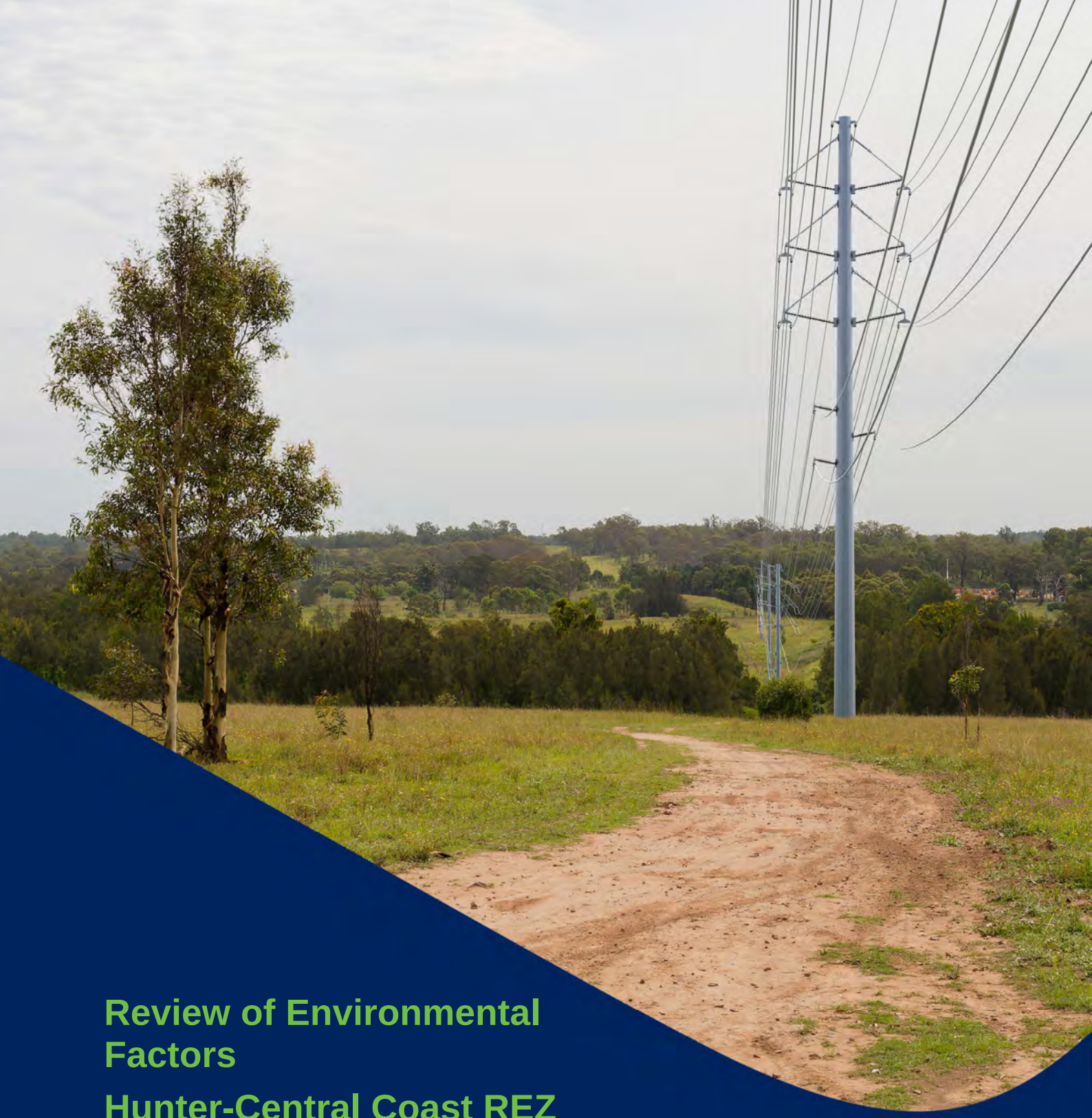

Review of Environmental Factors

Hunter-Central Coast REZ Network Infrastructure

Appendix L – Visual Impact

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Ausgrid

LANDSCAPE & VISUAL IMPACT ASSESSMENT

HUNTER-CENTRAL COAST REZ NETWORK INFRASTRUCTURE UPGRADES

CLIENT: AUSGRID

DATE: 16 APRIL 2025

PREPARED BY:

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CONTENTS

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Prepared by	Reviewed by	Released by
Name: Marina Budisavljevic **Position:** Lead LVIA Specialist	**Name:** Emma Mason **Position:** Principal Town Planner	**Name:** Marina Budisavljevic **Position:** Lead LVIA Specialist  **Date:** 16 April 2025 **Version:** V02 – Final (Issue 02)

EXECUTIVE SUMMARY

This Landscape and Visual Impact Assessment (LVIA) is intended to provide an assessment of the existing landscape character and potential impact to views from the proposed Hunter-Central Coast REZ Network Infrastructure Upgrade Project. The LVIA identified five (5) landscape character zones throughout the surrounding landscape, including rural, agricultural, mining and vineyards / tourism. The extent to which the project intersects with these LCZs varies throughout the study area.

The methodology for assessing the impact of the proposed works on landscape and visual characteristics includes identifying potential visual receptors, identifying the landscape character (in this case, rural, agricultural, mining and vineyards / tourism), undertaking a desktop assessment and preliminary visibility modelling, discussions with the proponent to confirm any potential visual receptors or key viewpoints that they specifically require to be captured in the LVIA. Fieldwork is then undertaken to confirm the visibility of the project from the areas identified in the desktop assessment. During the fieldwork, the landscape character and its value are assessed against standardised criteria (to limit subjectivity) and all visual receptors and viewpoints that are confirmed to have visibility of the project are assessed to determine the significance of the effect.

The project is also assessed for cumulative impacts that may arise from surrounding development of a similar scale and/or nature that may together constitute a visual impact on the landscape. In the event the assessment determines it necessary, mitigation measures to alleviate significant visual impacts are then provided to the project designers and the project is reassessed on this basis with final recommendations provided for consideration as part of any ongoing planning approval and/or detailed design works.

After following this methodology this LVIA determined that the proposed works will be of a moderate magnitude, where the landscape effect is considered to result in some change to views of the landscape due to loss of existing features and addition of new features. However, these changes will not significantly alter the composition of the baseline landscape or compromise the specific basis for the landscape character value. This effect will be most prominent during the construction stage, which is a temporary effect. The size and scale of the proposed works are noted to have the greatest effect when viewed in close proximity during both the construction and operational phases of the project. Using a matrix of significance, the effect of the proposed works on the landscape and its character is determined to be of moderate-low significance overall.

1 INTRODUCTION AND OBJECTIVES

This Landscape and Visual Impact Assessment (LVIA) has been prepared on behalf of Ausgrid to accompany a Review of Environmental Factors for upgrades to its existing network infrastructure to support the Hunter-Central Coast (HCC) Renewable Energy Zone (REZ).

Establishing the Hunter-Central Coast REZ (and other REZs across NSW) will be critical in the NSW Government meeting its commitments to decarbonise existing heavy electricity generating and consuming industry, as well as support the growth of emerging technologies and green manufacturing.

The objectives of this LVIA are to:

- Identify and analyse the baseline landscape character and value of the surrounding area and location of the proposed works,
- Assess the landscape effect
- Identify and assess potential visual receptors and viewpoints from which the proposal may have a visual effect,
- Assess the *sensitivity* of visual receptors and the *magnitude* of change (resulting from the proposed development) from each receptor to determine the overall significance of the effects,
- Assess the suitability of the proposal within the landscape setting, including consideration of cumulative impacts from other surrounding development; and
- Recommend mitigation measures where appropriate (if required).

1.1 RELEVANT EXPERIENCE

LVIA must be prepared by a 'suitably qualified professional'. de Witt Consulting is a quality assured, multi-disciplinary organisation providing clients with premium quality, town planning, surveying, ecology, GIS, sewer and water design and project management services. Our team has extensive experience in undertaking LVIAs for large- and small-scale projects across a variety of industries, including a range of electricity infrastructure projects. We have included a summary of recent projects where our specialists undertook LVIAs:

- 336MW solar energy system and 140MW battery energy storage system (BESS) with 560MWh of storage (Port Pirie LGA, South Australia)
- 636MW solar energy system and 250MW capacity BESS with 1,000MWh of storage (Goyder LGA, South Australia)
- 700MW Solar Farm including 200MW BESS in Cobbora (Dubbo LGA)
- 180MW Solar Farm including 400MW BESS in Dunedoo (Warrumbungle LGA)
- Dubbo Solar Farm (sub-5MW solar energy system) (Dubbo LGA, NSW)
- Dubbo Firming Power Station (Dubbo LGA, NSW)
- Dunedoo Firming Power Station (Warrumbungle LGA NSW)
- Horsham Firming Power Station (Horsham LGA, VIC)
- Barnawartha Firming Power Station (Albury LGA, VIC).

As such de Witt Consulting is suitably experienced and qualified to undertake this LVIA.

1.2 KEY TERMS

Key terms used throughout this LVIA are defined in the following table:

Table 1: Key Terms

Term	Definition
Close foreground	Generally areas within 500 metres (m) of the development, where details are easily discernible and/or occupy a larger proportion of the field of view.
Distant	Generally areas within 3 kilometres (km) of the subject site, where features and elements appear on the visible horizon and can be difficult to distinguish or are often indistinguishable.
Effect	The landscape or visual outcome of a proposed change from a development that is the combined result of the receptor's sensitivity and the magnitude of the change resulting from the development.
Foreground	Generally refers to areas within 1km of the subject site, where details are less distinguishable, but the features may occupy a large-moderate proportion of the field of view.
Impact	The effect of a proposal, which can be positive, negative, or negligible, when measured against an existing condition or baseline.
Landscape character	A distinct, recognisable, and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
Landscape effect	A change to landscape values as a result of development, which can be either positive, negative, or negligible.
Landscape receptor	Aspects of the landscape resource that have the potential to be affected by the proposal.
Landscape value	The relative value that is attached to different landscapes by present or future generations. Landscape values are formed by the characteristics of the landscape which can be determined through objective criteria, as well as personal values such as a person's association, memories, knowledge or experiences of that landscape (subjective).
Midground	Generally refers to areas within 2km of a proposed development, where details are difficult to distinguish and the features occupy minor significance within the field of view.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor.
Significance	A measure of the importance or gravity of the environmental effect, defined by criteria specific to the environmental topic.
View	Any sight, prospect or field of vision as seen from a place, and may be wide or narrow, partial or full, pleasant or unattractive, distinctive or nondescript, and may include background, midground and/or foreground elements or features.
Viewpoint	A specific location from which the landscape and its potential visual impacts are assessed, typically used to understand how a project or development might affect views and visual amenities.
Visual amenity	The overall pleasantness of the views that people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area.
Visual catchment	Areas visible from a combination of locations within a defined setting (may be modelled or field-validated).
Visual effect	Effects on specific views and on the general visual amenity experienced by visual receptors, which can be either positive or negative.
Visual receptor	Individuals and/or defined groups of people who have the potential to be affected by a proposed development / changes in views or visual amenity at different places (viewpoints).
Visual significance	Used in this instance to describe the weighting that is given to the relative importance of identified landscape values. The landscape values of an area likely to be significant are those that help understand the past, enrich the present, and which will be of value to future generations.

2 METHODOLOGY

LVIA includes a separate assessment of a development's visual effect on:

- landscape character, and
- specific views.

The Landscape Institute and the Institute of Environmental Management & Assessment (IEMA) (Landscape Institute & IEMA, 2013) provides that landscape character can be identified by distinct, recognisable, and consistent patterns of elements that makes one landscape different from another (i.e., creating a sense of place). Additionally, landscape character includes landscape value, which may include biodiversity, geo-diversity, historic, and aesthetic values, as well as personal values such as a person's association, memories, knowledge, or experiences of that landscape (Department of Planning and Environment (DPE), 2022). As such, landscape character is an important consideration in LVIA because of the value that individuals, communities and public bodies attach to them and because landscapes are a shared resource that are as important in their own right as they are as a public good.

Importantly, landscapes are not static, but they continue to evolve and change over time. Landscape changes are a result of many factors – both anthropogenic and natural. Natural changes can be unpredictable; for example, resulting from natural disasters, or slower changes over time as a result of climate change. Anthropogenic changes on the other hand, can result from the evolving requirements for development to meet the needs of a growing population, strategic planning objectives, and increasing resilience to the changing climate, for example. If appropriately managed and informed, new types of development and any resulting landscape changes can avoid adverse impacts to the landscape's value.

