places.

Wherever possible, existing vegetation would be retained. Additional recommended mitigation measures regarding vegetation clearance, lighting, screening vegetation, and transmission tower positions, are included (see Table 8-1).

Chapter 1: Introduction

The Hunter Transmission Project (HTP, the project) involves the construction of a new overhead 500 kilovolt (kV) transmission line of around 110 kilometres connecting the existing 500 kV transmission line at Bayswater to the existing 500 kV transmission line in the Olney State Forest near Eraring in the Hunter region of New South Wales (NSW).

Due to its strategic importance, the NSW Minister for Planning and Public Spaces has declared the HTP to be critical State significant infrastructure (CSSI) under the NSW Environmental Planning and Assessment Act 1979 (EP&A Act).

Under this process, the Energy Corporation of NSW (EnergyCo, the proponent) is required to prepare an environmental impact statement (EIS) in accordance with the NSW Environmental Planning and Assessment Regulation 2021.

This Landscape character and visual impact assessment (LCVIA) accompanies the EIS for the HTP and addresses the Secretary's environmental assessment requirements (SEARs) issued on 13 August 2024. The objective of the LCVIA is to identify and assess the potential impacts of the HTP to landscape character, and to public and private views.

In addition to the SEARs, advice from several government agencies was received on the HTP. Agency advice relevant to and considered in this Landscape character and visual impact assessment is provided in Table 1-2 (and available in full on the Major Projects website maintained by the NSW Department of Planning, Housing and Infrastructure (DPHI)).

Table 1-1 Secretary's Environmental Assessment Requirements – landscape and visual impact

Ref.	Secretary's environmental assessment requirements	Where addressed in this LCVIA
Amenity	<i>an assessment of the likely visual impacts of the project on surrounding residences, scenic or significant vistas, night lighting, and road corridors in the public domain; ...</i> <i>a description of the measures that would be implemented to avoid / mitigate visual ... impacts.</i>	Chapter 6 Chapter 8

Table 1-2 Agency Advice– landscape and visual impact

Ref.	Identified issue	Where addressed in this LCVIA
Biodiversity, Conservation and Science Group NSW (with input from NPWS), Department of Climate Change, Energy, the Environment and Water	Attachment B- NPWS's Project specific environmental assessment requirements <i>16a. ...Overall impact consideration is to include:</i> <i>iv. visual, aesthetic and landscape level view lines, including effects on Outstanding Universal Value attached to the Greater Blue Mountains Area World Heritage Property and other prominent viewing areas on NPWS-managed land.</i>	Chapter 6, section 6.4
Muswellbrook Shire Council	<i>Visual</i> <i>6. Of concern to Muswellbrook Shire Council are the visual impacts to motorists travelling along the Golden Highway toward Muswellbrook. Particularly, the combined landscape and visual / aesthetic effect of the presence of coal mines and other infrastructure adjacent the Golden Highway, and how they impact the perception of Muswellbrook. ... [Council referenced relevant pages of Gyde landscape character and scenic value assessment along the Golden Highway. Precinct 3 relates to the land proposed nearby HTP North]. ...</i>	Chapter 6, section 6.4

Ref.	Identified issue	Where addressed in this LCVIA
	<p>7. Staff request an assessment of views travelling north along the Golden Highway, including a figure showing existing visual treatments (if any) and options for additional treatments to mitigate cumulative impacts adjacent each road.</p> <p>8. A plan to manage any visual screen tree plantings and ensure their growth and ongoing survival should be provided.</p>	
Singleton Council	<p><i>Strategic Planning</i></p> <p><i>The Environmental Impact Statement should include consideration and discussion on the following strategic planning documents relevant to both the Singleton local government area and the broader Hunter region:</i></p> <ul style="list-style-type: none"> • <i>Hunter Regional Plan 2041</i> • <i>Singleton Local Strategic Planning Statement</i> • <i>Singleton Community Strategic Plan</i> • <i>Singleton Local Housing Strategy</i> • <i>Singleton Sustainability Strategy 2019-2027.</i> 	Relevant visual and landscape character matters from these documents are discussed in Chapter 4, section 4.3
Heritage NSW, Department of Climate Change, Energy, the Environment and Water	<p><i>Heritage NSW recommends ...</i></p> <p><i>Include the following requirement: Consideration of visual impacts to view lines between elevated ridgelines and culturally significant areas including but not limited to Mount Yengo as identified by the Registered Aboriginal Parties.</i></p>	Chapter 6, section 6.4

Chapter 2: The Hunter Transmission Project

2.1 Overview

The Hunter Transmission Project (HTP, the project) is critical State significant infrastructure (CSS). It must be built by mid 2030 to protect energy security in NSW as the remaining coal-fired power stations close.

The HTP includes:

- a new overhead 500 kilovolt (kV) double circuit transmission line of around 110 kilometres
- 2 new switching stations (Bayswater South and Olney)
- upgrades to the existing Bayswater and Eraring substations
- adjustments and upgrades to existing transmission lines
- property adjustment works to facilitate access to the transmission lines and switching stations
- utility adjustments required for the construction of the transmission network infrastructure
- ancillary works to support construction including road upgrades, establishment of new access tracks and upgrade to existing access tracks, construction support sites (some with temporary workers accommodation), and other construction facilities such as laydown areas.

The new transmission line would transport electricity generated in the Central-West Orana and New England Renewable Energy Zones (REZs). It would connect the existing 500 kV transmission line at Bayswater to the existing 500 kV transmission line in the Olney State Forest near Eraring. This would strengthen the State's core electricity grid and supply clean and reliable energy to NSW consumers for generations to come.

The HTP involves development across 5 local government areas (Muswellbrook, Singleton, Cessnock, Central Coast and Lake Macquarie). Most of this development would be concentrated in and around the HTP corridor.

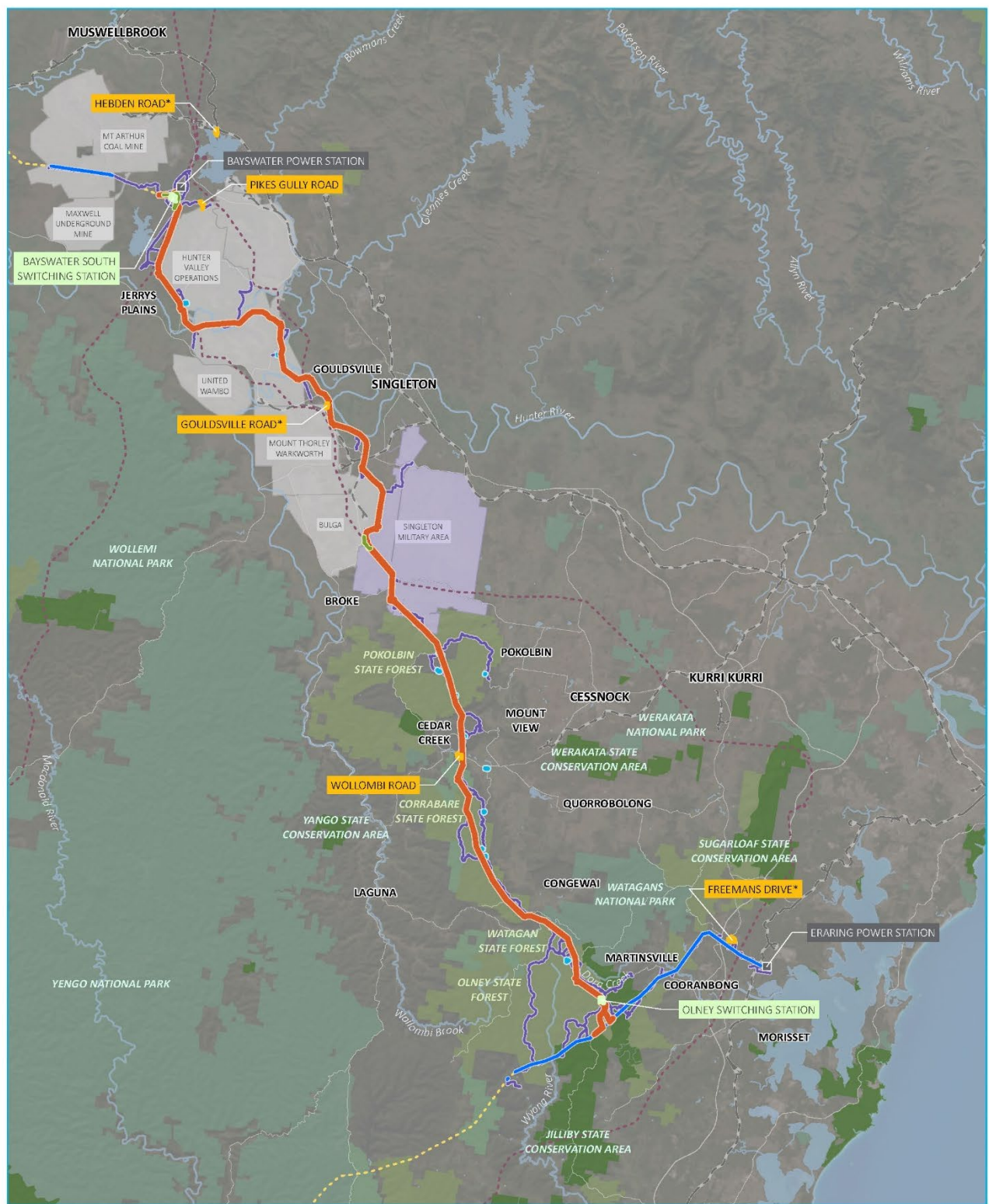
An overview of the HTP is provided in Table 2-1 and shown in Figure 2-1. The key project elements are shown Figure 2-2 to Figure 2-5.

Further details are provided in Chapter 4 (*Project description*) of the HTP environmental impact statement (EIS).

Table 2-1 Project overview

The project	<p>The critical State significant infrastructure application for the HTP covers 5 local government areas.</p> <p>Most development would be concentrated in and around the HTP corridor. Some ancillary development such as construction support sites and worker accommodation, road upgrades and laydown areas would be outside the corridor</p>
Project impact area	<p>The area that has been assumed for the purpose of this EIS to be directly affected by the construction and operation of the project. It includes the indicative location of project infrastructure, the area that would be directly disturbed during construction and any easement required during operation.</p>
Construction and operation	<ul style="list-style-type: none">• Construction impact area around 2351 ha• Operation impact area around 1261 ha
Disturbance area	<ul style="list-style-type: none">• Disturbance area around 1370 ha• Disturbance area A around 550.3 ha• Disturbance area A (centreline) around 255.9 ha• Disturbance area B around 222.1 ha• Disturbance area HZ around 1.4 ha

New transmission line and transmission towers	<ul style="list-style-type: none"> • Overhead 500 kV double circuit transmission line of around 110 km • Steel lattice towers generally up to 85 m high and that are spaced anywhere between 75 m to around 1.3 km apart (typically between 300 m and 600 m) • 500 kV transmission lines with a minimum ground clearance of 13.5 m • Ancillary infrastructure such as earth wire and communications systems • Construction easement of around 140 m wide • Operational easement around 70 m wide
Switching stations/substation works	<ul style="list-style-type: none"> • New Bayswater South 500 kV switching station – construction impact area around 26.6 ha • Modifications as the existing Bayswater 500 kV/330kV substation within the existing footprint • New Olney 500 kV switching station – construction impact area around 20 ha • Augmentation and modifications at the existing Eraring 500 kV/330kV substation, including installation of 2 new 1500 MVA transformers
Adjustments and crossings-existing transmission lines	<ul style="list-style-type: none"> • Adjustments to existing double circuit 500 kV transmission lines: <ul style="list-style-type: none"> - Line 5A1 and 5A2: Eraring – Kemps Creek 500 kV at Ravensdale to connect to the new Olney 500 kV switching station - Line 5A3: Bayswater – Mt Piper 500 kV at Bayswater to connect to the new Bayswater South 500 kV switching station - Line 5A4: Bayswater – Wollar 500 kV at Bayswater to connect to the new Bayswater South 500 kV switching station • Adjustments to existing double circuit 330 kV transmission lines: <ul style="list-style-type: none"> - Line 31: Bayswater – Regentville 330 kV - Line 32: Bayswater – Sydney West 330 kV - Line 81: Newcastle – Liddell 330 kV • Crossing of existing double circuit 330 kV transmission lines: <ul style="list-style-type: none"> - Line 31: Bayswater – Regentville 330 kV at Bayswater - Line 32: Bayswater – Sydney West 330 kV at Bayswater - Line 81: 330 kV: Newcastle – Liddell 330 kV at Lemington and again at the Singleton Military Area - Line 82: 330 kV: Tomago – Liddell 300 kV at Warkworth and again at the Singleton Military Area
Upgrades – existing transmission lines and towers	<ul style="list-style-type: none"> • Upgraded earth wire on Line 5A3 and Line 5A4 • Upgraded earth wire and communication systems on Line 5A1 and Line 5A2 • Tower strengthening on various existing towers on Line 5A1, Line 5A2, Line 5A3 and Line 5A4
Road works	<ul style="list-style-type: none"> • Modifications to the existing public road network • New and upgraded access tracks for construction and operation
Construction support sites	<ul style="list-style-type: none"> • Five construction support sites: Hebden Road, Pikes Gully Road, Gouldsville Road, Wollombi Road and Freemans Drive • Helicopter pads (helipads) indicatively at: Hebden Road, Pikes Gully Road, Gouldsville Road and Freemans Drive
Ancillary sites	<ul style="list-style-type: none"> • Laydown areas, which would be established to allow for flexibility in construction and to minimise the need for vehicle movements to and from the construction support sites
Ancillary works	<ul style="list-style-type: none"> • Construction support sites, including temporary workers' accommodation • Laydown areas • Stringing sites
Utility adjustments	<ul style="list-style-type: none"> • Third party utility works including gas, telecommunications, water, sewer and stormwater
Timing	<ul style="list-style-type: none"> • Construction to start in 2027 • Operation end-of 2029



KEY

Project impact area

- HTP corridor
- Switching station
- Construction support site (*with temporary worker accommodation)
- Laydown area
- Adjustment to existing transmission line
- Upgrades to existing transmission line
- Access track

Existing environment

- Power station
- 330 kV transmission line
- 500 kV transmission line
- Railway
- Major road
- Named watercourse

Named waterbody

- NPWS reserve
- State conservation area
- State forest
- Defence
- Mining

Project overview

Hunter Transmission Project
Environmental Impact Statement
Figure 1.2



Figure 2-1 Project overview

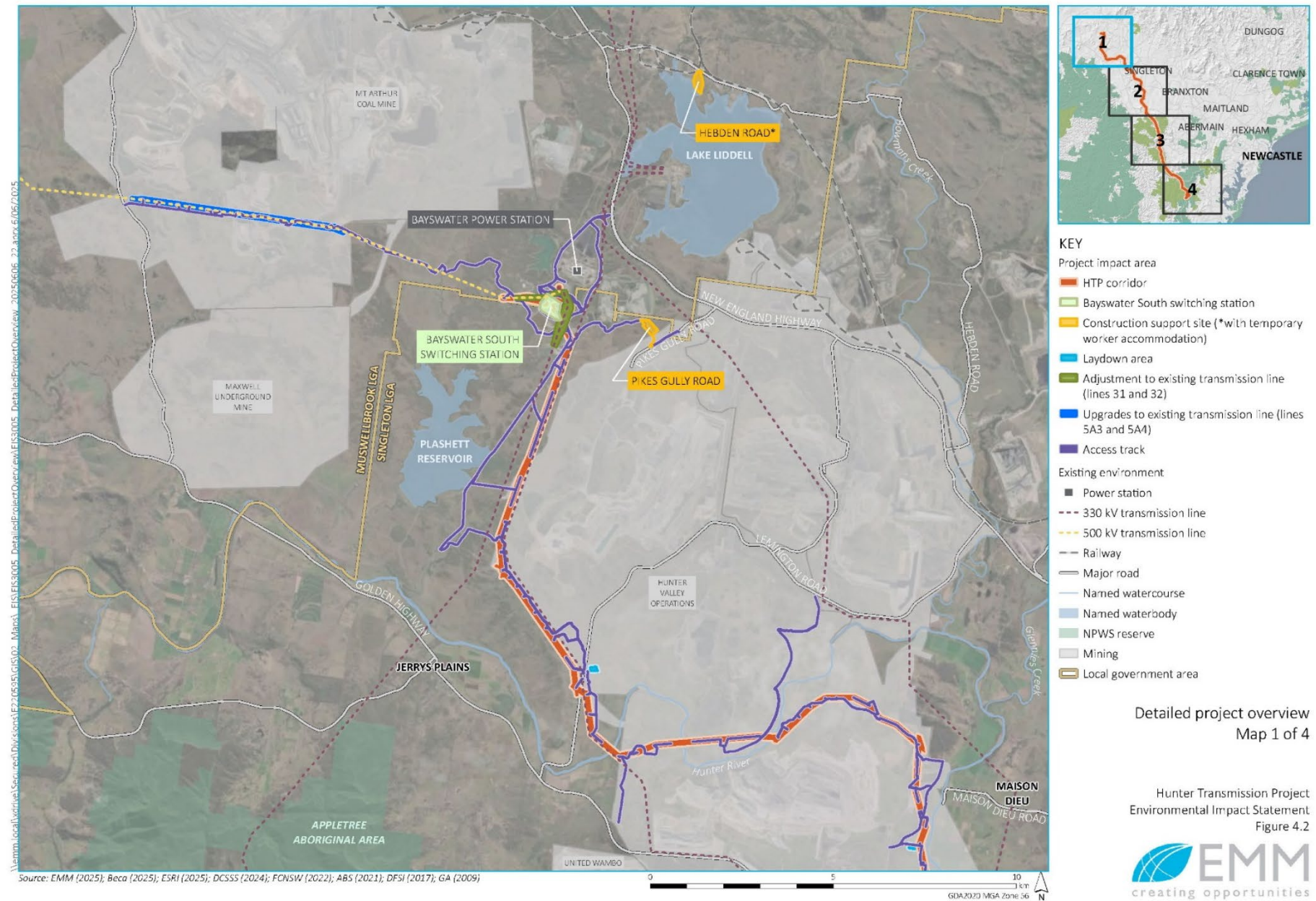


Figure 2-2 Key project elements (Map 1 of 4)

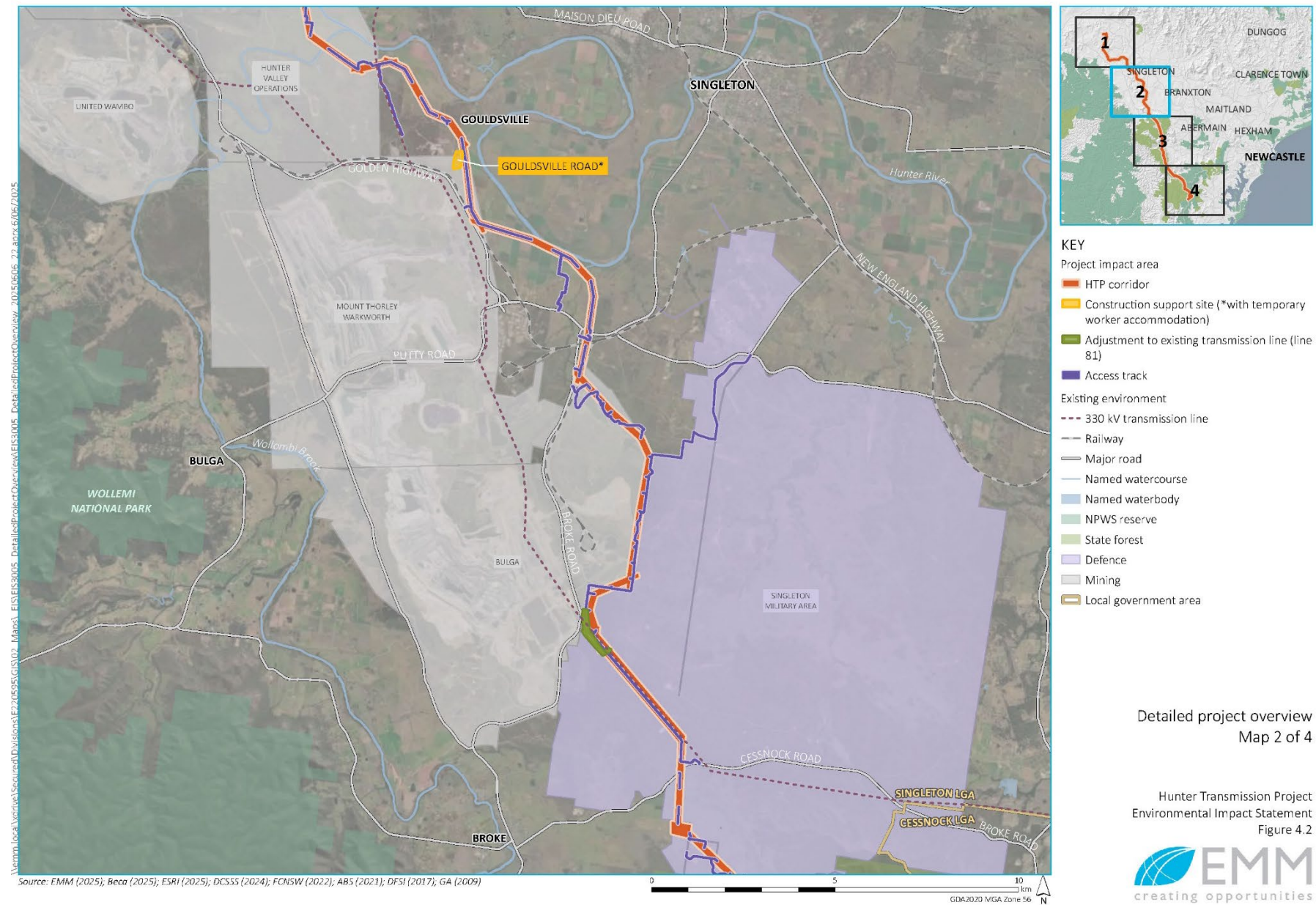


Figure 2-3 Key project elements (Map 2 of 4)

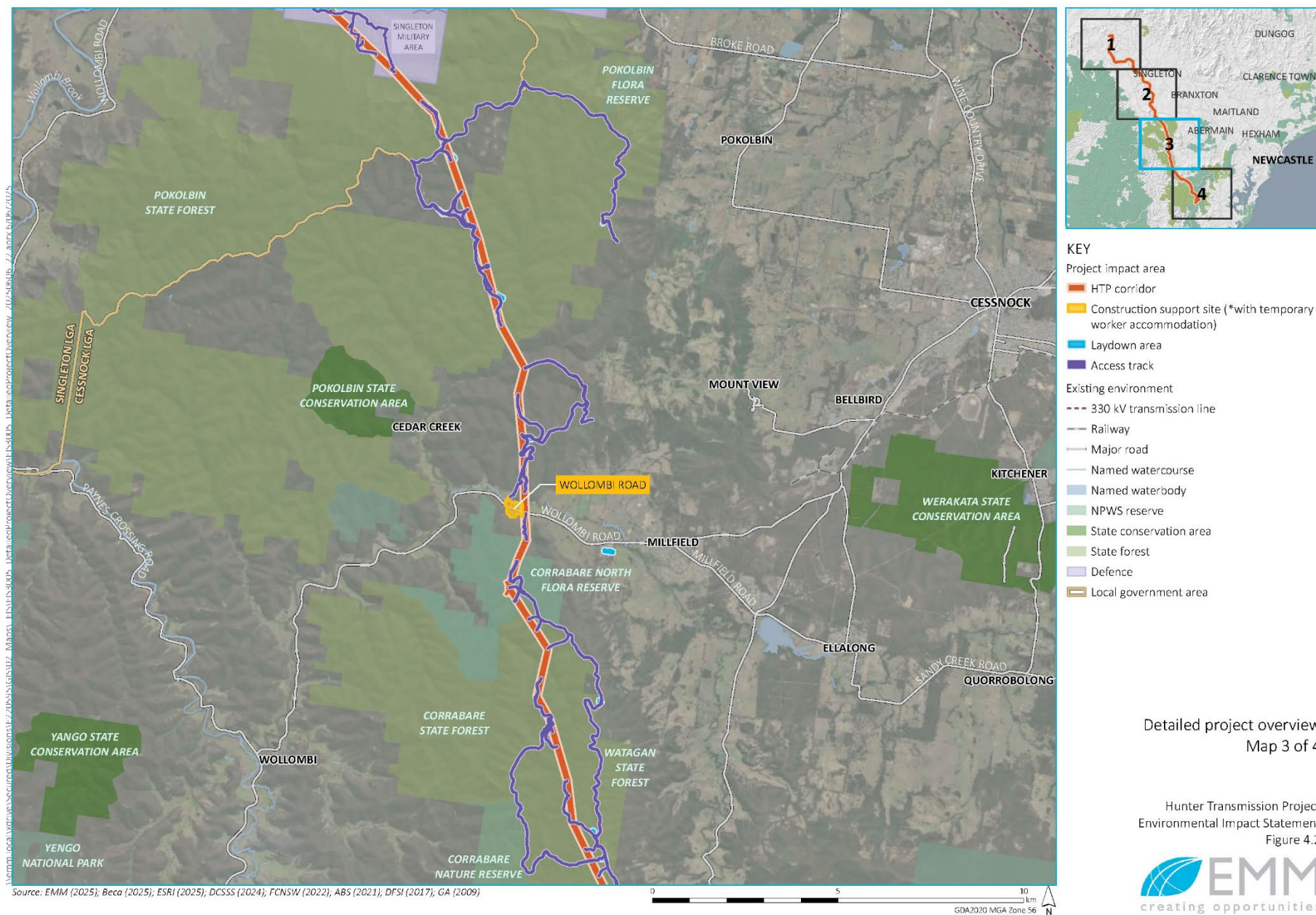


Figure 2-4 Key project elements (Map 3 of 4)

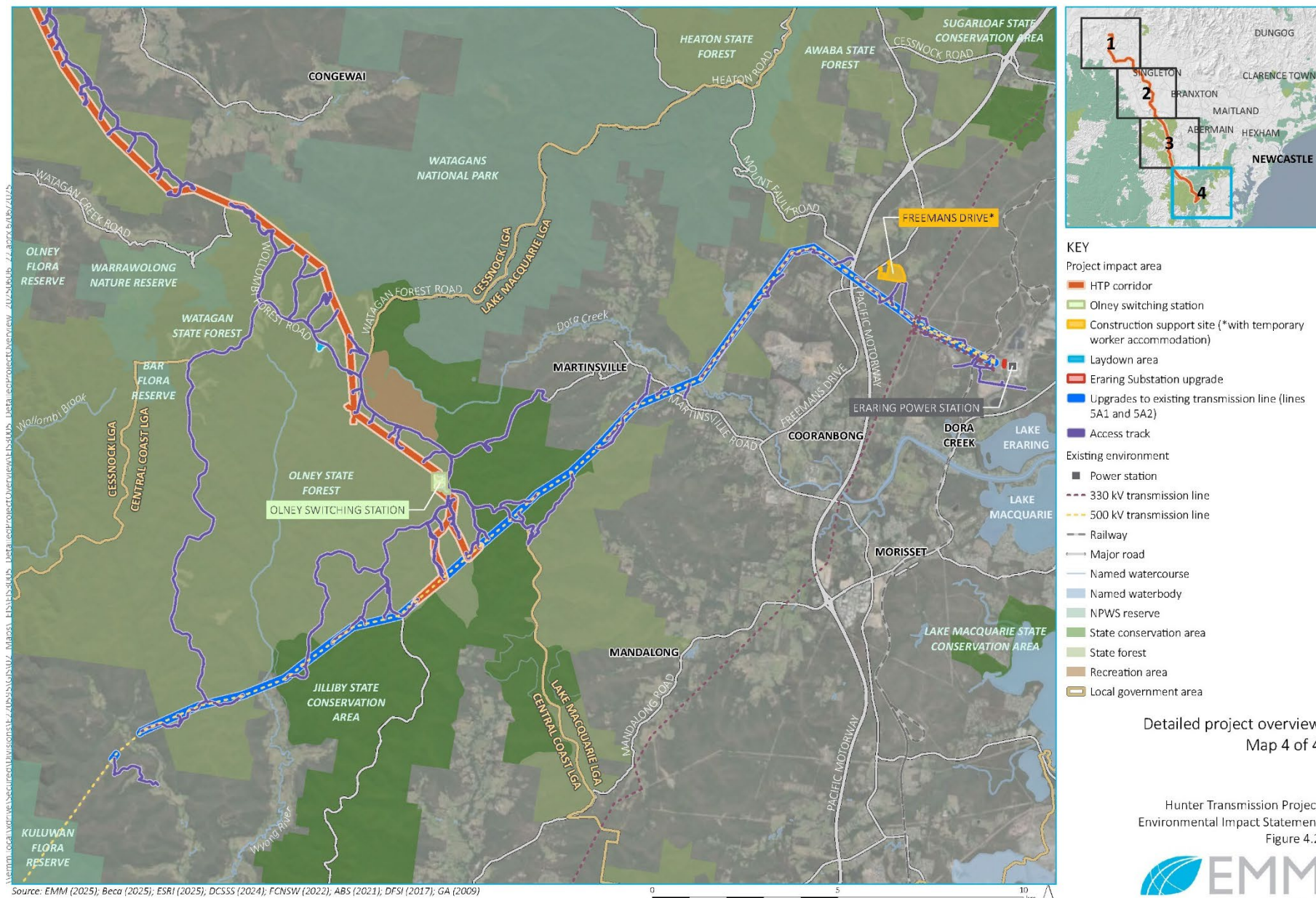


Figure 2-5 Key project elements (Map 4 of 4)

2.2 Project description

The following includes a further description of the project, relevant to the landscape character and visual impact assessment during operation:

- **Transmission line structures**- The steel lattice towers would be up to 85 metres high and spaced generally between 300 metres and 1.3 kilometre apart. Around 230 towers would be required.

The towers would either be suspension towers used for straight sections with an operational base footprint of around 20 metres by 20 metres or tension towers used where there is a changes in direction along the transmission line with an operational footprint of around 25 metres by 25 metres. Transmission line towers would include communications infrastructure consisting of optical fibre ground wire. An example of a 500 kV double circuit transmission line and towers is shown Figure 2-6.

- **New switching stations**- The 2 new 500 kV switching stations at Bayswater and Olney would include:
 - 500 kV switchyard with supporting electrical components including busbars, circuit breakers, isolators, metering, and gantries; line shunt reactors (Bayswater only)
 - supporting service building (for communications, control and protection systems), maintenance facility (including water tank and storage sheds), oil containment system, utilities and amenities for operational and maintenance staff, including a parking area
 - access roads and safety and security infrastructure (gates, fencing, lighting and cameras).
- **Existing substation upgrades** - Upgrades at the existing 500/330 kV substation at Bayswater power station and the 500/330 kV substation at Eraring power station would include:
 - modifications to the busbars, line bays, existing line connections, bench and associated earthwork
 - additional drainage infrastructure, modification to internal substation roads
 - installation of new concrete cable trenches and cable pits, steelwork, cabling and installation of secondary communication systems
 - installation of 500 kV/330 kV transformer units, associated switchgear and/or connections (Eraring substation only).
- **Access roads and tracks** – Establishment of new and upgrade of existing access tracks for transmission lines, switching stations and other ancillary works areas within the construction area (such as temporary watercourse crossings, laydown and staging areas, earthwork material sites with crushing, grinding and screening plants, concrete batching plants, brake / winch sites, site offices and workforce accommodation facilities.
- **Switching station lighting** – Minimal operational lighting would be installed and operate from dusk until dawn, seven days a week. It would typically be located on steelwork (i.e. gantries) and the switching stations. The final lighting design would focus illumination to within the switching station boundary in accordance with the requirements of *Australian Standard AS 4282-2023 Control of the obtrusive effects of outdoor lighting* (Standards Australia 2023).
- **Operational activities** – Regular maintenance activities including managing vegetation; regularly testing and servicing the electrical equipment and battery systems; undertaking fault and emergency response (unplanned maintenance) should an unplanned outage occur; fixing, replacing or upgrading components as required.



Figure 2-6 Example of 500 kV double circuit transmission line and towers (Source: HTP Environmental Impact Statement (EIS) image 3.1)

2.3 Construction approach

The following section includes a further description of the project, relevant to the landscape character and visual impact assessment during construction:

- **Construction support sites (x 5)** – Including temporary construction support sites with workers’ accommodation, laydown areas, stringing sites and helicopter landing pad / helicopter facilities. Temporary construction infrastructure would be located within existing disturbed areas where possible.
- **Temporary workers’ accommodation facilities (x 3)**- would be established at: Hebden Road, Ravensworth; Gouldsville Road, Gouldsville; and Freemans Drive, Cooranbong. These sites would include demountable accommodation and office buildings, workforce amenities, including food and catering, laundry, bathroom and first aid facilities, utilities, including telecommunication services, electricity, water and generators.
- **Helicopter landing pads**- would be positioned generally alongside or within construction support sites and laydown areas, with an additional helicopter landing pad set up within the Corrabare State Forest. Helicopters may be used for transporting materials, equipment, and personnel to construction sites; and may also be used for stringing of the transmission lines).
- **Transmission line stringing** - Transmission line stringing may be undertaken by ground pulled draw wire or with use of helicopters and/or drones. Brake and winch sites would be established at intervals along the transmission line alignment, consisting of a temporarily cleared area for plant and equipment.
- **Construction plant and equipment** – the project would require the use of large-scale construction equipment including cranes (ranging from 50 to 300 tonnes)/crane trucks, helicopters (and supporting equipment), dozers (D6 to D10), dump trucks, excavators, graders, haulage trucks and semi-trailers.
- **Vegetation clearance**- including:
 - full vegetation removal around transmission towers (including tower foundations and batters), stringing sites, new and upgraded access tracks, and road upgrades

- 20-metre-wide vegetation clearance area between transmission towers to allow stringing of the transmission line (this area would also be subject to ongoing vegetation removal to maintain clearance requirements for operational and safety (including bushfire))
 - partial clearing of trees along the transmission line where vegetation exceeds the designated clearance heights (transmission lines have a minimum ground clearance of 13.5 metres)
 - removal of trees that pose a hazard within 10 metres either side of the transmission line easement (see Figure 2-7 for clearances).
- **Construction hours** - Construction work would be generally carried out during recommended standard hours being, Monday to Friday between 7.00 am and 6.00 pm and Saturday between 8.00 am and 1 pm. Some activities may be required outside of the project standard hours of work for safety, technical or public infrastructure operational reasons (e.g. to minimise utility or traffic disruptions). Workforce accommodation facilities would be operational 24 hours per day, 7 days per week.
 - **Lighting** – Lighting would be installed at 3 construction support sites associated with temporary workers' accommodation, for occasional use when construction activities are required outside of standard hours of work. Lighting would be available and potentially in use through the night at each temporary workers' accommodation facility. Lighting would be designed and installed in accordance with the requirements of *Australian Standard AS 4282-2023 Control of the obtrusive effects of outdoor lighting* (Standards Australia 2023).
 - **Project timing** - Subject to NSW and Commonwealth planning approvals, construction of the project is expected to commence in late 2027 (enabling works phase). Once construction has commenced, the project is estimated to take around 2 years to complete. Decommissioning and remediation of temporary areas used to support the construction of the project (such as construction support sites, temporary worker accommodation and laydown areas) would extend around 6 months beyond the initial commissioning (operational) phase, with an estimated completion by the end of 2029. The final construction program would be confirmed as part of the finalisation of the project infrastructure following approval of the project.

A detailed description of construction work for the project is further described in Chapter 4 (*Project description*) of the EIS.

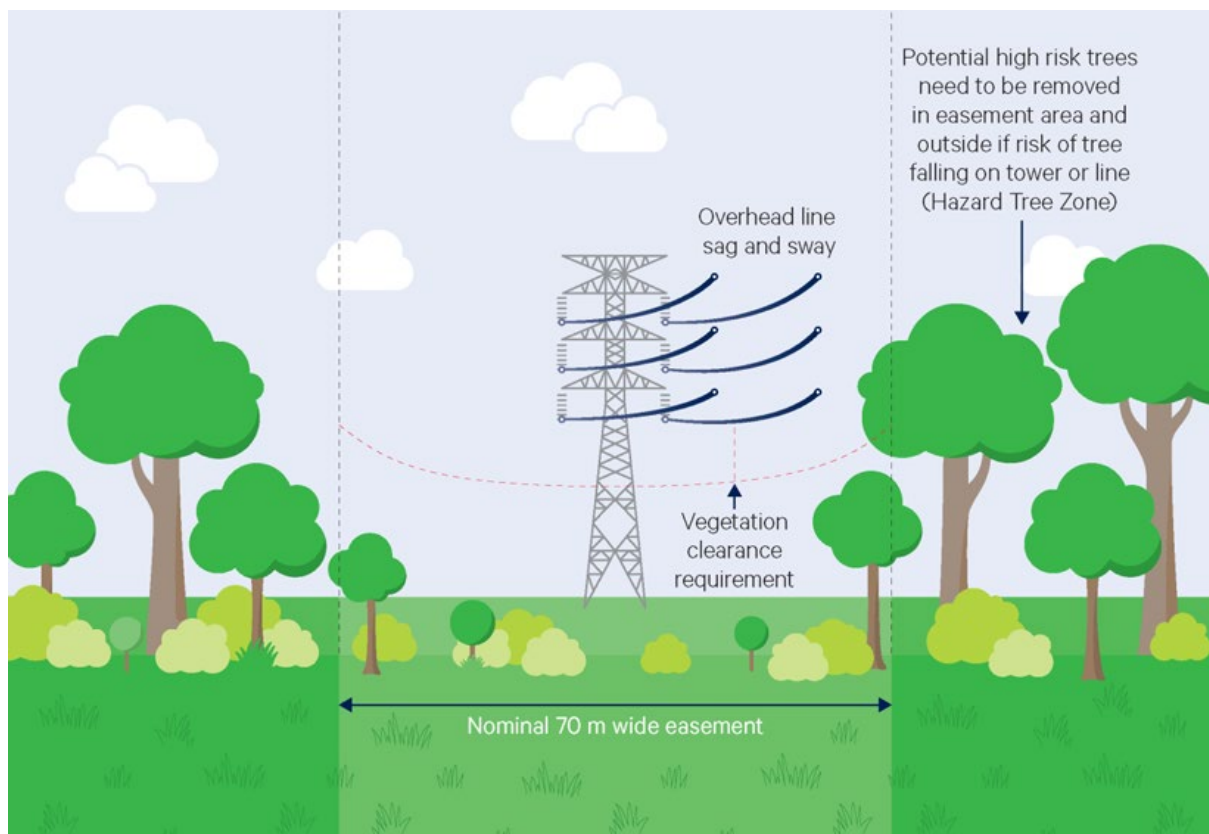


Figure 2-7 Indicative vegetation clearance and management within operational areas (Source: HTP EIS)

Chapter 3: Methodology

3.1 Guidelines

This landscape and visual impact assessment (LCVIA) has been undertaken in accordance with the *Transmission Guideline, Technical Supplement for Landscape Character and Visual Assessment Technical Supplement* (DPHI 2024) (the *Technical Supplement*). The *Technical Supplement* provides guidance for the assessment of landscape character and a detailed methodology for the assessment of visual impacts of transmission projects.

Where the *Technical Supplement* does not provide guidance, this LCVIA draws upon methodology from other national and international guidelines and standards, including:

- *Guidance Note for Landscape and Visual Assessment*, Australian Institute of Landscape Architects Queensland, 2018
- *Guidelines for Landscape and Visual Impact Assessment*, Third Edition, 2013, prepared by the Landscape Institute and Institute of Environmental Management & Assessment.
- *AS/NZS 4282 Control of the obtrusive effects of outdoor lighting*, 2023.

3.2 Scope of this assessment

This LCVIA includes an assessment of landscape character and visual impacts, and covers the following types of impact:

- impacts to landscape character:
 - during the day throughout construction
 - during the day throughout operation
 - at night throughout construction
 - at night throughout operation.
- impacts to viewpoints from the public domain and from private dwellings:
 - during the day throughout construction
 - during the day throughout operation
 - at night throughout construction
 - at night throughout operation
- cumulative impacts.

3.3 Landscape character and visual impact assessment study area

The study area for this LCVIA has been determined in accordance with the *Technical Supplement*. This includes different study areas for landscape character and visual impacts, including:

- the landscape character assessment study area includes all areas within 5 kilometres of the proposed development (page 14, DPHI 2024).
- the visual assessment study area is all areas within 1.625 kilometres of the HTP corridor (based on a maximum tower height of 85 metres) (page 36, DPHI 2024).

Those construction support sites outside the landscape character study area have also been considered for temporary landscape character and visual impact.

3.4 Landscape character impact assessment methodology

The structure of the landscape character impact assessment is shown in Figure 3-1.

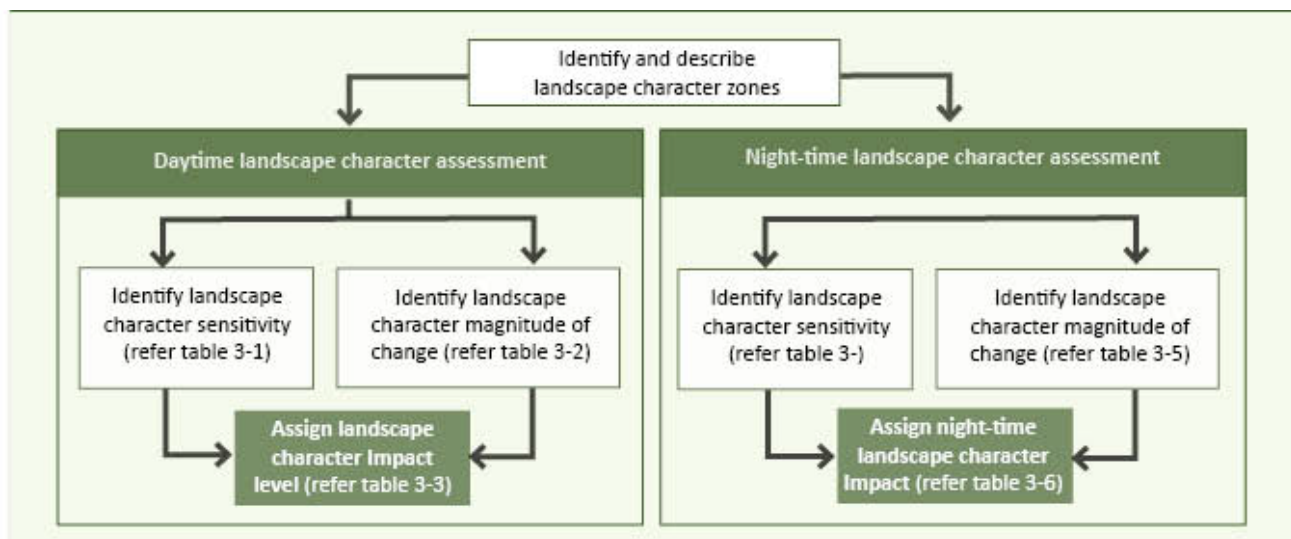


Figure 3-1 Structure of this landscape character impact assessment

3.4.1 Daytime landscape character assessment

Identification of landscape character zones

Within the study area, landscape character zones (LCZ) are identified based on characteristics including geology, topography, vegetation cover, watercourses, built form and land use pattern. These LCZ are used as the basis of the landscape character impact assessment.

Landscape character sensitivity

The landscape character sensitivity levels that apply to this assessment are listed at Table 3-1. The descriptions of landscape sensitivity in this table incorporate the scenic quality values identified in the *Technical Supplement* (Tables 5 and Table 6, DPHI 2024), reproduced in this LCVIA at Figure 3-8 and Table 3-10.

Table 3-1 Landscape character sensitivity levels

Landscape character sensitivity	Description
High	<ul style="list-style-type: none"> Landscape character that is strongly valued, iconic within the nation or state and/or protected under state or national legislation or international policy e.g. World Heritage Areas and National Parks Typically includes distinctive and unique landscape features which are uncommon within the state, nation or internationally, including predominantly high scenic quality landscapes (see Figure 3-8 and Table 3-10)
Moderate	<ul style="list-style-type: none"> Landscape character that is valued by residents of a major portion of a city or a non-metropolitan region and/or places with regionally important scenic value or landscape features Includes landscape features that are mostly moderate scenic quality landscapes (see Figure 3-8 and Table 3-10)
Low	<ul style="list-style-type: none"> Landscape valued and experienced by concentrations of residents and/or local recreational users and/or places of local scenic value or local landscape features Includes landscape features that are mostly of low scenic quality landscapes (see Figure 3-8 and Table 3-10)
Very low	<ul style="list-style-type: none"> Places without identified scenic values or landscape features Includes landscape features that are mostly very low scenic quality landscapes (see Figure 3-8 and Table 3-10)

Magnitude of change

The magnitude of change describes the changes to landscape character that would occur as a result of the project. The magnitude of change is assigned a level based on the categories described in Table 3-2. These categories have been informed by the matters listed in section 2.3 of the *Technical Supplement* (DPHI 2024), including: size and scale, and geographical area.

Table 3-2 Landscape character magnitude of change levels

Landscape magnitude of change	Matter to be considered	Description
Very high	Size and scale	<ul style="list-style-type: none"> • Would be an extensive loss of landscape elements that contribute to the character of the landscape • Infrastructure would be a dominant element in the landscape • The infrastructure would substantially change the key characteristics of the landscape
	Geographical area	<ul style="list-style-type: none"> • The project would occupy or alter an extensive area of the LCZ
High	Size and scale	<ul style="list-style-type: none"> • Would be a substantial loss of landscape elements that contribute to the character of the landscape • Infrastructure would become a major element in the landscape • The infrastructure would change some key characteristics of the landscape
	Geographical area	<ul style="list-style-type: none"> • The project would occupy or alter a large area of the LCZ.
Moderate	Size and scale	<ul style="list-style-type: none"> • Would be a moderate loss of landscape elements that contribute to the character of the landscape • Infrastructure would become a noticeable element in the landscape • The infrastructure would somewhat change the key characteristics of the landscape
	Geographical area	<ul style="list-style-type: none"> • The project would occupy or alter a medium sized area of the LCZ
Low	Size and scale	<ul style="list-style-type: none"> • Would be a small loss of landscape elements that contribute to the character of the landscape • The infrastructure would be a minor element in the landscape • The infrastructure would result in minor changes to the key characteristics of the landscape
	Geographical area	<ul style="list-style-type: none"> • The project would occupy or alter a small area of the LCZ
Very low	Size and scale	<ul style="list-style-type: none"> • Would be a very small loss of landscape elements that contribute to the character of the landscape • The infrastructure would be a very minor element in the landscape • The infrastructure would result in very minor changes of the key characteristics of the landscape
	Geographical area	<ul style="list-style-type: none"> • The project would occupy or alter a very small area of the LCZ

Assigning landscape character impact levels

An assessment of landscape character impact is made by combining the landscape sensitivity and magnitude of change levels for each LCZ and assigning an impact level using the levels identified in Table 3-3.

Table 3-3 Landscape character impact levels (based on Table 8, DPHI 2024)

	High sensitivity	Moderate sensitivity	Low sensitivity	Very low sensitivity
Very high magnitude	High	High	Moderate	Moderate
High magnitude	High	Moderate	Moderate	Low
Moderate magnitude	Moderate	Moderate	Low	Low
Low magnitude	Moderate	Low	Low	Very low
Very low magnitude	Low	Low	Very low	Very low

3.4.2 Nighttime landscape character impact assessment

An assessment of the potential impacts of the project at night has been undertaken for each LCZ. The assessment of nighttime impact has been carried out with a similar methodology to the daytime assessment.

Nighttime visual sensitivity

AS4282 identifies environmental zones which are useful for categorising nighttime landscape settings. This LCVIA uses these environmental zones to describe the existing nighttime visual condition and assign a sensitivity level (see Table 3-4).

Table 3-4 Landscape character sensitivity levels – nighttime

Landscape character sensitivity at night	Environmental zone (from AS4282:2023)	Examples
High	A0: Intrinsically dark	<ul style="list-style-type: none"> UNESCO Starlight Reserve; International Dark-Sky Association Dark Sky Parks, Reserves or Sanctuaries; Major optical observatories Other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ecosystem protection Lighting for safe access may be required
High	A1: Dark	<ul style="list-style-type: none"> Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas) Generally roadways without street lighting through rural areas
Moderate	A2: Low district brightness	<ul style="list-style-type: none"> Sparsely inhabited rural and semi-rural areas Generally roadways without street lighting through suburban, rural or semi-rural areas other than intersections
Low	A3: Medium district brightness	<ul style="list-style-type: none"> Suburban areas in towns and cities Generally roadways with street lighting through suburban, rural or semi-rural areas
Very low	A4: High district brightness areas	<ul style="list-style-type: none"> Town and city centres and other commercial areas Residential areas abutting commercial areas Industrial and port areas Transport interchanges
Very low	TV: High district brightness	<ul style="list-style-type: none"> Vicinity of major sport and event stadiums during TV broadcasts

* AS/NZS 4282 is the shared Australian and New Zealand standard establishing requirements for the control of the obtrusive effects from outdoor lighting

Note: Zones AO and A1 would normally have a minimum area of 50 ha. There may be smaller environmentally sensitive areas.

Nighttime magnitude of change

The magnitude of change that would be expected within each LCZ at night is then identified using the categories in Table 3-5.

Table 3-5 Landscape character magnitude of change levels – nighttime

Magnitude	Description
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 project would transform the character of the surrounding setting at night, and/or The effect of lighting would be experienced over an extensive area
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 project 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 project 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 and/or Compatible with the existing or intended future use of the area

Assigning nighttime landscape character impact levels

An assessment of nighttime landscape character impact has been made by combining the visual sensitivity of the LCZ with the nighttime visual magnitude of change and assigning an impact level, as shown in Table 3-6.

Table 3-6 Landscape character impact levels – nighttime

	High sensitivity (A0, A1)	Moderate sensitivity (A2)	Low sensitivity (A3)	Very low sensitivity (A4)
Very high magnitude	High	High	Moderate	Moderate
High magnitude	High	Moderate	Moderate	Low
Moderate magnitude	Moderate	Moderate	Low	Low
Low magnitude	Moderate	Low	Low	Very low
Negligible	Negligible	Negligible	Negligible	Negligible

3.5 Visual impact assessment methodology

3.5.1 Assessment of daytime visual impacts during operation

The *Technical Supplement* describes the visual assessment method as follows:

‘The method for determining the visual impact of a transmission infrastructure project is generally based on a combination of the sensitivity of a view to change and the magnitude of the proposal. However, in some settings, transmission towers can be visually dominating despite the sensitivity of the view.’ (page 20, DPHI 2024)

The visual assessment framework is broken into two key parts:

- a **setback** assessment, to prevent towers from being close to sensitive receivers; and
- a **proportionate visual assessment process** for all other public viewpoints and private receivers.

This process, and how it has been applied to the HTP is described in the following sections.

3.5.1.1 Identifying and categorising receivers

Public and private viewpoints within the study area have been identified for assessment.

For private receivers, as required by the *Technical Supplement*, this includes (at time the SEARs were issued) any of the following places:

- existing dwellings and tourist and visitor accommodation
- dwellings and tourist and visitor accommodation that have been approved through a development application or complying development certificate, or are exempt from approval, and have physically commenced construction
- dwellings and tourist and visitor accommodation that are constructed but not yet occupied or used.

The *Technical Supplement* also states that ... ‘If a private landholding would host the proposed transmission infrastructure, and therefore be affected by an easement, then private receivers on that land need not be assessed in accordance with this document. The affected landowner will be eligible for compensation under the *Land Acquisition (Just Terms Compensation) Act 1991*.’ (page 12, DPHI 2024). As such, any dwellings on a private landholding that have been compensated or in negotiations with EnergyCo under the *Land Acquisition (Just Terms Compensation) Act 1991*, have not been included in this assessment.

For the purposes of this assessment, dwellings located on a mine owned landholding that is subject to an easement, and therefore in negotiations with EnergyCo, are considered to be easement affected and not assessed in this visual impact assessment. Dwellings on mine owned properties that are not on a contiguous landholding, have been assessed for visual impacts.

For public viewpoints, a range of locations have been selected that represent places that the local community can view the project, including local roads, highways and scenic routes, and rest stops.

3.5.1.2 Potential visibility

A visual catchment plan was prepared to identify the area over which the 85-metre-high towers would potentially be visible. This visibility analysis used a 3D digital terrain model (i.e. a digital graphic representation of elevation data to represent existing landform) and points at the height of each transmission tower which are shown in indicative locations, to identify the areas from which views to the transmission line corridor may be seen.

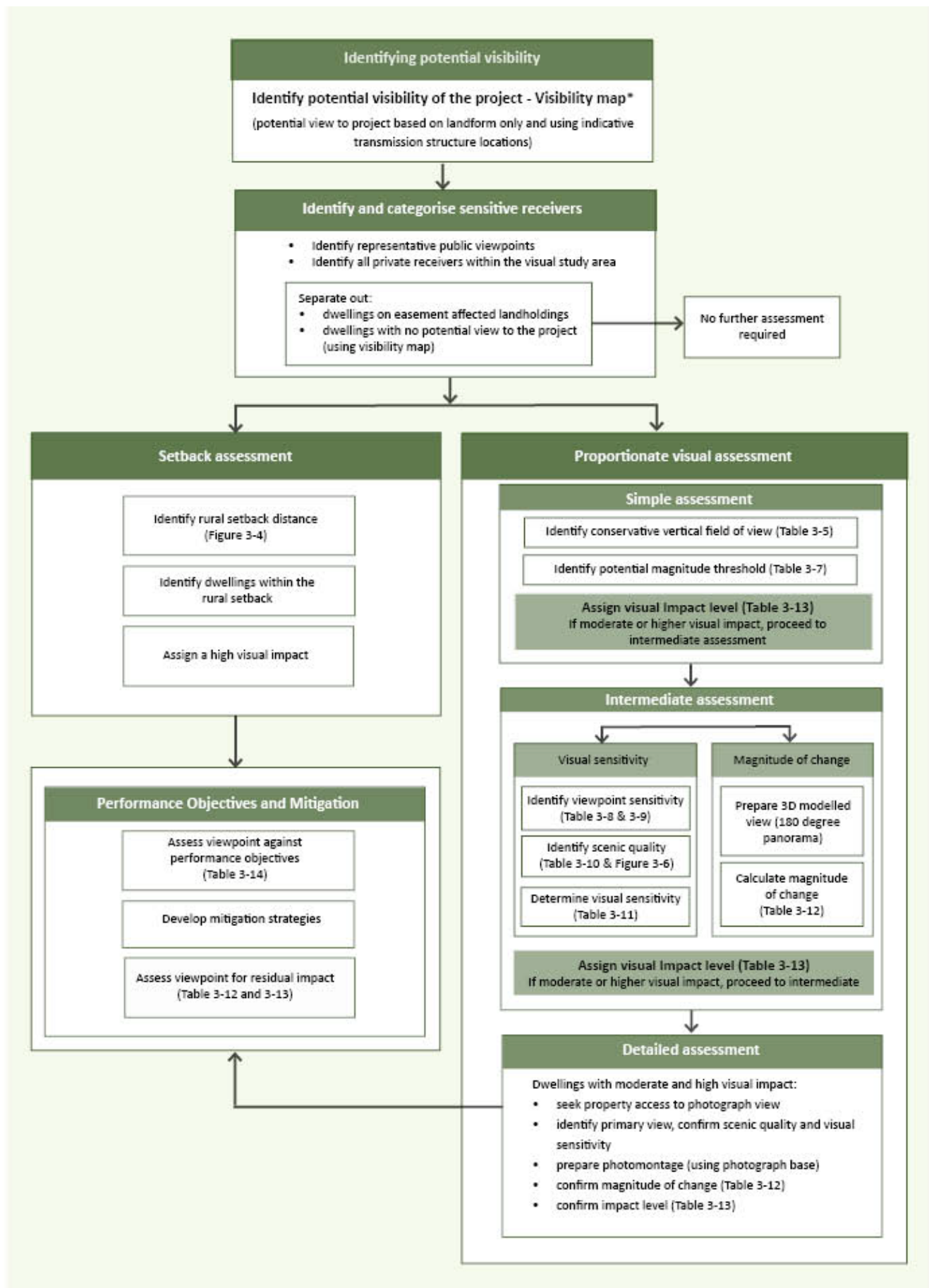


Figure 3-2 Visual impact assessment process

3.5.1.3 Setback assessment

The *Technical Supplement* identifies setbacks to prevent towers from being too close to sensitive receivers that are not easement affected. The view from a sensitive receiver is assigned a high visual impact if it is located within the relevant setback distance of a transmission tower (page 20, DPHI 2024) and has an unobstructed view of it.

For this project the rural sensitive receiver setback has been used. The setback is equivalent to a 12-degrees of vertical field of view or greater for rural sensitive receivers. As HTP is proposing a tower height of up to 85 metres the rural setback distance is 400 metres (see Figure 3-3).

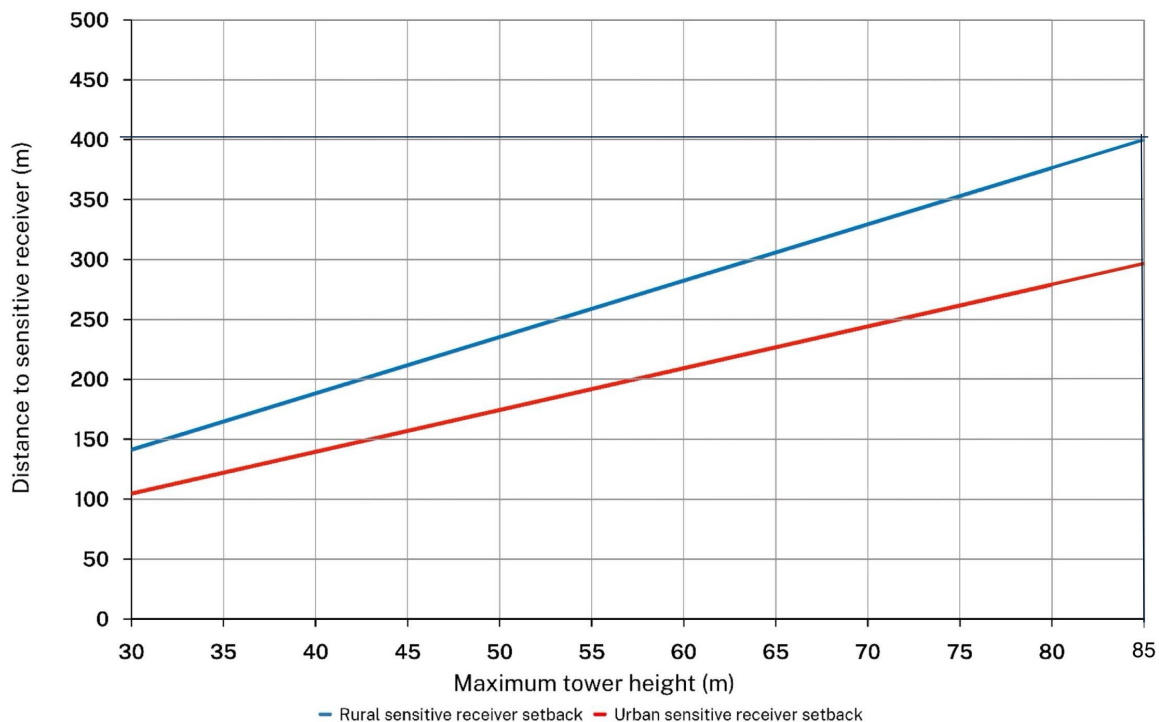


Figure 3-3 Setback from sensitive rural and urban receivers (Source: Figure 2, DPHI 2024, projected to 85 metre maximum tower height)

3.5.1.4 Proportionate visual impact assessment

For all public receivers and those private receptors outside the rural setback, the *Technical Supplement* requires a visual assessment process to be undertaken using the process shown in Figure 3-4 and following the proportionate assessment process shown on Figure 3-2.

The proportionate visual impact assessment includes three levels of assessment that are progressively more detailed. These levels are:

- Simple assessment
- Intermediate assessment
- Detailed assessment.

The 'simple assessment' and 'intermediate assessment' use desktop assessment tools and rely on worst-case scenario assumptions. The 'detailed assessment' includes field validation and the preparation of photomontages. Each view continues to the next level of assessment if the visual impact is identified as being moderate or higher (page 40, DPHI 2024).