The potential visual impact on landscape and visual receptors is derived from changes in the landscape, its character and how this is experienced. The assessment of a development's effect on the landscape itself and on specific views, LVIA must consider how sensitive a receptor/viewpoint is to the change of view and the magnitude of the change in order to determine the overall significance of the development's effect. A number of factors are considered in determining the sensitivity and magnitude, such as the type/context of the receptor/viewpoint (roadway, public lookout, private residence, workplace, recreation place, etc); position of the development to the view (both in proximity and in relative height/overlooking); any intervening features or structures; and duration of the view; etc.

Effects to views can have different levels of significance (e.g., high, moderate, low) depending on the sensitivity of the receptors and the magnitude of change. As indicated above, changes to the landscape and views are more than visual and include a range of physical and perceptual factors. Determining visual impact therefore requires a combination of qualitative and quantitative assessment measures and acknowledgement of limitations. Consultation with the relevant community and other stakeholders is the preferred method of obtaining the specific value criteria of the landscape as a whole and value of specific views. Where this is not made available to the assessment, LVIA literature is used to limit subjectivity and encourage a standardised method for undertaking these value-based determinations. This is discussed further below.

2.1 OVERVIEW OF LVIA PROCESS

The methodology and report structure of this LVIA (see Figure 1) is primarily based on the *Guidelines for Landscape and Visual Impact Assessment,* Third Edition (Landscape Institute & IEMA, 2013), which is generally considered industry standard and recognised as best practice. In addition to the above, other key resources this methodology is based on include:

- Australian Institute of Landscape Architects (AILA). (2018). *Guidance Note for Landscape and Visual Assessment.* June 2018;

- Department of Planning, Housing and Infrastructure. (2024). *Technical Supplement for Landscape Character and Visual Impact Assessment*. New South Wales Government;
- Department for Planning and Infrastructure (DPI). (2007). *Visual Landscape Planning in Western Australia: a manual for evaluation, assessment, siting and design.* West Australian Planning Commission;
- Transport for NSW (TfNSW). (2020a). *Guideline for Landscape Character and Visual Impact Assessment*. EIA No. 4. New South Wales Government; and
- TfNSW. (2020b). *Beyond the Pavement.* New South Wales Government.

The LVIA begins with establishing the baseline landscape setting within which the project is located from available published materials (local planning guidelines, policies, etc), identifying potential visual receptors, and identifying the landscape character (and therefore identifying the landscape receptors). A desktop assessment and preliminary visibility modelling can be conducted to eliminate areas and potential visual receptors from the visual impact assessment. Discussions with the proponent is also undertaken to confirm any potential visual receptors or key viewpoints that they specifically require to be captured in the LVIA, due to their knowledge of the project and/or through consultation with the community and stakeholders.

Fieldwork is then undertaken to confirm the visibility of the project from the areas identified in the desktop assessment. During the fieldwork, the landscape character and its value are assessed against standardised criteria (to limit subjectivity) and all visual receptors and viewpoints that are confirmed to have visibility of the project are assessed to determine the significance of the effect. This is an iterative process undertaken for each receptor/viewpoint.

The project is also assessed for cumulative impacts that may arise from surrounding development of a similar scale and/or nature that may together constitute a visual impact on the landscape. In the event the assessment determines it necessary, mitigation measures to alleviate significant visual impacts are then provided to the project designers and the project is reassessed on this basis with final recommendations provided for consideration as part of any ongoing planning approval and/or detailed design works.

This process is summarised in Figure 1.

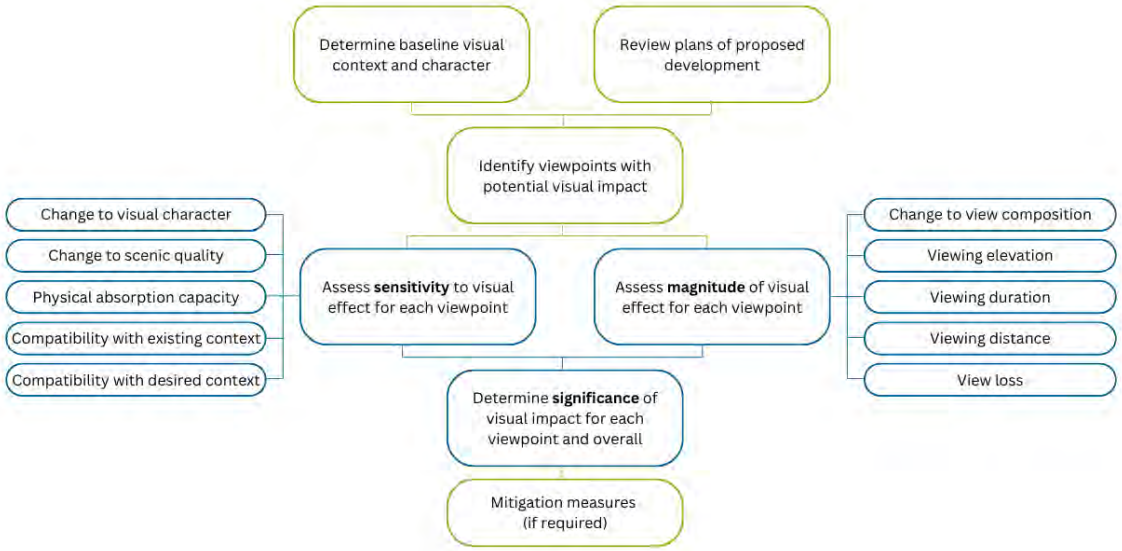

Figure 1: Process for assessing landscape and visual effects. (Source: Compiled by the author using information from Landscape Institute & IEMA, 2013)

2.2 SCOPING

The size/scale and nature of the proposed development must be considered with respect to its visibility throughout the landscape, which involves professional judgement from the LVIA assessor. The preliminary desktop assessment establishes a study area for the LVIA, using available aerial imagery, local planning and property information, topographical information including elevation data, and knowledge gained from the proponent. This assists to estimate areas where the proposed development (based on its size/scale and nature) will appear within the close foreground, foreground, midground and in the distance (background). These areas are referred to as "visual catchments".

Importantly, the effect of "perspective" and "prominence" as viewed by the human eye (where objects appear smaller with greater distance/physical separation) is considered as part of the exercise of determining visual catchments; therefore, professional discretion is again used to determine the extent of these visual catchments. It is noted that the visual catchments may be revised after the fieldwork stage of the assessment and/or if the size/scale of the proposed development changes at any time. The visual catchments are spatially defined using a Geographical Information System (GIS) and by applying a variable distance buffer of the site boundary at set intervals that correlate with the close foreground, foreground, midground and distance (background).

2.3 ASSESSMENT CRITERIA

As indicated, LVIA includes a separate assessment of:

- the landscape – to determine its baseline character and value, and
- the visual effect of the proposed development – to the landscape and visual receptors.

This involves separate assessment criteria, as outlined in the following subsections.

2.3.1 Assessment Criteria: Landscape Character and Value

A landscape's character is determined by the way the physical, natural and cultural components within an area interact, which together create a distinctive area or character (Landscape Institute & IEMA, 2013). Although some of these components are objective and can be assessed against a standardised set of criteria, landscape character is also defined by aesthetic, perceptual and experiential aspects (landscape values), which are subjective and based on personal associations and opinions that can differ between individuals. It is noted that preferences and values will also differ depending on the context of the landscape, for example urban, rural, natural and/or a combination of these landscape types.

Additionally, landscape character can be separated into 'landscape character zones', which are areas with strongly defined spatial qualities and/or features, distinct from immediately adjacent areas (TfNSW, 2020a; Landscape Institute & IEMA, 2013). Importantly, identification of the landscape character and its value must extend beyond reviewing how the landscape currently appears to also consider what the landscape may be like in the future and in the absence of the proposed development. This includes any existing trends in change and consideration of how these may affect the landscape over time, accepting that this involves a degree of speculation and uncertainty (Landscape Institute & IEMA, 2013). Local planning policies are typically used to understand the desired future character as well as any existing character assessments prepared by various authorities at the regional or local level, if available.

2.3.2 Assessment Criteria: Landscape and Visual Effects

As depicted in Figure 1, the overall ***significance*** of a visual effect (or impact) is determined by establishing each receptor's ***sensitivity*** to change resulting from the proposed development and the ***magnitude*** of the change (or visual effect) for each receptor, which can be viewed as the following expression:

sensitivity + magnitude = significance

where:

receptor's susceptibility to change + value attached to receptor = sensitivity (of the receptor)

and

size/scale of effect + duration of effect + reversibility of effect = magnitude (of the effect)

As stated, landscape value also influences the overall significance of an effect which is in addition to the combined assessments of sensitivity and magnitude. As such, a level of professional judgement must be utilised and requires clear explanation where the assessment results deviate from the criteria. The criteria for each assessment of sensitivity and magnitude are discussed in the following subsections.

2.3.2.1 Sensitivity Criteria

The sensitivity of *landscape receptors* is largely dictated by the ability of the receptor to accommodate the effect without compromising the specific basis for the value attached to the landscape receptor or the achievement of landscape planning policies and strategies. The sensitivity of *visual receptors* is determined by the occupation or activity of people experiencing the landscape from a particular location (viewpoint) and the extent to which their attention or interest may therefore be focused on the landscape and the visual amenity they experience at particular locations.

Each landscape and visual receptor are individually assessed for sensitivity. Table 2 (below) details the assessment criteria and grading system to determine the degree of sensitivity for both landscape and visual receptors.

Table 2: Sensitivity criteria for both landscape and visual receptors

Sensitivity	Receptor	Criteria
High	Landscape	The effect will result in a significant change to the landscape receptor, landscape character and/or value.
	Visual	The most sensitive visual receptors are residents at home in high proximity and visibility to the proposal.
Moderate	Landscape	The effect can be accommodated to some degree, but prominent elements of the proposal are uncharacteristic.
	Visual	People engaged in activities whose attention is likely to be focused on the landscape and on particular views, including residents that are located at a greater distance to the visual effect).
Low	Landscape	The effect can be accommodated within the landscape without altering the existing character or value; or the existing landscape characteristics/ amenity are of poorer quality.
	Visual	May include pedestrians and motorists that would typically have less vested interest and emotional connection to the specific landscape, its character or value (eg. view the effect infrequently, intermittently and/ or over a short time); receptors visiting a premises where the primary activity is indoors and/or not dependent on the amenity of the landscape to enjoy the activity; people at work whose attention is not focused on their surroundings and/or where the setting is not important to the quality of working life.
Negligible	Landscape & Visual	The effect is almost imperceptible and/or will not result in an adverse change to views or the landscape including its character and/or value.

2.3.2.2 *Magnitude Criteria*

The size and scale of an effect to a *landscape receptor* requires consideration of the extent of change to the landscape character either by the removal or addition of elements/features within the landscape and whether the effect changes any key characteristics of the landscape that are critical to its distinctive character. For *visual receptors*, the size and scale of an effect considers the scale of change in the view, its composition and the proportion of view occupied by the effect, which may include consideration of the angle of which the effect is observed from a viewpoint and the distance between the viewpoint and an effect.

For both landscape and visual receptors, the effect's duration distinguishes between temporary effects (i.e., through the construction stage) and long-term/permanent effects, which result directly from the operation of the project; while the effect's reversibility considers whether the site, landscape character and/or view can be returned to the original state prior to the implementation of the proposed development.

As with sensitivity, each landscape and visual receptor are individually assessed for magnitude. Table 3 details the assessment criteria and grading system to determine the degree of magnitude for both landscape and visual receptors.

Table 3: Magnitude criteria for both landscape and visual receptors

Magnitude	Receptor	Criteria
High	Landscape	The effect results in major alterations to the characteristics of the landscape.
	Visual	It consumes a large proportion of the view; high degree of contrast or integration of new features/ changes in terms of form, scale and mass, height, colour and texture.
Moderate	Landscape	The effect will result in some change to the view due to loss of existing features and addition of new features in the view without significant change in its composition or compromising the specific basis for the landscape character.
	Visual	The effect is a noticeable element in the view from the receptor (i.e. in the midground) but not in the direct line of sight.
Low	Landscape	The effect will not result in an obvious change to the view due to significant loss of existing features or addition of new features.
	Visual	The effect is difficult to distinguish from the receptor (i.e. due to distance / separation / visibility).
Negligible	Landscape & Visual	The effect is almost imperceptible and will not result in an adverse change to views or the landscape including its character and/or value.