It should be noted, that the *Technical Supplement* says that a visual impact assessment should be undertaken (using the stages shown in Figure 3-4) unless:

- ‘there is no line of sight to the project, and proponents can provide evidence that mitigating factors would eliminate any impact from the project
- the impact can be assessed by a representative public viewpoint or private receiver, or
- a private receiver sits within the setback and would be ineligible for an exemption.’ (page 40, DPHI 2024)

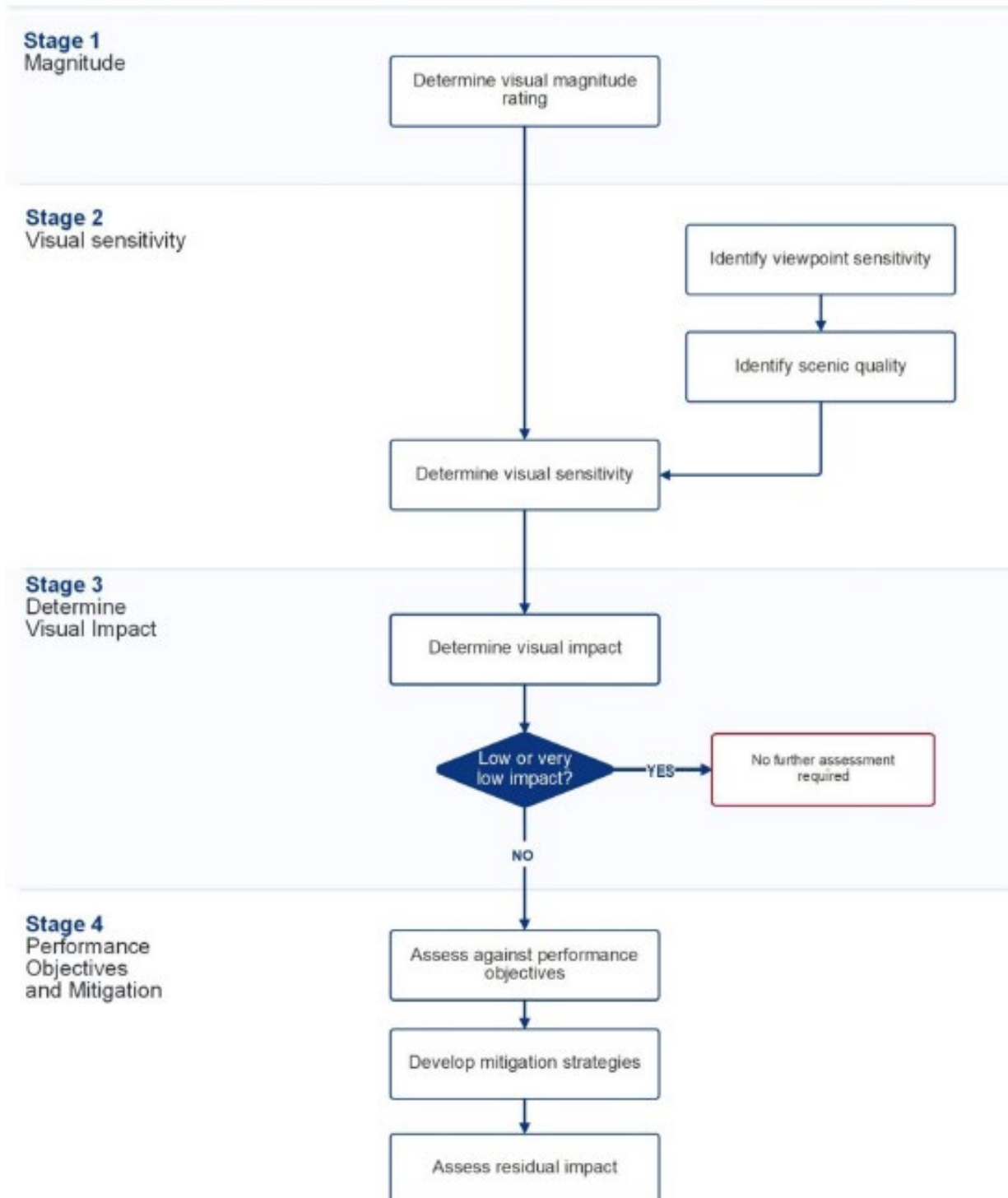


Figure 3-4 Visual impact assessment process (Source: Figure 4, DPHI 2024)

3.5.1.5 Stage 1 - Magnitude

The following tables are used to determine the magnitude of change at different stages of the visual impact assessment in accordance with the *Technical Supplement*.

Simple assessment

For the simple assessment, magnitude of change is estimated by determining the worst-case vertical field of view of the nearest tower or corridor from each viewpoint using Figure 3-5 or tools provided by DPIE in the *Technical Supplement*.

The vertical field of view for an 85-metre tower is shown in Figure 3-5. The simple assessment potential magnitude ratings for the number of vertical cells are shown in Table 3-7.

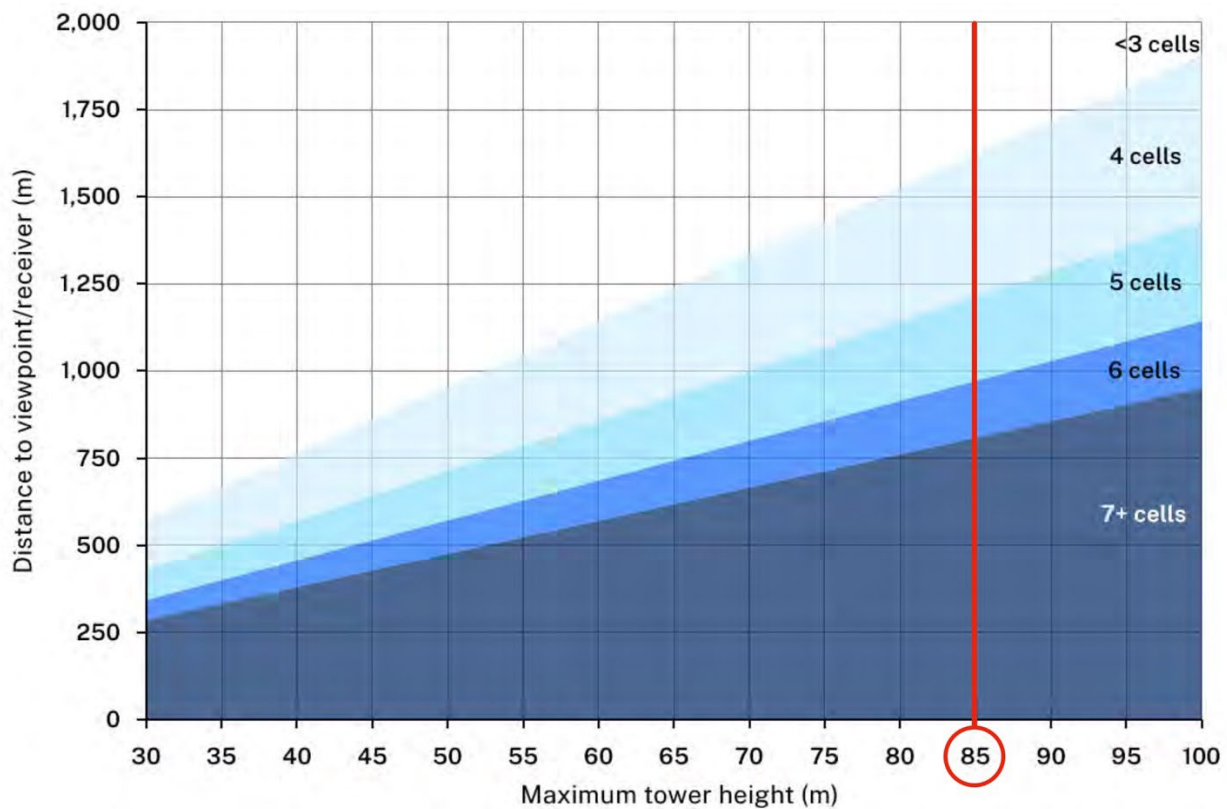


Figure 3-5 Conservative vertical field of view (based on Figure 10, DPHI 2024)

Table 3-7 Potential magnitude thresholds (Source: Table 10, DPHI 2024)

Potential vertical cells of nearest tower	Potential
Less than 3 cells	Very low
4 cells	Low
5 cells	Moderate
6 cells	High
7 cells or more	Very high

Intermediate and detailed visual assessment

For the intermediate and detailed assessment, magnitude of change is determined by first producing a 3D model of the project (such as a bare earth render or photomontage) that comprises an 180 degree horizontal field of view; overlaying a transparent grid provided by DPIE in the *Technical Supplement*; and identifying the number of occupied cells. The magnitude rating is determined based on the number of cells and the thresholds shown in Table 3-8.

Table 3-8 Visual magnitude thresholds (Source: Table 2, DPHI 2024)

Number of occupied cells	Visual magnitude rating
1 to 7	Very low
8 to 14	Low
15 to 25	Moderate
26 to 36	High
More than 37	Very high

3.5.1.6 Stage 2 - Visual sensitivity

The following tables are used to determine viewpoint sensitivity during the simple, intermediate and detailed assessment stage of the visual impact assessment process (see Figure 3-1 and Figure 3-4).

Table 3-9 Viewpoint sensitivity levels (Source: Table 3, DPHI 2024)

Viewpoint type	Very low viewpoint sensitivity	Low viewpoint sensitivity	Moderate viewpoint sensitivity	High viewpoint sensitivity
Private receiver	N/A	<p>Secondary view from dwellings in rural areas (zoned RU1, RU2, RU3, RU4, and RU6), large lot residential areas (zoned R5) and in environmental or conservation areas (zoned C2, C3, and C4).</p> <p>Primary views from dwellings in residential and rural villages (land zoned R1, R2, R3, R4 and RU5)</p>	<p>Primary view from dwellings in rural areas (zoned RU1, RU2, RU3, RU4, and RU6), large lot residential areas (zoned R5) and in environmental or conservation areas (zoned C2, C3, and C4)</p> <p>Tourist and visitor accommodation (such as bed and breakfasts, motels, hotels) and places of worship</p>	Historic rural homesteads / residences on the national, state or local heritage list
Public viewpoint	State highways, freeways and classified main roads.	<p>Tourist roads and scenic drives</p> <p>Significant entry ways to regional towns and cities</p> <p>Cemeteries, memorial parks</p> <p>Publicly accessible green and open spaces including picnic areas, parks, public recreation areas, lookouts</p> <p>Town centres and central business districts</p>	Tourist uses in tourist areas (zoned SP3)	N/A

Table 3-10 Primary and secondary viewpoints from rural dwellings (Source: Table 4, DPHI 2024)

Primary viewpoint	Secondary viewpoint
Principal/frequented living spaces (e.g., living rooms, kitchens, dining areas) Front or rear views from a dwelling, particularly from any porch, balcony, veranda, entertainment area, adjacent garden, deck or patio	Less frequented living and service areas (for example, bedrooms, laundries, bathrooms, garages and studies) Side views from a dwelling

Viewpoint scenic quality, during each stage of the visual impact assessment process, is determined by reference to the images and descriptions of scenic quality included in Table 6 (see Figure 3-6) and Table 5 (see Figure 3-2) of the Technical Supplement (2024).

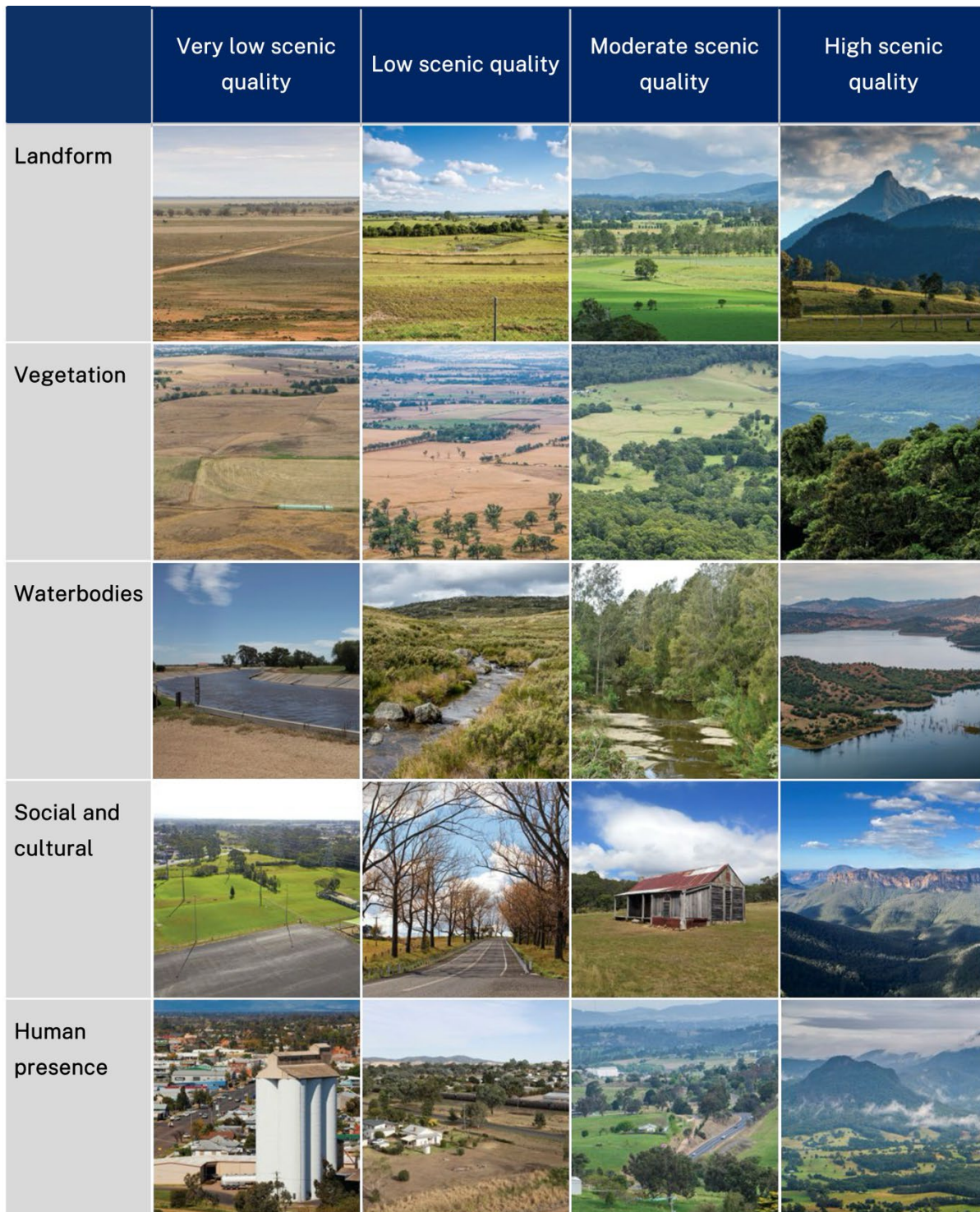


Figure 3-6 Visual reference for scenic quality values (Source: Table 6, DPHI 2024)

Table 3-11 Frame of reference for scenic quality values (Source: Table 5, DPHI 2024)

Viewpoint type	Very low scenic quality	Low scenic quality	Moderate scenic quality	High scenic quality
Landform	Large expanses of flat or gently undulating terrain Indistinct, dissected or broken landforms that provide little illusion of spatial definition or landmarks with which to orient	Mostly flat or gently undulating terrain with isolated areas of undulating topography	Steep, hilly and undulating ranges that are not visually dominant Broad shallow valleys Moderately deep gorges or moderately steep valley walls Minor rock outcrops	Isolated peaks, steep rocky ridges, cones or escarpments with distinctive form and colour contrast that become focal points Large areas of distinctive rock outcrops or boulders Well defined, steep sided valley gorges
Vegetation	Extensively cleared and cropped areas with very limited variation in colour and texture Pastoral areas, human-created paddocks, pastures or grasslands and associated buildings typical of grazing lands	Predominantly cleared and cropped areas with small areas of variation in colour and texture Most pastures or grasslands with small blocks of distinct native vegetation	Predominantly open forest or woodland combined with some natural openings in patterns that offer some visual relief Vegetative stands ranging in size, form, colour, texture and spacing, including human-influenced vegetation (for example, vineyards, plantation forests and orchards)	Strongly defined natural patterns with combinations of native forest, naturally appearing openings, streamside vegetation and scattered exotics Distinctive stands of vegetation that may create unusual forms, colours or textures compared with surrounding vegetation
Waterbodies	Absence of natural waterbody Farm dams, irrigation canals or stormwater infrastructure	Minor water forms, such as creeks and streams	Intermittent streams, lakes, rivers, swamps and reservoirs	Visually prominent lakes, reservoirs, rivers, streams, wetlands and swamps Presence of harbour, inlet, bay or open ocean
Social and cultural	Places of worship, cemeteries, memorial parks, private open spaces	Places of worship, cemeteries, memorial parks, private open spaces Local heritage sites	Local or state heritage sites Distinguishable entry ways to a regional city identified in the State Environmental Planning Policy (Transport and Infrastructure) 2021	Culturally important sites, wilderness, world heritage areas and protected areas World, national and state heritage sites
Human presence	Dominating presence of infrastructure, human settlements, highly modified landscapes and higher density populations, such as regional cities, industrial areas, agricultural transport or electricity infrastructure	Highly modified landscapes with visible infrastructure such as transmission lines and railway corridors	Dispersed yet evident presence of human settlement, such as villages, small towns, isolated pockets of production and industry, lower scale and trafficked transport infrastructure	Natural, undisturbed landscape Minimal evidence of human presence and production

The following matrix is used to identify visual sensitivity, by combining viewpoint sensitivity with scenic quality during the detailed assessment stage of the visual impact assessment process (see **Table 3-12**).

Table 3-12 Visual sensitivity matrix (Source: Table 7, DPHI 2024)

	High scenic quality	Moderate scenic quality	Low scenic quality	Very low scenic quality
High viewpoint sensitivity	High	High	Moderate	Low
Moderate viewpoint sensitivity	High	Moderate	Moderate	Low
Low viewpoint sensitivity	Moderate	Low	Low	Very low
Very low viewpoint sensitivity	Very low	Very low	Very low	Very low

3.5.1.7 Stage 3 – Determine visual impact

The following table is used to determine the visual impact rating during the intermediate and detailed assessment stage of the visual impact assessment process (see **Table 3-13**).

Table 3-13 Visual impact matrix (Source: Table 8, DPHI 2024)

	High visual sensitivity	Moderate visual sensitivity	Low visual sensitivity	Very low visual sensitivity
Very high magnitude	High	High	Moderate	Moderate
High magnitude	High	Moderate	Moderate	Low
Moderate magnitude	Moderate	Moderate	Low	Low
Low magnitude	Moderate	Low	Low	Very low
Very low magnitude	Low	Low	Very low	Very low

The following table lists the visual performance objectives for each visual impact level (see **Table 3-14**).

Table 3-14 Visual performance objectives (Source: Table 9, DPHI 2024)

Impact level	Visual performance objective
High visual impact	<p>This level of impact should be avoided unless the applicant can justify that:</p> <ul style="list-style-type: none"> all reasonable efforts have been made to avoid the impact and alternative project designs are not feasible or would be unlikely to materially reduce the impact all reasonable mitigation options have been considered, and the proposed mitigation measures would effectively mitigate the impact and would not result in a significant obstruction of views.
Moderate visual impact	<p>Public road viewpoints</p> <p>As far as reasonable and feasible, the proponent should seek to reduce moderate visual impacts to road users.</p> <p>Appropriate mitigation options include vegetation or other screening. Mitigation should only be considered if it would not obstruct important views and sight lines, could be confined to a relatively small area (i.e. vegetation screening would not be required for several hundred metres along a transport corridor) and where agreed with the relevant road or rail authority.</p> <p>All other private receivers and public viewpoints</p> <p>Visual impact mitigation should be implemented within the project corridor and / or offered to the affected landowner and should be proportionate to the scale of the impact.</p> <p>There is no expectation this mitigation should eliminate the view of the development entirely, but it must reduce the impact to an acceptable level and not create unacceptable visual impacts to other receivers.</p>
Low and very low visual impact	No mitigation is required.

3.5.2 Assessment of daytime visual impacts during construction

A general discussion of the potential visibility of the project during construction has been included. This discussion identifies those representative public viewpoints and private receivers that may have a view to the temporary construction facilities required for the project.

3.5.3 Assessment of visual impacts at night

A general discussion of the potential visibility of the project at night has been included. This discussion identifies those dwellings that may experience a view to areas of the project that would be lit at night during construction and operation. This is based on the findings of the private dwelling assessment and nighttime landscape character impact assessment.

3.6 Cumulative landscape character and visual impacts

Incorporating cumulative effects into the impact assessment widens the assessment to include not only direct effects of the HTP, but also collective effects with surrounding projects. 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 the HTP corridor and other transmission and renewable energy projects within 5 kilometres of the project have been assessed. This area aligns with the landscape character impact assessment study area for the project. The assessment of cumulative effects is based on details of proposed or approved projects as submitted to the DPHI for assessment.

There is no guidance for the assignment of impact levels to cumulative landscape character and visual effects, therefore these effects have been described generally considering the sensitivity levels of views and landscape character.

3.7 Field surveys

A site inspection was undertaken during preparation of the LCVIA over 2 days on the 18 and 19 December 2024. During the inspection the landscape was viewed from publicly accessible locations, such as public roads, lookouts, picnic areas, community halls and the vicinity of schools and villages. Day 1 of the inspection was hot and dry – visibility was good. Day 2 included intermittent rain and low cloud. The inspection was timed to view the study area when cloud lifted, and visibility was clear.

Two further site inspections were undertaken over four days on the 13 and 14 March and 10 and 11 June 2025. During these site inspections, where permission was obtained, private dwellings were accessed to take panoramic photography for photomontages and to assess scenic quality of private views. Weather during the March inspection was mostly dry with morning fog and intermittent grey skies and was clear with strong winds during the June inspection.

3.8 3D renders, modelled views and photomontages

The visual impact assessment is supported by digital representations of the project, used for analysis and to accurately illustrate the project in viewpoints where there would be moderate or higher potential visual impacts. These images include bare earth renders, 3D modelled views and photomontages.

3.8.1 Bare earth renders

Bare earth renders have been prepared to support the intermediate visual impact assessment. These images are generated from a 3D digital terrain model generated using high quality LiDAR data and a 3D model of the project. These bare earth renders show the view based on landform only exaggerating the potential visibility of the project. While these 3D modelled views are not photorealistic, they accurately show the location and scale of the project and are useful for conservatively identifying the visibility of the project.

3.8.2 3D modelled views

3D modelled views have been prepared to support the visual impact assessment where access to private viewpoints is not possible. These 3D modelled views do not have a base image but rely on a 3D model created using high quality LiDAR point cloud data to create an image. These 3D modelled views show the existing landform (created from a digital terrain model), and existing vegetation (represented by a point cloud), and a 3D model of the project. While these 3D modelled views are not photorealistic, they accurately show the location and scale of the project and are useful for conservatively identifying the visibility of the project.

3.8.3 Photomontages

Photomontages have been prepared in accordance with the guidance contained in the *Technical Supplement* (DPHI 2024). These guidelines require photographs to be taken every 15 degrees with a full frame sensor camera and 50 millimetre focal length lens (positioned 1.5 metres above the ground), to achieve a horizontal field of view of 180 degrees. While this approach distorts the scale of the transmission line structures in some areas of the panorama, it allows for the greater context of the view to be illustrated.

The process used to prepare photomontages was as follows:

- photographs were taken of the site and the GPS coordinates noted
- a 3D model was created by combining the terrain and some surface elements using LiDAR point cloud data
- the project elements were modelled in 3D and located within the model
- the camera location was positioned in the model and the camera specifications set in the model
- a digital surface model (generated from LiDAR point cloud data) was used to align the view
- the project elements are rendered and imported into a photo editing software
- the image was edited to locate the project within the image including removing vegetation.

3.9 Limitations

This assessment has been undertaken with the following limitations:

- field work was undertaken during the day and the nighttime assessment has been made from daytime observations
- the project design is subject to refinement during the detailed design. Assumptions have been made as to transmission tower designs and locations. Similarly, the detailed layout of supporting infrastructure is based on assumptions relating to the likely layout and scale of the components
- project construction planning would be undertaken by the project construction contractor at a later stage. For this assessment, assumptions have been made as to the scale and types of activities and infrastructure that would be required at the workforce accommodation and construction compounds

Where uncertainty exists, the assessment considers a worst-case scenario where possible.

Chapter 4: Existing environment

4.1 Overview

The Hunter Region encompasses varied landscapes from the upper reaches of the Hunter River to the city of Newcastle on the coast. The Region supports important mining, energy, defence, agriculture, tourism, manufacturing, wine, equine and conservation areas. The Hunter Transmission Project (HTP) corridor extends through the Hunter Region, connecting the existing 500 kilovolt (kV) transmission line near Bayswater Power Station, to the existing 500 kV transmission line within Olney State Forest on the northern fringe of the Central Coast Region. The HTP and existing transmission lines are shown in **Appendix A**.

The HTP runs mostly through power station, mining and government land between Bayswater and Broke, then through forested land within the Pokolbin, Corrabare, Watagan and Olney State forests. Landform and vegetation along the HTP corridor reflect the predominant land uses and range from: totally cleared, extensively excavated, open-cut mines; to flat to gently undulating agricultural areas with rural homes, grazing pastures and crops; and densely forested, steeply elevating, escarpments and rugged ranges. The varied topography along the HTP is shown in **Appendix A**, the land use zoning is shown in **Appendix B**, and the vegetation in **Appendix C**.

The Hunter River traverses the HTP at its northern end. Along the Hunter River Floodplain is rural land (including cropping, grazing, viticulture and equine industries), surrounded by coal mines and power stations. The southern end of the HTP is characterised by State forests, with smaller rural land holdings located on cleared, lower lying land between ridges.

There are large conservation areas nearby. The Greater Blue Mountains World Heritage Area (which includes Wollemi and Yengo National Park) is around 4.75 kilometres to the west of the HTP at its closest. Watagan National Park lies just east of the HTP corridor, while the southern end of the HTP connects to the existing transmission line within Jilliby State conservation area (extending within the National Park around 300 metres).

The New England Highway is around 2.7 kilometres from the corridor at its closest, and the Golden Highway is within around 250 metres of the corridor (at its closest). Numerous local roads – sealed and unsealed – travel close to, or cross, the corridor (including Cessnock Road, Putty Road, Lemington Road and Archerfield Road). A freight railway line crosses the corridor alignment at the western end of the alignment, transporting coal from the mines to the Port of Newcastle. The closest National Park is Watagans National Park, which borders the southern end of the corridor.

Several towns and villages are in the vicinity. Singleton, the largest nearby residential area (with a population of around 14,000 people¹), is located around 5.5 kilometres from the project. Muswellbrook (with a population of almost 11,000 people²) and Cessnock (with a population of over 16,000 people³) are over 12 kilometres from the project. Closer to the corridor are smaller residential villages (with less than 500 people⁴) (including Jerrys Plains, Bulga, Broke and Martinsville), as well as numerous rural localities (including Cedar Creek, Gouldsville, Millfield and Laguna).

4.2 Landscape values and visual sensitivity of the study area

This section outlines landscape values and sensitivities within the landscape character and visual impact assessment (LCVIA) landscape character study area (that is, within 5 kilometres of the HTP corridor). The 5 kilometre study area is shown **Appendix A**.

¹ <https://abs.gov.au/census/find-census-data/quickstats/2021/SAL13564>, accessed 4 December 2024.

² <https://abs.gov.au/census/find-census-data/quickstats/2021/UCL113011>, accessed 4 December 2024.

³ <https://abs.gov.au/census/find-census-data/quickstats/2021/SAL10877>, accessed 5 December 2024.

⁴ <https://abs.gov.au/census/find-census-data/quickstats/2021/SAL12030>, <https://abs.gov.au/census/find-census-data/quickstats/2021/SAL10648>, <https://abs.gov.au/census/find-census-data/quickstats/2021/UCL122026>, accessed 4 December 2024.

4.2.1 Community values relating to landscape and visual amenity

Technical Report 6: Social impact assessment outlines the outcomes of the community engagement activities as a part of the broader identification of impacts on local and regional communities, key stakeholders, and the surrounding social environment.

Among the topics raised during consultation, those relating to landscape and visual impact include:

- Concern about visual impacts and the project's impact on scenic landscapes, particularly in the Broke, Millfield, Cedar Creek and Cessnock areas.
- Importance of ridgelines and views of these landforms (i.e. scenic views in the Congewai Valley).
- Concern about views from the Congewai Valley.

These values have informed the sensitivity of landscape character zones and the selection of viewpoints for this LCVIA.

4.2.2 Sensitive locations

There are several locations within (or within the vicinity of) the landscape character study area that have increased landscape sensitivity. These locations include:

- rural villages, including Broke and Jerrys Plains
- rural dwellings, including those in the vicinity of:
 - the Hunter River valley (Lemington, Maison Dieu, Hambledon Hill, Long Point, Wylies Flat, Glenridding)
 - the Wollombi Brook valley west of Broke
 - the Congewai Creek Rural Valley west of Millfield
- the Broke- Fordwich vineyard precinct (viticulture and tourism area)
- Watagan National Park
- tourist and scenic routes, including:
 - Wollombi Road, NSW Tourist Drive 33 from Calga to Branxton
 - Golden Highway west of Jerrys Plains (gateway to the equine and viticulture area to the west)
 - The Great North Walk (walking trail from Sydney to Newcastle)
 - Cessnock Road (while not designated a scenic road, Cessnock Road connects 2 important vineyard areas (Hermitage Road and Broke-Fordwich) and is used by tourists visiting both wine precincts).
- recreation areas within State Forests, including:
 - Abbots Falls, Rock Lily and the Pines Walking Tracks
 - Casuarina, The Pines, Turpentine, Olney Headquarters camping areas
 - The Pines and Old Mill picnic areas.
- lookouts, including:
 - Flat Rock Lookout (within Watagan State Forest)
 - Yellow Rock Lookout (within Corrabare State Forest).
- there are also sensitive areas of regional and national importance just beyond the landscape character study area, including:
 - Mount Yengo and Yengo National Park (of Aboriginal cultural significance)
 - Greater Blue Mountains Area World Heritage Property (which includes Wollemi and Yengo National Park west of the study area).
 - Pokolbin / Hermitage Road viticulture and tourism area.
 - And lookouts just beyond the study area: The Narrow Place Lookout (within Watagan National Park), Bimbadeen Lookout, Mount Bright Lookout and 125r Lookout.

There are no scenic or passenger railway lines within the study area.

4.2.3 Heritage items

Heritage items can be sensitive to changes in the landscape. The following heritage items have been identified within the landscape character study area (see Hunter Transmission Project, Heritage Impact Statement, Biosis, 2024, Appendix L of the EIS):

- sites identified as having Commonwealth heritage value (within Singleton Military Area): Murinbin House complex (SMA internal ID: 170131), Blacksmith's shop and forge- Vere township (SMA internal ID: 170113), Unidentified site- Vere township (SMA internal ID: 170118), Vere school and second range warden's residence (SMA internal ID: 170119), Loder Family Sawmill (SMA internal ID: 170125), Oakley Estate (SMA internal ID: 170126/170127), and Warringah Stud/Old Myrtle (SMA internal ID: 170129)
- item on the State Heritage List: Rising Sun Inn (former) (Item no. 00529), 95–97 Wollombi Road, Millfield
- items on the NSW National Parks and Wildlife Service heritage register: Original Forest House Site, The Wishing Well, and Saw mill site
- item on the Department of Education heritage register: Millfield Public School- Buildings B00A and B00G and Memorial Gates
- items listed in Singleton Local Environmental Plan (LEP) 2013:
 - “Stafford” homestead and “Clifford” homestead (ruins) (Item No. I142), Long Point— West Road, Warkworth
 - brick farm house (Item no. I40), The Golden Highway Mount Thorle
 - Archerfield and outbuildings (Item no. I141), Off Comleroi Road, Warkworth
 - ‘Abbey Green’ and outbuildings (Item no. I39), 478 Putty Road Mount Thorley
 - Hambledon Hill Homestead (Item no. I24), 535 Hambledon Hill Road, Hambledon Hill
 - Cyril Moxham’s House (Item no. I155), 34 Trefolly Road, Wylies Flat
- items listed in Cessnock LEP 2013:
 - Clark’s Slab House (Item no. I47), 1726 Wollombi Road, Cedar Creek
 - Millfield General Cemetery (Item no. I141), Crump Street, Millfield
 - Millfield Public School and Memorial Gates—weatherboard classroom building, weatherboard school residence (former) and memorial pillars and gates (Item no. I144), 105–107 Wollombi Road, Millfield
 - Rising Sun Inn (former) (Item no. I143), 95–97 Wollombi Road, Millfield
 - St Luke’s Church Hall (Item no. I142), 42 Wollombi Road, Millfield

Those heritage items which are habitable dwellings and are located within the 1.625 kilometre visual study area have been included in the visual assessment.