2.3.2.3 *Determining Significance*

As stated, the overall significance of an effect is determined through combining the separate assessments of a receptor's sensitivity and the magnitude of the effect as experienced by that receptor. This is undertaken using a significance matrix (see Table 4 below) and is applied to each individual receptor. It is noted that the reporting of the assessment (as provided in Section 4.5 of this report) may group similarly scored receptors to reduce repetitiveness.

Further, and as previously stated, a level of professional discretion is used to determine the extent that the landscape value and receptor sensitivity (as determined using set criteria) may also influence the overall significance of the effect. A written discussion must be provided where this occurs to ensure transparency of the assessment.

Table 4: Matrix of Significance of Effects

		Magnitude of Effects			
		High	**Moderate**	**Low**	**Negligible**
Sensitivity of Receptors	**High**	High Significance	High-Moderate Significance	Moderate Significance	Negligible Significance
	Moderate	High-Moderate Significance	Moderate Significance	Moderate-Low Significance	Negligible Significance
	Low	Moderate Significance	Moderate-Low Significance	Low Significance	Negligible Significance
	Negligible	Negligible Significance	Negligible Significance	Negligible Significance	Negligible Significance

(Source: Landscape Institute & IEMA, 2002; TfNSW, 2020)

3 PROPOSED DEVELOPMENT

The proposed works are located within the planned Hunter-Central Coast REZ and relate to the construction, operation and maintenance of REZ network infrastructure (RNI) required to achieve the 1GW network capacity. All network augmentations, including both substation and subtransmission line works, will be undertaken while a secure electricity supply is maintained to customers.

The proposed works are largely contained within existing easements for electricity infrastructure, with the exception of the proposed Antiene STSS and Sandy Creek STSS. The proposed subtransmission line upgrades span across a liner area of approximately 85km between Kurri Kurri and Muswellbrook (Figure 2, overleaf).

This includes:

- **Antiene Sub Transmission Substation (STSS)**
  Antiene 132kV STSS: A new 132kV switching station is proposed on Hebden Road, Liddell. The Antiene 132kV STSS will facilitate connection of proposed generation and storage proposals, and interconnection to the existing 132kV Lower Hunter transmission network.
- **Sandy Creek Sub Transmission Substation (STSS)**
  Sandy Creek 132kV STSS: A new Sandy Creek 132kV Switching Station (SS) adjacent to the existing Muswellbrook 132kV STS to accommodate the reconfiguration of the 132kV supply network to Muswellbrook BSP. Approximately 5km of existing transmission line corridors would be rebuilt to double circuit transmission lines.
- **132kV Feeder Connections**
  Antiene 132kV Feeder Connections: To enable 600 MW power transfer from the Antiene SS to Newcastle BSP, new 132kV connections are proposed from the Antiene 132kV STSS to Kurri 132kV STS which would repurpose existing overhead mains within existing easements where possible. Approximately 95km of existing transmission line corridors would be rebuilt to double or triple circuit transmission lines.
- **Other infrastructure**

  Early works distribution 11Kv/400v network relocations:

  - Antiene to Muswellbrook Fibre Optics: Two new underground fibre optic circuits will be built between Antiene STSS to Muswellbrook BSP, over 13km, predominantly within existing transmission corridors
  - New Inductor at Rothbury Zone Substation
  - Muswellbrook Fibre Marshalling Kiosk: A new Fibre Marshalling Kiosk is proposed to be established at Transgrid's Muswellbrook BSP.
  - Secondary Systems Upgrades: Upgrade of 132kV feeder protection relays at various switching stations in the Upper and Lower Hunter Networks to meet compliance requirements with the National Electricity Rules.
  - Mt Thorley 66kV Network Rearrangement: Reconfiguration of the 66kV network supplied from Mt Thorley 66kV ZS is proposed.
  - Berowra to Somersby OPGW and ADSS: Replacement of approximately 30km of Optical Pilot Ground Wire (OPGW) and All-Dielectric Self-Supporting fibre (ADSS) is proposed on existing overhead lines between Berowra and Somersby.

FIGURE 2

PROJECT OVERVIEW

SANDY CREEK STSS (PROPOSED)

MUSWELLBROOK

ANTIENE STSS (PROPOSED)

SINGLETON

KURRI KURRI

CESSNOCK

LEGEND:

TRANSMISSION LINES
PROPOSED ROUTE UPGRADE

PROJECT:
HUNTER REZ TRANSMISSION PROJECT

CLIENT DETAILS:
AUSGRID

PREPARED BY:

dwc de Witt Consulting

0 2.5 5 7.5 km

A3 SCALE:1:250,000
DWC REF: 15166
VERSION: 02
DATE: 15/04/2025
CRS: EPSG:7856
AUTHOR: MB
APPROVED: EM
DATA © OpenStreetMap; AUSGRID 2024

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The proposed upgrades to Ausgrid's existing network infrastructure involves two key visual components:

- Replace ~85km existing overhead sub transmission lines and poles between Kurri Kurri and Muswellbrook with larger poles.
- Widen easements to facilitate larger capacity feeders and to meet the relevant design and safety standards for the higher capacity subtransmission lines, and
- Establish two (2) new subtransmission switching stations (STSS) at Muswellbrook (Sandy Creek STSS) and Lake Liddell (Antiene STSS).

These works will involve ancillary upgrades to the existing Kurri STS and various site preparation works including:

- Access tracks
- Establishment of bushfire buffer and earthworks
- Vegetation clearing associated with the two new STSS sites and to the increased widths of existing linear easements.

Figure 2 provides an overview of the project location and the excerpts in Figure 3 and 4 below depict the general arrangement of the two proposed STSS sites.

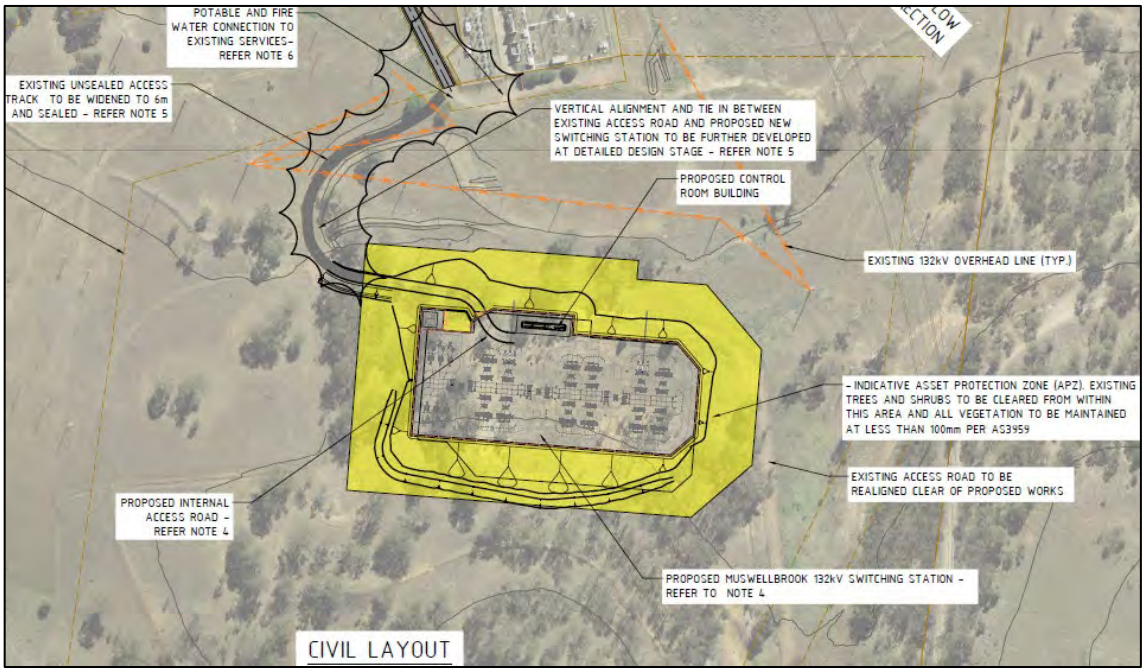

Figure 3: Extract of Sandy Creek STSS general arrangement (AECOM, Drawing No. 265663, Amd. E, 02/02/2024)

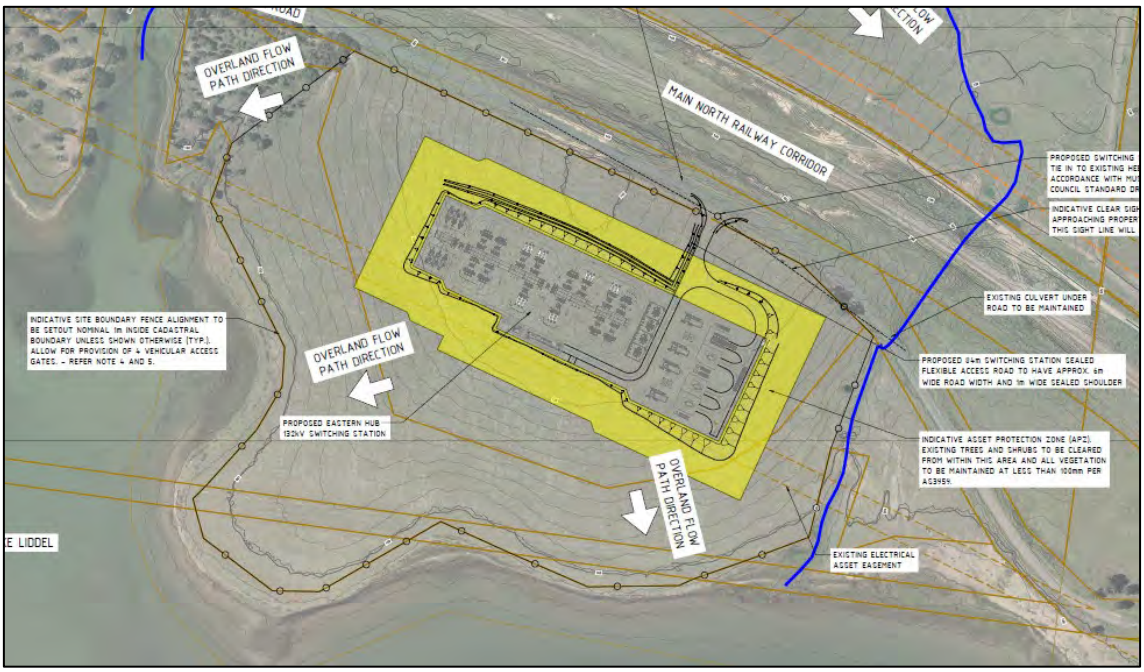

Figure 4: Extract of Antiene STSS general arrangement (AECOM, Drawing No. 265363, Amd. E, 25/01/2024)

4 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

4.1 SCOPE OF THIS LVIA

As stated, LVIA is generally scoped through desktop assessment and preliminary visibility modelling in the first instance to eliminate areas and potential visual receptors from the visual impact assessment. This visibility modelling is often done using a zones of theoretical visibility (ZTV) analysis modelled in a Geographic Information System (GIS). Visibility modelling was not determined to be valuable for this LVIA due a range of factors, including (but not limited to):

- High probability false-positive results due to known limitations of ZTV analysis, including the vastness of the surrounding area and extensive visual obstructions (mainly existing vegetation) not captured in a digital elevation model (DEM) which ZTV relies on,
- Early stage of the proposed works and indicative locations of new poles, etc, and
- Nature of the proposed works involving the replacement of existing electricity transmission poles with higher voltage poles within the same location and easement as existing.

Instead, consultation between Ausgrid and de Witt Consulting was undertaken to determine key viewpoints along the proposed route (largely within the existing easements) and key viewpoints at each of the proposed STSS sites to appropriately scale the LVIA to be suitable for the project's requirements. The viewpoints were selected within the different landscape character zones and visual receptors of varying sensitivities to gain a cross section of the proposed works as viewed within the landscape. A conservative approach was used in selecting many of the viewpoints within the existing easements, which is known to produce a higher visual impact scenario due to the proximity of those viewpoints to the proposed infrastructure. This must be considered in reviewing the assessment of those viewpoints as these views are not likely to be observed by members of the public who do not have access to these easements. In other cases, the viewpoints within the easements were selected for land access to obtain accurate survey data and photographs that are required for the photomontages. A total of 10 locations were ultimately identified for viewpoint assessment as depicted in Figure 5 and discussed in Section 4.5.

4.1.1 Other Data

This LVIA has utilised the following data:

- Plans and elevations provided by AECOM,
- LiDAR data provided by Ausgrid,
- Survey data provided by de Witt Consulting,
- Topographical maps and aerial imagery provided by de Witt Consulting; and
- Photographs and photomontages provided by de Witt Consulting.

4.2 BASELINE LANDSCAPE CHARACTER

"*The landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*" (Landscape Institute & IEMA, 2013).

4.2.1 Surrounding Landscape

As stated, landscape character is determined by the way the physical, natural and cultural components within a landscape interact, which together create a distinctive area or character (Landscape Institute & IEMA, 2013). Although some of these components are objective and are able to be assessed against a standardised set of criteria, landscape character is also defined by aesthetic, perceptual and experiential aspects (landscape values), which are subjective and based on personal associations and opinions that can differ between individuals. It is noted that preferences and values will also differ depending on the context of the landscape, for example urban landscape, rural landscape, natural landscape and/or a combination of landscape types. These are well-documented and recognised limitations affecting LVIA generally.

Landscape character can be separated into landscape character zones (LCZs), which are areas with strongly defined spatial qualities and/or features, distinct from areas immediately adjacent (TfNSW, 2020a; Landscape Institute & IEMA, 2013). These elements include physical influences such as geology, landform, water bodies, vegetation and patterns of tree cover, and the influence of human activity including land use and management, character of settlements / buildings, and the pattern and type of fields and enclosures.

Although these are separate from NSW environmental planning instrument (EPI) land use zones, there is typically a high degree of correlation between these planning designations and the landscape characteristics that define the LCZs. While EPI zoning may place specific planning controls over a single parcel of land, LCZs are more general and can encompass multiple land use zones where shared spatial qualities or features across the landscape exist. Five (5) LCZs were identified in the surrounding landscape (see Figure 5, overleaf), including:

- rural / agriculture,
- rural / mining,
- urban / rural fringe,
- vineyards / tourism, and
- remnant vegetation.

Of these LCZs, the proposed works intersect with:

- rural / mining,
- urban / rural fringe, and
- vineyards / tourism (small extent only).

The proposed subtransmission line/pole upgrades largely span across land zoned as RU1 Primary Production, RU2 Rural Landscape, and SP2 Infrastructure. To a lesser extent, the works cross C3 Environmental Management zoned land (near Muswellbrook) and proximate to a mix of zones in more urbanised areas of the southern extent of works including land zoned for business, industrial, and residential. The proposed Antiene STSS is located on land zoned RE1 Public Recreation proximate to the Lake Liddell Recreation Area, and the proposed Sandy Creek STSS on land zoned both SP2 Infrastructure and C3 Environmental Management. A plan depicting the surrounding EPI land use zones is provided in Figure 6.

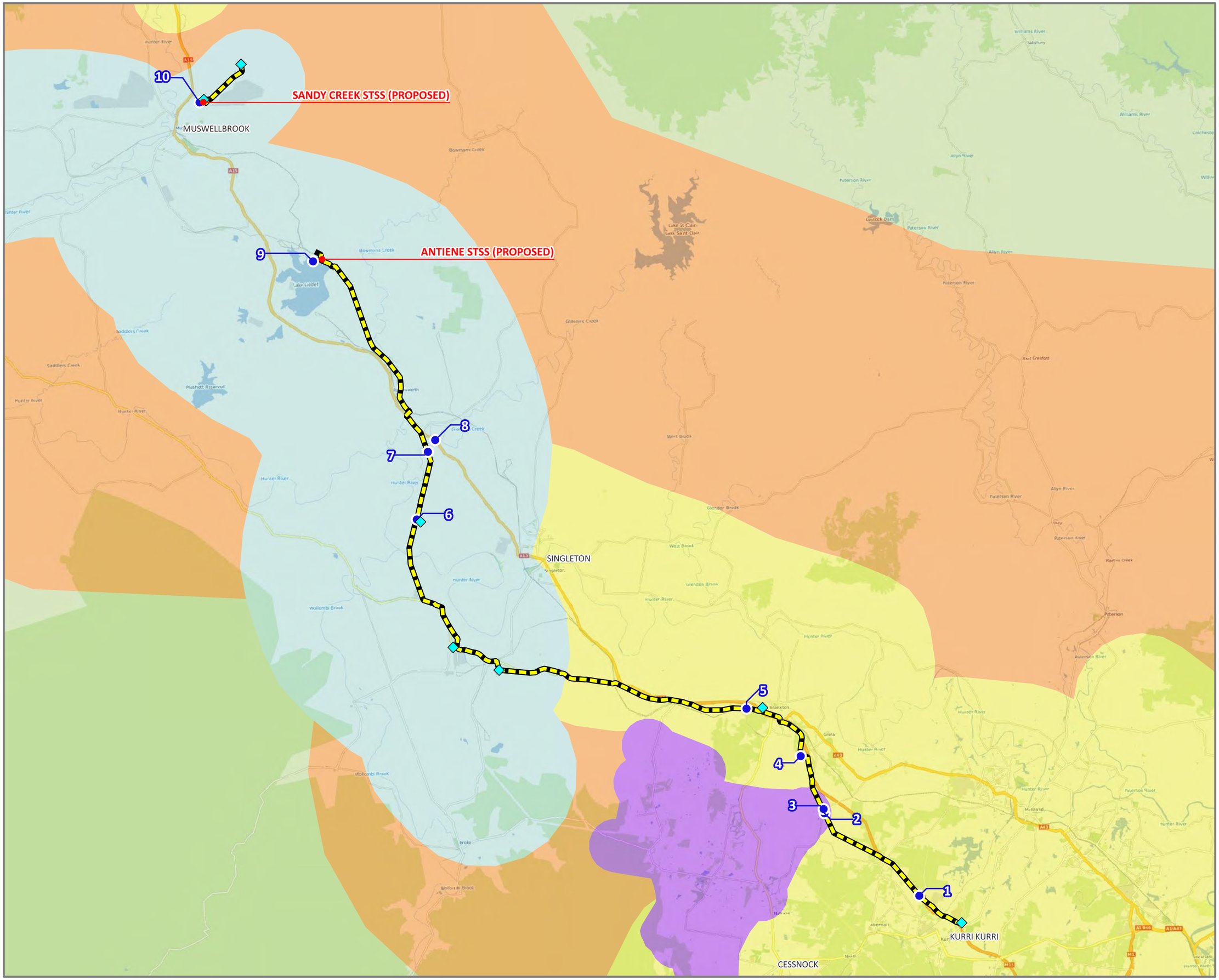

FIGURE 5

LANDSCAPE CHARACTER ZONES & VIEW-POINTS

LEGEND:

- TRANSMISSION LINES PROPOSED ROUTE UPGRADE
- VIEWPOINT
- EXISTING SUBSTATION

LANDSCAPE CHARACTER ZONES:

- RURAL / AGRICULTURE
- RURAL / MINING
- URBAN / RURAL FRINGE
- VINEYARDS / TOURIST
- REMNANT VEGETATION

PROJECT:
HUNTER REZ TRANSMISSION PROJECT

CLIENT DETAILS:
AUSGRID

PREPARED BY:

dwc de Witt Consulting

0 2.5 5 7.5 km

A3 SCALE:1:250,000
DWC REF: 15166
VERSION: 02
DATE: 15/04/2025
CRS: EPSG:7856
AUTHOR: MB
APPROVED: EM
DATA © OpenStreetMap; NSW SPATIAL SERVICES 2024; AUSGRID 2024

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FIGURE 6

LAND USE ZONES

SANDY CREEK STSS (PROPOSED)

ANTIENE STSS (PROPOSED)

MUSWELLBROOK

SINGLETON

CESSNOCK

KURRI KURRI

LEGEND:

TRANSMISSION LINES
PROPOSED ROUTE UPGRADE

PROJECT:
HUNTER REZ TRANSMISSION PROJECT

CLIENT DETAILS:
AUSGRID

PREPARED BY:

dWC de Witt Consulting

0 2.5 5 7.5 km

A3 SCALE:1:250,000
DWC REF: 15166
VERSION: 02
DATE: 15/04/2025
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AUTHOR: MB
APPROVED: EM
DATA © OpenStreetMap; NSW SPATIAL SERVICES 2024; AUSGRID 2024

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4.3 BASELINE LANDSCAPE VALUE

This section seeks to determine the baseline landscape value that will then be used to inform the landscape's 'sensitivity' to change resulting from the proposed development in the assessment of landscape effects (Section 4.4 of this report).

As discussed in the previous section of this report, the baseline character is identified *as rural / mining*, *urban / rural fringe*, and *vineyards / tourism*; therefore, the landscape value will be assessed on the closest associated available criteria from the literature, being that for rural landscapes. These criteria have been obtained from the literature identified in Section 2.1 of this report and are outlined in Table 5 below.

Table 5: Characteristics of higher and lower preferences / value of rural landscapes

Higher preference/ value	Lower preference/ value
Characteristic: Landform/ topography	
• Elevated landforms and undulating terrain • Presence of water bodies • Presence of natural rock features • Significant landscape features (trees, tree stands, historic relics, windmills)	• Uniform or flat with little to no vertical relief • Absence of or eutrophied water bodies • Eroded areas • Unmanaged roads and access tracks
Characteristic: Landcover/ vegetation	
• Presence of fauna, distinctive crop rotations, water conditions and climatic conditions • Distinctive remnant vegetation located along creek lines, roadsides and paddocks	• Lack of vegetation • Areas of soil salinity/ salt scalds or dead, dying or diseased vegetation • Recently harvested areas (stumps, debris, abandoned off-cuts) • Extensive weed infestation
Characteristic: Land use	
• Gradual transition zones between agricultural land and natural landscape • Historic features and land use patterns that strengthen local rural character (historic farm machinery, old shearing sheds, windmills and historic buildings) • Well maintained buildings and/or structures that support the rural character	• Tips, dumps and landfill areas • Land use areas that contrast significantly from local rural landscape characteristics (plantations, mines, housing, utility towers, roads and fencing) • Abandoned structures (including farm structures) in a state of disrepair or destruction
Characteristic: Texture and colour	
• Diverse colour and contrast or species diversity of cropping • Agricultural patterns, colours and textures that complement natural features	• Lack of diversity in colour and texture • Difficult to distinguish details in the midground • No discernible focal points on the horizon
Characteristic: Settlement and human influence	
• Scattered settlement pattern and individual structures (silos, windmills, water tanks, historic buildings, bridges, hay bales, dams) • Large allotments • Gradual transition between zones • Development protects key landscape elements and maintains the density, scale and spacing of development • Balance between built form and the natural landscape • Unobtrusive utility services	• Concentrated settlements with uncharacteristic structures / subdivision pattern • Extensive areas of urban sprawl • Intrusive billboards (particularly along roads and railway reserves) • Buildings which contrast sharply from the surrounding built character • Obtrusive utilities that segment dense remnant vegetation • Poorly maintained waterways and drains prone to stagnation, pollution and littering • Extensive retaining walls which result in concrete canyon effects on roadways
Characteristic: Rarity	
• Presence of rare elements or features in the landscape or presence of a rare landscape character type	• Harshly contrasting and/or common elements or features within the landscape

4.3.1 Landform / Topography

Table 6: Assessment of landform/ topography characteristics of surrounding landscape

Higher preference/ value			Lower preference/ value	
High	**High-Moderate**	**Moderate**	**Moderate-Low**	**Low**
• Elevated landforms and undulating terrain • Presence of water bodies • Presence of natural rock features • Significant landscape features (trees, tree stands, historic relics, windmills)			• Uniform or flat with little to no vertical relief • Absence of or eutrophied water bodies • Eroded areas • Unmanaged roads and access tracks	

The surrounding landscape comprises an abundance of remnant vegetation, agricultural land, vineyards (in the southern areas of the proposed development near Cessnock), natural waterbodies (creeks and rivers), anthropogenic waterbodies (farm dams, wastewater treatment / detention ponds), and areas of elevated landforms. These landscape features are characteristic of higher valued rural landscapes.

Notwithstanding, approximately half (48km) of the entire route of works is within the rural / mining LCZ which forms a distinctive part of the overall landscape in this area. These open cut mines significantly degrade the higher-valued characteristics through cleared vegetation, prevalence of heavy industry, and airborne dust that diminishes visibility at times. It is recognised that the value that the local communities place on this LCZ may be higher than that described in the literature based on personal value associated with employment from the mining industry, which should be considered during community and stakeholder consultation.