4.2.4 Aboriginal cultural heritage

Hunter Transmission Project, Aboriginal Cultural Heritage Assessment (EMM, 2025, Appendix I of the EIS) identified 29 discrete places of archaeological, traditional, historical and/or contemporary value to the local Aboriginal community within the project impact area. They include artefact scatters, subsurface cultural deposits, rockshelters, grinding grooves, stone arrangements, culturally modified tree, cultural places, and a background scatter.

In addition, the *Aboriginal Cultural Heritage Assessment* identified the following broader cultural landscapes:

- the Warkworth sand system – a geological unit known to contain significant cultural materials
- view-lines and view-scapes between major promontories
- a series of localised cultural landscapes encompassing clusters of significant archaeological sites in the vicinity of Trig Road, Flat Rock lookout, Abbot Falls and the Dora Pinnacles.

Important view-lines identified are primarily between Mount Yengo to/from Mount Sugarloaf, Mount Vincent and Mount Warrawolong (page 106, EMM, 2025). Views-lines of contemporary value between these landscape features have been mapped in the *Aboriginal Cultural Heritage Assessment* (Figure 7.1, EMM, 2025):

- Mount Wareng to/from Mount Sugarloaf, Mount Vincent and Pulbah Island
- Mount Yengo to/from Mount Sugarloaf, Mount Vincent and Pulbah Island
- Mount Finchley to/from Mount Sugarloaf, Mount Vincent and Pulbah Island
- Mount Warrawolong to/from Mount Sugarloaf, Mount Vincent and Pulbah Island.

Elevated locations with views to Mount Sugarloaf, Mount Yengo and Mount Warrawolong were investigated in the *Aboriginal Cultural Heritage Assessment*. The visual impact of the HTP on these locations and the broader view-lines are discussed in Table 6-9.

Cultural heritage matters have been used to inform the design of the HTP.

4.2.5 Existing nighttime environment

Figure 4-1 illustrates the radiance of existing lighting along the Hunter Valley from Newcastle to Muswellbrook. The image shows mining and energy areas near Singleton and Muswellbrook, and urban centres, are brightly lit at night; contrasting the darker night sky associated with National Parks and forestry areas.

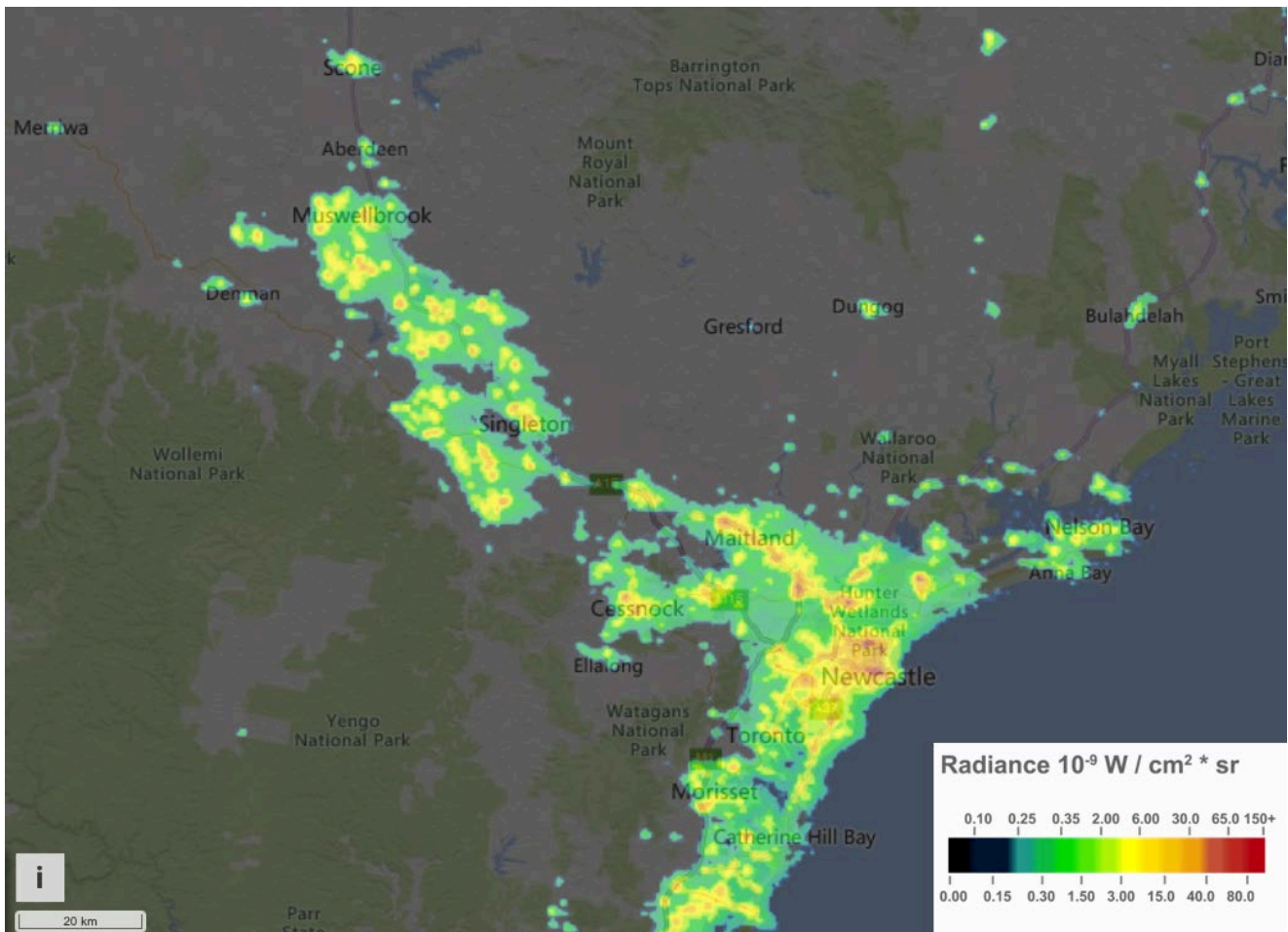


Figure 4-1 Existing night light along the Hunter Valley (Source: lightpollutionmap.info, 3 April 2025)

4.3 Legislative and policy context

The following review of national, regional and local government planning and compliance documents, identifies key matters of relevance to this LCVIA.

4.3.1 Australian Energy Infrastructure Commissioner's Governance and Compliance of Standards and Permit Conditions

The Australian Energy Infrastructure Commissioner has provided recommendations for setback distances for energy infrastructure, including transmission infrastructure, in their 2022 Annual Report (Australian Energy Infrastructure Commissioner 2023).

The commissioner makes the following recommendations that are relevant to this project:

'5.2.9.5 In relation to private transmission lines (typically, private power lines connecting the generation/storage asset to the grid), a transmission line that is 66kV or less than 220kV should have a minimum setback distance of 100 metres from a residence, while a transmission line that is 220kV or greater should have a minimum setback distance of 200 metres. In the event that the connecting transmission line is 500kV, the setback distance should be 300 metres. The setback distance should be measured from the edge of the transmission line easement to the residence. Transmission line towers should also be set back from public roads, with the suggested setback distance of the transmission line towers measured as the tower height plus 20 metres' (page 70 Australian Energy Infrastructure Commissioner 2023).

'5.2.15 Large-scale overhead transmission lines and towers (new build) for the electricity grid should have clear setback distances between the edge of the easement of the transmission line and nearby residences. Proposed setback distances should be consistent with Recommendation 5.2.9.5:

- 66kV up to <220KV – 100 metres
- 220kV up to <500kV – 200 metres
- 500kV – 300 metres.

Where a setback distance cannot be achieved due to a constrained route corridor, the developer must negotiate a fair and reasonable agreement with the owner of the residence to allow the transmission line to be within the prescribed setback distance' (page 71 Australian Energy Infrastructure Commissioner 2023).

These recommendations have been used to inform the design of HTP.

4.3.2 Hunter Regional Plan 2041

The *Hunter Regional Plan* (DPE 2022) identifies and includes place strategies for regionally significant growth areas. Two of the *Hunter Regional Plan's* regionally significant growth areas fall within the HTP corridor:

- the post mining and power station regionally significant growth area (including the Liddell and Bayswater Power Station)⁵ (see Figure 4-1)
- Denman and Broke-Fordwich viticulture regionally significant growth area (see Figure 4-2).

The post-mining area (including Liddell and Bayswater Power Station) is identified for potential industrial, manufacturing, energy, intermodal (inland rail), intensive agriculture, food and fibre production, as well as supporting biodiversity corridors via the area's substantial vegetated lands. Mount Thorley-Warkworth is included as a post-mining area of interest and identified for potential industrial, manufacturing, intensive agriculture, and energy generation.

⁵ The Department of Regional NSW, Department of Planning and Environment is the lead authority preparing the strategy.

Place strategy outcomes for post-mining areas (relevant to landscape and visual matters), are:

- use screening to soften non-rural land uses when viewed from the New England Highway
- retain vegetated areas and promote biodiversity corridors, connecting the site to adjoining vegetated areas including those required under the rehabilitation requirements of adjoining mines
- understand and support cultural and scenic values
- buffer, or visually screen, employment generating uses located elsewhere on the former mine site.

The Denman and Broke-Fordwich viticulture regionally significant growth area is renowned for wineries 'set amongst picturesque scenic rural landscapes' (page 129, DPE 2022). Place strategy planning requires that 'development adjoining scenic areas must consider the area's landscape values and viewpoints, with adverse visual impacts or encroachment of incompatible land uses on existing viticultural areas discouraged' (page 129 DPE 2022). In accordance with place strategy planning, 'the Broke-Fordwich and Hermitage Road area will support winemaking and tourism while understanding landscape values and local character to preserve scenic amenity' (page 131, DPE 2022). Place strategy outcomes for the viticulture region (relevant to landscape and visual matters), are:

- strategic agricultural land- Locate residential subdivision and other development incompatible with the vineyards' rural landscape and scenic amenity in villages and towns
- boutique vineyards and tourism precinct- Ensure development is sympathetic to local character and landscape values, and reinforces the sense of place
- tourism node investigation area – Development is sympathetic to the rural amenity and the local character of the area.

The *Hunter Regional Plan* objectives relevant to landscape values and visual matters include:

- objective 1: Diversify the Hunter's mining, energy and industrial capacity – which recognises the finite lifespan of coal mining and shift to alternative land use of rehabilitated sites (such as agriculture and renewable energy)
- objective 2: Support the right of Aboriginal residents to economic self-determination – which acknowledges the importance of land to Aboriginal people and their sacred connections to Country
- objective 6: Conserve heritage, landscapes, environmentally sensitive areas, waterways and drinking water catchments. The objective protects conservation areas and identifies biodiversity corridors – one of which extends from the southern end of the HTP (Watagans to Stockton link). This link will conserve remnant vegetation and rehabilitate land to strengthen the corridor between Watagans National Park and Port Stephens
- objective 9: Sustain and balance productive rural landscapes- recognises the contribution of the Hunter's landscapes to local identity and sense of place.

The *Hunter Regional Plan* includes planning priorities, the most relevant of which applies to Upper Hunter District:

- planning priority 4: Leverage scenic landscapes and enhance biodiversity and the natural environment. This priority requires 'local strategic planning should identify important scenic landscapes ... Planning and development controls should ensure development in these areas is sympathetic to the landscape values.' (page 121, DPE 2022).

4.3.3 Hunter Valley Destination Management Plan 2022 – 2030

Prepared jointly by Singleton Council and Cessnock City Council, the *Hunter Valley Destination Management Plan 2022 - 2030* (no publishing date) identifies an opportunity for the Hunter Valley to improve its aesthetic perception (as a major coal mining area). The need to protect, preserve and restore the uniqueness of the region's environment, biodiversity and scenic amenity is critical (page 49, Singleton Council and Cessnock City Council). There are no specific scenic amenity goals that apply to the HTP corridor or landscape character study area.

4.3.4 Draft Landscape Character and Scenic Value Assessment

A draft *Landscape Character and Scenic Value Assessment* has been prepared for the Department of Planning, Housing and Infrastructure (DPHI) and Muswellbrook Council (Gyde 2024). The assessment identified planning precincts based on identifiable landscape character and strategic land use. It is still to receive sign-off from DPHI, however, the assessment was provided for input to the LCVIA as draft Precinct 3 relates to land nearby HTP North.

Precinct 3 extends west from Jerrys Plains. It consists of pastoral lands, vineyards and horse studs between the Golden Highway and the fringes of the Wollemi National Park. The assessment identifies the precinct as having moderate-high scenic value, and the Golden Highway as a scenic route. There are main viewpoints from the horse studs west of Jerrys Plains.

The assessment states that ‘the protection of scenic values ... must be balanced with the rise in renewable developments’ (page 58, Gyde 2024) and proposes landscape treatments along the Golden Highway at the District entry [Jerrys Plains] and through Jerrys Plains to soften the visual impacts of built infrastructure (mines, quarries, transmission lines etc). To protect high value vistas, the assessment includes the following outcomes:

- discourage non-agricultural development, particularly large-scale or highly visible operations on rural land
- discourage built form visible from the main viewpoint facing southeast on the Golden Highway near Hollydene Estate
- vistas toward the rocky bluffs of Wollemi National Park are to remain undisrupted by built development
- new development proposed within or as seen from High Visibility Areas [that is, the Golden Highway west of Jerrys Plains] are recommended to be subject to a detailed visual impact assessment.

4.3.5 Muswellbrook Local Strategic Planning Statement

Muswellbrook Shire Council Local Strategic Planning Statement 2020 – 2040 (Muswellbrook Shire Council 2020) includes priorities relevant to the HTP:

- under Priority 2, Council is planning for the transition of mine and power station sites. Council supports rehabilitation of these site (to achieve agricultural/horticultural production, habitat, food processing, tourism, recreation and enhance scenic landscape values), and encourages retention of the labour intensity of these lands
- under Priority 4, Council encourages the location of industrial-type land uses away from rural areas, and toward mining and power station buffer and rehabilitation areas
- under Priority 6, Council encourages tourism opportunities, including nature-based experiences in, among other locations, artificial water bodies such as Lake Liddell
- and Priority 13 provides opportunity for housing growth. Areas nominated for growth are not within the HTP corridor or landscape character study area.

To enhance the environment, natural assets and scenic qualities of the local government area (LGA), Council will identify ‘significant rural landscapes’, ‘areas of high scenic value’ and ‘include scenic protection controls’ in local planning instruments (Priority 16). The *Draft Landscape Character and Scenic Value Assessment* (Gyde 2024), in part, delivers on this priority.

4.3.6 Singleton Community Strategic Plan

Create Singleton 2032, Community Strategic Plan 2022 - 2032 (Singleton Council 2022) includes broad visions for the LGA and is supported by various strategies and plans, including the Local Strategic Planning Statement 2041, Sustainability Strategy, and Vineyards and Rural Tourism Strategy.

4.3.7 Singleton Local Strategic Planning Statement 2041

It is a priority of *Singleton Local Strategic Planning Statement 2041* (LSPS, Singleton Council 2020) that places are well planned and visual access to important natural attractions is maintained (page 32, Singleton Council 2020), and that the growth of Singleton LGA does not detract from the visual amenity of the streetscape or landscape (page 48, Singleton Council 2020).

The LSPS identifies Jerrys Plains as a strategic growth area for increased housing and economic development, and Broke and Jerrys Plains as local character precincts for which local character statements will be prepared. The LSPS describes the Broke Fordwich area as a rural tourism landscape.

4.3.8 Singleton Vineyards and Rural Tourism Strategy

Singleton Vineyards and Rural Tourism Strategy (Singleton Council 2023) describes the Broke Fordwich Precinct as a large rural area running north along the Wollombi Brook and framed by the Yengo National Park, Wollemi State Conservation Area. Within the precinct are two character areas: the Broke Character Area (which is within the landscape character study area), and the Bulga-Milbrodale Character Area.

The Broke Character Area includes Broke village- a ‘Centre of Local Significance’ and key gateway connecting to the wider region (including mines and vineyards) (page 72, Singleton Council 2023). Outlooks from the Broke Character Area feature an elevated bushland backdrop to the southeast to the Pokolbin State Forest and Yellow Rock. The setting of Broke Village is enhanced by key views to Yellow Rock and to the west towards Yengo National Park (page 73, Singleton Council 2023).

Broke village has been marked as a centre with opportunities for further housing provision. The future vision for the Broke Character Area includes: a new pedestrian and cycle trail extending west from Broke, complementary land uses to viticulture and tourism, and containing residential growth to designated hubs. Importantly, “key views and the dramatic backdrops to the important landscapes across the Precinct need to be protected notably visual connections to Wollemi National Park” (page 81, Singleton Council 2023). “Developments should not obstruct or depreciate the dramatic backdrops across the LGA or dominate open landscapes or views from public places and roads” (page 85, Singleton Council 2023).

4.3.9 Singleton Local Housing Strategy

Singleton Council Local Housing Strategy 2041 (Singleton Council, no publishing date) identifies housing growth (including at Jerrys Plains and Broke), and prioritises the protection of rural character. Housing growth locations are several kilometres from the HTP at closest. Scenic and landscape quality issues related to housing would not be affected by the HTP corridor.

4.3.10 Singleton Sustainability Strategy 2019-2027

Singleton Sustainability Strategy 2019 – 2027 (Singleton Council, no publishing date) sets out the Council’s broad sustainability agenda, focusing on the United Nations Sustainable Development Goals. The strategy does not include policy or actions related to scenic quality, views or landscape values.

4.3.11 Broke – Fordwich Village Master Plan

Broke – Fordwich Village Master Plan (Peter Andrews + Associates, no publishing date) identifies key views from the village to Yellow Rock and the Pokolbin State Forest. Significant views of the Brokenback Range, Yellow Rock and the vineyards are also identified from the surrounding road network. Yellow Rock, the Brokenback Range and Pokolbin State Forest are viewed to the south of the village and not in the direction of the HTP (which is to the east). The master plan for the village includes a potential cycle link to Pokolbin that would travel via Cessnock Road, crossing the HTP corridor.

4.3.12 Cessnock Local Strategic Planning Statement 2036

Cessnock Local Strategic Planning Statement 2036 (LSPS, Cessnock City Council 2020) describes viticulture in the LGA as one of the primary tourist destinations in the Hunter Region and a major focus for visitor attractions, events and activities.

The LSPS also states that potential infill development may occur at Millfield, however, the character of the residential area, surrounded by large areas of rural or bushland, is noted as an important quality to be retained.

4.3.13 Millfield Cemetery Masterplan

Cessnock City Council proposes improvements to Millfield Cemetery (Cessnock City Council 2019, *Cemeteries Masterplan Report*), including landscaping and entry improvements. The entry to the cemetery is via Hayes Road, adjacent to a proposed HTP construction support site (laydown area).

4.3.14 Trails Strategy

A *Trails Strategy* has been prepared for Cessnock City Council (Treadwell Management 2020) for ‘trails’ including sealed and unsealed pathways which are publicly accessible for active recreation.

The *Trails Strategy* refers to 2 cross-regional trails which traverse the HTP corridor- the Great North Walk and the Convict Trail / Tourist Drive 33. The significance of the Great North Walk is noted in the Strategy. It states parts of the Great North Walk offer significant landscape experiences, and at a Council meeting in 2019 it was noted the trail is a significant natural asset to NSW (page 33, Treadwell Management 2020). The *Trails Strategy* includes actions to enable improvements to the trail such as signage.

Tourist Drive 33 is the scenic gateway for motorists travelling from Sydney into the lower Hunter Valley and includes destinations on the “convict trail”. Potential integration with additional drive trails are noted in the *Trails Strategy*.

Also, in the vicinity of the HTP are walking trails within Olney State Forest (The Pines Walking Trail and Rock Lily Walking Trail). The *Trails Strategy* does not have specific objectives for the forest trails.

4.3.15 Central Coast Council Local Strategic Planning Statement

The HTP occurs within a small section of the Central Coast LGA. The interim *Central Coast Council Local Strategic Planning Statement* (Central Coast Council 2020) does not contain policy or actions related to scenic quality, views or landscape values applicable to the vicinity of the HTP.

4.3.16 Lake Macquarie Local Strategic Planning Statement

A proposed construction support site, including workers’ accommodation, would be located at Cooranbong, within Lake Macquarie Council LGA. *Shaping the Future, Lake Macquarie City Local Strategic Planning Statement*, (Lake Macquarie City Council 2020), identifies Cooranbong within the South West Growth Area- an area of change (page 12, Lake Macquarie City Council 2020). The area is proposed as a location of significant population and employment growth, and a sensible location for diverse housing development (page 52, Lake Macquarie City Council 2020).

The local strategic planning statement also seeks to manage rural production areas to ensure protection to scenic areas or places with a highly valued landscape (page 20, Lake Macquarie City Council 2020). However, Cooranbong’s rural lands are not identified as scenic, highly valued, or locations to be protected.

4.3.17 Land use zoning

The following local environmental plans apply to land within the HTP:

- Muswellbrook Local Environmental Plan 2009
- Singleton Local Environmental Plan 2013
- Cessnock Local Environmental Plan 2011
- Lake Macquarie Local Environmental Plan 2014
- Central Coast Local Environmental Plan 2022.

Within these local environmental plans (LEPs), land use zoning prescribed along the HTP includes: special purpose infrastructure, primary production, forestry, and rural landscape. Each of these zones encourage or discourage certain land uses, influencing the character of the landscape. Some zones specify future desirable character. Relevant objectives of each zone are outlined below.

4.3.17.1 *Special purpose infrastructure*

Muswellbrook LEP 'SP2 Infrastructure' zone covers existing mining and energy infrastructure. The zone provides for infrastructure and related uses, enabling future development for railway purposes, expansion of major road networks, and utility undertakings. The Hebden Road construction support site (including workers' accommodation), and Bayswater South switching station would be located within this zone. The HTP infrastructure is compatible with the intended character of this zone.

Singleton LEP also includes an 'SP2 Infrastructure' zone. The zone covers existing defence and military land. The zone provides for infrastructure and related uses and seeks to prevent development that is not compatible with the zone. The HTP would traverse this zone.

4.3.17.2 *Primary production*

Singleton LEP includes an 'RU1 Primary Production' zone. The objectives of the zone are to maintain and encourage primary industry, minimise fragmentation of resource lands, and conflict with adjoining zones. There are no specific objectives relating to amenity or scenic quality.

The transmission line and temporary construction support sites would be located within this zone.

4.3.17.3 *Forestry*

The HTP would traverse Singleton LEP's, Cessnock LEP's and the Central Coast LEP's 'RU3 Forestry' zone. The objectives of the Forestry zone are to enable development for forestry purposes, or other development that is compatible with forestry land use. There are no specific objectives relating to amenity or scenic quality.

HTP infrastructure located within the Forestry zone includes the transmission line, Olney switching station, construction support sites, access roads.

4.3.17.4 *Rural landscape*

The HTP would traverse Cessnock LEP's 'RU2 Rural Landscape' zone. Objectives of the zone are:

- to maintain the rural landscape character of the land
- to maintain and enhance the scenic character of the land
- to minimise disturbance to the landscape from development caused by vegetation clearing, earthworks, access roads and construction of buildings
- to ensure development does not intrude into the skyline when viewed from a road or other public place.

Along the proposed HTP, land within the Rural Landscape zone is currently largely forested, with the only identified clearings for primary production being a short distance (around 600 metres) within the vicinity of Congewai Creek and Wollombi Road. In addition to the transmission line, a construction support site would be located within the cleared land. The impact of the HTP on rural character is discussed in the LCVIA landscape character assessment (see section 5.2.10).

Freeman's Drive construction support site would be within Lake Macquarie LEP's 'RU2 Rural Landscape' zone. The objectives of the zone include to maintain the rural landscape character of the land, and to enhance the natural amenity and ecological values of the land. The construction support site, including workers' accommodation, is temporary, and would not permanently affect rural landscape character. The impact of the HTP on rural character is discussed in the LCVIA landscape character assessment (see section 5.2.13).

Chapter 5: Landscape character assessment

The landscape character assessment study area for the Hunter Transmission Project (HTP) is defined as all areas within 5 kilometres of the HTP corridor, that is a 10-kilometre wide corridor including the 140-metre transmission line corridor (see DPE 2024).

The assessment of impact to landscape character has been undertaken as described in section 3.4 of this landscape character and visual impact assessment (LCVIA).

5.1 Landscape character zones

The landscape character impact assessment study area has been divided into landscape character zones (LCZs) based on similar topography, vegetation type and cover, and land use. These LCZs are:

- LCZ 1 Energy and mining
- LCZ 2 Jerrys Plains rural village
- LCZ 3 Hunter River (Lemington) rural valley
- LCZ 4 Hunter River (Maison Dieu) rural valley
- LCZ 5 Bushland and open forest
- LCZ 6 Broke rural village
- LCZ 7 Wollombi Brook rural valley
- LCZ 8 Forested hills
- LCZ 9 Millfield suburban area
- LCZ 10 Congewai Creek rural valley
- LCZ 11 Narrow rural valley
- LCZ 12 Managed forestry

The location of the LCZs is shown in **Appendix D: Landscape character plans**. The characteristics and sensitivity (day and night) of each LCZ are described in section 5.2. Section 5.3 describes the daytime impacts to landscape character for each LCZ throughout operation and construction, and section 0 describes the nighttime impacts to landscape character for each LCZ throughout operation and construction.

5.2 Characteristics and sensitivity

5.2.1 LCZ 1 Energy and mining

Existing conditions

The energy and mining LCZ is typified by the following visual characteristics:

- landform is highly modified for mining operations and power stations, open-cut pit excavation is extensive
- vegetation is mostly cleared of tall vegetation. There is large, planted rehabilitation areas (mostly juvenile) and some trees along the fringes of mines
- water bodies are engineered and associated with mining and power operations
- buildings and services include the industrial area of Mount Thorley, transmission lines, tall power station stacks, and isolated residences owned by mining operations

- includes existing transmission lines and towers (500 kilovolt (kV), 330 kV and 132 kV) and associated cleared vegetation corridors
- operations are continual (daytime and nighttime) and include external night lighting of operations areas and access roads by vehicles at night.

See Figure 5-1 for images of the energy and mining LCZ.

Landscape sensitivity

The sensitivity of the LCZ is rated **very low**. The LCZ is mostly a highly modified industrial landscape with no identified scenic values. Dominant features include highly engineered landform, exposed earth and limited vegetation cover, dominating industrial scale buildings and structures. Post-mining, the area is identified for potential industrial, manufacturing, energy intermodal (inland rail), intensive agriculture, food and fibre production (DPE 2022). Existing and future land use characteristics are compatible with transmission infrastructure. Vegetation clearance within the LCZ would be required, however, would not be extensive. Vegetation loss would be potentially sensitive as a strategy for the post-mining landscape is to retain vegetated areas, including those required under rehabilitation.

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **very low**. There is high district brightness (A4) with night lighting of mining operations areas and power station facilities.

5.2.2 LCZ 2 Jerrys Plains rural village

Existing conditions

Jerrys Plains rural village LCZ is typified by the following visual characteristics:

- it is located on flat to gently undulating land above the floodplain around 500 metres from the Hunter River
- vegetation is mostly cleared with pockets of taller trees on larger lots and road verges. The village is fringed with cleared paddocks
- it includes a few services, such as a hotel, church, primary school, recreation/camping ground and service station
- housing is mostly timber/weatherboard single story, detached
- there is an existing 330 kV transmission line adjacent to the village to the north.

See Figure 5-2 for images of Jerrys Plains rural village LCZ.

Landscape sensitivity

The sensitivity of the LCZ is rated **moderate**. The village has been identified as the District entry to the scenic vineyard, equine and pastoral area west of the village (Gyde 2024). Muswellbrook Council and DPHI propose landscape treatments at the District entry and through Jerrys Plains as an outcome in the draft *Landscape Character and Scenic Value Assessment*. The village has also been identified as a strategic growth area for increased housing and economic development, and a local character precinct for which a local character statement will be prepared (LSPS, Singleton Council, 2020). The town is pleasant, however, does not include rare, unique or distinctive elements of high scenic value. It is an important node defining the gateway to a scenic precinct to the west.

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **low**. There is medium district brightness (A3) with street lighting through the village and lighting from houses.



Figure 5-1 LCZ1 Mining and energy, character images



Figure 5-2 LCZ 2 Jerrys Plains village, character images

5.2.3 LCZ 3 Hunter River (Lemington) rural valley

Existing conditions

The Hunter River (Lemington) rural valley LCZ is typified by the following visual characteristics:

- it comprises flat to undulating land formed by the Hunter River in the vicinity of Lemington. The valley is broad and expansive, and flanked by a ridgeline along the east. Landform becomes increasingly hilly with proximity to the ridgeline
- the eastern ridgeline encloses the LCZ and visually separates it from the adjacent mining and energy LCZ
- the rural valley is typified by open, cleared, cultivated land with vegetation along the River, scattered within road verges and paddocks. Vegetation density increases on steeper land and with proximity to the elevated ridges
- the rural valley supports agricultural uses, including cropping and grazing
- rural residences are interspersed within agricultural land holdings. Supporting built infrastructure includes large sheds and farm equipment
- it includes transmission lines and towers (330 kV and 132 kV) and associated cleared vegetation corridors.

See Figure 5-3 for images of Hunter River (Lemington) rural valley LCZ.