4.3.2 Landcover / Vegetation

Table 7: Assessment of landcover / vegetation characteristics of surrounding landscape

Higher preference/ value			Lower preference/ value	
High	**High-Moderate**	**Moderate**	**Moderate-Low**	**Low**
• Presence of fauna, distinctive crop rotations, water conditions and climatic conditions • Distinctive remnant vegetation located along creek lines, roadsides and paddocks			• Lack of vegetation • Areas of soil salinity/ salt scalds or dead, dying or diseased vegetation • Recently harvested areas (stumps, debris, abandoned off-cuts) • Extensive weed infestation	

The general landcover of the surrounding landscape varies, however there is a distinct presence of trees and greenery throughout. This ranges from pockets of dense remnant vegetation, scattered tree stands, roadside vegetation, riparian vegetation along natural waterways, and pockets of more densely vegetated hillsides. More intentional landcover / vegetation is also found across the landscape in the form of agricultural activities that were in varying stages of harvest and crop rotations during the field-based assessment of this LVIA.

A significant portion of the area surveyed during the field-based assessment was existing electricity easements for subtransmission lines. These areas are notably lacking vegetation for safety requirements and form distinctive vegetation 'breaks' throughout the landscape. These are largely co-located alongside other infrastructure, such as the Hunter Expressway, New England Highway, and through the mining areas.

The extensive areas of mining in the surrounding landscape are also significantly lacking landcover and vegetation. These are observable from numerous locations throughout the landscape, including from prominent viewpoints along the New England Highway and can be observed frequently by a high volume of visual receptors that were observed using this highway.

4.3.3 Land Use

Table 8: Assessment of land use characteristics of surrounding landscape

Higher preference/ value			Lower preference/ value	
High	**High-Moderate**	**Moderate**	**Moderate-Low**	**Low**
• Gradual transition zones between agricultural land and natural landscape • Historic features and land use patterns that strengthen local rural character (historic farm machinery, old shearing sheds, windmills and historic buildings) • Well maintained buildings and/or structures that support the rural character			• Tips, dumps and landfill areas • Land use areas that contrast significantly from local rural landscape characteristics (plantations, mines, housing, utility towers, roads and fencing) • Abandoned structures (including farm structures) in a state of disrepair or destruction	

The surrounding landscape demonstrates a diverse settlement pattern and type of buildings, structures, and uses. As previously described, the location of the proposed works is defined by rural / mining, urban / rural fringe, and vineyards / tourism landscape characteristics. The rural

/ mining and urban / rural fringe are the predominant LCZs within which the proposed works are located, with only a very minor extent of the upgrade works located within the vineyards / tourism LCZ (~3km).

The vineyards / tourism LCZ contains strong links to historic heritage items, as well as well-maintained buildings, structures and land uses that strengthen the landscape character in this LCZ. Conversely, the rural / mining and urban / rural fringe LCZs are lacking in visually distinctive historic features. Visually prominent buildings and structures that are abandoned and/or in a state of disrepair are also scattered throughout these LCZs.

The transition between LCZs is abrupt, particularly while travelling along the Hunter Expressway and New England Highway. However, these LCZs cover large areas which results in less frequent occurrences of the transition between LCZs.

4.3.4 Texture and Colour

Table 9: Assessment of texture and colour characteristics of surrounding landscape

Higher preference/ value			Lower preference/ value	
High	**High-Moderate**	**Moderate**	**Moderate-Low**	**Low**
• Diverse colour and contrast or species diversity of cropping • Agricultural patterns, colours and textures that complement natural features			• Lack of diversity in colour and texture • Difficult to distinguish details in the midground • No discernible focal points on the horizon	

The surrounding landscape presents diversity in colour through the dark greens of the remnant vegetation, less saturated browns and greens of dryer native vegetation, harvested land, grassed areas, and vivid greens from crops within their growth cycle. These features also provide different textures in the landscape that complement the landscape.

Some areas of extensive open land were noted to lack contrast in both colour and texture in the foreground but framed by hills in the midground to distant views (background), providing some visual relief. The open cut mines in particular contrast sharply in both texture and colour to other features of the rural landscape.

4.3.5 Settlement and Human Influence

Table 10: Assessment of settlement and human influence characteristics of surrounding landscape

Higher preference/ value			Lower preference/ value	
High	**High-Moderate**	**Moderate**	**Moderate-Low**	**Low**
• Scattered settlement pattern and individual structures (silos, windmills, water tanks, historic buildings, bridges, hay bales, dams) • Large allotments • Gradual transition between zones			• Concentrated settlements with uncharacteristic structures / subdivision pattern • Extensive areas of urban sprawl • Intrusive billboards (particularly along roads and railway reserves)	

• Development protects key landscape elements and maintains the density, scale and spacing of development • Balance between built form and the natural landscape • Unobtrusive utility services	• Buildings / structures contrast sharply from the surrounding built character • Obtrusive utilities that segment dense remnant vegetation • Poorly maintained waterways and drains prone to stagnation, pollution and littering • Extensive retaining walls which result in concrete canyon effects on roadways

As previously described, the surrounding landscape has distinctive character zones that transition abruptly. There are elements present within the surrounding landscape that align with the higher preference/value criteria, including scattered settlement patterns, dams on rural / agricultural land, and large allotments. However, the overall balance of these when viewed alongside the prevalence of lower preference/value characteristics results in an adverse effect to the overall characteristic of settlement and human influence in the landscape.

Overhead subtransmission lines and associated poles are a prevailing feature throughout the landscape, spanning across rural properties, through vineyards, alongside roadways, and in dominating the skyline particularly near road intersections, heavy industry uses, and existing substations. While these are recognised as a less-desirable landscape characteristic, this type of infrastructure was present throughout all the LCZs. Additionally, there is evidence of urban sprawl from the Singleton and Cessnock townships, however this is not visually extensive.

4.3.6 Rarity

Table 11: Assessment of rarity characteristics of surrounding landscape

Higher preference/ value			Lower preference/ value	
High	**High-Moderate**	**Moderate**	**Moderate-Low**	**Low**
• Presence of rare elements or features in the landscape or presence of a rare landscape character type				• Harshly contrasting and/or common elements or features within the landscape

Cultural and environmental features were largely absent in the surrounding landscape. No rare landscape characteristics were identified within the surrounding landscape.

It is recognised that a small section of works occurs within the vineyards district of the Hunter Valley wine region, which is one of Australia's oldest wine regions. As identified previously, electricity infrastructure is also prevalent throughout the vineyards district, and in many cases pre-dates the vineyards themselves, including easements that cross directly through the plantations and border roads and properties. As provided for the settlement and human influence characteristic, this type of infrastructure is not complementary to the rarity characteristic however it is prevalent throughout the vineyards / tourism LCZ.

4.3.7 Landscape Value – Summary and Discussion

Based on the assessment in the preceding subsections, the baseline landscape value scores **low** using the literature-based criteria for preferred characteristics of rural landscapes.

As acknowledged throughout this report, certain aspects of landscape and visual impacts are inherently subjective. Landscapes can be valued differently by individuals where it can be influenced by a person's association, memories, knowledge, or experiences of that landscape. This can also be different across communities, various types of stakeholders, and public authorities. Without direct input in this specific case, the assessment can only use the results of the baseline landscape value as determined through the literature (as discussed in Sections 4.2 and 4.3).

The baseline landscape value in this context is an objective value used for the purpose of assigning the surrounding landscape's sensitivity to change, which informs the assessment of landscape and visual effects of the proposed development. It is not a finding of how individuals, the community or specific public bodies may personally value the landscape within which they live, work in, or visit. Consultation with the community and relevant may uncover differing or

consistent findings as presented in this LVIA. This is a key reason why LVIA benefits from an iterative process that may enable reassessment based on new information as it becomes available.

It is understood that community and stakeholder consultation will be undertaken for the proposed works and that the above-mentioned finding can be considered for this local area at that time. Where this information is not yet available, the author does not include any personal associations or opinions that differ from the literature that may otherwise contribute to the perceived value, approval, or disagreement of the proposed works in the proposed locations.

4.4 ASSESSMENT OF LANDSCAPE EFFECTS

As defined in Table 1 (Section 1.4 of this report), a ***landscape effect*** means a change to landscape values as a result of development, which can be positive, negative, or negligible; and a ***landscape receptor*** refers to the characteristics of the landscape that together form the baseline character. The assessment below uses the criteria outlined in Section 2.3.2 of this report.

Sensitivity: The landscape receptors presented a **low sensitivity**, where the landscape effect can be accommodated within the existing landscape without altering the baseline character or value, and where the existing landscape characteristics are of lower value and the proposed works can be accommodated within the landscape without altering the existing character or value.

Magnitude: The proposed works are considered to present a **moderate magnitude**, where the landscape effect is considered to result in some change to views of the landscape due to loss of existing features and addition of new features. However, these changes will not significantly alter the composition of the baseline landscape or compromise the specific basis for the landscape character value. This effect will be most prominent during the construction stage, which is a temporary effect. The size and scale of the proposed works are noted to have the greatest effect when viewed in close proximity during both the construction and operational phases of the project. The magnitude is lowered where the proposed subtransmission line works will be replacing existing poles within the same location (easements), which in themselves are already affected.

Significance: Using the matrix of significance (below), the effect of the proposed works on the landscape and its character is determined to be of **moderate-low significance** overall.

Table 5: Assessment of magnitude of effects on surrounding landscape

		Magnitude of Effects			
		High	**Moderate**	**Low**	**Negligible**
Sensitivity of Receptors	**High**	High Significance	High-Moderate Significance	Moderate Significance	Negligible Significance
	Moderate	High-Moderate Significance	Moderate Significance	Moderate-Low Significance	Negligible Significance
	Low	Moderate Significance	Moderate-Low Significance	Low Significance	Negligible Significance
	Negligible	Negligible Significance	Negligible Significance	Negligible Significance	Negligible Significance

4.5 ASSESSMENT OF VISUAL EFFECTS

As defined in Table 1 (Section 1.4 of this report), a ***visual effect*** means a change to specific views and on the general visual amenity experienced by visual receptors, which can be either positive (improvement / enhancement of the existing view), negative (adversely imposes on the view and/or restricts viewing of the landscape), or negligible (no observable change). A ***visual receptor*** refers to the individuals and/or defined groups of people who have the potential to be affected by changes in views from different places (viewpoints).

As discussed throughout this report, considerable effort is made to limit subjectivity within the LVIA process; notwithstanding, a level of professional judgement is utilised in making the determinations. The assessment presented below relies on tangible criteria and accepted assumptions defined by the when determining the *sensitivity* of receptors. Any professional discretion that deviates from the literature-based criteria is clearly stated to ensure transparency in the assessment.

The assessment of visual effects is aided by photomontages to illustrate how the proposed works may visually appear once constructed. This involves overlaying a computer-generated model of the proposed infrastructure of a photograph captured at each viewpoint undergoing assessment. To ensure consistency and accuracy, these montages are created using the same camera and settings, land-based survey, and same 3D model of the proposed infrastructure. The following camera specifications were used to capture the photographs.

Camera:	Canon, 26.2 megapixel, full frame, mirrorless
Lens:	Canon, 50mm, f/4-7.1mm range, image stabilisation, Stepper Motor
Image format:	RAW (lossless, uncompressed and unprocessed image data)
Shooting method:	Tripod mounted, levelled
Vertical position:	1.6m above ground level

Each photograph was captured using manual settings and the ISO sensitivity, aperture, and shutter speed adjusted at each viewpoint to capture the highest quality image based on the environmental conditions at the time.

The survey was undertaken using Leica Geosystems Global Positioning System (GPS) and Total Station equipment. A minimum of four (4) and up to five (5) objects were surveyed for each viewpoint. The conservative accuracy of measurements averages 0.1m horizontally and 0.1m vertically.

This data is used within a 3D computer model of the proposed infrastructure and the in-model camera-view is positioned to the physical camera location and height. The photograph is then digitally aligned to the model and survey data, creating a photomontage that realistically depicts how the proposed infrastructure could appear from each viewpoint. Extracts of the photomontages are provided below and the full size images in **Appendix A**.

As discussed in Section 4.1 of this report, the viewpoints in this LVIA were selected through a combined effort between Ausgrid and de Witt Consulting. A variety of factors informed the selection process, including (but not limited to) project scope requirements, land access, and areas of higher and lower sensitivity. These factors were reviewed through both local knowledge and a desktop assessment. Initially, 10 viewpoints were identified for field-based assessment. During this assessment, it was determined that one of the viewpoints would not be of value to the LVIA and was removed from the study. One other viewpoint was identified during field-based assessment to be included in the LVIA.

As such, a total of 10 viewpoints are reviewed below. We submit that these viewpoints provide a suitable cross section of how the proposed works could be observed within the landscape.

4.5.1 Viewpoint 1: Graham Lane, Sawyers Gully

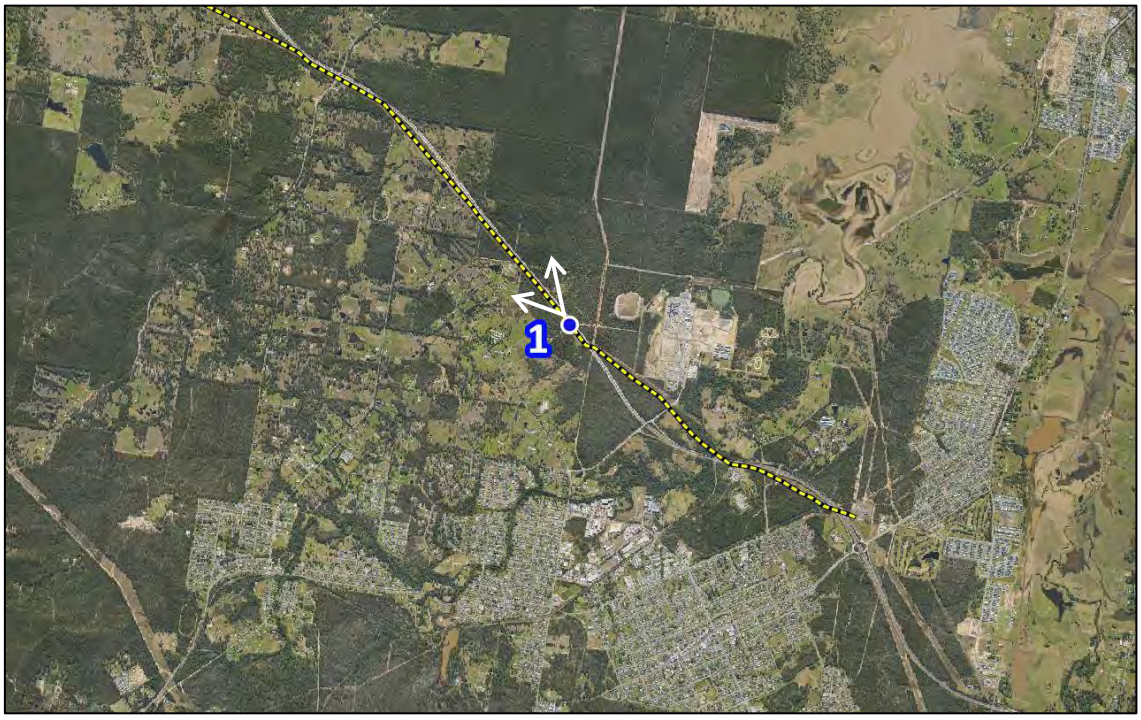

Figure 7: Overview of Viewpoint 1 location (map orientated north; aerial © Aerometrex 2024)

Camera position:	311342.763 E, 6418415.344 N; 130.025 AHD RL
LCZ:	Urban / rural fringe
Key reason(s) for viewpoint selection:	Proximity of proposed subtransmission line works to a high volume of receptors passing through the urban / rural fringe LCZ via the Hunter Expressway.
Representation of receptors:	Motorists and workers. No residential type receptors were identified with visibility of this location.
Actual receptors at the viewpoint location:	Authorised persons with access to the electricity easement.
Field observations:	Viewpoint does not contain sensitive landscape characteristics and can accommodate the replacement subtransmission lines in this location and similar locations. It is relevant to note that along the powerline route, there is a mixture of new green concrete poles, new treated poles and the original natural poles. Adjacent powerlines show a similar inconsistency along the route. The new poles will form a similar style as compared to those from Kurri Kurri and further south along the highway, that is, the upgraded powerline would install consistently along the route galvanised steel monopoles.
Sensitivity:	Low
Magnitude:	Low
Significance:	Low
Recommended mitigation measures:	Nil

Plate 1: Viewpoint 1 - Existing View

Plate 2: Viewpoint 1 – Proposed View

4.5.2 Viewpoint 2: de Iuliis Vineyard / Lovedale Wedding Chapel and Reception

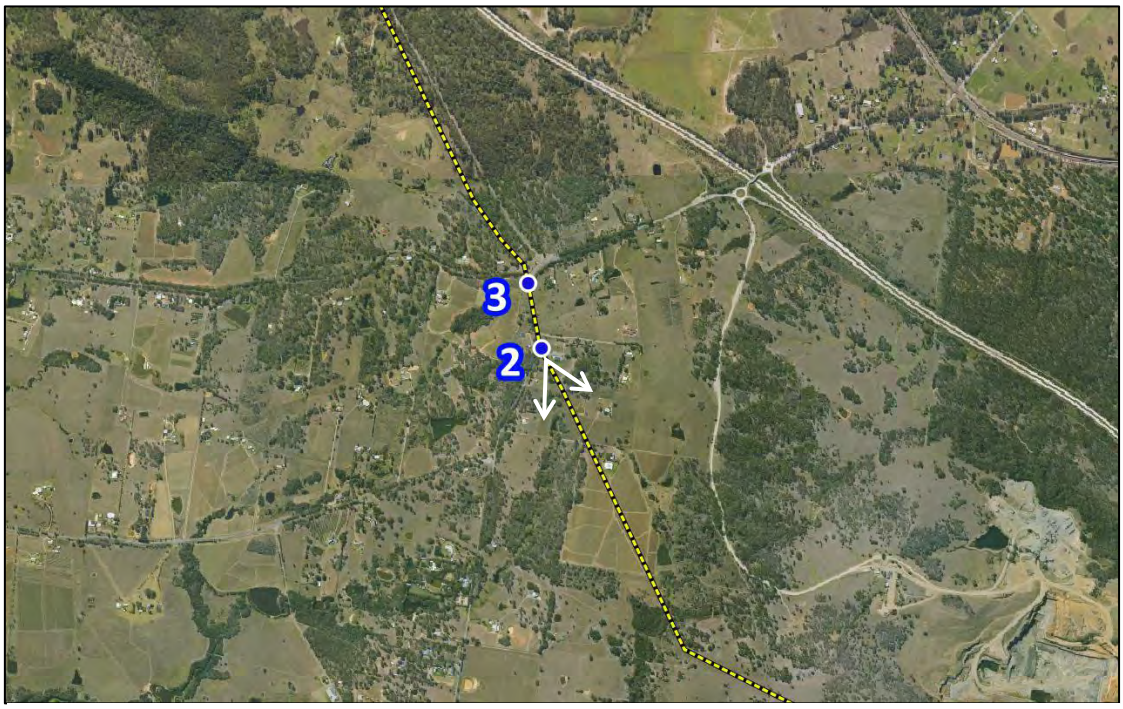

Figure 8: Overview of Viewpoint 2 location (map orientated north; aerial © Aerometrex 2024)

Camera position:	349377.183 E, 6377371.54 N, 128.376 AHD RL
LCZ:	Vineyards / tourism
Key reason(s) for viewpoint selection:	Location of proposed subtransmission line works directly through the plantation; proximity of receptors to the proposed works; the surrounding land is presumed to be used by receptors whose attention involves appreciating the landscape character.
Representation of receptors:	Tourists, visitors, attendees of weddings and other events, workers of the vineyard and associated facilities. Other receptors with similar views in the vineyards / tourism LCZ (limited identified).
Actual receptors at the viewpoint location:	As above, and authorised persons with access to the electricity easement.
Field observations:	Viewpoint includes higher value landscape characteristics; however, existing subtransmission lines span the same location. Residential receptors identified south of viewpoint. These receptors are noted to benefit from existing vegetation that provides natural screening.
Sensitivity:	Moderate
Magnitude:	Moderate
Significance:	Moderate
Recommended mitigation measures:	Rerouting in this location could minimise impact from the proposed works but not remedy existing impact from present infrastructure. When considering this option, it is also important to consider that an alternative route may result in greater impacts due to tree clearing etc. In consultation with receptors, consider maximising pole spacing to reduce number of new poles.

Plate 3: Viewpoint 2 – Existing View

Plate 4: Viewpoint 2 - Proposed View

4.5.3 Viewpoint 3: Lovedale Information Kiosk

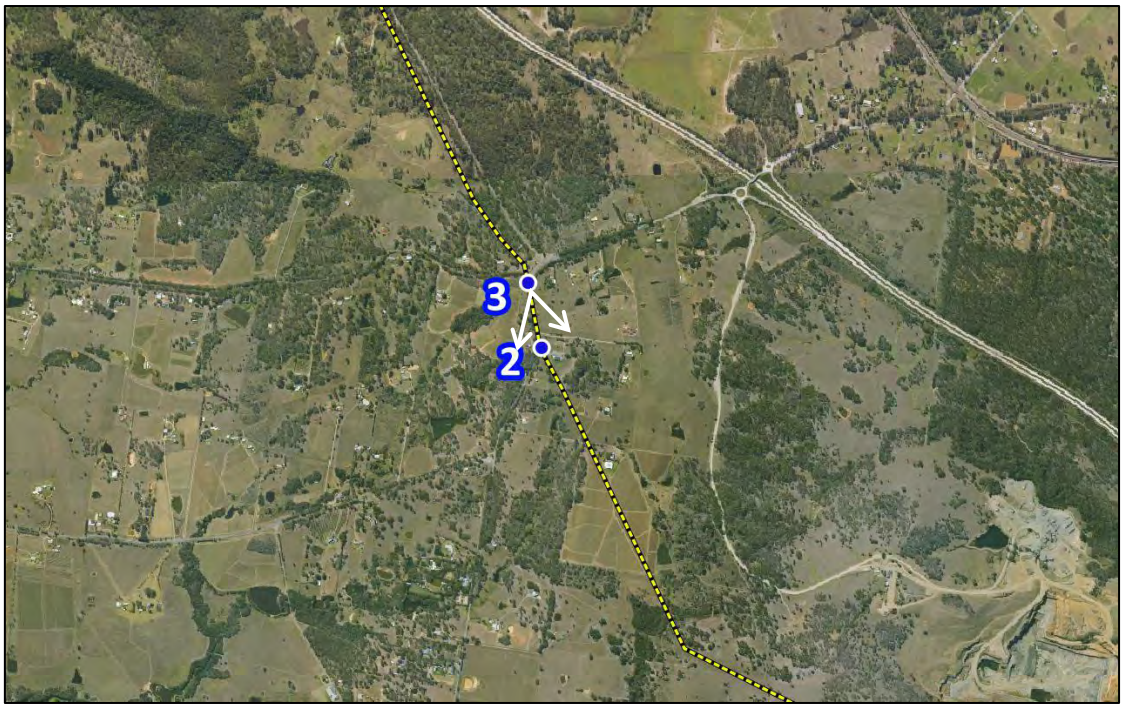

Figure 9: Overview of Viewpoint 3 location (map orientated north; aerial © Aerometrex 2024)

Camera position:	349311.591 E, 6377688.086 N, 131.483 AHD RL
LCZ:	Vineyards / tourism
Key reason(s) for viewpoint selection:	View of vehicle approach into the vineyards district on Lovedale Road off the Hunter Expressway.
Representation of receptors:	Visitors to the area, residents, motorists, workers.
Actual receptors at the viewpoint location:	As above, and authorised persons with access to the electricity easement.
Field observations:	Existing electricity and other infrastructure of similar scale and nature noted to the east (Hunter Expressway / Lovedale Road overpass).
Sensitivity:	Low
Magnitude:	Low
Significance:	Low
Recommended mitigation measures:	Nil