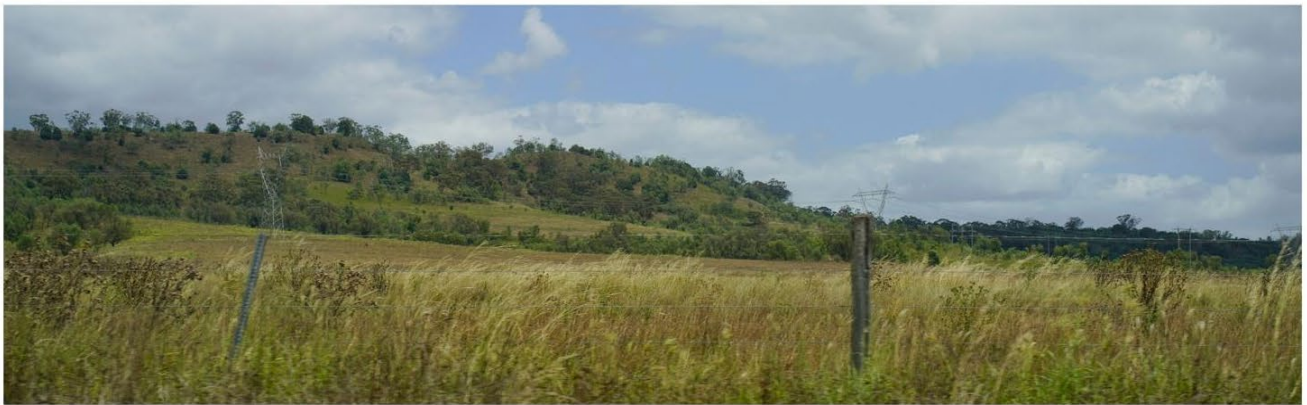


Figure 5-3 LCZ 3 Hunter River (Lemington) rural valley, character images

Landscape sensitivity

The sensitivity of the LCZ is rated **moderate**. The open, agricultural landscape is attractive. The Golden Highway traverses through the west of the LCZ, connecting the District entry of Jerrys Plains to moderate-high scenic area to the west of the LCZ, and is identified as a scenic route (Gyde 2024). Treatment along the Golden Highway at the District entry is proposed as an outcome in the joint Muswellbrook Council and DPHI draft *Landscape Character and Scenic Value Assessment* to soften the visual impacts of existing energy infrastructure. Non-agricultural development on rural land is discouraged (Gyde 2024).

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **moderate**. There is low district brightness (A2) with lighting from scattered rural residences and distant street lighting from Jerrys Plains

5.2.4 LCZ 4 Hunter River (Maison Dieu) rural valley

Existing conditions

The Hunter River (Maison Dieu) LCZ is typified by the following visual characteristics:

- it comprises flat to undulating land formed by the Hunter River in the vicinity of Maison Dieu. The valley is broad and expansive. Landform is more elevated and becomes increasingly hilly toward the east
- the rural valley is typified by open, cleared, cultivated land with some dense remnant vegetation along the River and in paddocks
- the rural valley supports agricultural uses, including cropping and grazing
- rural residences are interspersed within agricultural land holdings which include large sheds and farm equipment. Smaller residential lots are located on more elevated land to the east
- it includes transmission lines and towers (330 kV and 132 kV) and associated cleared vegetation corridors.

See Figure 5-4 for images of Hunter River (Maison Dieu) LCZ.

Landscape sensitivity

The sensitivity of the LCZ is rated **low**. The landscape is attractive, although there are distant views of the adjoining energy and mining LCZ (in particular from eastern elevated areas of the LCZ) which affect the scenic quality of the landscape. There are no landscape designations or protections. For the most-part, landscape values are locally valued.

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **moderate**. There is low district brightness (A2) with lighting from scattered rural residences and skyglow from adjacent mining operations.



Figure 5-4 LCZ 4 Hunter River (Maison Dieu) rural valley, character images

5.2.5 LCZ 5 Bushland and open forest

Existing conditions

The bushland and open forest LCZ is typified by the following visual characteristics:

- hilly land above the floodplain and on lower slopes of steeply elevated ridges
- mostly vegetated with native trees and shrubs. Open, dry forest with trees to around 18 metres. Includes small open pockets and larger cleared areas. Denser vegetation occurs along watercourses
- it includes a few creeks and smaller water bodies
- it supports military uses (training facility, Australian Army School of Infantry, Infantry Museum, practice range, storage areas) and agricultural uses (primarily grazing)
- some scattered residential associated with agricultural land use
- it includes existing transmission lines and towers (132 kV).

See Figure 5-5 for images of the bushland and open forest LCZ.

Landscape sensitivity

The sensitivity of the LCZ is rated **low**. The landscape is typical of bushland in the region. It does not include characteristics or features that are distinct or rare. It has not been recognised as scenic or of regional landscape value.

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **moderate**. There is low district brightness (A2) with lighting from military training facilities, nighttime training activities, and scattered rural residences

5.2.6 LCZ 6 Broke rural village

Existing conditions

Broke rural village LCZ is typified by the following visual characteristics:

- it is located on the banks of the Wollombi Brook, on flat to gently undulating land
- vegetation within the village includes pockets of taller trees in parks, on larger lots and road verges. Along Wollombi Creek vegetation is dense. Cleared paddocks fringe the village
- the village supports local tourism and includes tourist accommodation, cafes, a village store, as well as local services, such as a church and primary school
- housing is mostly single story, detached
- there are no existing transmission lines within or adjacent to the village.

See Figure 5-6 for images of Broke rural village LCZ.

Landscape sensitivity

The sensitivity of the LCZ is rated **high**. Broke is an important node for tourism and identified by Singleton Council as ‘a Centre of Local Significance’. The village is sited within the regionally significant Denman and Broke-Fordwich viticulture growth area, which is designated to support winemaking and tourism while protecting landscape values (DPE 2022). The village is attractive with its sense of place enhanced by surrounding pastoral and viticulture land, and backdrop of rugged ranges. *Singleton Vineyards and Rural Tourism Strategy* states that “key views and the dramatic backdrops to the important landscapes ... need to be protected notably visual connections to Wollemi National Park” (page 81, Singleton Council 2023). Council plans to prepare a local character statement for the village.

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **low**. There is medium district brightness (A3) with street lighting and lighting from houses in the village.



Figure 5-5 LCZ 5 Bushland and open forest, character images



Figure 5-6 LCZ 6 Broke rural village, character images

5.2.7 LCZ 7 Wollombi Brook rural valley

Existing conditions

Wollombi Brook rural valley LCZ is typified by the following visual characteristics:

- flat to undulating land within a broad valley formed by Wollombi Brook and its tributaries
- the valley is enclosed by distinctive steeply elevated ridges and rocky outcrops (Yengo National Park, Wollemi State Conservation Area and Pokolbin Forest). Landform becomes increasingly hilly with distance from the creeks and proximity to the ridges
- the valley floor is typified by cultivated land, is open and expansive. Trees are scattered in paddocks. Vegetation density increases on steeper land and with proximity to the elevated ridges
- intermittent remnant vegetation occurs along the edges of Monkey Place Creek. Denser vegetation lines Wollombi Creek
- the rural valley supports cropping, grazing, and a small area of viticulture. Rural residences are interspersed within the agricultural land holdings. Supporting built infrastructure includes large sheds and farm equipment
- there are no transmission towers.

See Figure 5-7 for images of Wollombi Brook LCZ.

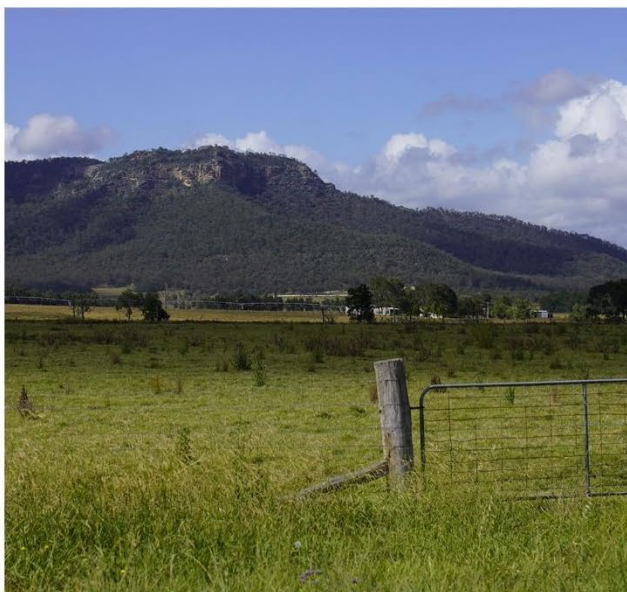


Figure 5-7 LCZ 7 Wollombi Brook rural valley, character images

Landscape sensitivity

The sensitivity of the LCZ is rated **moderate**. The far western edge of the LCZ is within the regionally significant Denman and Broke-Fordwich viticulture growth area (DPE 2022). However, the growth area includes and extends west of Broke. It does not include areas east of Broke or Cessnock Road, the principal route east-west through the LCZ over which the project would be located. The importance of the viticulture landscape is recognised in Singleton local environmental plan (LEP) 2013. Under the LEP, the cleared rural areas surrounding Broke are zoned 'RU4 Primary Production Small Lots'. An objective of the zone is to recognise Hunter Valley Wine Country and the adjoining environs of Broke-Fordwich as a major viticultural and tourist destination. The HTP would be located west of the RU4 zone, within the adjoining 'SP2 Infrastructure' zone.

The landscape in the south of the LCZ is distinctive. The broad, cultivated, valley floor of the LCZ and backdrop of steeply rising ridges and rocky outcrops is scenic, and has a strong sense of place.

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **moderate**. There is low district brightness (A2) with distant street lighting from Broke and scattered rural residences.

5.2.8 LCZ 8 Forested hills

Existing conditions

The forested hills LCZ is typified by the following visual characteristics:

- steeply elevated, rugged ridges; forested sandstone plateaus with rocky outcrops; and lower foothills
- densely vegetated with tall, closed forest (20- 30 metres tall)
- waterbodies are not visually prominent
- includes densely wooded private landholdings, as well as Watagans National Park (to the east), Jilliby State Conservation Area, and other National Parks and Wildlife managed land along the route of the project
- recreational use is supported in publicly managed areas via designated camping areas, sheltered picnic areas and hiking trails including part of the Great North Walk (a 250 km path from central Sydney to downtown Newcastle)
- the southern end of the LCZ includes an existing 500 kV transmission line and towers and associated cleared vegetation corridor through the Jilliby State Conservation Area

See figure 5-8 for images of the forested hills LCZ.

Landscape sensitivity

The sensitivity of the LCZ within private landholdings is rated **moderate**. The landscape character is valued by residents and has moderate scenic quality.

Where the landscape has been designated as a National Park or State Conservation Area, the sensitivity of the LCZ is rated **high** as the landscape character is strongly valued and managed for conservation. Scenic quality ranges from moderate to high and protection of existing landscape features and scenic qualities is the primary intent.

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **high**. The night sky is dark (A1). There is no street lighting, and the area is relatively uninhabited with scattered residences (or no residences in the case of designated as National Park or State Conservation Areas). The only lighting is from occasional vehicles use on local roads through the LCZ at night, and low-level lighting from scattered residences or campgrounds.



Figure 5-8 LCZ 8 Forested hills, character images

5.2.9 LCZ 9 Millfield suburban area

Existing conditions

Millfield suburban area LCZ is typified by the following visual characteristics:

- it is sited on gently undulating land within a broad rural valley
- vegetation is mostly cleared with pockets of taller trees on larger lots, road verges, and watercourses
- Congewai Creek borders the LCZ to the southwest with several larger water bodies nearby
- housing is mostly detached single story, with a mix of smaller lot, older, timber/weatherboard houses, and larger lot, newer, brick and tile houses
- there are no existing transmission towers within the LCZ.

See Figure 5-9 for images of Millfield suburban area LCZ.

Landscape sensitivity

The sensitivity of the LCZ is rated **low**. Millfield is an attractive residential area sited well within the valley and landscape. However, there are no unique or distinctive qualities. Housing and streets are typical of rural suburban residential areas in the vicinity, and there are no sites or features of local or regional importance. The LCZ is not designated as a location of local or regional value.

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **low**. There is medium district brightness (A3) with street lighting and lighting from houses in the (relatively high density) residential area.



Figure 5-9 LCZ9 Millfield suburban area, character images

5.2.10 LCZ 10 Congewai Creek rural valley

Existing conditions

Congewai Creek rural valley LCZ is typified by the following visual characteristics:

- a broad rural valley formed by Congewai Creek and its tributaries. The valley is broad and expansive, and enclosed by steep ridges. Landform becomes increasingly hilly with distance from the creeks and proximity to the surrounding ridges
- the rural valley is typified by open, cleared, cultivated land with (often dense) remnant vegetation along watercourses, road verges and scattered in paddocks. Vegetation density increases on steeper land and with proximity to the elevated ridges
- the rural valley supports agricultural uses, including cropping, grazing and viticulture
- rural residences are interspersed within agricultural land holdings. Supporting built infrastructure includes large sheds and farm equipment
- there are no existing transmission lines within the LCZ.

See Figure 5-10 for images of Congewai Creek rural valley LCZ.

Landscape sensitivity

The sensitivity of the LCZ is rated **moderate**. The rural valley is attractive, with broad valley floor flanked by steep ridges. Wollombi Road traverses east-west through part of the LCZ and is a designated tourist route. The scenic quality of the landscape has regional value (the LCZ includes winery estates and other tourist accommodation).

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **moderate**. There is low district brightness (A2) with distant street lighting from Millfield and lighting from scattered rural residences.

5.2.11 LCZ 11 Narrow rural valleys

Existing conditions

The narrow rural valleys LCZ is typified by the following visual characteristics:

- comprises several narrow, cleared rural valleys along Watagan Creek; the upper reaches of Congewai Creek and its tributary, Cedar Creek; and upper valleys near Lemon Tree and Cooranbong
- the valley floors are narrow and enclosed by steeply elevated ridges, creating an enclosed landscape
- the rural valleys are typified by cleared, cultivated land with dense vegetation along watercourses and scattered in paddocks. Vegetation density increases on steeper land and with proximity to the elevated ridges
- the rural valleys support agricultural uses, including cropping, grazing and small viticulture lots. Rural residences are interspersed within the agricultural land holdings. Supporting built infrastructure includes large sheds and farm equipment
- there are no existing transmission lines within the LCZ.

See Figure 5-11 for images of the narrow rural valley LCZ.



Figure 5-10 LCZ 10 Congewai Creek rural valley, character images



Figure 5-11 LCZ 11 Narrow rural valley, character images

Landscape sensitivity

The sensitivity of the LCZ is rated **moderate**. The landscape is distinct and attractive with the cleared, narrow valley floor contrasting steeply sided enclosing ridges. The landscape has regional scenic value as a tourist route (Wollombi Road traverses through part of the LCZ and is a designated tourist route) and includes regionally important landscape features such as a winery and tourist accommodation.

The importance of the LCZ's existing rural character and scenic character is recognised in Cessnock LEP's 'RU2 Rural Landscape' zoning. Zone objectives include minimising disturbance to the landscape (caused by vegetation clearing, earthworks, access roads and construction of buildings); and ensuring development does not intrude into the skyline when viewed from a road or other public place.

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **moderate**. There is low district brightness (A2) with lighting from scattered rural residences.

5.2.12 LCZ 12 Managed forestry

Existing conditions

The managed forestry LCZ is typified by the following visual characteristics:

- steeply elevated, rugged ridges and elevated plateau with rocky outcrops
- densely vegetated with tall, closed forest (20- 30 metres tall) designated for forestry purposes
- waterbodies are not visually prominent
- it includes NSW State forest (Olney State Forest, Pokolbin State Forest, Corrabare State Forest and Watagan State Forest) along the route of the project. Timber within forestry land is actively harvested. Roads are mostly unsealed
- recreational use is supported via designated camping areas, picnic areas, walking trails and lookouts. The Great North Walk travels within the Olney State Forest from Watagan Creek Road via Flat Rock Lookout to the Congewai Valley
- views to surrounding landscape features have been identified from the highest ridgelines (cultural viewlines)
- the southern end of the LCZ includes an existing 500 kV transmission line and towers and associated cleared vegetation corridor.

See Figure 5-12 for images of the managed forestry LCZ.

Landscape sensitivity

The sensitivity of the LCZ is rated **low**. The LCZ along the route of the project is actively harvested state forest in several areas. The scenic quality ranges from moderate (where there are tall, dense trees), to very low (at clear felled areas). The scenic qualities associated with vegetation within the forestry areas can vary over time due to the state forest designation. There are several recreation areas including camping, picnic areas and trails through this area.

Prominent ridgelines and viewlines within the forested hills LCZ are potentially of very high aboriginal cultural significance.

Landscape sensitivity at night

The sensitivity of the LCZ at night is rated **high**. The night sky is dark (A1). There is no street lighting or residences. The only lighting is from occasional vehicles use on forestry roads at night, and low-level lighting from the campgrounds.

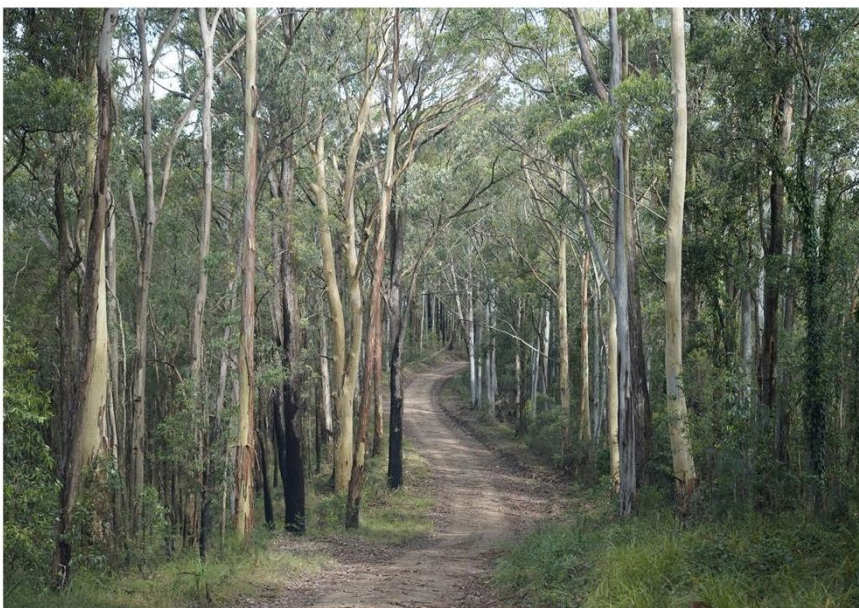


Figure 5-12 LCZ 12 Managed forestry character images

5.2.13 Areas beyond the study area

There are two locations beyond the LCVIA study area where temporary construction sites would be located:

- along Hebden Road, northeast of the study area, and
- in the vicinity of Freemans Drive, southeast of the study area.

The following section describes the landscape character and sensitivity of these areas.

Hebden Road

Hebden Road is at the northern end of Lake Liddell. The area is zoned for recreation and along the road is an open space and recreation area, and a speedbowl. Adjacent are railway lines and mining infrastructure. The area is partially cleared of vegetation.

The sensitivity of the landscape is rated **very low**. Although zoned for recreation, the location is dominated by power station infrastructure on the southern side of the lake. The proximity of railway lines and views of the tall stacks associated with the power station, reduces scenic quality and visual amenity.

The sensitivity of the area at night is rated **low**. There is medium district brightness (A3) with night lighting of mining operations areas and power station facilities.



Figure 5-13 View from Hebden Road to the temporary construction support site

Freemans Drive

Freemans Drive is largely vegetated with tall trees either side. It has an open, forest character, with large cleared agricultural areas. The area is zoned rural landscape (RU2). Rural residences are located along the road and scattered throughout the vicinity.

The sensitivity of the landscape is rated **low**. The rural landscape is locally valued (objectives for the zone under Lake Macquarie LEP include to maintain the rural landscape character of the land). However, the landscape does not have unique or distinctive landscape features, or regionally important scenic values. And *Lake Macquarie City Local Strategic*

Planning Statement infers the area could be subject to future housing growth. In addition, there are multiple cleared transmission easements in the vicinity.

The sensitivity of the area at night is rated **moderate**. There is low district brightness (A2) with lighting from scattered rural residences.



Figure 5-14 View from Freemans Drive towards the temporary construction support site



Figure 5-15 View from Freemans Drive towards the temporary construction support site

5.3 Landscape character impacts during the day

5.3.1 Landscape character impact during construction

An assessment of the impact of the project on landscape character during the day throughout the temporary construction period (up to three years) is contained in **Table 5-1**.

Table 5-1 Landscape character impact during construction, daytime

Landscape character zone	Landscape sensitivity	Magnitude of change	Landscape character impact
LCZ 1: Energy and mining	Very low	Very low <ul style="list-style-type: none"> The Bayswater South switching station construction area would be adjacent to existing energy and mining infrastructure A temporary construction support site, including a construction compound, access roads, laydown area, helicopter landing pad, wiring and stringing areas, would occupy a moderately large area in the vicinity of Bayswater Power Station (around 10 ha). Smaller construction sites would occur along the project corridor throughout the LCZ Where suitable access tracks do not exist, new access roads would be formed to gain access to the HTP Vegetation clearing would affect some juvenile rehabilitation areas and some taller trees in bushland areas. However, large, cleared areas are consistent with key characteristics of the LCZ Helicopter activities may temporarily draw attention as aerial movement would be a new element in the landscape Overall, construction infrastructure and activities would be a very minor and generally consistent element within the existing character of the LCZ. 	Very low
LCZ 2: Jerrys Plains rural village	Moderate	Negligible <ul style="list-style-type: none"> Temporary construction infrastructure would not be stockpiled or installed in the LCZ, and construction activities would not occur in the LCZ or alter existing physical characteristics of the LCZ Vehicle movements may increase through the village during the construction period. 	Negligible
LCZ 3: Hunter River (Lemington) Rural Valley	Moderate	Low <ul style="list-style-type: none"> Relatively small, temporary construction support sites would occur in the LCZ (occupying around 2 – 3 ha each) including a laydown area on the northern side of Old Lemington Road, two stringing sites straddling either side of Lemington Road, and a small stringing area on the southern side of the Hunter River Where suitable access tracks do not exist, new access roads would be formed to gain access to the HTP Vegetation clearing may affect a small number of isolated trees scattered in paddocks Tower installation activities occurring on the valley floor may temporarily draw attention as they would be a new element in the landscape and contrast the open, broad agricultural valley Overall, construction infrastructure and activities would be temporary, and a minor element within the landscape. 	Low

Landscape character zone	Landscape sensitivity	Magnitude of change	Landscape character impact
LCZ 4: Hunter River (Maison Dieu) Rural Valley	Low	Low <ul style="list-style-type: none"> Temporary construction support sites would occur along the length of the HTP in the LCZ, and include laydown areas, stringing sites, compound, helicopter landing pad, and a workers' accommodation site. They are all located along the western fringe of the LCZ, on the western side of the Hunter River, close to the energy and mining LCZ The temporary workers' accommodation would be accessible from Gouldsville Road and would be the largest of the construction support sites occupying around 10 ha. Overall, the construction support sites occupy a very small area within the LCZ Where suitable access tracks do not exist, new access roads would be formed to gain access to the HTP. Generally, these would be within existing cleared transmission corridors, or short sections of new road to connect to existing roads Vegetation clearing for tower installation and an asset protection zone around the workers' accommodation, may affect a small number of isolated trees scattered in paddocks Helicopter activities may temporarily draw attention as aerial movement would be a new element in the landscape Tower installation activities may be noticeable; however, they would be a minor change to key characteristics along the western fringe of the LCZ Overall, construction infrastructure and activities would be temporary, and a minor element within the landscape. 	Low
LCZ 5: Bushland and open forest	Low	Very low <ul style="list-style-type: none"> Several temporary stringing sites would occur within the LCZ. They would occupy a relatively small area adjacent to the energy and mining LCZ Short sections of new road would be formed to connect to existing access tracks and gain access to the HTP Vegetation clearing would affect some tall trees within the open forest. However, large, cleared areas are consistent with key characteristics of the LCZ Tower installation activities are unlikely to be noticeable. They would result in a very minor change to key characteristics along the western fringe of the LCZ Overall, construction infrastructure and activities would be temporary, and a very minor element within the landscape. 	Very low
LCZ 6: Broke rural village	High	Negligible <ul style="list-style-type: none"> Temporary construction infrastructure and activities would not occur in the LCZ or alter existing physical characteristics of the LCZ. 	Negligible
LCZ 7: Wollombi Brook rural valley	Moderate	Moderate <ul style="list-style-type: none"> A large (around 15 ha) stringing site would occupy open, rural land Temporary construction activities at the stringing site, and tower installation activities, would be noticeable due to their contrast to the characteristics of the flat, expansive, agricultural valley Existing access tracks would be used to gain access to the HTP corridor. Vegetation clearing may affect a small number of isolated trees scattered in paddocks Construction infrastructure and activities would temporarily result in a change to key characteristics of the LCZ 	Moderate

Landscape character zone	Landscape sensitivity	Magnitude of change	Landscape character impact
LCZ 8: Forested hills	Moderate	Moderate <ul style="list-style-type: none"> Temporary construction infrastructure and activities would not occur within designated National Parks or State Conservation Areas within the LCZ or alter existing physical characteristics of these protected places. Relatively short sections of the LCZ within private landholdings would be occupied by the HTP corridor and include areas adjacent to Singleton Military Area; Pokolbin State Forest; within the vicinity of Cedar and Congewai Creeks; and near Watagan Creek. Vegetation removal and works to install the transmission towers would occur and contrast with the existing characteristics of the forested hills LCZ. 	Moderate
LCZ 9: Millfield suburban area	Low	Low <ul style="list-style-type: none"> Temporary construction infrastructure and activities would not occur in the LCZ or alter existing physical characteristics of the LCZ A temporary laydown area would occur near the LCZ, next to Millfield Cemetery, and would temporarily increase vehicle movements through the LCZ to access the temporary laydown area Vehicle movements in general may increase through the LCZ during the construction period. 	Low
LCZ 10: Congewai Creek Rural Valley	Moderate	Low <ul style="list-style-type: none"> A temporary construction laydown area would occur near the western outskirts of Millfield, in the vicinity of Millfield cemetery. The area is currently a storage yard (car parts, scrap metal, gravel) and accessed by trucks The laydown area would store materials and equipment and be accessible during the daytime by construction workers The area may require clearing of some tall trees Existing roads would be used to gain access to the laydown area Overall, the site would be a minor element in the landscape, and result in a minor, temporary change to key characteristics of the LCZ. 	Low
LCZ 11: Narrow Rural Valleys	Moderate	High <ul style="list-style-type: none"> A large (around 15 ha) construction support site would temporarily occupy the narrow rural valley floor, and include a stringing site, compound, laydown areas, offices and access roads surrounded by a cleared asset protection zone Some vegetation clearing may be required and affect a small number of isolated trees scattered in paddocks Construction infrastructure and activities would be noticeable within the narrow, enclosed valley floor They would become a major element in the landscape, temporarily changing key characteristics of the LCZ. 	Moderate
LCZ 12: Managed forestry	Low	Low <ul style="list-style-type: none"> Olney switching station construction area would occupy around 8 ha of densely vegetated forest. Temporary construction support sites would occur along the length of the HTP and include several laydown areas, stringing sites, and a helicopter landing pad. Overall, the support sites occupy a small area of the LCZ Some construction sites would occur in existing cleared and relatively level areas of the forest. For most construction sites, including Olney switching station 	Low

Landscape character zone	Landscape sensitivity	Magnitude of change	Landscape character impact
		<p>construction area, however, substantial vegetation clearance and/or earthworks would be required</p> <ul style="list-style-type: none"> Large, cleared areas for forestry harvesting is a characteristic of the LCZ, and clearing associated with the project would be a minor change to existing landscape characteristics Substantial earthworks may be required to prepare the construction support sites and create foundations for the towers, helicopter landing, and switching station The LCZ has a network of forestry tails, however, new access roads may be required to gain access to the HTP. Access roads may require more substantial earthworks compared to other LCZs. Large bare areas of earth (resulting from clear felling) are an existing characteristic of the landscape and not dissimilar to large earthworks Tower and switching station construction would be noticeable. Helicopter activities may temporarily draw attention as aerial movement would be a new element in the landscape Overall, however, construction infrastructure and activities would not be substantially different from ongoing forestry harvesting occurring in the LCZ. They would be a generally consistent element within the existing character of the LCZ. 	
Locations beyond the study area			
Hebden Road	Very low	<p>Low</p> <ul style="list-style-type: none"> A temporary construction site (around 11 ha) would occupy cleared land between Hebden Road and Lake Lidell. The site includes an access road, compound, laydown areas, helicopter landing pad, office, and workers' accommodation, within an asset protection zone Minor levelling of the site may be required. Minimal or no tree clearance would be required Helicopter activities may temporarily draw attention as aerial movement would be a new element in the landscape. There would be increased traffic along Hebden Road which may be noticeable change in the landscape The infrastructure would result in a minor change to key characteristics of the landscape and would not permanently change the intended recreational setting and character of the zone. 	Very low
Freemans Drive	Low	<p>Low</p> <ul style="list-style-type: none"> A large temporary construction support site (around 21 ha) would occupy cleared land surrounded by tall trees on Freemans Drive. The site includes access roads, compounds, laydown areas, offices, helicopter landing pad, and workers' accommodation within an asset protection zone There are also several stringing sites located within cleared transmission easements between Eraring Station and the HTP (on land zoned for conservation) Earthworks would shape and level the area. The construction support site and laydown areas are set back over 200 m from Freemans Drive and surrounded by tall trees The compound and accommodation area would be located in existing cleared areas within the conservation zone. Additional tree removal may be possible, but unlikely 	Low

Landscape character zone	Landscape sensitivity	Magnitude of change	Landscape character impact
		<ul style="list-style-type: none"> Helicopter activities may temporarily draw attention as aerial movement would be a new element in the landscape. There would be increased traffic along Freemans Drive which may be a noticeable change in the landscape The construction support sites would not be typical features of a rural landscape. They would not maintain existing rural character or enhance natural amenity; however, the construction support site would be temporary, and the site would be restored upon completion of construction There would be minor permanent changes to the key characteristics of the landscape. 	

5.3.2 Landscape character impact during operation

An assessment of the impact of the project on landscape character during the day throughout operation is contained in **Table 5-2**.