Plate 5: Viewpoint 3 – Existing View

Plate 6: Viewpoint 3 – Proposed View

4.5.4 Viewpoint 4: Sandalwood Vine Resort

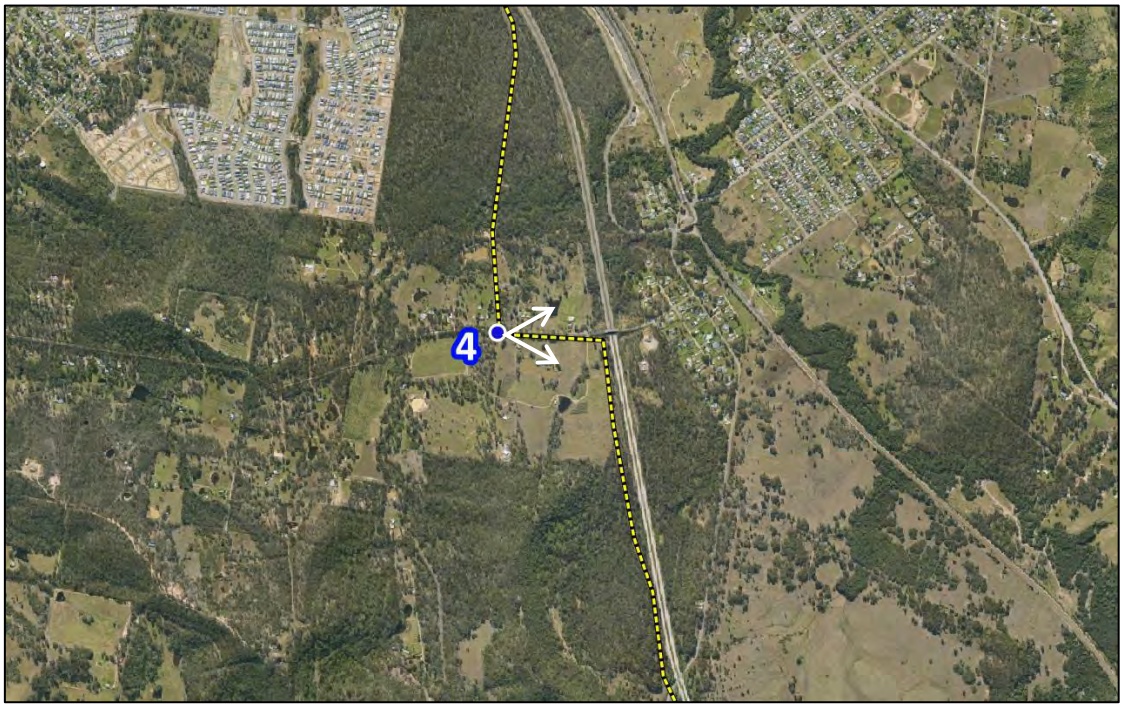

Figure 10: Overview of Viewpoint 4 location (map orientated north; aerial © Aerometrex 2024)

Camera position:	347609.849 E, 6381625.674 N, 75.828 AHD RL
LCZ:	Urban / rural fringe
Reason(s) for viewpoint selection:	Proximity to visual receptors of higher sensitivity (residential / short stay accommodation) where visitors are likely to be more engaged with the landscape.
Representation of receptors:	Specific to this receptor; no directly comparable receptors in other areas of the proposed works (receptor type and LCZ). The proposed works do not appear to be located as nearby a receptor of this nature in any other area.
Actual receptors at the viewpoint location:	Residents and/or visitors to this receptor using the front area of the property; authorised persons with access to the electricity easement.
Field observations:	The receptor is located on a large property (~40ha), including a scenic dam, vineyards and orchard to the centre and south of the property. Receptors are expected to be engaged with these areas of the property rather than the location of the proposed works at the Tuckers Lane road frontage, or the frontage that adjoins the Hunter Expressway (east). This reasoning would support the other uncharacteristic structures in the front area of the property placed by the owner.
Sensitivity:	Moderate
Magnitude:	Low
Significance:	Moderate-low
Recommended mitigation measures:	Consultation with receptor recommended.

Plate 7: Viewpoint 4 – Existing View

Plate 8: Viewpoint 4 – Proposed View

4.5.5 Viewpoint 5: Huntlee

Figure 11: Overview of Viewpoint 5 location (map orientated north; aerial © Aerometrex 2024)

Camera position:	319915.197 E, 6404045.287 N, 64.099 AHD RL
LCZ:	Urban / rural fringe
Key reason(s) for viewpoint selection:	Representative of public and private large lot properties with existing electricity easements. Approved Huntlee residential subdivision to be located on land south of the easement. Vantage point depicting higher quality rural fringe.
Representation of receptors:	Potential rural-residential receptors with similar views of the landscape and electricity easements.
Actual receptors at the viewpoint location:	Authorised persons with access to the electricity easement.
Field observations:	Railway and Hunter Expressway located immediately east of the easement. Industry visible in mid-background areas. Existing easement segments remnant vegetation in landscape.
Sensitivity:	Low
Magnitude:	Low
Significance:	Low
Recommended mitigation measures:	Nil

Plate 9: Viewpoint 5 – Existing View

Plate 10: Viewpoint 5 – Proposed View

4.5.6 Viewpoint 6: Maison Dieu Road, Maison Dieu

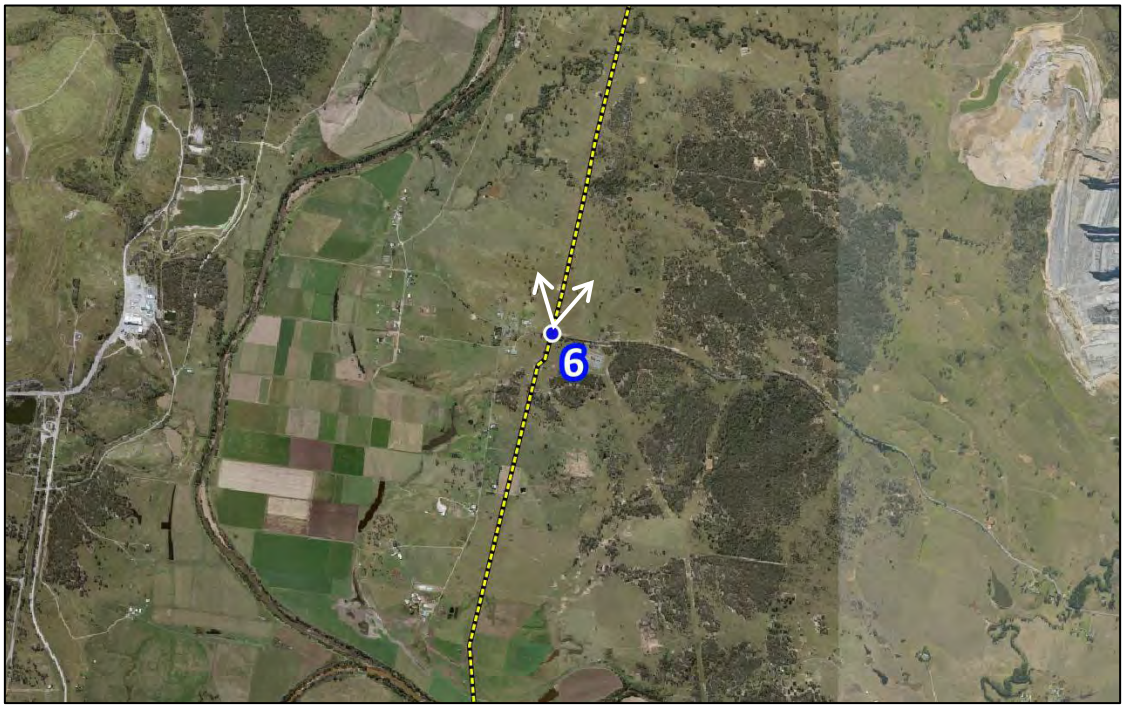

Figure 12: Overview of Viewpoint 6 location (map orientated north; aerial © Aerometrex 2024)

Camera position:	319058.911 E, 6399220.318 N, 92.375 AHD RL
LCZ:	Rural / mining
Key reason(s) for viewpoint selection:	Proximity to visual receptors of higher sensitivity in nature (residential) who are likely to be more engaged with the landscape.
Representation of receptors:	Residential receptors located west of the proposed works.
Actual receptors at the viewpoint location:	As above, and persons with access to the electricity easement
Field observations:	Prominent existing electricity infrastructure in this area and to the south; higher voltage (330kV) Transgrid steel lattice towers located closest to the receptors; electricity substation located immediately south.
Sensitivity:	Low
Magnitude:	Low
Significance:	Low
Recommended mitigation measures:	Nil

Plate 11: Viewpoint 6 – Existing View

Plate 12: Viewpoint 6 – Proposed View

4.5.7 Viewpoint 7: Glennie Street, Camberwell

Figure 13: Overview of Viewpoint 7 location (map orientated north; aerial © Aerometrex 2024)

Camera position:	319915.197 E, 6404045.287 N, 64.099 AHD RL
LCZ:	Rural / mining
Key reason(s) for viewpoint selection:	Representative of public and private large lot properties with existing electricity easements.
Representation of receptors:	As above.
Actual receptors at the viewpoint location:	Authorised persons with access to the electricity easement, including authorised persons with access to land owned by Ashton Coal Mine, as well as a landowner or land leasee with cattle grazing interests.
Field observations:	Viewpoint includes higher value natural landscape characteristics; however, existing electricity infrastructure features prominently in this area. Existing structures (including dwellings) proximate to this viewpoint are abandoned and dilapidated.
Sensitivity:	Low
Magnitude:	Low
Significance:	Low
Recommended mitigation measures:	Nil

Plate 13: Viewpoint 7 – Existing View

Plate 14: Viewpoint 7 – Proposed View

4.5.8 Viewpoint 8: New England Highway, Camberwell

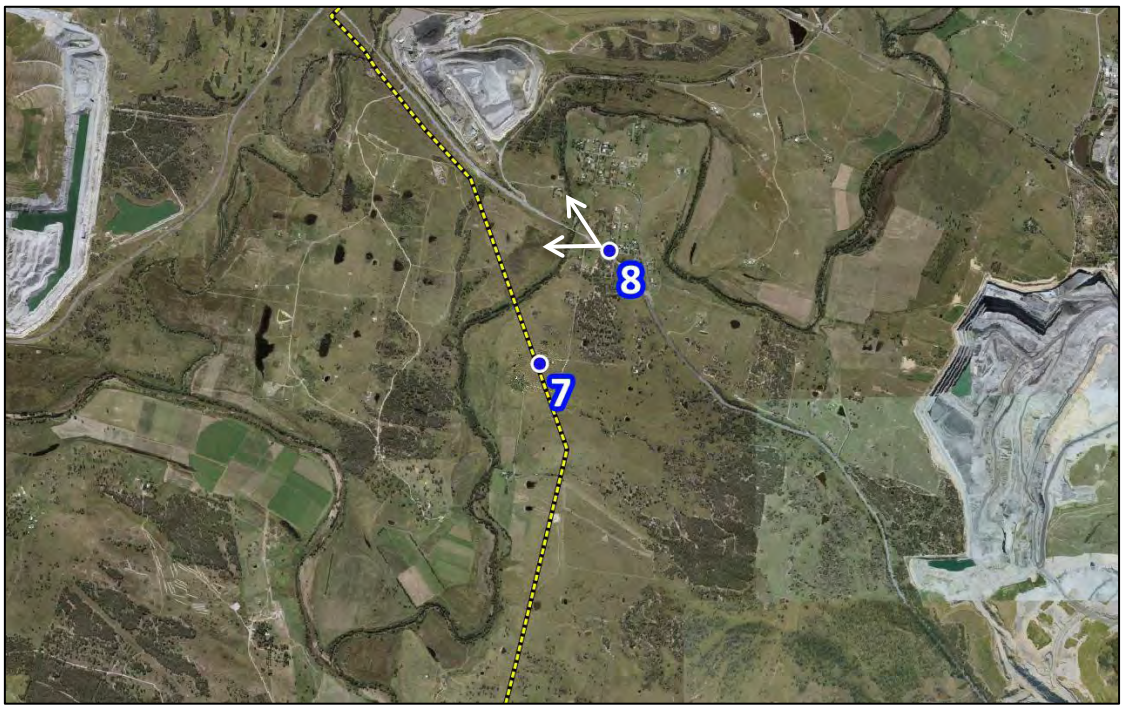

Figure 14: Overview of Viewpoint 8 location (map orientated north; aerial © Aerometrex 2024)

Camera position:	356422.902 E, 6371238.419 N, 26.034 AHD RL
LCZ:	Rural / mining
Key reason(s) for viewpoint selection:	Proximity of proposed subtransmission line works to a high volume of receptors travelling along New England Highway; view of vehicle approach from Camberwell township.
Representation of receptors:	Motorists and workers travelling through the rural / mining LCZ; residents and visitors travelling northwest from Camberwell township.
Actual receptors at the viewpoint location:	As above
Field observations:	High volume of heavy rigid vehicles using this road; higher value landscape characteristics northwest of the easement (natural features and topography). Prominent heavy industry in surrounding area. Existing electricity infrastructure of similar scale and nature visible from viewpoint, along New England Highway (north and south), and within private property in the surrounding area.
Sensitivity:	Low
Magnitude:	Low
Significance:	Low
Recommended mitigation measures:	Nil

Plate 15: Viewpoint 8 – Existing View

Plate 16: Viewpoint 8– Proposed View

4.5.9 Viewpoint 9: Antiene STSS

Figure 15: Overview of Viewpoint 9 location (map orientated north; aerial © Aerometrex 2024)