Table 5-2 Landscape character impact during operation, daytime

Landscape character zone	Landscape sensitivity	Magnitude of change	Landscape character impact
LCZ 1: Energy and mining	Very low	Very low <ul style="list-style-type: none"> Project infrastructure would occupy a relatively small area within the LCZ, and the largest new structure (Bayswater South switching station) would be located adjacent to an existing substation Project transmission towers and lines would not detract from, or result in the loss of, existing landscape elements within the LCZ. There are multiple existing tall, industrial elements within the LCZ, and the project would not be distinctive or draw attention The project would be a minor and consistent element with the existing character of the LCZ and post-mining character. 	Very low
LCZ 2: Jerrys Plains rural village	Moderate	Negligible <ul style="list-style-type: none"> The project would not directly impact the LCZ or alter existing physical characteristics of the LCZ. 	Negligible
LCZ 3: Hunter River (Lemington) Rural Valley	Moderate	Low <ul style="list-style-type: none"> The project towers and lines would occupy a small section of the LCZ, traversing the eastern end of the rural valley (for around 5 km). The project would occur below a dominant ridgeline (facing toward the energy and mining LCZ) limiting its visual exposure A section (of around 3 km) would appear along the valley floor between 2 ridges. It would be a relatively minor element in the landscape (resulting in around 4 visible towers occupying the valley floor). It would be visually dominated by the more elevated ridgelines, and in proximity of existing transmission lines The project would result in a minor change the open character of the rural valley. 	Low
LCZ 4: Hunter River (Maison Dieu) Rural Valley	Low	Low <ul style="list-style-type: none"> The project would occupy a relatively long distance, skirting the western edge of the Maison Dieu Rural Valley (for around 13.6 km) 	Low

Landscape character zone	Landscape sensitivity	Magnitude of change	Landscape character impact
		<ul style="list-style-type: none"> Project towers and lines would occupy open agricultural land, however, would be sited adjacent the energy and mining LCZ. Against the visible background of open-cut mining, and proximity to existing transmission lines, the project would be a relatively minor element in the landscape The project would result in a minor change to the key characteristics of the landscape. 	
LCZ 5: Bushland and open forest	Low	Very low <ul style="list-style-type: none"> The project would occupy the western fringe of the LCZ, adjacent to the energy and mining LCZ Project towers and lines would occur in proximity to existing transmission lines. The project would not detract from existing landscape elements and would not be distinctive or draw attention The infrastructure would result in a minor change to the visual characteristics of the landscape. 	Very low
LCZ 6: Broke rural village	High	Negligible <ul style="list-style-type: none"> The project would not directly impact the LCZ or alter existing physical characteristics of the LCZ. 	Negligible
LCZ 7: Wollombi Brook rural valley	Moderate	Moderate <ul style="list-style-type: none"> The project would occupy a small distance along the eastern end of the LCZ (around 3.5 km) Although occupying a relatively small area within the LCZ, there is currently no energy infrastructure in this location. Project towers and lines would be a noticeable element in the landscape Near the project, the height and size of the towers may locally dominate, contrasting the surrounding flat, cultivated land, and changing the key characteristics of the landscape. However, adjacent bushland and open forest LCZ (to the east) would likely provide a more complex, vegetated background and partially absorb the visual characteristics of the project. 	Moderate
LCZ 8: Forested hills	Moderate	Moderate <ul style="list-style-type: none"> The project would not directly or permanently impact National Parks or Conservations Areas within the LCZ or alter existing physical characteristics of those places. Ongoing maintenance of the HTP would require periodic and permanent removal of trees in the corridor. The cleared corridor would remain a noticeable element in the forested landscape when in proximity. However, surrounding existing trees would screen the corridor when at a distance, limiting the extent of change to the LCZ. Transmission towers within the corridor are less likely to be a noticeable new feature of the landscape (due to surrounding screening by existing trees) except where the corridor and transmission towers are in an elevated, prominent location, such as in the vicinity of Congewai Creek/Wollombi Road. 	Moderate

Landscape character zone	Landscape sensitivity	Magnitude of change	Landscape character impact
LCZ 9: Millfield suburban area	Low	Negligible <ul style="list-style-type: none"> The project would not directly impact the LCZ or alter existing physical characteristics of the LCZ The project would be beyond the visual setting of the residential area and would not have a material effect on its sense of place. 	Negligible
LCZ 10: Congewai Creek Rural Valley	Moderate	Negligible <ul style="list-style-type: none"> The project would not directly impact the LCZ or alter existing physical characteristics of the LCZ. 	Negligible
LCZ 11: Narrow Rural Valleys	Moderate	Moderate <ul style="list-style-type: none"> The project would span a very small section of the LCZ (less than 1 km), crossing the open, narrow valley floor (which is a visual focus of the enclosed landscape) adjacent the Congewai Creek rural valley LCZ. The landscape opens at this point into a wider, valley floor. Towers would not occupy the valley floor. The northern tower would be located on a prominent ridgeline in the adjacent forest LCZ, while the southern tower would be located on vegetated foothills in the adjacent forest LCZ. The northern tower on the ridge and lines spanning the narrow valley may become a noticeable element and somewhat change key characteristics of the landscape. 	Moderate
LCZ 12: Managed forestry	Low	Moderate <ul style="list-style-type: none"> The project would occupy a large area of the forest LCZ, traversing north-south through state forest Project towers and lines would be a new and noticeable element in the landscape; however, visual exposure would be limited to the (relatively) low-use forestry tracks The project switching station would occupy a large area, and require the removal of a large area of bushland The switching station would introduce industrial characteristics to this area that would contrast the surrounding forest, comprising large areas of hardstand and electrical components and buildings. When travelling on the unsealed forestry road adjacent to the switching station, it would be mostly out of view, and it would have very limited visual exposure from any other Forestry roads and tracks. 	Low
Locations beyond the study area			
Hebden Road	Very low	Negligible <ul style="list-style-type: none"> There would be no permanent changes to the key characteristics of the landscape. 	Negligible
Freemans Drive	Low	Negligible <ul style="list-style-type: none"> There would be no permanent changes to the key characteristics of the landscape. 	Negligible

5.4 Landscape character impacts at night

5.4.1 Landscape character impact during construction at night

An assessment of the potential landscape character impacts of the project at night during construction is shown in Table 5-3.

Table 5-3 Landscape character impact during construction, nighttime

Landscape character zone	Nighttime Landscape sensitivity	Magnitude of change	Landscape character impact
LCZ 1: Energy and mining	Very low	Negligible <ul style="list-style-type: none"> Construction of Bayswater South switching station is unlikely to occur at night within the LCZ Lighting associated with construction would not change the existing bright lighting levels within the LCZ Construction lighting would not contrast with the existing nighttime landscape of the LCZ. 	Negligible
LCZ 2: Jerrys Plains rural village	Low	Negligible <ul style="list-style-type: none"> Jerrys Plains is around 3 km from the project corridor. Construction of project towers and lines within the corridor would not occur at night The nearest construction support site is over 3 km from Jerrys Plains. There is no permanent lighting associated with construction support sites and construction activities would not be undertaken there at night There would be no change to the existing nighttime landscape of the LCZ. 	Negligible
LCZ 3: Hunter River (Lemington) Rural Valley	Moderate	Negligible <ul style="list-style-type: none"> Construction of project towers and lines within the corridor would not occur at night There is no permanent lighting associated with construction support sites and construction activities would not be undertaken at support sites within the LCZ at night There would be no change to the existing nighttime landscape of the LCZ. 	Negligible
LCZ 4: Hunter River (Maison Dieu) Rural Valley	Moderate	Low <ul style="list-style-type: none"> The temporary workers' accommodation within the LCZ would operate 24/7 and include external lighting of access roads, car parks and pathways. Vehicle access to/from the workers' accommodation would also occur at night Construction of project towers and lines within the corridor would not occur at night There is no permanent lighting associated with construction support sites and construction activities would not be undertaken at construction support sites at night Overall, project lighting would slightly increase existing nighttime level of lighting in the landscape 	Low
LCZ 5: Bushland and open forest	Moderate	Negligible <ul style="list-style-type: none"> Construction of project towers and lines within the corridor would not occur at night 	Negligible

Landscape character zone	Nighttime Landscape sensitivity	Magnitude of change	Landscape character impact
		<ul style="list-style-type: none"> There is no permanent lighting associated with construction support sites and construction activities would not be undertaken at support sites within the LCZ at night There would be no change to the existing nighttime landscape of the LCZ. 	
LCZ 6: Broke rural village	Low	Negligible <ul style="list-style-type: none"> Broke is around 4 km from the project corridor. Construction of project towers and lines within the corridor would not occur at night The stringing site within Wollombi Brook rural valley (the nearest construction support site to Broke) is around 4 km away. There is no permanent lighting associated with construction support sites and construction activities would not be undertaken there at night There would be no change to the existing nighttime landscape of the LCZ 	Negligible
LCZ 7: Wollombi Brook rural valley	Moderate	Negligible <ul style="list-style-type: none"> Construction of project towers and lines within the corridor would not occur at night There is no permanent lighting associated with construction support sites and construction activities would not be undertaken at support sites within the LCZ at night There would be no change to the existing nighttime landscape of the LCZ. 	Negligible
LCZ 8: Forested hills	High	Low <ul style="list-style-type: none"> Temporary construction lighting occurring along the HTP and construction support sites would be unlikely to be visible from National Parks or State Conservation Areas within the LCZ. Vegetation clearing, and construction of project towers and lines within the corridor would not occur at night. It is possible that night lighting from construction support sites (such as the workers' accommodation adjacent to the LCZ along Wollombi Road) would be visible from the LCZ. 	Moderate
LCZ 9: Millfield suburban area	Low	Negligible <ul style="list-style-type: none"> Millfield is almost 2 km from the project corridor. Construction of project towers and lines within the corridor would not occur at night The nearest construction support site is adjacent to Millfield. There is no permanent lighting associated with construction support sites and construction activities would not be undertaken there at night The larger construction support site (located in the narrow rural valley) is over 2 km away. There is no permanent lighting associated with construction support sites and construction activities would not be undertaken there at night There is no permanent lighting associated with construction support sites and construction activities would not be undertaken at support sites within the LCZ at night There would be no change to the existing nighttime landscape of the LCZ. 	Negligible
LCZ 10: Congewai Creek Rural Valley	Moderate	Negligible <ul style="list-style-type: none"> The construction support site within the LCZ would have no permanent lighting and construction activities would not be undertaken there at night 	Negligible

Landscape character zone	Nighttime Landscape sensitivity	Magnitude of change	Landscape character impact
		<ul style="list-style-type: none"> The larger construction support site (located in the adjacent narrow rural valley) would also have no permanent lighting and construction activities would not be undertaken there at night There would be no change to the existing nighttime landscape of the LCZ. 	
LCZ 11: Narrow Rural Valleys	Moderate	Negligible <ul style="list-style-type: none"> Construction of project towers and lines within the corridor would not occur at night There is no permanent lighting associated with the large construction support site within the LCZ and construction activities would not be undertaken there at night There would be no change to the existing nighttime landscape of the LCZ. 	Negligible
LCZ 12: Managed forestry	High	Low <ul style="list-style-type: none"> Construction of Olney switching station may occur at night within the LCZ. Lighting associated with construction would contrast the dark lighting level of the landscape in the immediate area of the construction site. Construction of project towers and lines within the corridor would not occur at night Construction lighting at the switching station would result in a local change to the existing nighttime landscape of the LCZ. 	Moderate
Locations beyond the study area			
Hebden Road	Low	Low <ul style="list-style-type: none"> The temporary workers' accommodation would operate 24/7 and include external lighting of access roads, car parks and pathways. Vehicle access to/from the workers' accommodation would also occur at night There would not be construction activities associated with the compound or laydown areas at night The lighting of the project would not contrast substantially with the surrounding landscape at night. 	Low
Freemans Drive	Moderate	Moderate <ul style="list-style-type: none"> The temporary workers' accommodation would operate 24/7 and include external lighting of access roads, car parks and pathways. Vehicle access to/from the workers' accommodation would also occur at night There would not be construction activities associated with the compound or laydown areas at night Surrounding trees would limit night lighting. However, lighting may contrast somewhat with the surrounding landscape at night. 	Moderate

5.4.2 Landscape character impact during operation at night

There is no operational lighting proposed along the transmission line. Lighting would be installed at the Bayswater and Olney switching station, however, there is unlikely to be regular operational or maintenance activity at night at either switching station, or along the transmission line unless for emergencies. Occasional lighting at the switching station would increase the level of lighting within the LCZs identified for the project in this section.

An assessment of the potential landscape character impacts of the project during operation at night is shown in Table 5-4.

Table 5-4 Landscape character impact during operation, nighttime

Landscape character zone	Nighttime Landscape sensitivity	Magnitude of change	Landscape character impact
LCZ 1: Energy and mining	Very low	Negligible <ul style="list-style-type: none"> Lighting would be associated with Bayswater South switching station. Slightly increasing lighting within the LCZ Project towers and lines would not include permanent lighting Project lighting would not contrast substantially with the existing nighttime landscape of the LCZ 	Negligible
LCZ 2: Jerrys Plains rural village	Low	Negligible <ul style="list-style-type: none"> Project towers and lines would not include permanent lighting The project would not change the existing nighttime landscape of the LCZ 	Negligible
LCZ 3: Hunter River (Lemington) Rural Valley	Moderate	Negligible <ul style="list-style-type: none"> Project towers and lines would not include permanent lighting The project would not change the existing nighttime landscape of the LCZ 	Negligible
LCZ 4: Hunter River (Maison Dieu) Rural Valley	Moderate	Negligible <ul style="list-style-type: none"> Following completion of construction, the accommodation facility in the LCZ and its associated lighting would be removed and the site restored Project towers and lines would not include permanent lighting The project would not change the existing nighttime landscape of the LCZ 	Negligible
LCZ 5: Bushland and open forest	Moderate	Negligible <ul style="list-style-type: none"> Project towers and lines would not include permanent lighting The project would not change the existing nighttime landscape of the LCZ 	Negligible
LCZ 6: Broke rural village	Low	Negligible <ul style="list-style-type: none"> Project towers and lines would not include permanent lighting The project would not change the existing nighttime landscape of the LCZ 	Negligible
LCZ 7: Wollombi Brook rural valley	Moderate	Negligible <ul style="list-style-type: none"> Project towers and lines would not include permanent lighting The project would not change the existing nighttime landscape of the LCZ 	Negligible
LCZ 8: Forested hills	High	Negligible <ul style="list-style-type: none"> Project towers and lines would not include permanent lighting The project would not change the existing nighttime landscape of the LCZ 	Negligible

Landscape character zone	Nighttime Landscape sensitivity	Magnitude of change	Landscape character impact
LCZ 9: Millfield suburban area	Low	Negligible <ul style="list-style-type: none"> Project towers and lines would not include permanent lighting The project would not change the existing nighttime landscape of the LCZ 	Negligible
LCZ 10: Congewai Creek Rural Valley	Moderate	Negligible <ul style="list-style-type: none"> Project towers and lines would not include permanent lighting The project would not change the existing nighttime landscape of the LCZ 	Negligible
LCZ 11: Narrow Rural Valleys	Moderate	Negligible <ul style="list-style-type: none"> Project towers and lines would not include permanent lighting The project would not change the existing nighttime landscape of the LCZ 	Negligible
LCZ 12: Managed forestry	High	Low <ul style="list-style-type: none"> Project towers and lines would not include permanent lighting. Permanent lighting would be associated with Olney switching station, and be required occasionally, such as during emergency maintenance. The intermittent use of lighting at night would (on occasion) increase localised lighting within the LCZ, contrasting with the existing nighttime landscape of the LCZ. 	Moderate
Locations beyond the study area			
Hebden Road	Low	Negligible <ul style="list-style-type: none"> There would be no permanent changes to the key characteristics of the landscape. 	Negligible
Freemans Drive	Moderate	Negligible <ul style="list-style-type: none"> There would be no permanent changes to the key characteristics of the landscape. 	Negligible

5.5 Summary of landscape character impacts

A summary of the daytime and nighttime landscape character impacts of the HTP is provided in Table 5-5 and Table 5-6, respectively.

The assessment results show that during the daytime, the HTP would have a:

- **moderate** impact on 3 landscape character zones:
 - LCZ 7: Wollombi Brook rural valley, during construction and operation, due to the higher scenic quality of the LCZ
 - LCZ 8: Forested hills, during construction and operation, due to the existing wooded characteristic of the landscape and proposed tree clearance for the HTP, and
 - LCZ 11: Narrow rural valleys, during construction and operation, due to the higher magnitude of the HTP within the LCZ
- **low** impact on 5 landscape character zones and locations (LCZ 3: Hunter River (Lemington) rural valley (during construction and operation); LCZ 4: Hunter River (Maison Dieu) rural valley (during construction and operation); LCZ 12: Managed forestry (during construction and operation); LCZ 9: Millfield suburban area (during construction); LCZ 10: Congewai Creek rural valley (during construction) and Freemans Drive (during construction), due to the lower scenic quality, and greater distance from the HTP
- **very low** impact on 2 landscape character zones and 1 location beyond the LCVIA study area: LCZ 1: Energy and mining (during construction and operation); LCZ 5: Bushland and open forest (during construction and operation); Hebden Road (during construction) due to the very low scenic quality and presence of mining and related infrastructure
- **negligible** impact on remaining landscape character zones (LCZ 2: Jerrys Plains rural village, LCZ 6: Broke rural village, and LCZ 10: Congewai Creek rural valley (during operation) due to the separation of the project from these areas.

The assessment results show that during the nighttime, the HTP would have a:

- **moderate** impact on 1 landscape character zone and 1 location beyond the LCVIA study area:
 - LCZ 12: Managed forestry, during construction and operation, at the location of the proposed Olney switching station, due to the introduction of (occasional) localised artificial light into an otherwise dark environment
 - Freemans Drive, during construction, due to increased localised lighting of the rural area associated with the proposed workers' accommodation.
- **low** impact on 1 landscape character zone and 1 location beyond the LCVIA study area:
 - LCZ 4: Hunter River (Maison Dieu) Rural Valley) (during construction) due to the temporary workers' accommodation within the LCZ
 - Hebden Road, during construction, due to the workers' accommodation facility within the LCZ.

negligible impact on the remaining landscape character zones during construction and operation as there is no lighting or construction support facilities proposed.

Table 5-5 Summary of landscape character impact – day time

		Construction		Operation	
Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
LCZ 1: Energy and mining	Very low	Very low	Very low	Very low	Very low
LCZ 2: Jerrys Plains rural village	Moderate	Negligible	Negligible	Negligible	Negligible
LCZ 3: Hunter River (Lemington) rural valley	Moderate	Low	Low	Low	Low
LCZ 4: Hunter River (Maison Dieu) rural valley	Low	Low	Low	Low	Low
LCZ 5: Bushland and open forest	Low	Very low	Very low	Very low	Very low
LCZ 6: Broke rural village	Moderate	Negligible	Negligible	Negligible	Negligible
LCZ 7: Wollombi Brook rural valley	Moderate	Moderate	Moderate	Moderate	Moderate
LCZ 8: Forested hills	Moderate	Moderate	Moderate	Moderate	Moderate
LCZ 9: Millfield suburban area	Low	Low	Low	Negligible	Negligible
LCZ 10: Congewai Creek rural valley	Moderate	Low	Low	Negligible	Negligible
LCZ 11: Narrow rural valleys	Moderate	High	Moderate	Moderate	Moderate
LCZ 12: Managed forestry	Low	Low	Low	Moderate	Low
Hebden Road	Very low	Low	Very low	Negligible. Only in use during construction phase.	
Freemans Drive	Low	Low	Low		

Table 5-6 Summary of landscape character impact – nighttime

		Construction		Operation	
Location	Sensitivity	Magnitude	Impact	Magnitude	Impact
LCZ 1: Energy and mining	Very low	Negligible	Negligible	Negligible	Negligible
LCZ 2: Jerrys Plains rural village	Low	Negligible	Negligible	Negligible	Negligible
LCZ 3: Hunter River (Lemington) Rural Valley	Moderate	Negligible	Negligible	Negligible	Negligible
LCZ 4: Hunter River (Maison Dieu) Rural Valley	Moderate	Low	Low	Negligible	Negligible
LCZ 5: Bushland and open forest	Moderate	Negligible	Negligible	Negligible	Negligible
LCZ 6: Broke rural village	Low	Negligible	Negligible	Negligible	Negligible
LCZ 7: Wollombi Brook rural valley	Moderate	Negligible	Negligible	Negligible	Negligible
LCZ 8: Forested hills	High	Negligible	Negligible	Negligible	Negligible
LCZ 9: Millfield suburban area	Low	Negligible	Negligible	Negligible	Negligible
LCZ 10: Congewai Creek Rural Valley	Moderate	Negligible	Negligible	Negligible	Negligible
LCZ 11: Narrow Rural Valleys	Moderate	Negligible	Negligible	Negligible	Negligible
LCZ 12: Managed forestry	High	Low	Moderate	Low	Moderate
Hebden Road	Low	Low	Low	Negligible. Only in use during construction phase.	
Freemans Drive	Moderate	Moderate	Moderate		

Chapter 6: Visual impact assessment

The visual assessment study area for the project is defined as all areas within 1.625 kilometres of the Hunter Transmission Project (HTP) corridor (based on a maximum tower height of 85 metres). This equates to a 3.25-kilometre wide corridor including the transmission line corridor (see DPE 2024). The visual study area is shown **Appendix A**.

6.1 Visibility analysis

The maps in **Appendix E** show the visual catchment, which is the area that has potential visibility of the project. This analysis is based on the maximum heights of the transmission line structures (85 metres) and is identified using a 3D digital terrain model of the landform of the study area.

This map shows areas where there is a greater potential for views, assuming there is no existing screening vegetation or buildings. Those areas outside the visual catchment are eliminated from further visual assessment.

6.2 Assessment of public viewpoints

The assessment of impact to public views is provided in the following sections:

- section 6.2.1- daytime impacts to public viewpoints during operation
- section 6.2.1.4- daytime impacts to public viewpoints during construction
- section 6.2.3- nighttime impacts to public viewpoints during construction
- section 6.2.4- nighttime impacts to public viewpoints during operation.

6.2.1 Assessment of daytime visual impacts during operation

An assessment of representative views from public locations has been undertaken using the methodology described in section 3.5 of this landscape character and visual impact assessment (LCVIA). This includes a simple, intermediate and detailed visual assessment which determine the potential impact to viewpoints during the day throughout operation.

6.2.1.1 Simple visual assessment

A simple visual assessment has been undertaken for 10 public viewpoints selected to represent views to the project. The viewpoints include a state highway and other public roads, a village and lookout:

- 01: New England Highway
- 02: Jerrys Plains
- 03: Golden Highway
- 04: Shearers Lane
- 05: Hunter Valley Gliding Club
- 06: Putty Road
- 07: Cessnock Road
- 08: Wollombi Road (looking east)
- 09: Wollombi Road (looking west)
- 10: Flat Rock Lookout
- 11: Olney Headquarters campground and picnic area
- 12: Watagan Forest Road

Two of the viewpoints (01 and 02) are outside of the visual impact study area, however, they are included in the assessment as: the New England Highway (01) is an important regional road and major tourism route; and Jerrys Plains (02) is of regional importance as a gateway to the scenic equine and viticulture area of Muswellbrook Shire to the northwest.

An inspection was made at each viewpoint. If the location offered multiple viewing points, the assessment was undertaken from a position that would provide the least obstructed views to the project. As public roads are linear viewpoints (that is, the view changes with movement along the route), the assessment was undertaken from a position enroute that would provide an unobstructed view of the project, would be close to the project, and where it was safe to stop and undertake the assessment.

The outcomes of the simple visual impact assessment of public viewpoints are contained in Table 6-1. The location of these viewpoints is included in **Appendix F**.

The simple assessment identified:

- 1 public viewpoints with a potential **high** visual impact (P07: Cessnock Road)
- 5 public viewpoints with a potential **moderate** visual impact (06: Putty Road, 08: Wollombi Road (looking east); 10: Flat Rock Lookout, 11: Olney Headquarters Campground and picnic area, and 12: Watagan Forest Road)
- 6 public viewpoints with a potential **low** visual impact, and
- 3 public viewpoints with a potential **very low** visual impact.

Those viewpoints with a low or very low visual impact are eliminated from further assessment. The 6 viewpoints with a moderate or high potential visual impact proceed to the next level of assessment.



Figure 6-1 Flat Rock Lookout

Table 6-1 Summary of simple assessment – public views

Viewpoint	Viewpoint type	Viewpoint sensitivity	Scenic quality	Landscape character zone	Potential visual sensitivity	Potential vertical cells	Potential magnitude	Distance to HTP corridor (metres)	Potential Impact rating
01: New England Highway	Public road	Very low: State highway	Very low: Dominating presence of infrastructure and highly modified landscape	LCZ 1 Energy and mining	Very low	2	Very low	2615	Very low
02: Jerrys Plains	Town centre	Low: Town centre	Moderate: District gateway to vineyards, equine and scenic areas to the north	LCZ 2 Jerrys Plains rural village	Low	2	Very low	2880	Very low
03: Golden Highway	Public road	Low: State highway	Moderate: Recognised as a regionally significant scenic route (Gyde 2024)	LCZ 3 Hunter River (Lemington) rural valley	Low	4	Low	1490	Low
04: Shearers Lane	Public road	Very low: Unsealed road	Low: Presence of mining infrastructure and highly modified landscape	LCZ 4 Hunter River (Maison Dieu) rural valley	Very low	4	Low	1400	Low
05: Hunter Valley Gliding Club	Community recreational facility	Low: Gliding club	Low: Presence of energy infrastructure and highly modified landscape	LCZ 1 Energy and mining	Low	4	Low	1600	Low
06: Putty Road	Public road	Very low: Classified main road	Low: Dominating presence of infrastructure and highly modified landscape	LCZ 4 Hunter River (Maison Dieu) rural valley	Very low	17	Very high	295	Moderate
07: Cessnock Road	Public road	Low: Scenic drive (not classified as a tourist drive, however, used by tourists accessing vineyards) and entry to Broke village	High: Visually dominant steep ranges, rocky outcrops, broad pastoral valley	LCZ 7 Wollombi Brook rural valley	Moderate	12	Very high	410	High

Viewpoint	Viewpoint type	Viewpoint sensitivity	Scenic quality	Landscape character zone	Potential visual sensitivity	Potential vertical cells	Potential magnitude	Distance to HTP corridor (metres)	Potential Impact rating
08: Wollombi Road (looking east)	Public road	Low: Part of NSW Tourist Drive 33 (Calga to Branxton). Used by tourists accessing vineyards and is near the entry to Millfield village	Moderate: Open pastoral land with distinctive rugged ranges	LCZ 11 Narrow rural valley	Low	9	Very high	540	Moderate
09: Wollombi Road (looking west)	Public road	Low: Part of NSW Tourist Drive 33 (Calga to Branxton). Used by tourists accessing Wollombi area	Moderate: Open pastoral land with forest background	LCZ 7 Wollombi Brook rural valley	Low	3	Very low	2015	Very low
10: Flat Rock Lookout	Lookout	Low: Publicly accessible lookout	High: Wide regional outlook (north to east) over pastoral land and rugged ranges. The project location is to the south and west	LCZ 12 Managed forestry	Moderate	6	High	820	Moderate
11: Olney Headquarters campground and picnic area	Campground and picnic area	Low: Publicly accessible picnic and recreation area	Low: Clearing within state forest with minor infrastructure (toilet block and picnic facilities) for tourist camping, adjacent dominant, cleared forestry area	LCZ 12 Managed forestry	Low	14	Very high	365	Moderate
12: Watagan Forest Road ⁶	Public road	Very low: Unsealed forestry road	Moderate: Tall, dense forest	LCZ 12 Managed forestry	Very low	20	Very high	235	Moderate

⁶ The viewpoint assessment was based on distance to the nearest proposed tower. Some proposed switching station components would be closer to the viewer.

6.2.1.2 Intermediate visual assessment

The intermediate assessment measures magnitude by preparing a 3D model (bare earth render) of the view and overlaying the modelled project. As there have been requests from the community to see photomontages of the project, and access to the public viewpoint was available for photography, the viewpoints proceeded to detailed visual assessment for more accurate calculation of magnitude, without undertaking the interim intermediate assessment step.

6.2.1.3 Detailed visual assessment

A detailed assessment has been undertaken on the 6 public viewpoint with the potential for a moderate and high visual impact:

- 06: Putty Road
- 07: Cessnock Road
- 08: Wollombi Road (looking east)
- 10: Flat Rock Lookout
- 11: Olney Headquarters campground and picnic area
- 12: Watagan Forest Road

For the detailed assessment, a photomontage (or reference bare earth render where there is considerable intervening vegetation) was prepared to illustrate the location and scale of the project in the view. From this photomontage (or bare earth render) the magnitude of change can be more accurately measured.

The detailed assessment of public views is contained in full in **Appendix G**. A summary of the detailed assessment is presented in Table 6-3.

The detailed assessment found that the impact to P07: Cessnock Road would decrease from high (in the simple assessment) to a moderate visual impact, and all of the other public viewpoints would reduce from a moderate potential impact (in the simple assessment) to a low visual impact.



Figure 6-2 Olney Headquarters camp ground and picnic area

Table 6-2 Summary of detailed assessment – public views

Public viewpoint	Distance to HTP corridor (metres)	Viewpoint sensitivity	Scenic quality	Visual sensitivity	Number of cells	Magnitude	Visual impact
06: Putty Road	295	Very low	Very low	Very low	35	High	Low
07: Cessnock Road	410	Low	High	Moderate	31	High	Moderate
08: Wollombi Road (looking east)	540	Low	Moderate	Low	12	Low	Low
10: Flat Rock Lookout	820	Low	High	Moderate	0	None	None
11: Olney Headquarters campground and picnic area	365	Low	Low	Low	18	Moderate	Low
12: Watagan Forest Road	235	Very low	Moderate	Very low	0	None	None

Table 6-3 Comparison of simple and detailed assessment results – public views

Public viewpoint	Sensitivity	Simple assessment		Detailed assessment	
		Potential magnitude	Potential impact rating	Magnitude rating	Impact rating
06: Putty Road	Very low	Very high	Moderate	High	Low
07: Cessnock Road	Moderate	Very high	High	High	Moderate
08: Wollombi Road (looking east)	Low	Very high	Moderate	Low	Low
10: Flat Rock Lookout	Moderate	High	Moderate	None	None
11: Olney Headquarters campground and picnic area	Low	Very high	Moderate	Moderate	Low
12: Watagan Forest Road	Very low	Very high	Moderate	None	None

6.2.1.4 Performance objectives

In accordance with the Technical Supplement, relevant performance objectives must be met for each assessable viewpoint and the level of impact identified. For moderate impacts from viewpoints from public roads, 'As far as is reasonable and feasible, the proponent should seek to reduce moderate visual impacts to road users. Appropriate mitigation options include vegetation or other screening. Mitigation should only be considered if it would not obstruct important views and sight lines, could be confined to a relatively small area (i.e. vegetation screening would not be required for several hundred meters along a transport corridor) and where agreed with the relevant road authority'. (page 33, DPHI 2024).

For receivers with a low or very low visual impact, no mitigation is required.

There has been a moderate visual impact identified from Viewpoint 07: Cessnock Road. This viewpoint represents a location close to where the HTP would cross Cessnock Road and while the sensitivity of this view is low, the view is of high scenic quality. Any screening vegetation proposed for this section of the road corridor would also obstruct the views to the ridgeline that is the focal point of this view, therefore obstructing an important view. Therefore, it is considered that, due to the short distance over which this moderate impact would be experienced, and the potential for the loss of an important view, that screening is proposed to mitigate this impact. However, in this area, the transmission line tower height would be minimised as far as practical to reduce the magnitude of change and reduce the visual impact.

6.2.2 Assessment of daytime visual impacts during construction

There would be temporary visual impacts from public viewpoints with a view to the HTP construction area, construction support sites, or the flight path of helicopters. Some construction activities may draw attention, such as helicopter movements. Other activities, such as surveying, would be more commonplace and less noticeable. Some construction support sites would result in less contrast and change in the view, such as laydown areas, while others such as compounds and temporary accommodation facilities, result in greater contrast and change in the view.

Public viewpoints that would experience the highest change to the view during construction would be:

- Viewpoint 08 and 09 Wollombi Road. A large construction support site would be located adjacent to Wollombi Road, west of Millfield. The construction support site would be clearly visible, close to public road users, and activities within the support site would occur 24 hours a day. The site and activities would significantly contrast the existing view. Helicopter activities may temporarily draw attention as aerial movement would be a new element in the landscape.
- Viewpoint 12 Watagan Forest Road. Significant change would occur during construction of Olney switching station, adjacent to Watagan Forest Road. Trees would be removed, heavy trucks and machinery would be in use, traffic controls would be in place, and earth moving and installation activities would be undertaken. These activities and changes would occur close to the viewer, although would only be experienced for a short period of time, while travelling past the construction area.

Construction changes would also be more noticeable from:

- Viewpoint 07: Cessnock Road. Construction of the transmission towers and line stringing would be clearly visible within the open valley, and contrast the agricultural setting, and scenic background
- Freeman's Drive. From Freemans Drive, the workers' accommodation and support site would be visible, although it is likely to be surrounded by trees which would filter views of activities at the site.

The construction support sites would be in place for about 2.5 years however the impacts would occur for a short period, while in transit, travelling past the construction site.

Construction impacts are temporary. Following construction, the construction support sites would be repaired and returned to their former use. Machinery and vehicles associated with installation activities would no longer be present in the view. The impact of the newly installed permanent infrastructure was assessed at section 6.2.1

6.2.3 Nighttime visual impacts during construction

At night there would be temporary visual impacts from public roads with a view to construction support sites and temporary worker accommodation facilities. The level of impact will vary according to the visibility (distance and intervening landform and vegetation) and sensitivity of the viewing location. Viewpoint 06, 07 and 10 would experience the most significant nighttime impacts, as lighting at the adjacent construction sites would contrast existing night lighting. Impacts would occur for a short period, while in transit, travelling past the construction sites.

6.2.4 Nighttime visual impacts during operation

There is no operational lighting proposed along the transmission line.

Lighting would be installed at the Bayswater and Olney switching station, however, there is unlikely to be regular operational or maintenance activity at night at either switching station, or along the transmission line unless for emergencies.

Occasional lighting at Olney switching station would increase localised lighting for road uses travelling along Watagan Forest Road (within LCZ 12 – Managed forestry). The switching station is surrounded by trees, and lighting would appear briefly, while in transit past the switching station.

6.3 Assessment of private viewpoints

The assessment of impact to private views is provided in the following sections:

- section 6.3.1- daytime impacts to private viewpoints during operation
- section 6.3.2- daytime impacts to private viewpoints during construction
- section 0 - nighttime impacts to private viewpoints during construction
- section 6.3.4- nighttime impacts to private viewpoints during operation.

6.3.1 Impacts to private views during operation, daytime

An assessment of views from private locations has been undertaken using the steps outlined in the Technical Supplement (as described in section 3.5 of this LCVIA). This includes a proportionate visual assessment (simple, intermediate and detailed assessment) to determine the impact to private viewpoints during the day throughout operation.

This assessment was conducted on private receivers, including dwellings, and tourist and visitor accommodation, within the visual assessment study area, that is, within 1.625 kilometres of the Project. The assessment excluded easement affected dwellings; dwellings being acquired by the HTP, derelict or non-habitable dwellings; moveable dwellings; and accommodation within Singleton Military Area; ancillary farm, industrial or commercial buildings; heritage ruins and non-habitable heritage items.

6.3.1.1 Rural setback

In accordance with the Technical Supplement the setback for an 85 metre high transmission tower is 400 metres in rural areas. The rural setback is shown **Appendix A**. Any dwelling within these rural set back areas is identified as having a **high** potential visual impact and must be assessed against high-impact performance criteria.

five dwellings have been identified within the setback (ID2928, 2929, 2930, 2931 and 2932). All of these dwellings are located on the one landholding and are clustered together.

ID2931 is the closest dwelling to the HTP project. The nearest proposed transmission tower would be around 310 metres away from this dwelling, however, the view in the direction of the proposed transmission tower, is screened by vegetation (see Figure 6-3). The other dwellings on this property, ID2928, 2929, 2930 and 2932, would also have the nearest transmission tower screened by intervening vegetation.

In accordance with the Technical Supplement, 'if the transmission tower would be partially visible due to vegetation, topography or other mitigating factors, then the sensitive receiver is exempt from the setback' (page 21, DPHI 2024). In these cases, the proportionate visual assessment process is followed (as outlined in Figure 3-2).

As shown in Figure 6-3, and confirmed on site, this vegetation would screen the nearest transmission tower. The next closest transmission tower is around 440 metres from these dwelling, and not within the rural setback. Therefore, ID2928, 2929, 2930, 2931 and 2932 are exempt from the setback and are included in the proportional visual assessment that follows (see section 6.3.1.2). Through the proportional visual assessment process, this vegetation screening was confirmed at the detailed assessment phase (via a site visit and site photographs) (see section 6.3.1.4).



Figure 6-3 Rural setback - Proximity of ID2931 to transmission towers

6.3.1.2 Simple visual assessment

A simple visual assessment has been undertaken for 68 dwellings identified within the visual impact study area.

A site visit to each dwelling is not a component of the simple assessment and has not been undertaken. For this simple assessment, all views from dwellings are assumed to be primary views (that is, the highest sensitivity apart from listed heritage homes), and scenic quality is based on conservative assumptions of existing landscape character within each landscape character zone. A summary of the results of this assessment is contained in Table 6-4.

This assessment has identified:

- 12 viewpoints with a potential **high** visual impact
- 22 viewpoints with a potential **moderate** visual impact
- 34 viewpoints with a potential **low** visual impact.

In accordance with the Technical Supplement, those viewpoints with a potential low visual impact are eliminated from further assessment. An intermediate assessment is conducted for the viewpoints identified as having a potential high or moderate visual impact.

Table 6-4 Summary of simple assessment – private views

Viewpoint ID.	Viewpoint type	Viewpoint sensitivity	Scenic quality	Landscape character zone	Potential visual sensitivity	Maximum vertical field of view (cells)	Potential magnitude	Viewpoint in setback	Potential Impact rating
65	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
72	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
92	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
95	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
132	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	5	Moderate	N	Moderate
163	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
164	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
166	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
168	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	5	Moderate	N	Moderate
170	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	6	High	N	Moderate
173	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	7	Very high	N	High

Viewpoint ID.	Viewpoint type	Viewpoint sensitivity	Scenic quality	Landscape character zone	Potential visual sensitivity	Maximum vertical field of view (cells)	Potential magnitude	Viewpoint in setback	Potential Impact rating
229	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	5	Moderate	N	Moderate
232	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	6	High	N	Moderate
237	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	6	High	N	Moderate
238	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	7	Very high	N	High
251	Historic rural homestead 'Abbey Green'	High Potential primary view from historic rural dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	High	7	Very High	N	High
264	Rural dwelling (granny flat)	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
270	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
277	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	7	Very high	N	High
301	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	6	High	N	Moderate
315	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural area adjacent the Golden Highway	LCZ 5 Bushland and open forest	Moderate	4	Low	N	Low
463	Rural dwelling	Moderate Potential primary view from dwelling in rural area	High Rural character area with views of distinctive outcrops and ridges	LCZ 7 Wollombi Brook rural valley	High	5	Moderate	N	Moderate

Viewpoint ID.	Viewpoint type	Viewpoint sensitivity	Scenic quality	Landscape character zone	Potential visual sensitivity	Maximum vertical field of view (cells)	Potential magnitude	Viewpoint in setback	Potential Impact rating
465	Rural dwelling	Moderate Potential primary view from dwelling in rural area	High Rural character area with views of distinctive outcrops and ridges	LCZ 7 Wollombi Brook rural valley	High	5	Moderate	N	Moderate
466	Rural dwelling	Moderate Potential primary view from dwelling in rural area	High Rural character area with views of distinctive outcrops and ridges	LCZ 7 Wollombi Brook rural valley	High	4	Low	N	Moderate
467	Rural dwelling	Moderate Potential primary view from dwelling in rural area	High Rural character area with views of distinctive outcrops and ridges	LCZ 7 Wollombi Brook rural valley	High	5	Moderate	N	Moderate
471	Rural dwelling	Moderate Potential primary view from dwelling in rural area	High Rural character area with views of distinctive outcrops and ridges	LCZ 7 Wollombi Brook rural valley	High	10	Very High	N	High
472	Rural dwelling	Moderate Potential primary view from dwelling in rural area	High Rural character area with views of distinctive outcrops and ridges	LCZ 7 Wollombi Brook rural valley	High	8	Very High	N	High
1478	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	5	Moderate	N	Moderate
1495	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	4	Low	N	Low
1624	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	3	Very low	N	Low
1661	Organisation with residential and visitor facilities (New Gokula)	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	4	Low	N	Low

Viewpoint ID.	Viewpoint type	Viewpoint sensitivity	Scenic quality	Landscape character zone	Potential visual sensitivity	Maximum vertical field of view (cells)	Potential magnitude	Viewpoint in setback	Potential Impact rating
1665	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character close to densely vegetated ridges	LCZ 11 Narrow rural valley	Moderate	5	Moderate	N	Moderate
1670	Visitor centre. Organisation with residential and visitor facilities (New Gokula)	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	4	Low	N	Low
1679	Accommodation. Organisation with residential and visitor facilities (New Gokula)	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	5	Moderate	N	Moderate
1684	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character close to densely vegetated ridges	LCZ 11 Narrow rural valley	Moderate	5	Moderate	N	Moderate
1685	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character close to densely vegetated ridges	LCZ 11 Narrow rural valley	Moderate	6	High	N	Moderate
1689	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character close to densely vegetated ridges	LCZ 11 Narrow rural valley	Moderate	4	Low	N	Low
1978	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	4	Low	N	Low
2037	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	5	Moderate	N	Moderate
2184	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	4	Low	N	Low

Viewpoint ID.	Viewpoint type	Viewpoint sensitivity	Scenic quality	Landscape character zone	Potential visual sensitivity	Maximum vertical field of view (cells)	Potential magnitude	Viewpoint in setback	Potential Impact rating
2198	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	4	Low	N	Low
2203	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	4	Low	N	Low
2205	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	4	Low	N	Low
2214	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	4	Low	N	Low
2218	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	5	Moderate	N	Moderate
2219	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	5	Moderate	N	Moderate
2221	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	4	Low	N	Low
2222	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	4	Low	N	Low
2223	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	4	Low	N	Low
2224	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	4	Low	N	Low

Viewpoint ID.	Viewpoint type	Viewpoint sensitivity	Scenic quality	Landscape character zone	Potential visual sensitivity	Maximum vertical field of view (cells)	Potential magnitude	Viewpoint in setback	Potential Impact rating
2228	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 10 Congewai Creek rural valley	Moderate	4	Low	N	Low
2254	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	4	Low	N	Low
2274	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	5	Moderate	N	Moderate
2277	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character close to densely vegetated ridges	LCZ 11 Narrow rural valley	Moderate	4	Low	N	Low
2278	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	4	Low	N	Low
2279	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character close to densely vegetated ridges	LCZ 11 Narrow rural valley	Moderate	4	Low	N	Low
2283	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Clearing in densely vegetated, steeply sloping ridges	LCZ 8 Forested hills	Moderate	4	Low	N	Low
2918	Heritage dwelling	High Historic rural homestead. Locally heritage listed	Low Adjacent operational mining land and busy road	LCZ 1 Energy and mining	Moderate	6	High	N	Moderate
2920	Tourist accommodation	Moderate Tourist and visitor accommodation	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	5	Moderate	N	Moderate

Viewpoint ID.	Viewpoint type	Viewpoint sensitivity	Scenic quality	Landscape character zone	Potential visual sensitivity	Maximum vertical field of view (cells)	Potential magnitude	Viewpoint in setback	Potential Impact rating
2923	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
2924	Rural dwelling	Moderate Potential primary view from dwelling	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	4	Low	N	Low
1685b	Heritage dwelling 'Clark's Slab House'	High Historic rural homestead. Locally heritage listed	Moderate Open rural character	LCZ 11 Narrow rural valley	High	6	High	N	High
2926	Heritage dwelling 'Hambledon Hill'	High Historic rural homestead. Locally heritage listed	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	High	5	Moderate	N	Moderate
2925b	Rural dwelling on 'Hambledon Hill' property	Moderate Potential primary view from dwelling	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	5	Moderate	N	Moderate
2928	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	15	Very high	Y*	High
2929	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	15	Very high	Y*	High
2930	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	15	Very high	Y*	High
2931	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	15	Very high	Y*	High
2932	Rural dwelling	Moderate Potential primary view from dwelling in rural area	Moderate Open rural character	LCZ 4 Hunter River (Maison Dieu) rural valley	Moderate	15	Very high	Y*	High

* Refer to discussion in section 6.3.1.1,

6.3.1.3 Intermediate visual assessment

An intermediate assessment has been undertaken for those dwellings identified as having the potential for a moderate or higher visual impact. For the assessment, a 3D generated 'bare earth render' (or 'wireframe') of the project has been prepared to more accurately determine the magnitude rating. The bare earth render is a modelled view of the project within the landform. It does not include existing trees or other existing structures that could limit the view of the project. This assessment is contained in **Appendix H**. A summary of the results of this assessment is contained in Table 6-5.

The intermediate assessment has identified the potential for:

- 8 private viewpoints with a potential **high** visual impact
- 13 private viewpoints a **moderate** visual impact from
- **low** or no visual impact from all remaining private viewpoints

Those views with a high or moderate rating proceed to detailed assessment. In addition to this, some dwellings that have a potential low visual impact with a magnitude of four cells (low potential magnitude) were also advanced to the intermediate assessment.

Table 6-5 Summary of intermediate assessment

Dwelling ID.	Address	Sensitivity	Number of cells	Potential magnitude	Potential impact rating
65	956b Maison Dieu Road, Maison Dieu	Moderate	12	Low	Low
72	20 Shearers Lane, Maison Dieu	Moderate	12	Low	Low
92	50 Shearers Lane, Maison Dieu	Moderate	17	Moderate	Moderate
95	20 Shearers Lane, Maison Dieu	Moderate	12	Low	Low
132	318 Dights Crossing Road, Maison Dieu	Moderate	12	Low	Low
163	133 Long Point Road East, Long Point	Moderate	0	None	None
164	131 Long Point Road East, Long Point	Moderate	0	None	None
166	121 Long Point Road East, Long Point	Moderate	8	Low	Low
168	99 Long Point Road East, Long Point	Moderate	4	Very low	Low
170	83 Long Point Road East, Gouldsville	Moderate	14	Low	Low
173	66 Long Point Road East, Gouldsville	Moderate	25	Moderate	Moderate
229	535c Hambledon Hill Road, Hambledon Hill	Moderate	14	Low	Low
232	609a Hambledon Hill Road, Hambledon Hill	Moderate	21	Moderate	Moderate
238	609c Hambledon Hill Road, Hambledon Hill	Moderate	31	High	Moderate
237	609 Hambledon Hill Road, Hambledon Hill	Moderate	14	Low	Low
251	'Abbey House', 478 Putty Road, Mount Thorley	High	26	High	Moderate
264	984 Putty Road, Mount Thorley	Moderate	0	None	None
270	984 Putty Road, Mount Thorley	Moderate	0	None	None
277	896 Putty Road, Mount Thorley	Moderate	39	Very high	High
301	887 Putty Road, Mount Thorley	Moderate	30	High	Moderate
463	385 Cessnock Road, Broke	High	8	Low	Moderate
465	367 Cessnock Road, Broke	High	14	Low	Moderate
466	359 Cessnock Road, Broke	High	14	Low	Moderate

Dwelling ID.	Address	Sensitivity	Number of cells	Potential magnitude	Potential impact rating
467	368 Cessnock Road, Broke	High	19	Moderate	Moderate
471	118 Oakley Lane, Broke	High	31	High	High
472	36 Oakley Lane, Broke	High	27	High	High
1478	436 Cedar Creek Road, Cedar Creek	Moderate	4	Very low	Low
1495	436 Cedar Creek Road, Cedar Creek	Moderate	Trees intervene	None	None
1661	83 Lewis Road, Millfield	Moderate	0	None	None
1665	1726 Wollombi Road, Cedar Creek	Moderate	0	None	None
1679	83 Lewis Road, Millfield	Moderate	8	Low	Low
1684	Wollombi Road, Cedar Creek	Moderate	5	Very low	Low
1685	1700 Wollombi Road, Cedar Creek	Moderate	Refer 2926	Very low	Low
1689	1739 Wollombi Road, Sweetmans Creek	Moderate	8	Low	Low
1978	25 Wollombi Road, Millfield	Moderate	0	None	None
2037	1469 Wollombi Road, Millfield	Moderate	0	None	None
2184	52 Millfield Road, Millfield	Moderate	0	None	None
2198	232 Millfield Road, Millfield	Moderate	8	Low	Low
2203	147 Trig Road, Congewai	Moderate	Trees intervene	None	None
2205	284 Thursbys Road, Congewai	Moderate	Trees intervene	None	None
2214	168 Eglinford Lane, Congewai	Moderate	0	None	None
2218	191 Eglinford Lane, Congewai	Moderate	Trees intervene	None	None
2219	153 Eglinford Lane, Congewai	Moderate	Refer ID 2221	None	None
2221	121 Eglinford Lane, Congewai	Moderate	0	None	None
2222	125 Elingford Lane, Congewai	Moderate	Refer ID 2221	None	None
2223	Eglinford Lane, Congewai	Moderate	Refer ID 2221	None	None
2224	Eglinford Lane, Congewai	Moderate	0	None	None
2228	940 Congewai Road, Congewai	Moderate	0	None	None
2254	1297 Watagan Creek Road, Laguna	Moderate	Trees intervene	None	None
2274	1831 Watagan Creek Road, Laguna	Moderate	Trees intervene	None	None
2277	1713 Watagan Creek Road, Laguna	Moderate	0	None	None
2278	1999 Watagan Creek Road, Laguna	Moderate	Trees intervene	None	None
2279	1753 Watagan Creek Road, Laguna	Moderate	0	None	None
2283	1861 Watagan Creek Road, Laguna	Moderate	Trees intervene	None	None
2918	478 Putty Road, Mount Thorley	Moderate	Trees intervene	None	None
2920	887 Putty Road, Mount Thorley (cabin)	Moderate	23	Moderate	Moderate
2923	41 Trefolly Road, Wylies Flat	Moderate	4	Very low	Low
2924	535A Hambledon Hill Road, Hambledon Hill	Moderate	Refer 2926	Low	Low
1685b	'Clark's Slab House', 1726 Wollombi Road, Cedar Creek	High	6	Very low	Low

Dwelling ID.	Address	Sensitivity	Number of cells	Potential magnitude	Potential impact rating
2926	'Hambledon Hill', 535C Hambledon Hill Road, Hambledon Hill	High	14	Low	Moderate
2925b	'Hambledon Hill', 535C Hambledon Hill Road, Hambledon Hill	Moderate	22	Moderate	Moderate
2928	16 Long Point Road East, Gouldsville	Moderate	Refer to 2929	High	High
2929	16 Long Point Road East, Gouldsville	Moderate	39	High	High
2930	16 Long Point Road East, Gouldsville	Moderate	Refer to 2929	High	High
2931	16 Long Point Road East, Gouldsville	Moderate	Refer to 2929	High	High
2932	16 Long Point Road East, Gouldsville	Moderate	Refer to 2929	High	High

6.3.1.4 Detailed visual assessment

A detailed assessment has been conducted for private viewpoints with a moderate or higher impact rating. The detailed assessment was based on the analysis of photomontages (or detailed point-cloud (lidar) survey generated images) and field validation of scenic quality.

During the field investigations, the ratings of viewpoint sensitivity and scenic quality of individual views were evaluated and adjusted if required, affecting the overall visual sensitivity rating.

During the site inspection, the rating of viewpoint sensitivity changed or was confirmed as follows:

- ID471 – the view toward the HTP from ID471 had been assumed to be of 'moderate' viewpoint sensitivity (that is, the primary view from a rural dwelling) in the simple and intermediate assessment. During the site inspection, the view east toward the HTP from ID471 was identified as being a secondary view, from the side of the dwelling, restricted by surrounding farm sheds.
- ID2926b – the viewpoint sensitivity of the view toward the HTP from ID2926 had been assumed to be 'high' (that is, from a historic rural homestead) in the simple and intermediate assessment. During the site inspection, it was identified that there was no view toward the HTP from the historic rural homestead. There was secondary view toward the HTP from a studio next to the historic homestead. Therefore, the viewpoint sensitivity reduced from 'high' to 'low'. This view has been referred to as 2926b.

During the site inspection, the rating of scenic quality changed as follows:

- ID2928, 2929, 2930, 2931 and 2932 – the scenic quality of the view toward the HTP had been assumed to be 'moderate' during the simple and intermediate assessment. During the site inspection, it was determined that the view included the extensive mining and energy landscape. Therefore, the scenic quality rating reduced from 'moderate' to 'low'
- ID463 – the scenic quality of the view toward the HTP had been assumed to be 'high' during the simple and intermediate assessment due to the high scenic qualities of the Wollombi Brook valley. During the site inspection, it was determined that the view from ID463 was limited by tall, existing vegetation, which enclosed the dwelling, preventing scenic views of the broader landscape. Therefore, the scenic quality rating reduced to 'moderate'
- ID471 and 472 – the scenic quality of the view toward the HTP had been assumed to be 'high' during the simple and intermediate assessment, as the dwellings were within the scenic Wollombi Brook valley. During the site inspection, it was determined that the view from ID471 and 472 did not include the more scenic aspects of the valley and was limited by either surrounding tall trees or agricultural infrastructure. Therefore, the scenic quality rating reduced from 'high' to 'moderate'.

In addition, based on assessment made during the field investigations, the following adjustments were made:

- ID2928, 2929, 2930, 2931 and 2932- several structures were identified as being used for residential purposes on this property. Two of these dwellings were identified (ID2928 and 2929) as potentially having views to the HTP. Photomontages were prepared for both viewpoints from both dwellings and are these are included in the detailed assessment
- ID465 – access to this property was not granted, so an assessment has been prepared using a LiDAR point cloud generated image, and a reference photograph was taken from an adjacent property, around 50 metres from the dwelling. A photomontage was prepared from this nearby location to further illustrate the view (labelled ID465b in Appendix I, Detailed viewpoint assessment)
- ID2926 ('Hambledon Hill') –there was no view toward the HTP from the heritage dwelling 'Hambledon Hill', so a photomontage was taken from an adjoining art studio, around 50 metres from the dwelling (labelled ID2926b in detailed assessment). The art studio is not a heritage listed structure.
- ID92 and ID232 – access to these properties was not possible and a representative viewpoint from the adjacent road has been selected and used as a reference for the detailed assessment.
- ID301 – A location adjacent to the deck (primary view) on this property was selected to minimise the obstruction by vegetation from this viewpoint which would obstruct different transmission structures depending on the angle of view.
- ID472 – A viewpoint was revised from a ground level outdoor entertainment area to the view from an elevated deck on the side of the dwelling. This viewpoint has been used for the detailed assessment.

The 'detailed assessment' is contained in **Appendix G** and a summary of the results of the assessment is presented in Table 7-6.

The 'detailed assessment' identified:

- no private viewpoints with a **high** visual impact
- 6 private viewpoints with a **moderate** visual impact (ID238, ID465, ID466, ID46, ID2920 and ID2928).

Table 6-6 Summary of detailed private viewpoint assessment

Dwelling ID.	Address	Sensitivity	Number of cells	Magnitude rating	Impact rating
92	50 Shearers Lane, Maison Dieu	Moderate	7	Low	Low
132	318 Dights Crossing Road, Maison Dieu	Moderate	4	Very low	Low
173	66 Long Point Road East, Gouldsville	Moderate	11	Low	Low
232	609a Hambledon Hill Road, Hambledon Hill	Moderate	9	Low	Low
238	609c Hambledon Hill Road, Hambledon Hill	Moderate	30	High	Moderate
251	'Abbey House', 478 Putty Road, Mount Thorley	High	6	Very low	Low
277	896 Putty Road, Mount Thorley	Moderate	13	Low	Low
301	887 Putty Road, Mount Thorley	Moderate	11	Low	Low
463	385 Cessnock Road, Broke	High	0	None	None
465	367 Cessnock Road, Broke	High	8	Low	Moderate
465b	367 Cessnock Road, Broke (reference photomontage)	High	4	Very low	Low
466	359 Cessnock Road, Broke	High	9	Low	Moderate
467	368 Cessnock Road, Broke	High	8	Low	Moderate
471	118 Oakley Lane, Broke	High	25	Moderate	Low
472	36 Oakley Lane, Broke	High	8	Low	Low
2920	887 Putty Road, Mount Thorley	Moderate	17	Moderate	Moderate
2926	'Hambledon Hill', 535c Hambledon Hill Road, Hambledon Hill (Heritage dwelling)	High	4	Very low	Low
2926b	'Hambledon Hill', 535c Hambledon Hill Road, Hambledon Hill (Living area, not heritage structure)	Moderate	4	Very low	Low
2925	'Hambledon Hill', 535c Hambledon Hill Road, Hambledon Hill (Secondary dwelling)	Moderate	12	Low	Low
2928	16 Long Point Road East, Gouldsville	Moderate	22	Moderate	Moderate
2929	16 Long Point Road East, Gouldsville	Moderate	0	None	None
2930	16 Long Point Road East, Gouldsville (refer ID 2020)	Moderate	0	None	None
2931	16 Long Point Road East, Gouldsville (refer ID 2020)	Moderate	0	None	None
2932	16 Long Point Road East, Gouldsville (refer ID 2020)	Moderate	0	None	None

6.3.1.5 Summary of visual private viewpoint assessment results

The following table includes a summary of the proportionate viewpoint assessment results.

Table 6-7 Summary of private viewpoint assessment results

ID.	Address	Sensitivity	Simple Assessment		Intermediate assessment		Detailed assessment	
			Potential magnitude	Potential impact rating	Potential magnitude	Potential impact rating	Magnitude rating	Impact rating
65	956B Maison Dieu Road, Maison Dieu	Moderate	Low	Low	Low	Low	-	-
72	20 Shearers Lane, Maison Dieu	Moderate	Low	Low	Low	Low	-	-
74	20 Shearers Lane, Maison Dieu	Moderate	Low	Low	Low	Low	-	-
92	50 Shearers Lane, Maison Dieu	Moderate	Low	Low	Moderate	Moderate	Low	Low
95	20 Shearers Lane, Maison Dieu	Moderate	Low	Low	Low	Low	-	-
132	318 Dights Crossing Road, Maison Dieu	Moderate	Moderate	Moderate	Low	Low	Very low	Low
163	133 Long Point Road East, Long Point	Moderate	Low	Low	None	None	-	-
164	131 Long Point Road East, Long Point	Moderate	Low	Low	None	None	-	-
166	121 Long Point Road East, Long Point	Moderate	Low	Low	Low	Low	-	-
168	99 Long Point Road East, Long Point	Moderate	Moderate	Moderate	Very low	Low	-	-
170	83 Long Point Road East, Gouldsville	Moderate	High	Moderate	Low	Low	-	-
173	66 Long Point Road East, Gouldsville	Moderate	Very high	High	Moderate	Moderate	Low	Low
229	535C Hambledon Hill Road, Hambledon Hill	Moderate	Moderate	Moderate	Low	Low		
232	609A Hambledon Hill Road, Hambledon Hill	Moderate	High	Moderate	Moderate	Moderate	Low	Low
238	609C Hambledon Hill Road, Hambledon Hill	Moderate	Very high	High	High	Moderate	High	Moderate
237	609 Hambledon Hill Road, Hambledon Hill	Moderate	High	Moderate	Low	Low		
251	478 Putty Road, Mount Thorley	High	Very high	High	High	Moderate	Very low	Low
264	984 Putty Road, Mount Thorley	Moderate	Low	Low	None	None		
270	984 Putty Road, Mount Thorley	Moderate	Low	Low	None	None		

ID.	Address	Sensitivity	Simple Assessment		Intermediate assessment		Detailed assessment	
			Potential magnitude	Potential impact rating	Potential magnitude	Potential impact rating	Magnitude rating	Impact rating
277	896 Putty Road, Mount Thorley	Moderate	Very high	High	Very high	High	Low	Low
301	887 Putty Road, Mount Thorley	Moderate	High	Moderate	High	Moderate	Low	Low
463	385 Cessnock Road, Broke	High	Moderate	Moderate	Low	Moderate	None	None
465	367 Cessnock Road, Broke	High	Moderate	Moderate	Low	Moderate	Low	Moderate
466	359 Cessnock Road, Broke	High	Low	Moderate	Low	Moderate	Low	Moderate
467	368 Cessnock Road, Broke	High	Moderate	Moderate	Moderate	Moderate	Low	Moderate
471	118 Oakley Lane, Broke	High	Very high	High	High	High	Moderate	Low
472	36 Oakley Lane, Broke	High	Very high	High	High	High	Low	Low
1478	436 Cedar Creek Road, Cedar Creek	Moderate	Moderate	Moderate	Very low	Low		
1495	436 Cedar Creek Road, Cedar Creek	Moderate	Low	Low	None	None		
1624	225 Mount Baker Road, Mount View	Moderate	Very low	Low				
1661	83 Lewis Road, Millfield	Moderate	Low	Low	None	None		
1665	1726 Wollombi Road, Cedar Creek	Moderate	Moderate	Moderate	None	None		
1670	83 Lewis Road, Millfield	Moderate	Low	Low				
1679	83 Lewis Road, Millfield	Moderate	Moderate	Moderate	Low	Low		
1684	Wollombi Road, Cedar Creek	Moderate	Moderate	Moderate	Very low	Low		
1685	1700 Wollombi Road, Cedar Creek	Moderate	High	Moderate	Very low	Low		
1685b	1700 Wollombi Road, Cedar Creek	High	High	High	Very low	Low		
1689	1739 Wollombi Road, Cedar Creek	Moderate	Low	Low	Low	Low		
1978	25 Wollombi Road, Cedar Creek	Moderate	Low	Low	None	None		
2037	1469 Wollombi Road, Cedar Creek	Moderate	Moderate	Moderate	None	None		
2184	52 Millfield Road, Millfield	Moderate	Low	Low	None	None		

ID.	Address	Sensitivity	Simple Assessment		Intermediate assessment		Detailed assessment	
			Potential magnitude	Potential impact rating	Potential magnitude	Potential impact rating	Magnitude rating	Impact rating
2198	232 Millfield Road, Millfield	Moderate	Low	Low	Low	Low		
2203	147 Trig Road, Congewai	Moderate	Low	Low	None	None		
2205	284 Thursbys Road, Congewai	Moderate	Low	Low	None	None		
2214	168 Eglinford Lane, Congewai	Moderate	Low	Low	None	None		
2218	191 Eglinford Lane, Congewai	Moderate	Moderate	Moderate	None	None		
2219	153 Eglinford Lane, Congewai	Moderate	Moderate	Moderate	None	None		
2221	121 Eglinford Lane, Congewai	Moderate	Low	Low	None	None		
2222	125 Eglinford Lane, Congewai	Moderate	Low	Low	None	None		
2223	Eglinford Lane, Congewai	Moderate	Low	Low	None	None		
2224	Eglinford Lane, Congewai	Moderate	Low	Low	None	None		
2228	940 Congewai Road, Congewai	Moderate	Low	Low	None	None		
2254	1297 Watagan Creek Road, Laguna	Moderate	Low	Low	None	None		
2274	1831 Watagan Creek Road, Laguna	Moderate	Moderate	Moderate	None	None		
2277	1713 Watagan Creek Road, Laguna	Moderate	Low	Low	None	None		
2278	1999 Watagan Creek Road, Laguna	Moderate	Low	Low	None	None		
2279	1753 Watagan Creek Road, Laguna	Moderate	Low	Low	None	None		
2283	1861 Watagan Creek Road, Laguna	Moderate	Low	Low	None	None		
2918	478 Putty Road, Mount Thorley	Moderate	High	Moderate	None	None		
2920	887 Putty Road, Mount Thorley	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
2923	41 Trefolly Road, Wylies Flat	Moderate	Low	Low	Very low	Low		
2924	535A Hambledon Hill Road, Hambledon Hill	Moderate	Low	Low	Low	Low	None	None
2926	535C Hambledon Hill Road, Hambledon Hill	High	Moderate	Moderate	Low	Moderate	Very low	Low

ID.	Address	Sensitivity	Simple Assessment		Intermediate assessment		Detailed assessment	
			Potential magnitude	Potential impact rating	Potential magnitude	Potential impact rating	Magnitude rating	Impact rating
2926b	535C Hambledon Hill Road, Hambledon Hill	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Low
2925	535C Hambledon Hill Road, Hambledon Hill	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Low
2928	16 Long Point Road East, Gouldsville	Moderate	Very high	High	High	High	Moderate	Moderate
2929	16 Long Point Road East, Gouldsville	Moderate	Very high	High	High	High	None	None
2930	16 Long Point Road East, Gouldsville	Moderate	Very high	High	High	High	None	None
2931	16 Long Point Road East, Gouldsville	Moderate	Very high	High	High	High	None	None
2932	16 Long Point Road East, Gouldsville	Moderate	Very high	High	High	High	None	None

6.3.1.6 Performance objectives

In accordance with the Technical Supplement, relevant performance objectives must be met for each assessable viewpoint and the level of impact identified. For private receivers with a moderate viewpoint, ‘visual impact mitigation should be implemented within the project corridor and/or offered to the affected landowner and should be proportionate to the scale of impact’ (page 33, DPHI 2024). For receivers with a low, or very low visual impact, no mitigation is required.