Camera position:	311342.763 E, 6418415.344 N, 130.025 AHD RL
LCZ:	Rural / mining
Key reason(s) for viewpoint selection:	Vantage point of proposed STSS with highest volume of visual receptors at closest range.
Representation of receptors:	Visitors and workers of Lake Liddell Recreation Area.
Actual receptors at the viewpoint location:	As above.
Field observations:	Existing Liddell Power Station is a prominent feature in this area and located across Lake Liddell. Prominent existing electricity infrastructure features throughout landscape on approach to this area along Hebdon Road. Proposed STSS not visible from caretaker's residence or western side of recreation area. Public use of Lake Liddell is currently prohibited due to Naegleria Fowleri amoeba. Recreation activities on site are located to the centre and west of the area, away from the proposed STSS.
Sensitivity:	Low
Magnitude:	Moderate
Significance:	Moderate-Low
Recommended mitigation measures:	When considering vegetation protection measures / removal as part of the construction and monitoring phase, also consider the benefit of retaining vegetation to protect vegetation along lake foreshore. The proposed earthworks will lower the STSS, which will in turn decrease its visibility and increase effectiveness of vegetation screening along lake foreshore. Consultation with receptor recommended**.**

Plate 17: Viewpoint 9– Existing View

Plate 18a: Viewpoint 9– Proposed View A. NOTE: This view is indicative of the proposed STSS with Synchronous Condenser included. This montage represents a conservative approach to the visualisation

Plate 18b: Viewpoint 9– Proposed View B NOTE: This view is indicative of the current scope of work, i.e. excluding the Synchronous Condenser

4.5.10 Viewpoint 10: Sandy Creek STSS

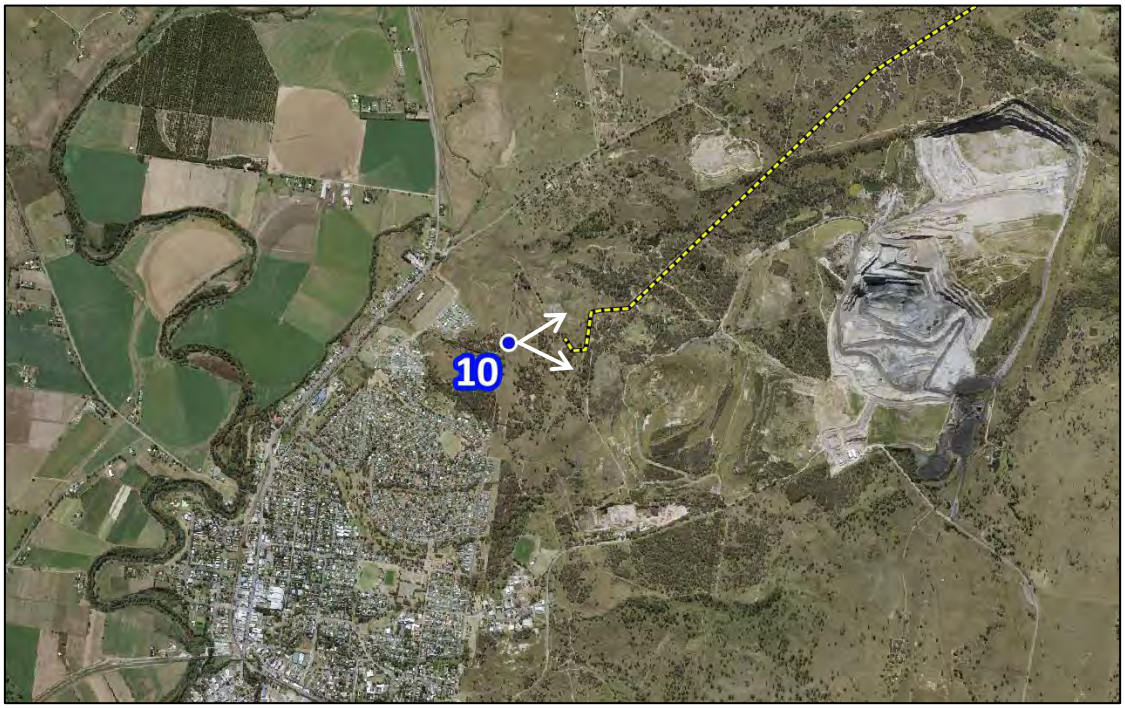

Figure 16: Overview of Viewpoint 10 location (map orientated north; aerial © Aerometrex 2024)

Camera position:	302905.012 E, 6430234.697 N, 189.478 AHD RL
LCZ:	Rural / mining
Key reason(s) for viewpoint selection:	Approved residential subdivision located on land southwest of viewpoint. Vantage point of proposed STSS on land of a similar level to residential subdivision.
Representation of receptors:	Potential motorists of future future bypass of the New England Highway located east of proposed STSS; residential receptors of subdivision to southwest with potential views of proposed STSS.
Actual receptors at the viewpoint location:	Authorised persons with access to the land.
Field observations:	Prominent existing electricity infrastructure in this area, including existing substation and subtransmission poles of a similar scale. Existing electricity infrastructure and potentially future highway bypass will be contained within the same views from potential residential receptors.
Sensitivity:	Low
Magnitude:	Low
Significance:	Low
Recommended mitigation measures:	Nil

Plate 19: Viewpoint 10– Existing View

Plate 20: Viewpoint 10– Proposed View

4.5.11 Summary and discussion of visual effects

The table below consolidates the viewpoint assessment presented above.

Table 6: Summary of viewpoint assessment

Viewpoint	LCZ	Sensitivity	Magnitude	Significance
1	Urban / rural fringe	Low	Low	Low
2	Vineyards / tourism	Moderate	Moderate	Moderate
3	Vineyards / tourism	Low	Low	Low
4	Urban / rural fringe	Moderate	Low	Moderate-low
5	Urban / rural fringe	Low	Low	Low
6	Rural / mining	Low	Low	Low
7	Rural / mining	Low	Low	Low
8	Rural / mining	Low	Low	Low
9	Rural / mining	Low	Moderate	Moderate-low
10	Rural / mining	Low	Low	Low

4.6 CONSTRUCTION VISUAL IMPACTS

Temporary and long-term visual changes to the site and surrounding area will occur during the construction phase. The key visual considerations from the construction phase include:

- Demolition of existing structures,
- Earthworks, access roads, and vegetation clearing associated with site preparation,
- Construction of new laydown areas,
- Greater movement of vehicles and workers (on ground and in helicopters), and
- Construction hoarding, signage, and traffic controls.

Notwithstanding, these receptors are expected to have proper consultation prior to the commencement of construction works.

4.7 CUMULATIVE IMPACTS

Cumulative landscape and visual impacts are the combined visual changes (both positive and negative) caused by a proposed development in conjunction with other similar developments that are proximate to each another that when combined can lead to an altered landscape character or greater overall visual impact to landscape and visual receptors. It is also important to consider both the existing and evolving contextual landscape in the region. As stated, landscapes are not static but continue to evolve and change for various reasons, and through both natural and anthropogenic influences.

The cumulative impact of the proposed subtransmission line works is considered minor where these are contained within existing electricity easements and replacing existing infrastructure within these easements. The cumulative visual impact arising from the associated works, including vegetation clearing for widening the easements, is also considered to be minor.

The proposed Antiene STSS is determined to have a minor cumulative impact due to its scale comparison to the existing Liddell Power Station and the two sites not being visible from the same vantage point at Lake Liddell Recreation Area. The proposed Antiene STSS is recognised as a new addition to the landscape, although small in scale when viewed at this level alongside other infrastructure and industry in the rural / mining LCZ. Similarly, the proposed Sandy Creek STSS is determined to have a minor cumulative visual impact, noting the existing electricity

substation being visible in the same views. It is noted that the proposed Muswellbrook Pumped Hydro Energy Storage and the solar farm projects located at AGL's Muswellbrook Coal mine site will be a key contributor to increased electricity infrastructure in the surrounding landscape. Furthermore, the future bypass of the New England Highway at Muswellbrook will also emerge as a strong feature in the landscape. Utility relocation work will start this year and the tender for major construction is expected to be in late 2026, with construction to commence the following year. The proposed Sandy Creek STSS and associated subtransmission line works are minor contributors to this increased infrastructure in the landscape. Both the Antiene STSS and Sandy Creek STSS are not considered to be uncharacteristic additions to the existing landscape in rural / mining LCZ.

The Hunter Transmission Precinct (HTP) is a critical state-significant infrastructure project led by EnergyCo, that involves building a new 100km, 500 kV transmission line between Bayswater and Olney/Eraring, connecting existing 500 kV lines and unlocking electricity supply from renewable energy zones including Hunter REZ. The HTP Environmental Impact Statement (EIS) is scheduled for submission to the Department of Planning, Housing and Infrastructure in mid-2025. EnergyCo anticipates further refining the transmission line alignment through community and technical consultations. Land acquisition processes for easements will continue concurrently, with a focus on reaching agreements that address landowner concerns. The HTP route has the potential to intersect with the proposed subtransmission line works thus may result in cumulative visual impacts. Until the route is confirmed the impacts cannot be fully investigated.

5 RECOMMENDATIONS

The following recommendations are provided to minimise and/or avoid adverse impacts of the proposed works to the landscape and visual receptors:

- Viewpoint 2 (de Iuliis Vineyard / Lovedale Wedding Chapel and Reception) – Where possible, use pole colours or materials poles that are consistent with existing poles located along Lovedale Road near Lovedale Road overpass. Maximise pole spacing to reduce number of new poles. Consultation with receptor recommended.
- Viewpoint 4 (Sandalwood Vine Resort) – Consultation with receptor recommended.
- Viewpoint 9 (Antiene STSS) – Establish vegetation protection measures during construction and monitoring to protect vegetation along lake foreshore. The proposed earthworks will lower the STSS, which will in turn decrease its visibility and increase effectiveness of vegetation screening along lake foreshore. Consultation with receptor recommended.

6 CONCLUSION

This LVIA is intended to provide an assessment of the existing landscape character and potential impact to views from the proposed Hunter-Central Coast REZ Network Infrastructure Upgrade Project. It has been noted that LVIA includes a degree of subjectivity, where opinions on the landscape character, its value, the sensitivity of a receptor and the perceived magnitude of the effect can differ. This can be influenced by individual values, preferences and affiliations with the landscape and particular views. Assessment criteria derived from the literature has been used in this LVIA to limit this subjectivity and clearly stated

The LVIA identified five (5) landscape character zones (LCZ) throughout the surrounding landscape, including:

- rural / agriculture,
- rural / mining,
- urban / rural fringe,
- vineyards / tourism, and
- remnant vegetation.

Of these LCZs, the proposed works intersect with:

- rural / mining,
- urban / rural fringe, and
- vineyards / tourism (small extent only).

The baseline landscape value was determined to be **low** using the literature-based criteria for preferred characteristics of rural landscapes. The landscape receptors presented a **low sensitivity**, where the landscape effect can be accommodated within the existing landscape without altering the baseline character or value, and where the existing landscape characteristics are of lower value and the proposed works can be accommodated within the landscape without altering the existing character or value. The proposed works were determined be of a **moderate magnitude**, where the landscape effect is considered to result in some change to views of the landscape due to loss of existing features and addition of new features. However, these changes will not significantly alter the composition of the baseline landscape or compromise the specific basis for the landscape character value. This effect will be most prominent during the construction stage, which is a temporary effect. The size and scale of the proposed works are noted to have the greatest effect when viewed in close proximity during both the construction and operational phases of the project. The magnitude is lowered where the proposed subtransmission line works will be replacing existing poles within the same location (easements), which in themselves are already affected. Using the matrix of significance (below), the effect of the proposed works on the landscape and its character is determined to be of **moderate-low significance** overall.

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Appendix A
Photomontages of viewpoints

Photomontage depicting proposed view (Viewpoint 1)

Photomontage depicting proposed view (Viewpoint 2)

Photomontage depicting proposed view (Viewpoint 3)

Photomontage depicting proposed view (Viewpoint 4)

Photomontage depicting proposed view (Viewpoint 5)

Photomontage depicting proposed view (Viewpoint 6)

Photomontage depicting proposed view (Viewpoint 7)

Photomontage depicting proposed view (Viewpoint 8)

Photomontage depicting proposed view (Viewpoint 9) (Synchronous Condenser included)

Photomontage depicting proposed view (Viewpoint 9) (Synchronous Condenser excluded)

Photomontage depicting proposed view (Viewpoint 10)