The following table identifies the specific mitigation measures proposed to address the moderate visual impacts identified for the project and includes a revised assessment of these private viewpoints, incorporating the proposed mitigation opportunities to determine the residual impact rating.

These opportunities would reduce the visual impact level from a moderate to a low visual impact for four private viewpoints: ID2928, ID238, ID467 and ID2920. There would be two moderate visual impacts remaining: ID465 and ID 466.

Table 6-8 Response to performance objectives – Private viewpoints

ID.	Address	Visual impact	Mitigation opportunity	Residual visual impact rating
2928	16 Long Point Road East, Gouldsville	Moderate	Opportunity for screening vegetation along property boundary to reduce visibility of the project over time to be offered to landowner. Refer Appendix K .	Low
238	609c Hambledon Hill Road, Hambledon Hill	Moderate	Opportunity for screening vegetation along property boundary to reduce visibility of the project over time to be offered to landowner. Refer Appendix K .	Low
465	367 Cessnock Road, Broke	Moderate	Screening vegetation (either within the project corridor or offsite) would not be effective as the visible towers are distant and any screening of the view would also obstruct the high scenic quality views of the rocky escarpments and ridgeline. It is proposed that individual transmission tower heights be minimised as far as practicable. A reduction in the height of these structures would reduce the obstruction of ridgeline (of high scenic quality) and reduce the visual prominence of the transmission line structures in this view.	Moderate
466	359 Cessnock Road, Broke	Moderate	Screening vegetation (either within the project corridor or offsite) would not be effective as the visible towers are distant and any screening of the view would also obstruct the high scenic quality views of the rocky escarpments and ridgeline. It is proposed that individual transmission tower heights be minimised as far as practicable. A reduction in the height of these structures would reduce the obstruction of ridgeline (of high scenic quality) and reduce the visual prominence of the transmission line structures in this view.	Moderate
467	368 Cessnock Road, Broke	Moderate	Opportunity for screening vegetation along property boundary to reduce visibility of the project over time to be offered to landowner. Screening vegetation should avoid obstructing the view of the ridgeline (of high scenic quality). Refer Appendix K .	Low
2920	887 Putty Road, Mount Thorley	Moderate	Screening vegetation adjacent to the cabin to screen towers to the east. Screening vegetation should avoid obstructing views of the distant hills to the north (of higher scenic quality). Refer Appendix K .	Low

These and other mitigation measures are also addressed in section Chapter 8: Recommended management and mitigation measures.

6.3.2 Assessment of daytime visual impacts during construction

The level of impact to private views during the temporary construction period would vary according to their visibility of, and distance from, proposed construction support sites and construction activities. Most construction support sites, including the 3 proposed workers' accommodation sites, are located away from dwellings:

- Hebden Road temporary workers' accommodation facility and construction support site is located near a recreation area and railway line. The location is in the vicinity of the energy and mining landscape, and views are dominated by the power station stacks and buildings. There are no dwellings within a kilometre of this site.
- Pikes Gully Road construction support site is located within an energy and mining landscape and there are no dwellings within a kilometre of this site.
- Gouldsville Road temporary workers' accommodation facility and construction support site is located near a railway line, the Golden Highway and open cut mining operations. Views in this setting are influenced by the mining and energy landscape character. The closest dwelling (ID2928) is about 800 metres away and will have views across the landscape to this facility during construction. Some residents may see the workers' accommodation and activities at the construction support site daily during the construction period, as they travel along Gouldsville Road to access their property. The view would be temporary and brief, while in transit alongside the construction support site.
- The Wollombi Road construction support site (in the Congewai Creek rural valley) is around 500 metres from the nearest rural residents, however, it is likely direct views of the site from these rural dwellings would be screened by dense vegetation surrounding dwellings. Dwellings with a more direct view (although still filtered by existing vegetation) are around 1 kilometre away. Their view would change throughout the construction period to include the temporary construction support site with its associated site offices, stockpiles and vehicle movements. Installation of the transmission towers and associated vegetation clearance on the elevated ridge either side of the rural valley would likely be visible from some rural dwellings within the Congewai Creek rural valley. Some residents would see the workers' accommodation and activities at the construction support site daily during the construction period, as they travel along Wollombi Road to access their property. The view would be temporary and brief, while in transit alongside the construction support site.
- Freemans Drive temporary workers' accommodation facility and construction support site is located in rural landscape, surrounded by trees. The nearest dwelling is around 400 metres from the accommodation facility and around 75 metres from an entry into the construction support site. Visibility into the construction support site, including workers' accommodation, would be limited due to the surrounding trees which would be retained. However, an increase in vehicle movements along Freemans Drive, and helicopter movements, may be noticed from nearby rural dwellings.

Rural dwellings around Maison Dieu, Gouldsville, Hambledon Hill, Mount Thorley, east of Broke and west of Millfield would have views to ground construction activities, the installation of transmission towers, laydown sites and line stringing activities. This work would include the potential for views to construction vehicles and helicopters.

6.3.3 Night-time visual impacts during construction

At night there may be temporary visual impacts from dwellings with a view to selected construction support sites (those which include temporary workers' accommodation) which may be in use 24 hours a day. Laydown and stringing sites would not be accessed at night during the construction period, and do not include lighting.

Temporary worker accommodation facilities would include lighting and 24/7 use by workers, however:

- The nearest rural dwelling to the Freemans Drive workers' accommodation is around 400 metres away and there are intervening trees. Lights at the accommodation may be visible from the nearest dwelling, however, they would be relatively distant, temporary and not significantly change the existing nighttime view.
- Lights associated with the Gouldsville Road workers' accommodation, could be distantly visible from elevated rural dwellings at Gouldsville, Maison Dieu and Hambledon Hill. However, the nighttime use of the site would not change the existing nighttime view as existing lighting levels (associated with the mining and energy landscape) is very bright.
- Lights associated with Hebden Road workers' accommodation would not be visible from rural dwellings.

The large construction support site adjacent to Wollombi Road would not be accessed at night or host nighttime construction activities. Lighting that may be required at the site for use during standard working hours would be directed downward onto activities within the site.

6.3.4 Nighttime visual Impacts during operation

There is no operational lighting proposed along the transmission line. Therefore, no private views would be affected by regular operations of the transmission line. Maintenance of the transmission line, including tree trimming, would be undertaken during the day. Maintenance activity at night would only occur in emergency situations.

Lighting would be installed at the Bayswater and Olney switching stations. There are no dwellings identified with potential views of the switching stations.

6.4 Assessment of viewpoints beyond the study area

This section discusses the impact of the project on sensitive viewpoints beyond the study area:

- Greater Blue Mountains Area World Heritage Property
- other prominent viewing areas on NPWS-managed land
- Golden Highway toward Muswellbrook
- broader view-lines between prominent landscape features (Mount Yengo and other culturally significant areas).

The visual impact to these sensitive locations was identified by government agencies (see Table 1-2). The location, issue raised by the government agency, and discussion addressing the issue is provided in Table 7-9.

Table 6-9 Impact to sensitive views beyond the study area

Location	Identified issue	Discussion
Greater Blue Mountains World Heritage Property	<p>Overall impact consideration is to include:</p> <p>iv. visual, aesthetic and landscape level view lines, including effects on Outstanding Universal Value attached to the Greater Blue Mountains Area World Heritage Property and ...</p> <p>(Biodiversity, Conservation and Science Group NSW (with input from NPWS), Department of Climate Change, Energy, the Environment and Water)</p>	<p>The Greater Blue Mountains World Heritage Area (GBMA) occupies around 1 million ha, and includes Wollemi and Yengo National Parks, which are, at closest, around 4.75 km to the west of the HTP.</p> <p>Outstanding Universal Values are attached to the GBMA. The world heritage area:</p> <ul style="list-style-type: none"> • constitutes one of the largest and most intact tracts of protected bushland in Australia • supports an exceptional representation of the taxonomic, physiognomic and ecological diversity that eucalypts have developed • has a number of rare and endemic taxa • has an outstanding diversity of habitats and plant communities that support its globally significant species and ecosystem diversity • and has outstanding indigenous and post-European-settlement cultural values, geodiversity, water production, wilderness, recreation and natural beauty. <p>Its landscape characteristics comprise deeply incised sandstone tableland dominated by eucalypts. The geology and geomorphology of the GBMA, which includes 300 m cliffs, slot canyons and waterfalls, provides the physical conditions and visual backdrop to support its outstanding biological values.</p> <p>The HTP would be almost 5 km from this important property and would not physically affect the GBMA. The size of the GBMA and values attached to its landscape and biological reserves would not be altered by the HTP. The HTP would not change the GBMA's landscape characteristics or its aesthetics values.</p> <p>No view lines to the GBMA were identified from within the HTP study area.</p> <p>Finchley Lookout (Yengo National Park) is the closest lookout to the project within the GBMA and is almost 20 km away. With the maximum height of the project at 85 m, at this distance from the HTP, project infrastructure would not be visible from within the GBMA, and the HTP would not affect important view lines from the GBMA.</p>
Prominent viewing areas, NPWS managed land	<p>...other prominent viewing areas on NPWS-managed land.</p> <p>(Biodiversity, Conservation and Science Group NSW (with input from NPWS), Department of Climate Change, Energy, the Environment and Water)</p>	<p>Other NPWS managed land near the HTP includes Watagans National Park, located to the east of the project. The nearest lookout within Watagans National Park is The Narrow Place Lookout. This lookout is over 7.5 km from the project. With a maximum height of 85 m, at this distance, project infrastructure is very unlikely to be visible from the lookout, and the HTP would not affect the view from the lookout.</p>
The Golden Highway	<p>Of concern to Muswellbrook Shire Council are the visual impacts to motorists travelling along the Golden Highway toward Muswellbrook.</p>	<p>The visual impacts to the public (including motorists) travelling along the Golden Highway was assessed in section XXX of this technical paper. A representative viewpoint from the Golden Highway was selected for the assessment (P03). P03 is the closest point of the Golden Highway to the HTP (around 1.5 km) and also has potential for clear views of the project. The assessment determined a low visual impact to the viewpoint from the HTP.</p>

Location	Identified issue	Discussion
	Particularly, the combined landscape and visual / aesthetic effect of the presence of coal mines and other infrastructure adjacent the Golden Highway, and how they impact the perception of Muswellbrook. (Muswellbrook Shire Council)	Jerrys Plains and the Golden Highway west from Jerrys Plains, has been identified as a gateway to the scenic equine and viticulture areas of Muswellbrook. From Jerrys Plains and further west along the Golden Highway, the project would be largely hidden behind a ridgeline. The ridgeline currently screens coal mines and mining infrastructure. Therefore, the project is unlikely to be visible from the gateway to Muswellbrook, and the combined effect of viewing the project with coal and other infrastructure is unlikely from Jerrys Plains or the Golden Highway west of Jerrys Plains.
	Staff request an assessment of views travelling north along the Golden Highway, including a figure showing existing visual treatments (if any) and options for additional treatments to mitigate cumulative impacts adjacent each road. (Muswellbrook Shire Council)	<p>Views from the Golden Highway have been considered in the assessment of public viewpoints (see section 6.2, viewpoint P03: Golden Highway).</p> <p>Within the Muswellbrook Shire LGA, the HTP would be around 7 km from the Golden Highway and would be unlikely to be distinguishable in the landscape.</p> <p>Within the Jerrys Plains / Lemington vicinity, there are few instances where the HTP would be visible. At closest, the HTP would be around 1.5 km from the Golden Highway (viewpoint P03). At this location, the HTP would lie to the northeast of the road and would not be viewed in the direction of travel. The HTP would be seen briefly, appearing where there is a break in screening ridgelines. There are existing, regularly spaced, mature trees within the road reserve, that would reduce distant views of the HTP from the Golden Highway at this location. Mitigation screen planting of the HTP is not proposed at this location.</p> <p>Within the Mount Thorley vicinity (within the energy and mining landscape character zone), the HTP would appear adjacent to the Golden Highway for a distance of around 500 m. Views along this section of the Golden Highway are adversely affected by open cut mining activities. The landscape is highly modified, and scenic quality is dominated by mining and railway infrastructure. Mitigation screen planting of the HTP is not proposed at this location.</p>
	A plan to manage any visual screen tree plantings and ensure their growth and ongoing survival should be provided. (Muswellbrook Shire Council)	A mitigation measure has been included (see Chapter 8) that would provide guidance to ensuring any visual screen tree plantings are installed and managed to maximise the potential for ongoing survival.
View lines between elevated ridgelines (Mount Yengo and other culturally significant areas)	Consideration of visual impacts to cultural view lines between elevated ridgelines and culturally significant areas including but not limited to Mount Yengo as identified by the Registered Aboriginal Parties.	<p>Mount Yengo is located within the Yengo National Park, and part of the recognised Greater Blue Mountains World Heritage Area (GBMWhA). This distinctive mountain peak is over 35 km from the project and is identified as a significant dreaming place and important cultural landscape (<i>Hunter Transmission Project, Aboriginal Cultural Heritage Assessment</i>, (EMM, 2025)).</p> <p>Finchley Lookout (within Yengo National Park) lies to the west of the HTP and around 15.5 km from Mount Yengo. It provides a direct view of the mountain. The HTP would not affect the view from Finchley lookout and Mount Yengo.</p>

Location	Identified issue	Discussion
	(Heritage NSW, Department of Climate Change, Energy, the Environment and Water)	<p>Registered Aboriginal Parties identified and investigated 11 elevated locations with views to culturally significant features (including Mount Sugarloaf and Mount Warrawolong) in the <i>Aboriginal Cultural Heritage Assessment</i> (EMM 2025).</p> <p>Two of these locations were assessed in the <i>Aboriginal Cultural Heritage Assessment</i> as being subject to ‘significant impact’:</p> <ul style="list-style-type: none"> • SL5, located between Mount Warrawolong and Mount Vincent/Mount Sugarloaf. • SL8, located between Mount Warrawolong and Mount Vincent/Mount Sugarloaf. <p>SL5 ‘offers unobstructed views of the valley to the north, and partial views to the southwest towards Mount Warrawolong, somewhat obstructed by vegetation. The HTP corridor would encroach within 500 metres of this location’ (p119, EMM 2025).</p> <p>SL5 is located on the eastern side of the HTP, and Mount Warrawolong is to the southwest. The HTP corridor, is therefore, located within the viewline between SL5 and Mount Warrawolong. However, the HTP is 500 m from SL5 and vegetation clearance associated with the HTP would not affect vegetation close to SL5 which currently partly obstructs the view toward Mount Warrawolong. It is likely the view southwest would remain somewhat obstructed by vegetation. A mitigation measure is included in this LCVIA recommending a tower is not located directly within the view line.</p> <p>SL8 ‘offers a full and unobscured view of Mount Warrawolong approximately 3.5 kilometres to the southwest, an unnamed ridgeline straddled by the Harris Trail to the northeast, north and northwest, and the Watagan Creek to the west, north and east. The HTP corridor would encroach within 100 m of this location’ (p119, EMM 2025).</p> <p>SL8 is located on the southern side of the HTP with a view to Mount Warrawolong oriented to the southwest and away from the HTP. Therefore, the HTP would not be located between SL8 and Mount Warrawolong, and the viewline to Mount Warrawolong from SL8 would not be affected. View lines to other culturally significant areas were not identified from SL8.</p> <p>Five of the 11 locations investigated with Awabakal traditional owners were assessed as being subject to partial impacts in the <i>Aboriginal Cultural Heritage Assessment</i>. A more complete assessment of these locations was not possible due to the density of trees obscuring the view (EMM 2025). Regardless, Aboriginal participants in the investigation emphasised that obscuring or otherwise impacting these sightlines would have a substantial impact.</p> <p>In addition, Flat Rock and Trig Road ‘cultural landscapes’ were identified in the <i>Aboriginal Cultural Heritage Assessment</i> as having view-lines to cultural features.</p> <p>Flat Rock is ‘an important lookout towards cultural features in the landscape’ (page 107, EMM 2025). It is located over 600 m east of the HTP and has a broad view east over the valley. The view west from Flat Rock (toward the HTP) is screened by existing vegetation. The HTP would not change this view. Clearing associated with the HTP would be limited to 70 m and not affect trees surrounding Flat Rock.</p> <p>Trig Road ‘cultural landscape’ intersects the Mount Yengo to Mount Sugarloaf view-line and the HTP. The area includes rockshelters which look over Sweetmans Creek. Views to Mount Yengo or Mount Sugarloaf were not identified in the <i>Aboriginal Cultural Heritage Assessment</i>.</p>

Chapter 7: Cumulative landscape character and visual impacts

7.1 Projects in the vicinity

EnergyCo has identified the relevant projects that may be developed concurrently with the Hunter Transmission Project (HTP) and may result in cumulative impacts on people and the environment. Most of these projects are in the north of the HTP, in and around Singleton and Muswellbrook. EnergyCo has determined that significant cumulative impacts in the central and southern sections of the HTP are unlikely.

The key projects in the north located within 5 kilometres of the HTP corridor are:

- Hunter-Central Coast Renewable Energy Zone (Ausgrid HCC REZ)
- Bayswater Power Station: upgrade and continuation of the power station, demolition and rehabilitation of the old Liddell Power Station, and establishment of an energy hub on the site
- Hunter Valley Operations (HVO) mining complex: expansion and continuation of HVO North and HVO South
- Maison Dieu Solar Farm
- restart of the Redbank Power Station
- Liddell Future Land Use and Enabling Works
- Maxwell underground coal mine.

Of these, EnergyCo has identified the Maison Dieu Solar Farm as the only project that would result in potential cumulative visual impacts to the rural properties in Maison Dieu. The only other project within proximity of the HTP is Ausgrid's proposed HCC REZ infrastructure which would occur in the Mount Thorley vicinity.

Most other projects in the region are located too far away from the HTP corridor or would be out of sync with its construction to cause significant visual cumulative impacts. This includes:

- transmission and generation projects associated with the establishment of the Central-West Orana and New England REZs
- renewable energy projects around Muswellbrook: Hunter River Solar Farm, Muswellbrook Solar Farm, Muswellbrook Battery Energy Storage System, Bowmans Creek Wind Farm, Maxwell Underground Coal Mine Maxwell Solar Farm
- Hunter Gas Pipeline.

7.2 Cumulative impacts

The following table includes an assessment of the potential cumulative landscape character and visual impacts of the project during construction and operation (see **Table 7-1**)

Table 7-1 Cumulative impact assessment

Project	Project description	Impacts during construction		Impacts during operation	
		Landscape character impacts	Visual impacts	Landscape character impacts	Visual impacts
<p>Ausgrid HCC REZ</p> <p>(Review of Environmental Factors response to submissions stage)</p>	<p>Proposed infrastructure includes two new substations, a major upgrade on two existing substations, a minor upgrade of other substations, and upgrading of approximately 85 km of existing powerline lines.</p> <p>Replacement transmission poles would be up to 30 metres tall (replacing existing poles up to 20 metres tall). The corridor width would remain at 20 metres.</p>	<p>The HCC REZ upgrade of an existing transmission line would intersect the HTP twice (just north and south of Mt Thorley) and run parallel to the HTP in Mt Thorley.</p> <p>Mt Thorley is within LCZ 1 (Energy and mining). Industrial activities, use of heavy trucks and machinery are typical characteristics of this LCZ. Replacement of the transmission poles within an existing corridor, with similar (although taller) infrastructure, would result in minimal change to the character of the LCZ during construction.</p>	<p>Public viewpoints</p> <p>Public views to the HCC REZ would be limited to the Mount Thorley industrial area, and public roads in the vicinity. Existing views include industrial activities and heavy trucks.</p> <p>Replacement of the transmission poles within an existing corridor, would be a relatively minor and temporary activity, and would result in minimal visual impact during construction.</p> <p>Private views</p> <p>There are no rural dwellings (private viewpoints) identified within the HTP visual study area that would have a visual impact caused by Ausgrid's proposed update to transmission line.</p>	<p>The upgraded transmission poles would be taller (30 metres compared to 20 metres), however, the upgrade would not increase the extent of infrastructure or extent of clearing in the vicinity of the HTP. It would result in minimal change to the character of the LCZ.</p>	<p>Public viewpoints</p> <p>Existing views include an existing transmission line with 20 metre poles. The increase in pole height from 20 metres to 30 metres is relatively minor and would result in minimal visual impact during construction.</p> <p>Private views</p> <p>There are no rural dwellings (private viewpoints) identified within the HTP visual study area that would have a visual impact caused by Ausgrid's proposed update to transmission line.</p>
<p>Maison Dieu Solar Farm, Maison Dieu Road, Maison Dieu</p> <p>(Response to submissions stage)</p>	<p>Proposal for 110,000 photovoltaic solar panels (to a maximum height of 2.7 metres) with a capacity of around 60 MW), 40 MW / 80 MWh battery energy storage system and operations and maintenance facilities.</p>	<p>The Maison Dieu Solar Farm is located outside the landscape character study area of the HTP, but adjacent to LCZ 4 Hunter River (Maison Dieu) rural valley.</p> <p>The HTP and Maison Dieu Solar Farm projects would be separated by distance and landform. The Hunter River separates the LCZ 4 Hunter River (Maison Dieu) rural valley and setting of the Maison</p>	<p>Public viewpoints</p> <p>Public views to the Maison Dieu Solar Farm would be limited to locations on Maison Dieu Road. These views have a northerly aspect, away from the HTP study area. In these views low impacts were identified. Maison Dieu Road is outside the visual study area of the HTP (over 5 kilometres away) and these projects would not be</p>	<p>Due to the physical and visual separation between these projects, there would be no cumulative landscape character during operation.</p>	<p>Public viewpoints</p> <p>During operation there would not be views to both projects from a public location</p> <p>Private views</p> <p>There are no rural dwellings (private</p>

Project	Project description	Impacts during construction		Impacts during operation	
		Landscape character impacts	Visual impacts	Landscape character impacts	Visual impacts
	<p>The project impact area would impact around 90 hectares and require tree removal and minor cut and filling.</p> <p>The proposed solar farm is over 1.7 kilometres from the HTP at its closest.</p>	<p>Dieu Solar Farm from the HTP construction impact area. Therefore, the construction activity and heavy vehicle access would be separated both physically and visually. As such, the changes to the landscape created by these projects would occur within separate landscapes of different characters.</p> <p>There would be limited potential for views between these projects due to the intervening landform and distance.</p> <p>Overall, there would not be a cumulative landscape character impact during construction.</p>	<p>viewed together in views from Maison Dieu Road.</p> <p>Due to the separation of the Maison Dieu area from the HTP construction impact area by the Hunter River, the road networks are separate, and there is unlikely to be views to these projects seen in sequence.</p> <p>Private viewpoints</p> <p>There are no rural dwellings (private viewpoints) identified within the HTP visual study area that would have a visual impact caused by the proposed Maison Dieu Solar Farm. Therefore, while there might be dwellings that have a theoretical view to both projects, there would not be a visual impact caused by either. Overall, there would not be a cumulative visual impact caused by these projects.</p>		<p>viewpoints) identified within the HTP visual study area that would have a visual impact caused by the proposed Maison Dieu Solar Farm. Therefore, while there might be dwellings that have a theoretical view to both projects, there would not be a visual impact caused by either. Overall, there would not be a cumulative visual impact caused by these projects Error! Reference source not found.</p>

Chapter 8: Recommended management and mitigation measures

8.1 Mitigation already incorporated into the project

The location of the Hunter Transmission Project (HTP) corridor and key project components have been developed in consideration of visual amenity, including through extensive consultation with landowners. This included:

- maximising the distance from existing dwellings and towns
- maximising the distance of transmission structures from individual rural dwellings
- occupying disturbed mining and energy operational land (which has low visual impacts)
- occupying operational forestry land (which has low visibility) and avoiding recreational areas within forestry land
- minimising vegetation clearance requirements where practicable, including development of refined vegetation clearance areas rather than full easement clearance
- avoiding national parks, conservation areas and cultural heritage places.

The transmission line route was developed with an aim to minimise visual impacts where it was possible. EnergyCo will continue to further develop design elements of the project during the detailed design with the aim of further minimising visual impacts. These include siting of towers and retention of screening vegetation where possible. Refer to Chapter 3 of the EIS for further information on the route selection process.

8.2 Design refinement

EnergyCo will be incorporating the following design considerations into the ongoing refinement of the project.

8.2.1 Transmission tower design

Further consideration of transmission tower design would be undertaken during detailed design to reduce visual impacts in areas across the project where moderate, high-moderate and high visual impacts on the public domain and private properties have been identified.

Where reasonable and feasible, these options would include consideration of different transmission tower height and shapes (slim and tall or short and wide) and spacing (fewer larger structures or more smaller structures) for example.

8.2.2 Location of transmission line structures

Where feasible, transmission line structures would be located so that they are at the maximum distance from sensitive viewpoints, so that they are viewed against a more visually complex background or so that intervening landform and vegetation would screen views.

Where possible, transmission line structures would be located at a maximum spacing at road crossings. Transmission line structures near watercourses would be located to avoid the need to remove vegetation where possible.

8.2.3 Screening vegetation

Wherever possible, existing vegetation would be retained. Planting would be considered to filter and screen views where there would be a beneficial effect. However, planting would have a limited effect in screening visual impacts of the project due to the height of the structures and time required for vegetation to establish.

8.3 Mitigation measures

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

It should be noted that some environmental impacts assessed in this EIS are relevant to multiple technical aspects and therefore will share common mitigation measures. Where this occurs, the mitigation measure has not been duplicated but rather one ID number has been provided for the particular measure and a cross reference to that ID number has been included in other related environmental aspects. In line with this approach, reference has been made to the management of impacts to cultural heritage viewlines in line with mitigation measures AH7 and AH8 in Table 10.16.

Table 8-1 Proposed mitigation measures

Reference	Impact	Mitigation measure	Timing	Relevant location(s)
LV1	Vegetation retention	Vegetation clearance for the project will be limited to the minimum extent necessary for construction and operation to maximise existing visual screening and retention of the existing landscape character. Retained vegetation will be clearly demarcated on site as 'no-go zones' prior to the commencement of construction. Construction personnel will be made aware of no-go zones as part of environmental site induction(s).	Detailed design Construction Operation	All locations
LV2	Construction lighting	Lighting at construction support sites will be designed and operated in accordance with <i>AS 4282:2023 Control of the obtrusive effects of outdoor lighting</i> .	Detailed design Construction	Construction support sites
LV3	Visual changes near residences	For private properties assessed as having a moderate or higher visual impact, screening options would be agreed with the landowners. Screening options may include vegetation that would be installed and established by a contractor. Any screening vegetation will be installed in accordance with a Landscape plan and specification prepared by a qualified Landscape Architect or designer.	Construction	Private dwellings assessed as having a moderate or higher visual impact.
LV4	Visual changes near residences	Opportunities will be investigated to reduce the height of the transmission towers visible from those dwellings with a moderate visual impact in the vicinity of Cessnock Road, Broke.	Construction	Private dwellings assessed as having a moderate or higher visual impact near Cessnock Road, Broke.
	Cultural heritage management	The clearing of vegetation between significant cultural viewing locations would be managed in accordance with Aboriginal heritage mitigation measure AH07.	Detailed design Construction	Flat Rock Lookout (HTP-CP01 45-3-5003) Other important cultural viewlines and viewsapes, including but not limited to SL5 and SL8
	Cultural heritage management	The positioning of project elements to minimise their visibility within culturally important view-lines would be managed in accordance with Aboriginal heritage mitigation measure AH08.	Detailed design Construction	Important cultural viewlines and viewsapes, including but not limited to SL5

Chapter 9: References

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